

PROCEEDINGS OF THE CHIEF CONSERVATOR OF FORESTS.

No. 311, PRESS, DATED 27TH SEPTEMBER 1927

REVISED WORKING PLAN

FOR THE

MUDUMALAI FORESTS

(NILGIRI-WYNAD)

BY

H. G. HICKS, Esq., I.F.S.,

Deputy Conservator of Forests

1927--1937



MADRAS

PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS

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INTRODUCTION.

The revision of Mr. Cox's Working Plan of 1910 for the Mudumalai forests was made necessary by substantial alterations in its two main prescriptions, namely, Improvement Fellings and Fire Protection.

Improvement fellings were stopped by the Chief Conservator of Forests (Mr. Tireman) in 1923. In 1922 Mr. Cox's system of fire protection was abandoned and early burning was started for the whole forest except Teppakadu block.

Further, various attempts at clear-felling and artificial regeneration, not contemplated by Mr Cox's plan, and the introduction of Sandalwood, have been carried out since 1920.

The present Plan provides for experimental clear-felling with artificial regeneration in areas which, it is hoped, will prove more suitable for such operations than the majority of the areas clear-felled within the last few years.

Improvement fellings have been again provided for and a compromise between Mr. Cox's system of fire protection by orthodox fire lines and patrols and true early burning has been aimed at, the efficacy of which time alone can prove.

Mr. Currie, as Special Working Plans Officer, made a reconnaissance report for the Wynad and Mudumalai forests on 6th March 1925.

The writer commenced the field work for the present Plan on 13th February 1926 and completed it on 3rd September 1926 and was assisted throughout this period by Ranger Raman Pillai.

H. G. HICKS,
Deputy Conservator of Forests.

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PART I.

Summary of facts on which the proposals are based.

CHAPTER I—THE TRACT DEALT WITH.

SECTION 1.—NAME AND SITUATION.

1. The tract dealt with under this plan will be known as the Mudumalai forest and consists of :

(i) The Mudumalai forest, lying between the Mysore territory on the north ; Mysore and Todanad on the east ; the Moyar river, Sri Madurai desom and Cherumalai on the south ; Munanad amsom, Gudalur taluk and Ganapathi Vattam amsom, Malabar-Wynad taluk on the west.

(ii) The Kumbarakolli forest lying between the Mudumalai forest and the Moyar river.

(iii) The Benne reserve which separates the Mudumalai forest from the Malabar-Wynad.

(iv) In addition, a portion of the Moyar reserve of Masinigudi range (6,309 acres) lying east and south of the Moyar river and on both sides of the Teppakadu-Masinigudi road has been included in the area dealt with by this plan. This portion includes the hill Moyar-betta.

2. The total area dealt with in this plan is 65,905 acres and forms a solid block to the north and east of Gudalur taluk.

SECTION 2.—CONFIGURATION OF THE GROUND.

3. The tract is undulating ; numerous rounded hills rise some 300 or 400 feet above the general elevation which is about 3,250 feet above the mean sea-level.

4. The highest point is Moyar-betta (4,154 feet) and the lowest the junction of the Kakkanhalla with the Moyar river (2,051 feet) at the most easterly corner of the forest.

5. Apart from Moyar-betta and its adjacent hills, the outstanding topographical feature of the Mudumalai forest is the Jainbarribetta ridge, running from the Kakkanhalla stream in the east to the north-west corner of Benne reserve and rising to 3,804 feet (Angattibath-betta).

6. A typical feature of the country, particularly in the west, are the numerous grassy swamps, some of which are cultivated, lying between the low hills.

7. As would be expected from the nature of the country there are numerous streams and streamlets throughout the forests, the larger of them being perennial. The most important are the Moyar river, the Bidurhalla flowing through the south of Teppakadu block, the Kakkanhalla which forms the Mysore boundary on the east and north-east, the Imburhalla in the north and centre of Mudumalai block, the Benne hole and the Mukkatti hole in Benne block and the Chinnakolli a tributary of the Bidurhalla.

8. The Jainbarribetta ridge forms the watershed, all streams south of it with the exception of the Imburhalla, the Benne hole and the Mukkatti hole draining into the Moyar ; the Imburhalla drains into the Kakkanhalla and the Benne and the Mukkatti into the Nuger hole in the Wynad.

SECTION 3.—GEOLOGY, ROCK AND SOIL.

9. The underlying rock is gneiss ; small veins of quartz are found and in a few places mica flakes occur (muscovite).

10. The small mica patches are usually accompanied by a fine light brown sand.

11. Apart from the above, there are two distinctive soils in these forests :

(1) a black sandy loam, containing over 50 per cent coarse sand and gravel,

(2) a red heavy clay loam.

The red soil is practically confined to the western strip of Compartment 4, Compartment 6, some of the south-west area of Mudumalai block and the south-west of Benne block. A vein of quartz pebbles sometimes runs through this soil at varying depths but it may be absent altogether.

12. This red soil shows much better height growth than the black and a considerable growth of bamboo is one of its characteristics.

13. The dark colour of the black soil is not due to organic causes but to its infertile mineral content. It bears a considerable resemblance to black cotton soil in its physical and mechanical properties and is most probably formed in situ from disintegrated gneiss. Bamboo is typically absent on the black soil but it is characterised by a very heavy growth of rank grasses. On the red soil even though the canopy is open the grass is not nearly so dense.

14. Both these soils have been analysed by the Agricultural Chemists, Coimbatore, and though the samples sent were too small the types probably show but little variation.

15. The chief results of the analysis are summarised below:—

A. The Black soil.

Mechanical analysis.	Chemical analysis.
1. Over 50 per cent gravel and coarse sand.	1. Soil well provided with Nitrogen and Potash.
2. A somewhat large amount of fine silt which tends to improve the water-retaining power of the soil.	2. Very deficient in available phosphoric acid and contains very little lime.
3. But will tend to make the soil cake.	.....

B. The Red soil.

Mechanical analysis.	Chemical analysis.
1. Sixty per cent clay and fine silt. Drainage may therefore be a little difficult.	1. Percentage of iron and alumina very high.
	2. Marked deficiency in available phosphoric acid.
	3. Nitrogen and Potash present in reasonable quantity.
	4. Amount of lime inadequate.
	5. Amount of organic matter high, which will tend to improve the unfavourable mechanical condition of the soil.

SECTION 4.--CLIMATE.

16. *Temperature.*—The climate is comparatively temperate, the shade temperature probably ranging between 55° and 95° Far. Except during the monsoon months heavy dews are precipitated throughout the year.

17. *Rainfall.*—These forests receive both the South-West and North-East monsoons, the rainfall being heaviest in the former. Rain gauges were set up in 1911 at Benne, Mudumalai and Teppakadu, but the accuracy of the figures so obtained up to 1919 is doubtful. Figures from 1920 onwards are appended which it is hoped are more accurate.

18. It is of interest to note that at Devar Shola Estate, which is not more than five miles south-east of Benne station as the crow flies, the average annual rainfall from 1900 to 1919 was 84.3 inches. This shows that the line of the heavy rainfall of the South-West Monsoon just misses Benne, a fact which is borne out by visual observation during the South-West Monsoon.

19. This difference in the rainfall at the western (Benne) and eastern (Kargudi) ends of the forest is the principal factor in determining the type of forest growth.

20. The average rainfall for the years 1920 to 1926 at Benne and Mudumalai was 66 and 54 inches respectively and at Kargudi for the years 1922 to 1926—56 inches but this last figure covers too short a period to give a fair average.

Rainfall 1920-26.

Month.	1920			1921		
	Benne.	Mudumalai.	Teppakadu.	Benne.	Mudumalai.	Teppakadu.
	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.
January	1.6	0.4	0.8	Nil.	Nil.	Nil.
February	Nil.	Nil.	0.16	Nil.	Nil.	Nil.
March	0.8	1.2	0.4	0.5	0.3	Nil.
April	4.0	6.0	6.4	Nil.	Nil.	Nil.
May	4.4	6.0	6.8	3.1	4.4	Not known.
June	13.6	12.0	13.0	6.3	3.6	Do.
July	17.6	16.0	16.0	16.2	16.6	12.8
August	2.8	4.0	2.0	8.4	4.0	12.0
September	5.6	6.0	4.0	2.8	1.6	6.0
October	5.6	6.0	4.0	0.8	1.0	0.4
November	3.2	4.4	4.0	Nil.	2.4	Transferred to
December	Nil.	Nil.	Nil.	Nil.	0.1	Kargudi in
						November.
Total ..	59.2	62.0	57.56	38.1	34.0	Not complete.

Month.	1922			1923		
	Benne.	Mudumalai.	Kargudi.	Benne.	Mudumalai.	Kargudi.
	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.
January	Nil.	0.1	1.2	0.4	1.2	0.8
February	Nil.	Nil.	Nil.	1.6	Nil.	Nil.
March	Nil.	0.2	Nil.	2.4	1.2	2.0
April	3.2	3.6	3.6	4.0	4.0	3.0
May	9.03	9.8	8.0	1.6	2.4	1.6
June	7.2	7.6	7.2	5.8	6.0	4.0
July	15.2	13.2	8.8	25.6	16.4	20.0
August	7.8	3.2	5.2	22.2	17.4	15.6
September	4.4	2.8	4.0	3.2	2.8	2.1
October	8.8	9.6	5.6	3.6	4.8	3.2
November	6.4	9.8	6.4	1.0	0.6	0.2
December	0.2	0.1	1.0	8.2	Nil.	Nil.
Total ..	62.29	60.0	51.0	71.6	56.8	52.5

Month.	1924.			1925.		
	Benne.	Mudumalai.	Kargudi.	Benne.	Mudumalai.	Kargudi.
	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.	INCHES.
January	3.6	0.1	Nil.	Nil.	Nil.	Nil.
February	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
March	1.8	0.4	1.6	3.0	Nil.	Nil.
April	2.4	1.4	1.6	8.0	2.4	5.6
May	5.8	4.2	5.0	4.8	3.6	2.7
June	11.2	5.4	14.3	14.2	10.8	12.2
July	43.5	26.7	44.3	12.8	Nil.	8.2
August	8.4	6.9	4.2	11.2	19.3	7.6
September	11.3	6.8	5.8	5.4	6.15	4.6
October	8.7	1.2	1.4	10.8	3.2	4.0
November	5.4	7.8	7.6	3.6	4.2	3.0
December	2.8	0.6	0.4	1.4	1.5	2.0
Total ..	101.9	61.5	86.2	75.2	51.15	49.9

						1926.		
Months.						Benne.	Mudumalai.	Kargudi.
						INCHES.	INCHES.	INCHES.
January	...	...	...	...	...	1.2	2.3	1.0
February	...	...	...	...	...	Nil.	Nil.	Nil.
March	...	...	...	...	...	0.4	0.8	1.0
April	...	...	...	...	...	4.0	4.7	3.4
May	...	...	...	...	...	2.6	2.9	3.0
June	...	...	...	...	...	3.6	2.6	2.8
July	...	...	...	...	...	20.4	16.5	13.7
August	...	...	...	...	...	3.0	8.5	2.8
September	...	...	...	...	...	10.0	7.6	6.8
October	...	...	...	...	...	6.6	8.8	5.7
November	...	...	...	...	...	0.2	0.5	1.2
December	...	...	...	...	...	Nil.	Nil.	Nil.
Total ...						52.0	55.2	41.4

21. *Wind*.—The winds blow according to the prevailing monsoon currents but do not normally cause any damage. Steady winds blowing from the north-east during the fire season are a danger when burning fire lines and an important factor in spreading fires.

22. *Malaria*.—These forests have an evil reputation for malaria.

Kargudi—the range headquarters—is, owing to its open situation, probably pretty healthy and during the monsoon, quite free from fever. Benne camp too, now that it has been moved to the top of a hill is far healthier than the old low-lying camp.

23. Both from the point of view of the staff and the labour the health question is of supreme importance, and a great deal of harm has been done in the past by reports, often no doubt exaggerated, about the extreme unhealthiness of the place.

24. The stream beds are unhealthy and permanent camps must be situated on high ground.

SECTION 5.—WATER-SUPPLY.

25 *Kargudi*—the range headquarters—is supplied by means of a small hydraulic ‘ram’ (installed in 1926) from a stream on the west side of the Forest Rest-house hill. The tank is situated close to the Kargudi-Mudumalai road and from there the water is conveyed by a water cart as required.

26 *Benne*.—Water has to be carried from a water hole about one-fourth of a mile from the District Forest Officer’s rest-house and about 1 furlong from the Foresters’ quarters. If a cart is available it can be brought up from the Benne hole at the foot of the Rest-house hill, but there is a notion that this stream water is not good.

27 *Mudumalai*.—The Imburhalla runs about one-fourth of a mile from the serambi—usually water is obtained from an unpleasant looking water hole near the Foresters’ serambi.

28 *Doddakatti*.—There is a spring on the Rest-house hill but it is not perennial.

Water is also obtainable from a stream about half a mile away—it is reported however not to be a perennial source.

SECTION 6.—DISTRIBUTION AND AREA.

29. The area is divided up as follows for Working Plan purposes

Name of block.	Number of block.	Compartments.	Gross area in acres.
Teppakadu	I	1 to 14	17,993
Mudumalai	II	15 to 28	20,408
Doddakatti	III	not divided into compartments	15,972
Benne	IV	29 to 39	11,532

giving a total acreage of 65,905 acres or 102.98 square miles for the Mudumalai forests.

30. There is at present no necessity for Doddakatti block being divided into compartments as the whole block will be closed to working during the period of this plan.

31. As regards the remaining blocks, in block I (Teppakadu) ten compartments were originally provided for by Mr. Gamble, and one (the Kumbarakolli forest) was added by Mr. Jackson in the Working Plan of 1907 making eleven.

Under Mr. Cox’s plan of 1910 it was prescribed that these eleven compartments should be permanently demarcated on the ground. This has been more or less carried out except where the boundary follows a stream.

32. Compartments 12, 13, and 14 have now been added to this block from Moyar reserve in Masinigudi range. They should, accordingly, be transferred to the Mudumalai Range to facilitate management.

33. The eastern boundary of Compartment 12 will form the new Range boundary.

SECTION 7.—STATE OF THE BOUNDARIES.

34. The external boundaries of the Mudumalai forest are demarcated by (a) natural and (b) artificial boundaries. Of the latter : (1) the outer boundary of the Mudumalai forest on the Mysore side was settled by a commission of Madras and Mysore officials in 1897 when necessary cairns were fixed at points A, B, C, D, E and F.

The whole boundary is annually fire traced and is in a satisfactory condition.

(2) The north-west boundary of the Mudumalai forest and the northern boundary of Benne reserve are annually burnt and so kept reasonably cleared.

(3) The north-west boundary of Benne reserve from about a mile south-west of the Benne-Wynad road to the Sultan’s Battery road is completely overgrown.

(4) From the Sultan’s Battery road to the western end of the Mudumalai-Teppakadu block line the reserve boundary is nominally marked by earthen mounds with posts. Most of them now resemble ant-hills, if they exist at all, and the posts have almost all perished ; there are also some survey stones let into the ground but these are difficult to find.

The actual line, though easy to follow, is sometimes merely the width of a footpath.

As this portion of the forest adjoins private estates and the Tirumalpad of Nilambur’s forests, these boundaries should be properly maintained.

(5) From the junction of the western end of the Teppakadu-Mudumalai block line with the reserve boundary to the Moyar river the reserve boundary is demarcated as under (4), and its condition is much the same.

(6) Thence the Moyar river forms the boundary to the point where the northern Hay Reserve join the former.

(7) The reserve boundary is satisfactorily demarcated thence by cairns and posts to the 19th mile on the Sigur Ghat road.

(8) Thence the range boundary follows a stream down to the Moyar river—this is as yet undemarcated.

(9) From this point down the Moyar river to point 2051 and thence to Kakkanhalla and Honnurhatti the rivers form the boundaries and at Honnurhatti is situated cairn A on the Mysore frontier [vide paragraph 34 (1)].

35. The internal boundaries of the enclosures excluded at the time of reservation in Benne Reserve are in some cases undemarcated.

36. All enclosures in Benne and Mudumalai blocks are shown on the maps accompanying the section 16 notifications.

SECTION 8.—LEGAL POSITION.

37. *Benne forest* was notified as reserved forest in G.O. No. 234, Revenue, dated 14th March 1885.

The following additions were made during the period of the last plan to Benne Reserve:—

	ACS.
(1) Addition No. III	86.30
(2) Addition No. IV	62.78
Total ...	149.08

The above additions were notified under section 16 in G.O. No. 1328, Revenue, dated 9th May 1917 and embodied in B.P. No. 61, Forest, dated 18th May 1917.

38. *Mudumalai and Kumbarakilli forests.*—In June 1914, Government published a formal notification for the acquisition of the above forests. Messrs. Barber and Pascoe were appointed to value the forests and a fee of Rs. 3,000 was paid to them in October 1914.

39. 1915. Litigation with the Tirumalpad of Nilambur followed.

In G.O. Mis. No. 965, Revenue, dated 23rd April 1915, he was awarded compensation to the extent of Rs. 1,71,849-1-7. The amount was placed in deposit pending the disposal of an appeal against the Acquisition Officer's award.

1916. This appeal was heard by the District Judge, Coimbatore and was dismissed with costs. A copy of the judgment is filed in R. Dis. No. 155 of 1916, dated 10th June 1916, of the District Forest Office. The award amount was paid to the owner in July and August 1916, by the Treasury Deputy Collector.

1917. An appeal by the Tirumalpad regarding compensation for acquisition resulted in an award of a further sum of Rs. 8,050.

1918. A 'letters patent' appeal filed by the Tirumalpad to a Full Bench was dismissed with costs.

1919. The area acquired was formally taken possession of by the Tahsildar, Gudalur, on 2nd June 1925.

Section 4 notifications were published in the *Fort St. George Gazette* as Notification No. 355, dated 18th September 1919.

1919-1926. The settlement was under correspondence. Hence the forests have not yet been notified as reserved forest under section 16.

1926-27. Section 16 notification was sent for publication in the *Fort St. George Gazette* (February 1927).

40. *Moyar Reserve of Masinigudi Range* (a portion of which is included under this plan) was notified as reserved forest in G.O. No. 188, Revenue, Notification No. 88, dated 13th March 1886, and embodied in B.P. (Forests) No. 769, dated 30th March 1886, with the exception of what was known as Snowdon Estate (342 acres). This was added later to the Moyar Reserve [B.P. (Forests) No. 185, dated 29th March 1887 in respect of Notification No. 281, dated 7th July 1886].

SECTION 9.—RIGHTS AND CONCESSIONS.

41. Residents in the forest are allowed free grazing for their cattle and free grants of small timber, bamboos, etc., for house building, also firewood and materials for cultivation.

All these grants are subject to the sanction of the District Forest Officer.

42. The following 'Right of way' was admitted at the time of settlement in Benne Reserve, viz.:—

Footpath from old bridle road to S. Nos. 6 and 2

43. The following 'Rights of way' were admitted at the time of settlement of the Mudumalai and Kumbarakolli forests (February 1927), viz. :—

1. Footpath from Mandakarai S. No. 12 to Gudalur via Magarhalli and Mudugulli.
2. Footpath from Mandakarai S. No. 12 to Gudalur via Nambikuram Thottithuki.
- 3(a) Footpath from Kollimalai to Devarshola.
- (b) Footpath from Kollimalai to join Kollimalai-Devarshola path [Right No. 3 (a)].
4. Footpath from Nagarholli to join Benne-Mudumalai road.
5. Footpath from Karpur Mandakarai.
6. Footpath from Thottithuki to Gudalur via Vellaramkolli and Kundithal.
7. Footpath from Nellikarai to Vadavayal.
8. Footpath from Nellikarai to Gudalur via Molepalli and Kuniyal.
9. Footpath from Nellikarai to join Thorapalli-Mudumalai road.
10. Branch footpath from Right No. 5 to join Benne-Teppakadu road.
11. Footpath from Nigalarkolli to Gudalur.
12. Footpath from Puliyalan to join Benne-Teppakadu road.
13. Gudalur-Mysore local fund road.
14. Thorapalli-Mudumalai road.
15. Morgan's road (Kargudi to Mudumalai-Teppakadu road).
16. Teppakadu-Mudumalai-Benne road.
17. Kargudi station road to commencement of Right No. 15.
18. Bellur-Ammangudi-Kakkanhalla road.
19. Church Estate road.
20. Mudumalai-Karboi bridlepath.
21. Honnurhatti bridlepath.

44. The following 'Right of water' was admitted for the Mudumalai and Kumbarakolli forests, viz. :—

Right to use water flowing in its natural course and entering private janmam enclosures admitted in favour of janmi or his tenant for irrigation and domestic purposes only.

45. Right of access to shrines, three in number, was admitted in favour of the general public in the case of the Mudumalai and Kumbarakolli forests.

This right is subject to ten days' notice of a festival being given to the Range Officer.

Dead fuel may be collected for purposes of worship, a line must be cleared round any fire used in connection with worship and extinguished before leaving.

46. The following buildings were admitted in favour of the Nilgiris District Board in the Mudumalai and Kumbarakolli forests :—

1. Teppakadu chatram.
2. Tollgate at Teppakadu.

Access to both these buildings is by 'Right of way' No. 13.

CHAPTER II—THE FOREST.

SECTION I.—COMPOSITION AND CONDITION OF THE CROP.

47. The Mudumalai forests are of the mixed deciduous type—the principal species being Teak, *Terminalia tomentosa*, *Pterocarpus Marsupium*, *Lagerstroemia lanceolata*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Grewia tiliacifolia*, and *Shorea Talura* (Jal); of these it is hard to say whether Teak or *Terminalia tomentosa* is the commonest.

48. The northern part of the forest including the greater part of Doddakatti block and most of the northern part of Mudumalai block (Compartment 28) was, for many years, swept every year by fierce fires; on the greater part of the Jainbarribetta ridge and the majority of the lesser ridges there is no tree growth left to speak of.

49. This burnt-out area extends north of the Jainbarribetta ridge into Benne block about a mile beyond where the old Jaldari-Peepigaddai road crosses the Range boundary.

In this area the forest growth is practically confined to the vicinity of streams and the south-west corner of Doddakatti block.

50. Though there is no large tree growth in this burnt-out area there is dense natural regeneration, generally in the form of patches of varying extent, mainly of *Shorea Talura* (Jal) with some *Terminalia tomentosa* and a little Teak; such regeneration is especially common on the very badly burnt-out ridges.

51. This natural regeneration of *Shorea Talura* is worth more than a passing remark for in it lies the chances of the restoration of the forest in this area; generally this regeneration has always been burnt back but even now there are patches of this species well into the pole stage and isolated large trees can be found.

52. Grass which is fairly bad in this part stands no chance under the dense shade of Jal.

53. On the worst burnt-out areas the grass is not nearly so dense as where a rather poor and open type of forest prevails.

The wild date is typically found in some quantity in this locality.

54. The remainder of the forest may, for all practical purposes, be classified into three main types. This classification is based primarily on the 'quality of the locality' and does not necessarily imply that any one type is superior to another in actual timber 'stand', though type No. III is of necessity inferior to types I and II in this respect. In this it will be found to modify somewhat the Inspector-General of Forests (Mr. Hart's) classification of these forests (for his classification see Part I, Chapter VI, paragraphs 241, 242, 243).

55. The justification (in the writer's opinion) for this modification lies in the fact that the Inspector-General's classification was 'local,' e.g., type No. I in valleys, type No. III on ridges, etc., whereas the writer considers that the changes in type are mainly geographical though the growth in types I and II may be good, bad or indifferent according to their respective types.

56. Type No. I is found on the best 'quality of locality' areas and is characterised

(a) by superior height growth,
 (b) by a deep soil more often of the 'red' variety than the black,
 (c) by the rank grasses being either reduced or non-existent,
 (d) by the presence of other more beneficial undergrowth growing either along with or in place of grass, e.g., a species of the Ginger family, *Helicteres isora*, etc., but in special cases such as old Tuckle areas at Benne by lantana,

(e) by the presence of *Bambusa arundinacea*, but this is not an infallable guide as much of the south and western parts of type No. I in Benne block contain no bamboos or instead, an apparently exotic bamboo, possibly *Dendrocalamus Brandisii*,

(f) Teak is often, though not always, scarce or absent altogether—it is present, for instance, in the type No. I areas in Teppakadu block (Compartment 6) and in Mudumalai block. *Lagerstroemia lanceolata* is characteristic of this type and often grows well. Rosewood is also found,

(g) Regeneration, chiefly owing to the bamboo, is generally very deficient but in places much *Kydia* has come in and Rosewood and *Pterocarpus Marsupium* seedlings are sometimes abundant especially on a clear-felling, e.g., on the Mandakarai plantation,

(h) for the same reason the stocking, if bamboo is present, is poor.

57. This No. I type is virtually confined to the south and west of Benne Block (Compartments 32, 33, 34 and 36), Compartment 6 of Teppakadu Block, an irregular area on the eastern side of the Thorapalli-Mudumalai road north of the I and II block line, an irregular area extending from a little west of the Mandakarai plantation on the western side of the above road to a point on the Mudugulli swamp more or less south of it, that portion of the forest lying south of the Mudugulli swamp as far as the Range boundary from the Thorapalli—Mudumalai road on the east to about a line drawn south of Mudugulli settlement itself to the Range boundary on the west, the triangle formed by the Thorapalli road and the Chinnakolli and Bidurhalla streams and the western end of Compartment 5.

58. Small isolated areas of this type are to be found elsewhere throughout type No. II, e.g., on the right of the Benne-Muthunga road and along many of the streams.

59. Many more swamps were obviously cultivated in the past than now and invariably the surrounding forest is denuded of timber species. Sometimes inferior species like *Kydia* have come in. Again, the cultivators not content with wet cultivation sometimes 'tuckled' the forest in their vicinity—the result is seen in the areas near the Benne rest-house—a few scattered standards in a sea of lantana.

60. Type No. II covers the largest area in the Mudumalai forests.

The chief characteristic of this type is the dense growth of the coarse grasses, which are usually the only undergrowth. The stocking is typically open.

61. The varieties of grass principally found in type II are—

- (i) *Cymbopogon lexuusus*,
- (ii) *Cymbopogon citratus* (Lemon grass) these two are very common and often attain a height of 10 feet and more, and
- (iii) *Imperata arundinacea* (Cyrill)—which is not so common as the other two—attains a height of 4 to 5 feet. Burning or cutting the lastnamed grass appears to cause it to flower immediately.

62. Bamboo is not typical of this type and where patches of it occur the locality usually approaches type No. I in quality.

63. Teak and *Terminalia tomentosa* are the commonest species, the latter being probably more numerous in Benne block.

64. Rosewood occurs sporadically and also *Pterocarpus Marsupium*; *Lagerstroemia lanceolata* is uncommon in type No. II proper. A certain number of *Schleichera trijuga* are found scattered throughout.

65. Regeneration has been reported to be very deficient but in fact a considerable quantity of seedlings, in places of Rosewood in profusion, *Pterocarpus Marsupium* and *Terminalia tomentosa* can be found buried in the grass, for which reason they rarely come to anything.

66. This type is consequently very deficient in regeneration of about the height of a man. A certain amount does struggle up but much of the growth, apparently in the sapling stage, is probably of considerable age.

67. Some pure patches of *Shorea Talura* occur in Mudumalai and Teppakadu blocks.

68. This type carries far the largest stand of 'timber', the height growth being generally moderate.

69. The middle girth classes predominate (roughly between 3 feet 6 inches and 5 feet). But on many acres especially in the north of Mudumalai block there are very few trees of over 6 feet girth.

70. Naturally types I and II merge into one another at times--parts of Compartment 5 are a good illustration of this and isolated small areas approximating to type I are found in the middle of type II. Such areas often show good growth and stocking but are seldom of more than a few acres in extent.

71. Type II extends over the eastern half of Benne block, the greater part of Mudumalai block--except those parts which come under type I in the south-west and in Compartment 28 in the north--; Compartment 2, the eastern part of Compartment 4, part of Compartment 5, Compartments 3 and 14, and parts of Compartments 1 and 2 of Teppakadu block.

72. Type No. III represents the poorest areas in the forest. This type is confined to the eastern end of the forest. Its main characteristics are--

(1) The rank grasses are replaced to a great extent by the variety *Themeda imberbis* (T. Cook) which forms a comparatively light soil covering.

(2) The soil is generally shallow and often gravelly or stony.

(3) Height growth is poor.

(4) Regeneration is pretty good and the poorer the locality the better the regeneration, consequently the stocking is much better than on either of the other two types.

(5) Teak is very common but is mostly poorly grown and, if old, is often likely to be unsound; *Anogeissus* is very numerous and stunted *Terminalia tomentosa* are also common.

This type deteriorates rapidly east of Teppakadu until, at the most easterly limits of the Mudumalai forests the dry scrub-like jungles of Masinigudi range begin.

73. This type is practically confined to Teppakadu block except for possibly a small portion at the extreme eastern end of Mudumalai block but the line of demarcation in Teppakadu block itself between types II and III is illdefined.

74. A line drawn north and south from the block line (I/II) through the Kargudi rest-house to the Mysore road would show approximately the western limits of type No. III but areas of type No. II persist east of the rest-house. Along the stream beds and on the lower ground generally this type shows often a moderate height growth and a deficiency of regeneration and stocking reminiscent of type No. II. Patches of lantana are sometimes found, mostly due to artificial opening of the canopy, noticeably in the neighbourhood of Teppakadu.

75. Type No. III covers parts of Compartments 1 and 11, 10, 8 and more or less all of Compartments 7, 9 and 13, Compartment 8 being the least typical. It is, generally speaking, true of all three types to say that the poorest growth is found on the ridges and the best on the lower ground.

SECTION 2.—INJURIES TO WHICH THE CROP IS LIABLE.

76. (a) *Fire*:—The history of fire protection in these forests dates from Mr. Gamble's inspections during 1884-1885 and 1886. With the exception of Teppakadu block it is a history of repeated failure.

77. As Mr. Cox in his working-plan of 1910 remarked 'so long as there are great areas of impenetrable grass forest any spark may cause a conflagration'.

78. Fires are either of external or internal origin. External fires usually cross from the neighbouring Mysore forests which are annually swept by fires of great intensity.

Internal fires, which present the most serious problem, are started either intentionally or accidentally, the chief agents being the wandering Jain Kurumbers who fire the grass wantonly to facilitate movement or for the collection of honey, etc. This question is discussed at length later (see Chapter V, section 2, paragraph 216 et seq.).

79. Previous to 1909 fires were not properly reported. In 1909, 3,500 acres were especially protected at a cost of Rs. 1,040. In the specially protected area there was a fire which burnt 600 acres. In the remaining unprotected area there were very severe fires one of which was reported to have spread over about 6,000 acres along the Mysore boundary. There were other fires along the Moyar river also.

80. A statement of fire occurrences since 1909 is given below :—

Year.	Locality.	Area burnt in acres.	Origin of fire.	Cost of fire protection.
				RS. A. P.
1909	Compartments 3 and 4 of Block I and Benne Buckle.	600	Not known	1,040 0 0
1910	Block III along Mysore boundary Near Chetty hamlets in Block II, in Thavanavayal of Block IV, in Compartment 8 of Block I and along Jaldari road of Block III.	6,000 3,600		9,995 0 0
1911	Block IV Near Mudumalai camp in Block II Block I Blocks II and III	350 100 300 13,000	Said to have crossed from Mysore boundary. By foot passengers or more probably by Jain Kurumbers.	3,343 7 0 3,360 0 0
1912	Block I along Moyar Waterfalls	825		3,667 0 0
1913	Near Kakkanhalla in Block I, along Church Estate road of Block II, along Hulgal Chetty hamlets of Block II and parts of Compartments 3 and 5 of Block I.	2,330	Not known	3,667 0 0
1914	Block III	12,000	Careless burning of the Mysore line and carelessness of the gang working in Block IV.	2,815 0 0
1915	Block II	506	Careless line burning ..	2,654 0 0
1916	Compartments 1, 2 and 3 of Block I	7,597	Due to collectors of honey, game and horn.	2,662 0 0
1917	Mostly in Block IV	657	by Jain Kurumbers and by an ex-mahout.	2,782 0 0
1918	Block II	9,970	Incendiarism and careless line burning.	2,470 0 0
1919	Blocks II and IV	2,000	Incendiarism and careless burning of line by Jain Kurumbers.	3,124 0 0
1920	1. Block III 2. Block I 3. Block IV	536 235 3,342	Incendiarism by jungle-men suspected. Escape while fire tracing. Said to have crossed from North Malabar and incendiarism of Jain Kurumbers.	2,041 0 0
1921	† 4. Block III and part of Block II. Near Aduppukattv in Block II Near Kakkanhalla in Block II Block IV Block II Compartments 3 and 5 of Block I Benne Reserve Block IV Compartment 7 of Block I	26,397 15 35 12 550 180 20 720	Said to have crossed from Mysore in two places. (Carelessness in line burning and said to have crossed from the exterior fire lines outside the Range.	

* In this fire the Ranger's serambi and outhouses at Benne were burnt.

† In this fire the District Forest Officer's serambi and outhouses were burnt at Mudumalai.

The system of 'early burning' was introduced in 1922.

Fire season.	Area attempted by fire lines and patrols.	Total cost of area attempted by fire lines and patrols.	Area attempted by early burning.	Total cost of area attempted by early burnings.	Cost per square mile of area early burnt.	Results.				Remarks.
						In fire line protected area.		In early burnt area.		
						Number of fires.	Area.	Number of fires.	Area.	
1922.	ACRES. 11,395 (Block I Plantation).	RS. A. Not noted.	ACS. 48,205	RS. A. 503 0	RS. A. P. 7 12 0	..	ACS.	ACS. ..	5,000 acres excluded from early burning for elephant grazing. Includes pay of some patrols in early burnt area. 300 acres unburnt for elephant grazing in the early burnt area. Spread from early burning in Wynad after early burning was stopped in the Nilgiris.
1923.	11,395 (Block I Plantation).	1,325 0	48,205	550 0	8 1 0	..	..	..	..
1924.	11,395 (Block I Plantation).	1,191 0	48,205	454 0	6 12 0	4	450	3	100	
1925.	11,395 (Block I Plantation).	1,259 0	48,205	421 0	6 0 0	3	600	..	..
1926.	27,192 (Blocks I & II) *	4,065 6 48 6	32,408	205 0	4 0 0	3	1,200	1	300	

* Cost per square mile of area protected by fire lines and patrols.

81. (b) *Grass*.—The areas of dense grass referred to above do injury to the crop for the following reasons:—

- (1) by rendering the forest highly inflammable ;
- (2) by preventing the proper aeration of the soil ;
- (3) by preventing to a great extent the establishment of natural regeneration ;

This form of injury is naturally most serious in the type II areas and as far as inflammability and non-aeration of the soil go in the burnt-out areas in the north.

82. Detected offences are few. Incendiarism, wilful and accidental, is the most serious.

83. The paucity of reported forest offences other than incendiarism may be attributed to the sparse population in the forest and there is probably a certain amount of connivance by the subordinate staff.

84. (c) *Animals*.—Elephants, which, at times, cross the Moyar above Teppakadu, and a few of which are usually found in the hot season in Benne block, do the usual damage.

85. Cheetal, Sambhur and pig are responsible for damage to regeneration, both natural and artificial, in the former case particularly to Rosewood seedlings.

86. Jungle sheep are blamed for the non-success of *Artocarpus hirsuta* (Aini) in one of the Benne tuckies. Porcupines may cause damage when regular plantations are established.

87. (d) *Insects*.—Damage by animals and insects is not very noticeable at present owing to the small area under artificial regeneration.

88. As District Forest Officer in 1916 Mr. Richmond mentions an attack by a borer larva of *Phassus* sp. — a Hepialid moth—on Teak in the Benne tuckle areas.

CHAPTER III.—UTILIZATION OF THE PRODUCE.

SECTION 1.—AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION.

89. The resident population is small and their requirements limited. In Benne block there are 12 Chetti hamlets and in Mudumalai block 13.

90. They cultivate the swamps for paddy, only taking one crop a year which is ample for their requirements.

91. The Panians who work for them are virtually their slaves.

92. The Bet Kurumbers depend chiefly on the department for their livelihood as foresters, guards and coolie labourers.

93. Lastly there is the jungle tribe of Jain Kurumbers who have practically no contact with civilization and are rarely seen. They are skilled in collecting honey and setting the forest on fire.

94. For housebuilding the people use for poles, posts and cutcha door frames, *Grewia tiliaefolia*, *Cassia fistula*, *Odina Wodier*, *Bridelia retusa*, *Vitex altissima*, bamboos ; for rafters, bamboos ;

These housebuilding materials are supplied free, with the sanction of the District Forest Officer.

95. They use for ploughs—Rosewood, *Careya arborea*, *Pterocarpus Marsupium* (Vengai) ; for plough handles—elephant palm, *Randia dumetorum* ; for yokes bamboos ; for mud levellers *Careya arborea*.

These materials are also supplied free with the District Forest Officer's sanction. They use for fencing, cattle pens, etc., bamboos, roughly estimated at 200 bamboos per year per house ; for axe handles, etc., Rosewood ; for billhook handles, *Zizyphus* and *Grewia* ; for rice pounders, rosewood.

Of thatching grass.—Fifty to 100 cart-loads annually are exported by petty merchants to Gudalur at four annas per cart-load.

96. *Fuel*.—Residents are allowed free removal of dead fuel.

97. *Grazing*.—The rate in force for slaughter cattle was, till January 1927, 3 annas per 100 head per day for cows and bulls and 1 anna 6 pies per 50 sheep and goats. Two days were usually charged for, this being the average time the cattle were in the forest. ' Draught ' bullocks were also charged at the rate of 8 annas per head per year and ' draught ' buffaloes at Re. 1 per head. This practice was discovered to be contrary to the conditions laid down in the grazing notification for the Nilgiri district and was stopped by the District Forest Officer on 27th January 1927. Cattle for slaughter and ' draught ' bullocks and buffaloes are now allowed to graze free of charge for fifty yards on either side of the road while passing through the Mudumalai forest.

98. Chettis and others who are not landholders in Benne reserve, and who wish to graze cattle in the reserve, pay at the rate of 3 annas per head for cows, bulls, etc., and 6 annas per head for buffaloes per annum.

99. Residents in the forest are allowed free grazing.

100. No special provisions are therefore necessary with regard to the local population.

SECTION 2.—MARKETS AND MARKETABLE PRODUCTS.

101. The only market of importance at present is Nanjangode in Mysore, 46 miles distant from Kargudi.

102. The West Coast is ruled out on account of the prohibitive carting rates and there is now no demand for Mudumalai timber in Ootacamund.

103. There is a market in Nanjangode for Teak, Rosewood, and Pterocarpus Marsupium. Sandalwood is, of course, readily saleable but there is no demand for Shorea Talura (Jal). Only sound, good class timber is worth sending to Nanjangode as, with a *minimum* exploitation cost of 11 annas per cubic foot it is impossible to show a profit on inferior stuff; at present rates it is a gamble whether it pays to send Pterocarpus Marsupium to Nanjangode (for recent rates—see Chapter III, section 5).

104. The absence of a demand for Terminalia tomentosa at Nanjangode constitutes a serious problem as there is a vast quantity of this timber in the Mudumalai forests, much of which will shortly be of exploitable size. Every effort should be made to create a market for it.

105. Inferior stuff is disposed of locally at roadside depots by auction, and includes Terminalia tomentosa; the prices realized are poor but, with a *minimum* exploitation cost to roadside depots of, say, 3 annas per c. ft. it is quite possible to show a profit.

Bidders generally come from Ootacamund or Mysore.

106. There is no demand for fuel or bamboos.

107. *Grass*.—About 50 to 100 cart-loads of grass for thatching are exported by petty merchants to Gudalur at 4 annas per cart-load.

108. *Minor produce*.—This consists almost entirely of honey, wax, horns and seakoy which are collected departmentally and sent to Ootacamund for sale.

The following prices on an average are obtained:—

Honey—Rs. 6 per lb. (approximate average for past five years).

Wax—As. 8 per lb.

Horns—As. 2 per lb.

Seakoy—Rs. 4 per bag.

Elephant tusks are also sometimes obtained.

SECTION 3.—LINES OF EXPORT.

109. These are—

(1) The Gudalur-Mysore road which traverses the southern and eastern portions of the forest leading to Nanjangode and Mysore—the only route of any importance.

(2) The Sultan's Battery road leading to the West Coast.

(3) The Gudalur-Vayitri road.—These last two, however, are ruled out for practical purposes owing to the high rate of carting to the coast.

(4) The Gudalur-Ootacamund road.—This route is now of no importance from the point of view of exportable produce, there being no appreciable market for the Mudumalai timber on the Nilgiri plateau.

SECTION 4.—METHODS OF EXPLOITATION AND THEIR COST.

110. The volume of logs is calculated as follows; after squaring, the girth at mid-log is taken and the volume obtained by referring to tables giving volumes according to the " $(\frac{1}{4} \text{ girth})^2 \times \text{length}$ " method.

111. Felling and dressing charges are paid for the volume thus obtained and work out to an average of 1 anna 6 pies per cubic foot.

Dragging to the nearest forest road is done by departmental elephants and costs on an average 1 anna 6 pies per cubic foot.

Thence the logs are taken by carts to local roadside depots or to Nanjangode.

The carting rates are per cubic foot—

	MILES.	RS.	A.	P.
Kargudi to Nanjangode	46	0	8	0
Kargudi to Calicut	92	1	8	0
Bidurhalla bridge to Ootacamund (paid by buyers) ...	37	0	15	0

112. The minimum cost of exploitation to Nanjangode thus works out to 11 annas per cubic foot and to local roadside depots 3 annas per cubic foot.

SECTION 5.—PAST AND CURRENT PRICES.

113. The bulk of the timber offered for sale during the period of the last plan was that extracted as the result of improvement fellings and much of it was of poor quality.

114. It will be seen from the statement given below that the prices obtained for all classes of timber were miserable up till 1923 when, for the first time, selected timber was sold at Nanjangode. The prices realized for inferior stuff sold locally in 1925-26 show a marked improvement and are a proof of the folly of exporting such material to Nanjangode as had been done in 1916-17.

115. This local market requires careful nursing and every facility should be offered to induce bidders to attend the sales which should be conducted by the District Forest Officer in person.

116. Statement showing prices obtained since 1909—

Year.	Where sold.	Species.	Rate per cubic foot.	Remarks.
1909	Kakkanahalla ..	Not known	RS A. P. 0 5 9	
1910-11	Locally	Do.	0 8 0	
1911-12	Do.	Do.	0 6 0	
1912-13	Do.	Do.	0 5 0	
1913-14	Do.	Do.	0 9 8	Much small and crooked.
	Depot on Gudalur road.	Teak—		
	Do.	Class I	1 10 9 to 1 12 0	
	Do.	Class II	0 11 0 to 0 14 0	
	Do.	Class III	0 7 0 to 0 10 6	
	Do.	Poles	0 10 0	
	Do.	Rosewood	1 8 0	
1914-15 ..	Do.	Pterocarpus Marsupium ..	0 5 0 to 0 12 0	
	Do.	Lagerstroemia lanceolata ..	0 8 0	
	Do.	Teak	0 8 8	
	Do.	Pterocarpus Marsupium ..	0 8 0	
	Do.	Lagerstroemia lanceolata ..	0 4 0	
	Do.	Rosewood	0 8 0	
	Do.	Teak under—		
		Classes II, III and IV	0 3 0	
	Locally	Teak I Class	0 14 0	
	Do.	Teak II Class	0 11 0	
	Do.	Teak III Class	0 8 0	
	Do.	Teak IV Class	0 4 0	
	Do.	Pterocarpus Marsupium ..	0 9 0	
	Do.	Lagerstroemia lanceolata ..	0 11 0	
	Not stated	Teak I Class	0 14 0	
	Do.	Teak II Class	0 11 0 and 0 12 0	
1915-16 ..	Do.	Teak III Class	0 8 0 and 0 8 6	
	Do.	Teak IV Class	0 4 0	
	Do.	Pterocarpus Marsupium ..	0 9 0	
	Do.	Lagerstroemia lanceolata ..	0 11 0	
1916-17 ..	Mysore	Teak I Class	0 10 2	By auction.
	Do.	Teak II Class	0 6 7	These rates were de-
	Do.	Teak III Class	0 2 6	termined.
	Do.	Teak IV Class	0 1 3	
The above timber was resold by depots and fetched an average of As. 2-7 per cubic foot.				
1917-18 ..	Kargudi	Teak and teak poles	average of 0 5 5	There was a demand for Terminalia
	Do.	Rosewood and Pterocarpus Marsupium ..	(auction) 0 5 11	tomentosa.
	Do.	Mixed	(auction)	Some very small and bad timber was included.
1918-19 ..	Do.	Teak (mostly)	0 10 2	By auction.
	Do.	Girdled Terminalia and dead Pterocarpus Marsupium ..	0 11 5	
1919-20 ..	Kargudi	Teak (mostly II and III Classes). Some	0 9 2	Do.
	Locally	Pterocarpus Marsupium, Lagerstroemia lanceolata and Terminalia tomentosa.		

Year.	Where sold.	Species.	Rate per cubic foot.	Remarks.
			RS. A. P.	
1920-21	Locally	Mostly Teak II and III Classes.. ..	0 8 6	By auction.
1921-22	Do.	Teak, Rosewood, Pterocarpus and Terminalia tomentosa.	0 9 9	
1922-23	Do.	Do.	0 5 11	Mostly of very poor quality.
	Kargudi	(a) Teak	0 5 7	
		Poles	0 3 5	
			each	
		Rosewood	1 3 2	
1923-24		Pterocarpus Marsupium	0 3 9	
		Terminalia tomentosa	0 3 2	
		Lagerstroemia lanceolata	0 4 0	
	Nanjangode	(b) Teak	1 8 4	Selected timber.
		Rosewood	1 10 8	
		Pterocarpus Marsupium	0 15 8	
		Junglewood	0 12 9	
1924-25	Kargudi	(a) All species	0 2 6	Poor stuff.
	Nanjangode	(b) do.	1 3 0	
	Do.	(a) Teak	1 0 6	
		Rosewood	1 3 8	
	Kargudi	(b) Rosewood	0 11 6	
		Teak	0 13 3	
1925-26		Kalvengai	0 2 7	
		Terminalia tomentosa	0 4 3	
		Pterocarpus Marsupium	0 5 1	
		Lagerstroemia lanceolata	0 5 10	
		Teak poles	0 3 0	Per pole.
	London	12 Rosewood logs 600 cubic feet	£27 10 0	Per ton weight.
	Kargudi	Teak (average price)	0 8 9	
	Do.	Pterocarpus Marsupium (average price).	0 5 7	
1926-27				
	Do.	Rosewood average price	0 8 2	
	Do.	Miscellaneous all species (average price).	0 1 7	Including crooked and unsound.

117. A timber classification was introduced in February 1913 for teak only.

Teak I Class	...	...	...	...	Logs over 5 feet girth.
Teak II	..	...	...	...	" 3 feet to 5 feet girth.
Teak III	..	...	...	...	" 2 feet to 3 feet girth.
Teak IV	..	...	...	...	Logs of any size which were crooked, cracked, burnt, etc.

CHAPTER IV—STAFF AND LABOUR SUPPLY.

SECTION 1.—STAFF.

118. The following table shows the staff employed in the Mudumalai forests (September 1926) but does not include staff engaged in the Moyar reserve of Masinigudi range.

Permanent establishment.

Serial number.	Grade.	Number.	Pay per month.	Total for each grade.	Beat.
			RS.	RS.	
1	Range Officer	1	100 50 15	165	
2.	Assistant Range Officer	1	100 50 15	165	
3.	Forester II Grade	1	45 15	60	General duty undergoing training at the Madras Forest College.
4.	Forester V Grade	1	30 15 10	55	Benne Section charge.
5.	Forester V Grade	1	30 15	45	Mudumalai Section.
6.	Forester III Grade	1	40 10 15	65	Timber charge.

Permanent establishment—cont.

Serial number.	Grade.	Number.	Pay per month.	Total for each grade.	Beat.
7.	Forester IV Grade	1	35 10	45	Live-stock.
8.	Forest Guard I Grade	1	24 3	27	
9.	Do. I Grade	1	24	24	Mudumalai Section.
10.	Do. II Grade	4	21	84	
11.	Do. III Grade	2	18	36	One man on Benne Beat.
12.	Do. III Grade	2	18 3	42	
13.	Do. IV Grade	6	15 3	108	One man on Benne Beat.
14.	Range head clerk	1	35 15	50	
15.	Range peon	1	12 2	14	

This classification was altered in 1917 as follows:—

Teak I Class	...	...	...	...	Logs over 18 cubic feet.
Teak II	„	...	...	...	Logs over 8 to 18 cubic feet.
Teak III	„	...	...	...	Logs under 8 cubic feet.

and squaring of all logs was insisted on.

Since August 1926, the following classification for all species has been adopted:—

1-A.	...	12 cubic feet and over	...	Without serious defect.
1-B.	...	Do.	...	With serious defect.
2-A.	...	under 12 cubic feet	..	Without serious defect.
2-B.	...	Do.	...	With serious defect.

119. The following table taken from the “Trade Supplement” to the “Indian Forester” shows recent prices in the Nanjangode market:—

The prices are all per cubic foot.

Serial number.	Species.	Description.	Market.	Date.	Price.
1.	Pterocarpus Marsupium.	Logs	Nanjangode ..	April 1926.	RS. A. P. 0 13 0 and
		Do.	Do. ..	June	0 11 0
		I Class logs	Do. ..	September	0 12 0 to
		II Do.	Do. ..	Do.	1 3 3
		I Do.	Do. ..	October	0 8 0 to
		II Do.	Do. ..	Do.	1 6 2
					0 8 0 to
					0 14 6
2.	Rosewood	I Class logs	Do. ..	January	1 11 6
		II Do.	Do. ..	Do.	0 11 0
		Logs	Do. ..	April	0 8 0 to
		I Class logs	Do. ..	August	1 11 0
		II Do.	Do. ..	Do.	1 4 0 to
					1 8 0
3.	Teak	I Class logs	Do. ..	April	1 6 8 to
		Do.	Do. ..	June	2 3 11
		Do.	Do. ..	August	1 2 0 to
					2 6 6
		II Class below 12 cubic feet.	Do. ..	Do.	1 10 11 to
		Do.	Do. ..	June	2 14 6
					0 7 6 to

Temporary establishment.

Serial number.	Grade.	Number.	Pay per mensem.	Total for each grade
1	II Range clerk	1	RS. 30	RS. 30
2	Tappal carriers	2	12	24
3	Cartmen	4	15	60
4	Depot watcher	2	12	24
5	Bungalow watcher	1	10	10
6	Blacksmith	1	40	40
7	Elephant jamadar	1	32	32
Total ..		..	..	220

Abstract of the permanent establishment.

Serial number.	Grade.	Number.	Pay per mensem.	Total per month.
1	Rangers	2	RS. 165	RS. 330
2	Foresters	5	..	270
3	Forest guards	16	..	321
4	Range head clerk	1	50	50
5	Range peon	1	14	14
Total ..		..	..	985

Abstract of temporary establishment.

Serial number.	Grade.	Number.	Pay per mensem.	Total per month.
1	II Range clerk	1	RS. 30	RS. 30
2	Tappal carriers	2	12	24
3	Cartmen	4	15	60
4	Depot watcher	2	12	24
5	Bungalow watcher	1	10	10
6	Blacksmith	1	40	40
7	Elephant jamadar	1	32	32
Total ..		..	..	220
Grand total ..		..	..	1,205

SECTION 2.—LABOUR.

120. The shortage of labour has probably been exaggerated in the past. It is true that the resident population is small but Range officers are only too prone to put this forward as an excuse for failure in carrying out works. When these forests were being worked heavily, there was plenty of labour available and there is no doubt that, given regular employment, coolies could be attracted easily enough from Mysore State. They would probably only stay for short periods unless regular work could be provided. Particular attention will have to be given to this question.

121. According to the Range officer, the labour available on the spot is as follows (August 1926) :—

Whence obtainable.	Distance from each locality.	Number of coolies available.
Kargudi .. .. .	.....	20
Teppakadu	Three miles from Kargudi ..	10
Benne	One to 1½ miles from Benne camp	11
Mudumalai	Two miles from Mudumalai ..	12
Total ...		53

122. The rates in force are for—

Local labour—

Male coolie	...	...	...	...	...	6 annas per day.
Females and children	...	...	...	...	...	4 " "
Axemen (Kurumbars)	...	...	...	...	...	10 " "

Imported labour—

From Malabar :

Unskilled male	...	...	...	...	...	8 " "
Axemen	...	...	...	...	...	1 rupee per day.
Sawyers	...	...	...	...	...	Rs. 4-8-0 per 66 sq. ft. of cut.

From Mysore State :

Unskilled male	...	...	...	...	...	8 annas per day.
Unskilled females and children	...	...	...	...	...	6 " "

123. Neighbouring estates absorb much of the available labour and on them a coolie can easily earn 6 annas a day on casual labour and 12 annas a day on permanent employment; the question of our having to increase our rates may have to be considered.

CHAPTER V—PAST SYSTEMS OF MANAGEMENT.

SECTION 1.—GENERAL HISTORY OF THE FOREST.

124. The following account of the past history of the Mudumalai forests is taken almost verbatim from Mr. Cox's Working Plan of 1910.

125. It is stated on the authority of Mr. Rhodes Morgan that the Mudumalai forest, a then more or less indefinite tract of 200 square miles, was leased during the first half of last century by the Tirumalpad of Nilambur to a timber merchant by name Muddanah, who, on payment of a stump fee, exploited the more accessible portions of it for many years. The first official mention however of the Mudumalai forests occurs in a letter from a Mr. G. Williams, sleeper contractor to the Madras Railway, who wrote in 1855 to the Collector of Malabar on the subject of his recent examination of these forests for sleeper material. He reported the forests to contain a fine stock of timber which was being endangered by uncontrolled and unsystematic felling on the part of the local inhabitants. Mr. Williams' letter was forwarded to Government.

126. Government shortly afterwards called on the Collector of Malabar to furnish a report showing the extent of Government forests in the Wynad and to give his opinion on the best method of working them; at the same time recording the belief that the rights of the State have been much infringed; and that whereas the whole of the forests in the Wynad belonged rightfully to the State in succession to the Pychee Raja, private claims founded on no basis had been allowed to spring up, and had in some cases been officially admitted to the great injury of the rights of Government.

Particular attention was drawn to the Mudumalai forests on account of the action of Captain Campbell, Assistant Engineer in charge of Public Works on the Nilgiris, who had taken a lease of these forests for two years, being the remainder of the term for which a lease had been granted by the Nilambur Tirumalpad to a Parsi, Edulji Sait, at a rent of Rs. 2,300 per annum.

127. Mr. Robinson, the Collector, in 1857, accordingly forwarded a report to Government, through the Board of Revenue, on the subject of the Wynad forests in general.

With regard to Mudumalai, he gave it as his opinion that the Nilambur Tirumalpad's claim could not be disputed. Of the value of the forests estimated to cover an area of 200 square miles, he was unable to form an opinion without undertaking an extensive examination for which opportunity was lacking; nor did he consider that he was justified in such a proceeding so long as Government was in doubt as to the validity of the existing possessor's claim.

128. The Board of Revenue in forwarding the report concurred with the Collector that the assertion of claims by Government to Mudumalai forests was not likely to be attended with success; and Government, after some hesitation and further enquiry, finally accepted this view in 1859.

129. The lease entered into by Captain Campbell expired in 1857; and, under the advice of Mr. Robinson, Government rented the forests for five years directly from the Tirumalpad for the continued supply of Teak for buildings on the Nilgiri plateau. The rent remained as before, Rs. 2,300 per annum.

130. In 1859, Doctor Cleghorn, Conservator of Forests, inspected the leased forests to answer some enquiries from Government on the system of management to be adopted by which Mudumalai timber could best be made available for work at Wellington and Ootacamund. The forests had then been under exploitation by Captains Campbell and Morgan, Executive Engineers, for four years.

131. At the time of Doctor Cleghorn's inspection, felling, dragging, squaring and carting were in full swing.

During four days of forest inspection, the Conservator counted over 1,000 Teak logs lying in the forest awaiting dragging and there were 11,000 more logs stacked in parts of the forest unvisited by him or at the Gundalpet workshop, where the Teak was sawn to measurement for the barracks at Wellington. Fifteen elephants and 100 Commissariat bullocks were employed in exploitation to the depots and about 20 miles of interior cart-road had been constructed.

The chief difficulty met with had been the construction of a road across the Mudumalai swamp, a work found necessary in order to bring the western portions of the forest under felling; while troubles connected with carting up the badly aligned Sigur ghat road had been chronic. It is interesting to note in connexion with the scarcity of labour in 1910 that over 100 Kurumbar axemen were in regular employ; and, as an illustration of theories long since exploded, that the carting from the forest depots to Wellington was performed by two sets of contractors, one set carrying only as far as Ootacamund on account of the alleged risk of keeping Mysore bullocks for more than 24 hours on the plateau.

132. Doctor Cleghorn's recommendations for future operations were mainly concerned with the construction of a new ghat road to Ootacamund, a work which he advised on the ground that the Public Works Department demands for Teak timber were not only very large but annually increasing, while the existing cost of carriage was equal to at least half of the actual sale value of the timber at the foot of the ghat.

In 1860 Government agreed to the extent of ordering a new alignment to be made of the upper part of the Sigur ghat, but, owing to the temporary abandonment of a proposal to build a large sanitary depot at Wellington, appear to have had some doubts whether the future demands of the Public Works Department would be large enough to warrant retaining the lease of the Mudumalai forests.

133. These doubts were set at rest by a further report from the Conservator who stated that the prospective demands on the part of the Engineers were very large and entirely beyond the resources of the local market.

134. The Military Works Department at Wellington had already obtained from Captain Morgan no less than 118,750 cubic feet of Mudumalai Teak, about 30,000 cubic feet of fashioned Teak was ready for carting from the Gundalpet workshops, wastage in the workshop amounted to about 8,000 cubic feet, and about 30,000 cubic feet of timber were lying in the forest. To supplement the above supply 50,000 cubic feet of Teak had also been delivered at Wellington from the Anamalais.

135. During 1860-61, felling continued on an extensive scale and at the end of the year 33,396 cubic feet of Teak were stored at Masinigudi depot, waiting carriage up the ghat; and 93,290 cubic feet of timber in log were felled but not dragged. The amount supplied to the plateau was comparatively small.

136. The efforts of the officer in charge were in fact concentrated on extracting out of the forest as much Teak as possible before the expiry of the lease, and felling and dragging continued without intermission throughout the whole of the year. The Conservator notes in his annual report for 1860-61 that a large amount of timber will be required for the jail, the new church, the Lawrence Asylum and the barracks and this must be removed from the Mudumalai forests within the next two years.

137. During 1862, the same process continued. About 2,000 cubic feet were supplied to Ootacamund and 2,000 cubic feet to Wellington, while the balance of Teak felled but not carted to the plateau was raised to 202,000 cubic feet.

138. Doctor Cleghorn visited the Mudumalai forests during the year and reported that little Teak would be left in the forests by March 1863, when the lease expired. The Government were however in the meantime considering the advisability of renewing the lease as demands for timber from the Madras Railway, the Bangalore Barracks and other works, in addition to those mentioned above, had to be considered; and Captain Beddome, the Officiating Conservator, was directed to report on the subject.

139. Captain Beddome inspected the Mudumalai forests in August 1862, a few months before the expiry of the five years' lease.

He reported that all the useful Teak had been felled or would be felled before the forest was surrendered, but that there was still a large quantity of Vengai, Karimathi and Rosewood, which had not been included in the conditions of the lease and had therefore not been felled.

He strongly recommended the renewal of the lease for ninety-nine years for the reasons that the extraction of these less valuable timbers would be profitable; that if the Government did not step in, the forests would be given over to tuckle cultivation; and that the prospective value of the young Teak left on the ground was considerable.

140. The Government agreed with him ; and from 21st March 1853 took a lease of a portion of the forests for ninety-nine years. The chief provisions of the lease were as follows :—

(1) That a rent of Rs. 3,500 be paid by Government in advance on 1st January of each year during the term of ninety-nine years.

(2) That Government should have the right to cut down trees of 8 inches and upwards in diameter except gallnuts, sealing wax and panthom or pitch trees, without payment of stump fee.

(3) That Government should have the right to clear and plant with Teak, or other valuable trees, any suitable land within the area leased and should cut and remove such planted trees as they deemed advisable ; provided that a stump fee of one rupee was paid for every tree 8 inches in diameter and upwards so felled.

(4) That naturally grown trees below 8 virals thick, cut in the process of thinning or in promoting the growth of the forests, should be cut without stump fee ; but that the produce so cut should be at the disposal of the lessor if required within three months of felling.

(5) That Government were at liberty to seize or destroy elephants or any wild beasts causing damage to the forests ; but in the case of elephants were to hand them over if alive, or their tusks and ivory, if dead, to the lessor on payment of reasonable expenses incurred in seizure or destruction of them.

(6) That Government should be at liberty to erect any buildings ; but that all such buildings and all trees cut and not removed and all trees either planted or standing should be handed over to the lessor at the expiry of the lease without charge.

(7) That trees within 80 yards of pagodas and devasthanams should not be cut down nor such places interfered with provided there were not more than five of such temples.

(8) That lands cultivated with paddy should not be interfered with by Government nor objection raised to cultivation of land adapted for that purpose.

(9) That the huts of Malians and hill tribes should not be interfered with by Government more than was absolutely necessary in the interests of working the forests.

(10) That the lessor should retain the right of collecting honey, bees wax, cardamoms, gallnuts, sealing wax and pitch.

(11) That coffee cultivation, if carried on in the forests by Government or by a private party with Government's consent, should pay a rent to the lessor in accordance with the usage of the country.

141. Up to 1863 the sole object of Government in renting the forests had been to extract all the Teak timber in them. It is not easy to ascertain the exact figures but the following details give some idea of the extent of the operations :—

By the end of March 1861, the value of timber delivered at Wellington, calculated at practically cost price, amounted to Rs. 1,48,438-7-0. There were besides logs in the depots and timber at the Gundalpet workshop valued at Rs. 54,000, and the total volume of standing timber felled was about 250,000 cubic feet.

During the two years following, the output was extraordinarily large considering the area, and more than 2,00,000 cubic feet of Teak in log were felled and brought to depot.

142. Allowing for the inevitable wastage which operations on this whole sale scale involved, it is probable that the total volume of Teak felled in the Mudumalai forests from 1857 to 1863 approached 500,000 cubic feet.

This mass of material was extracted to a considerable extent from the Benne forests, which was then an almost pure Teak forest. [There is probably now proportionately less Teak in Benne block than in any of the other blocks except Doddakatti.] For one year at least the Moyar Valley forests on the eastern side were also worked.

143. The annual financial results during these years were as a rule unfavourably reviewed by Government, but it is evident that the rates of sales, fixed by Government itself, precluded the officers in charge from showing much profit, and as the whole of the timber was used for Government works, profit or loss was only a matter of paper adjustment.

144. The entering into of a new lease in 1863 was not followed, as might be expected, by a cessation of Teak felling. On the contrary the output was continued at the former level and both Doctor Cleghorn and Captain Beddome appear to have made a curious mistake when reporting that the Teak was exhausted. Probably a considerable portion of the forest was more or less inaccessible and their reports were based on unreliable information.

145. In 1863-64, 52,730 cubic feet of fresh Teak was logged, the bulk of which was destined for the Lawrence Asylum. The difficulties of exploitation do not seem to have diminished with time. Cattle diseases, both 'rinderpest' and 'foot and mouth,' were serious troubles and the constant sickness among the sawyers, handymen and the forest establishment frequently stopped work. The ghat road was always a difficulty and Captain Morgan reported that the rate of carting timber for the Lawrence Asylum was 10 annas per ton per mile compared with 4 annas per ton per mile for timber conveyed to the Bangalore Barracks. The rate rose a few years later to 14 annas.

The Conservator, Southern Circle, in 1910 considered the use of traction engines or road trains to exploit the Wynad forests. It is of some interest that Captain Morgan, nearly fifty years before, was firmly convinced of the necessity of the former and endeavoured to get sanction for their purchase.

146. During 1865, a violent outbreak of rinderpest destroyed all the contractors' cattle and Government were obliged to purchase hurriedly 100 bullocks to replace them.

The conservation of the remnants of the Teak forest continued to be lost sight of in the necessity of pushing on building work at Ootacamund and felling went merrily on throughout 1864-65, during which no less than 92,442 cubic feet of Teak were logged.

147. That this process could not be indefinitely prolonged was beginning to be recognized. Two small Teak plantations were started in 1854-65 and some attempt made to find purchasers for Rosewood and Vengai.

148. For the next twenty years or so there is little of special interest to record.

The forests were worked to their utmost capacity for the supply of timber for the public works both in the Nilgiris and the Wynad.

The church, the Lawrence Asylum, the Wellington Workshops, the Bangalore Barracks the Government offices at Ootacamund, the Naduvattam Cinchona Factory, Police lines and numerous bridges on the Mettupalaiyam-Vayitri road absorbed large quantities of timber and 293,107 cubic feet of Teak and some thousands of cubic feet of Vengai were supplied to the Public Works Department by Colonel Morgan. In addition to the Government demand, private demands, chiefly in Mysore, where the department maintained a depot, accounted for a revenue of Rs. 1,14,042 at a price varying from As. 12 to Re. 1 per cubic foot of squared Teak.

149. That the department was able to continue to supply such large quantities of timber was due to the discovery of an hitherto untapped source of Teak in the somewhat inaccessible north-west corner of the Mudumalai leased forest and some forest (trans Benne) on the Malabar-Wynad boundary appears to have been indented on.

150. The continued heavy felling of these years with its sequel of a mass of branch wood lying in the forest and the opening of the forest canopy produced the inevitable results of an immense growth of grass and severe forest fires. No steps were taken to combat them but, owing to the constant destruction of logs lying in the forest depots, arrangements were made to drag the timber out of danger as soon as it was felled.

151. As a set-off to the rapid denudation of the natural forest, much energy was spent on the plantations of Teak at Benne and Mudumalai above referred to. It was anticipated that by planting 12 acres per annum the growing stock of mature plantation Teak would within fifty years more than equal the amount already extracted from the natural forest.

The estimate was founded apparently on the results of Teak planting under totally different conditions at Nilambur, and the fallacy of imagining that Teak would come to maturity in fifty years at the elevation and on the laterite (sic) soil selected at Mudumalai and Benne was not exposed until Colonel Beddome paid a visit to the plantations in 1875. By that time 20 acres had been planted at Mudumalai and 80 acres at Benne at a total cost of Rs. 20,373-13-1 or 4 annas a plant. All further planting was stopped and the plantations or portions of them remain to this day an illustration of wasted energy and money.

152. Colonel Morgan continued in charge of the Mudumalai forests, as well as those of Mettupalaiyam, Bolampatti, Sigur, and sometimes Kollegal, Palamalai and the Anamalais, up to 1874 when he was relieved by Major R. S. Jago.

153. It is extraordinary that even at this late period no one appears to have realized the absolute need for conservancy nor the effect of constant felling in a totally unprotected forest. In fact it was proposed in 1875 to commence felling the locally unsaleable crooked Teak with the idea of supplying the English dockyards with curved wood.

154. The scheme fell through, but it was not until 1878 that departmental felling was temporarily put a stop to, chiefly for want of saleable material. The Mudumalai permanent forest establishment, which at the time consisted of a ranger, a forester and six forest guards, was reduced to a minimum in 1879. The ranger and three forest guards were transferred and the whole of the cattle and its establishment sent to the Malabar-Wynad. Three forest guards were left to represent the protective establishment, and the forester placed in charge had his headquarters transferred to Masinigudi, whence he controlled the Sandalwood and other operations in Sigur range.

155. With this reduced establishment no departmental operations were attempted, beyond the dragging out of Teak logs left here and there in the forest.

A good deal, but by no means all, of the timber appears to have been retrieved, and from 1878 to 1883 sales to local contractors and sales at the Ootacamund depot, whither a portion of the timber was carted by contract, accounted for 80,558 cubic feet and a revenue of Rs. 91,595.

The demands of the Public Works Department continued to shrink from year to year as the Mudumalai timber diminished in size and value; and Burma Teak appears to have been adopted in preference. Only 10,000 cubic feet of Mudumalai Teak were purchased by that department during these six years.

156. Attempts were repeatedly made to persuade Mysore timber merchants to purchase standing Teak, Vengai and Rosewood under the permit system; but except in 1881, when Rs. 8,337 were realized, the result was usually a failure.

The saleable timber still remaining was far from the roads and in more or less inaccessible portions of the forests. Without elephants the contractors were unable to bring the logs to roadside. The system was abandoned in 1884 after 15,000 to 20,000 cubic feet of Teak had been sold.

No sale could be found for Rosewood or Vengai.

157. The fact was that the Benne and Mudumalai forests had then and for many years to come almost reached their limit of utility as a timber-producing tract. About 600,000 cubic feet of Teak, Rosewood and Vengai valued at Rs. 7,70,000, had been sold in depot since 1860 and there had been enormous wastage.

The Conservator, fifteen years after felling had ceased, remarked on the immense quantity of dead and rotten timber lying all over the forest.

158. Benne forest was separated from Mudumalai between the years 1876 and 1878, during which both forests were demarcated and surveyed on the 4-inch scale by the Madras Revenue Survey department.

In the case of Benne, forest settlement followed and in 1883 the greater portion of the present reserve was notified under section 16 of the Forest Act; The settlement was not finally completed until 1891. In the case of Mudumalai, the demarcation and survey led to a complaint by the Tirumalpad concerning the accuracy of the Mysore boundary, a difficulty which became more acute in later years and will be referred to later.

159. Mr Gamble, whose visit marks an epoch in the history, inspected the Mudumalai leased forests in 1884.

The lease had then run for 21 years and the great question was whether it was "worth our while to take steps to place the forest under such management as will ensure its gradual improvement".

160. Mr Gamble's report is given in full in the Proceedings of the Board of Revenue, No. 271, Forest, dated 27th January 1885. It is a very interesting note, but his remarks on the condition of the forest in general refer chiefly to the southern and eastern portions, which alone he visited.

Certain clauses of the existing lease were held by him to be objectionable.

Clause 6, for instance, enforcing a payment of stump fee on planted trees, while practicable in fixed plantations, was unsuitable to the proposed planting up of blanks in the natural forest. Under clause 4 it was obviously impossible to make thinnings pay their own cost; and the right of collection of minor produce given under clause 11 to the lessor led to divided control and the constant burning of the forest. These were the Conservator's most important objections.

161. The question of altering the lease to exclude the collection of minor produce by Government had already been raised in 1875 and an offer had been made to the Tirumalpad to revise the lease in this respect and also to include the Kumbarakolli forests in consideration of an increase in the annual rent. The offer however had not been accepted.

Mr. Gamble now advised Government to reopen negotiations and, if possible, to add to the conditions a provision empowering Government to renew the lease on expiry on the same terms.

The ground taken was that Teak in the Nilgiri Wynad worked as 'high forest' could hardly be expected to reach maturity in less than 80 to 100 years, whereas only about 75 years of the existing lease remained. I [Mr. Cox] would here note that Mr. Popert subsequently stated that from his experience elsewhere he thought the age of maturity of Teak in Mudumalai was nearer 120—160 years than the figures given by Mr. Gamble.

162. The Conservator's suggestions for future departmental working centred on the necessity of immediate measures of protection.

He considered that the future prospects of the forest under conservancy were promising and that although there was little sound growth of any size and that annual fires had done much harm, still the soil was excellent and only protection was wanted to re-convert the forest into a valuable property.

A scheme was accordingly drawn up for dividing portions of the forest into annually worked compartments, for fellings by silvicultural methods, for rigid fire protection, in certain areas and for the regulation of grazing.

It was suggested that the cost of conservancy could be met to some extent by the results of felling in the area marked out for improvement and that the expectation value of the forest in general, especially if the period of lease could be extended, was sufficient to justify the expenditure proposed.

163. The previous negotiations with the Tirumalpad with respect to the alteration of the lease (paragraph 161) had no issue. They had hinged on two questions—

First, the lease by the Tirumalpad, illegal in the opinion of the Government Advocate, of the right to cut and collect bamboos in the Mudumalai forests to one Kuppasami.

Secondly, the lease by the Tirumalpad of the Kumbarakolli forests on the banks of the Moyar to a timber merchant called Muttanah. Government was anxious to extinguish the former as an infringement of its own rights and to buy up the latter owing to its being utilized as a means of smuggling timber from adjacent Government forests.

An offer to raise the annual rent from Rs. 3,500 per annum to Rs. 4,200 per annum in consideration of the transfer of the two leases to Government was not accepted. The Tirumalpad suspected some ulterior motive connected with gold mining or coffee planting; and Government, tired of the haggling and correspondence, refused in 1876 to discuss the matter further.

164. On the subject being mooted again eight years afterwards by Mr. Gamble, the Collector entered into negotiations with the Tirumalpad and after a great deal of correspondence lasting until 1891, a modification of the lease was agreed to by which in consideration of raising the annual rent from Rs. 3,500 to Rs. 4,500 the latter agreed

(1) to include the Kumbarakolli forests (1,771.46 acres) with the leased area.

(2) to cancel the clauses of the old lease forbidding the cutting of *Terminalia chebula* (gallnuts) and the reserving of the right of collection of minor produce;

(3) to give up the right to remove trees of under 8 inches thick cut in thinnings;

(4) to give the option to Government of renewing the lease for a further term of fifty years subject to the payment of a renewal fee of Rs. 4,500.

165. While the negotiations were in progress the Mudumalai forests were notified as 'reserved land' under section 26 of the Forest Act by a notification published in the *Port St. George Gazette*, No. 212, dated 1st July 1889. The Kumbarakolli forests were brought under the same notification by a subsequent notification dated 20th October 1892.

166. Mr. Gamble's accepted proposals of 1884 for departmental working, which he further elaborated after two more inspections during 1886, involved the division of the Mudumalai and Benne forests into blocks of about 1,000 acres each.

Each block was to be annually felled over for the removal of all sound trees of 6 feet girth and over of trees between 3'—6' girth unlikely to produce good timber or interfering with the growth of better species. Seedlings and saplings of Teak, Vengai and Rosewood were to be protected from the overgrowth of inferior species.

Above all, as block after block was felled over, rigid fire protection was to follow.

The scheme broke down in practice for want of men, money and markets, and during the first eight years of working, only 417 acres were worked over in the whole working circle.

167. Under the advice of Mr. Peet, the acting Conservator, some timber was extracted from the Benne forest under a system of 'jardinage' and about 40,000 cubic feet of Teak, Blackwood, Vengai and Ventek extracted departmentally.

The timber sold very badly, the price of Teak having fallen to as low as 6 annas per cubic foot; and the scheme was very soon abandoned.

168. Apart from these operations very little was done. Fire protection was the subject of constant discussions and all sorts of suggestions were made to deal with annual fires. At one time the Jain Kurumbaras and Chetties were held entirely to blame and at another the chief cause of fire was said to be the want of protection along the Mysore boundary, or the absence of definite fire-traced camping grounds along the roads.

The latter were prepared in Mr. Douglas's time who, with the approval of Government, endeavoured to obtain some influence over the Jain Kurumbaras by the free grant of cloths.

The Mysore boundary was also at times fire-traced. But the views of one officer were not shared by the next, and nothing definite having been really settled these spasmodic attempts to deal with a serious situation had no practical results.

169. In 1892, Mr. Cherry, the then Conservator of Forests, Southern Circle, inspected the Nilgiri district and visited Mudumalai and Benne rest-houses which had just been rebuilt. The health of the establishment had been so bad that he again raised the question of shifting the range headquarters to a site on the hills to the north of Mudumalai.

No work of any importance was going on in the range. Mr. Gamble's improvement fellings had come to more or less of a stand still; a little stagheaded Teak was being dragged here and there out of the Benne forests by means of a single elephant, but was scarcely saleable; the scattered and spasmodic attempts at fire protection were a failure; and the executive establishment, consisting of an old and untrained ranger and a youthful forester, was incapacitated by fever.

170. Mr. Cherry's proposals followed the usual lines of 'division of the forest into workable units'; 'increased activity in improvement fellings'; and 'organized and systematic fire protection'.

The Board of Revenue considered Mr. Cherry's report on the Mudumalai and Benne forests to be meagre, especially in respect of his failure to state how far Mr. Gamble's scheme had been a success and what modifications in it, if any, were required.

It drew his attention to the fact that the Nilgiri division was very far from paying its expenses, and desired that the Collector and Conservator should jointly suggest measures to augment the revenue.

The Board also desired Mr. Popert, the Conservator of Forests, Central Circle, to inspect the Mudumalai and Benne forests and to report on the enhancement of revenue from them in the light of his great experience of the Burma Teak forests.

171. A further report from Mr. Cherry, based on a letter from Mr. Rhodes Morgan, District Forest Officer, was received by the Board in 1893, in which were given reasons, obvious from the previous history of the forests, for the impossibility of extracting any considerable revenue.

But the Board had again to complain that no reasons were given for the apparent failure to carry out Mr. Gamble's recommendations and resolved to await Mr. Popert's special inspection and report.

172. The latter was not submitted until 1895. It cannot be said to have thrown more light on the subject. Mr. Popert supported Mr. Cherry in assuring the Board that a large revenue from the depleted forests was out of the question. He considered that Mr. Gamble's recommendations were all that were required and that "no proposals are necessary for the systematic extraction of full-grown Teak, for, as far as I saw, it no longer exists."

He also added that the number of saleable Blackwood and Vengai seen by him could be counted on one's finger ends. He suggested the introduction of the Burma 'taungya' system into the Benne forest as a means of restocking the forests. The Board directed that Mr. Popert's suggestions should receive the careful attention of the Collector, who was called on to report what course of action he proposed to adopt.

173. Mr. J. D. Rees in his reply (drafted by Mr. C. G. Douglas, District Forest Officer) wrote at considerable length—

"The outlook has to be faced in the shape of an indefinite outlay in a deficit district and in forests where, as Mr. Popert aptly phrases it, 'the plums have been most effectually picked out of the cake,' but if the game is worth the candle it should be played out to the end. The alternative is to let the forests go from bad to worse."

Mr. Gamble's recommendations were therefore to be given full effect to. Fire protection was to be rigidly enforced in definite and smaller areas, the forest opened up; fixed camping grounds arranged to prevent fires; 'taungya' to be started; trained, more efficient and larger establishments to be introduced; and improvement fellings pushed on. In addition, felling of mature Rosewood and Vengai and dead Teak was to be started and carried on to the extent which the supply of labour and prospects of sales seemed to justify.

It was clearly stated that the expenditure to be incurred on this programme could not be compensated by contemporary revenue. Benne and Mudumalai had alone contributed over 7½ lakhs of revenue to Government and had earned a claim to assistance at the expense of districts more fortunate in being less exploited.

The Board accepted these views and suggested that if possible a simple working scheme should be drawn up.

174. There were many difficulties to face.

The chronic ill-health of the whole establishment seems to have been the worst of them, judging from the repeated references to it. Labour was very scarce and complaints were often made of the quality and quantity of the establishment, and especially of the want of training of the executive officers.

I [Mr. Cox] think a still greater obstacle to success was the want of a definite annual allotment for the conservancy of the forests to be spent without any reference to the resulting revenue. As long as the budget for the Mudumalai forests was merged in that of the whole division and as long as the whole division was, owing to its peculiar circumstances, run at a loss, so long were no funds available to open out the Mudumalai forests and provide a sufficient establishment.

It has also to be remembered that nearly all the District Forest Officers' time between 1888 and 1898 was taken up in the selection, demarcation and settlement of the reserves on the plateau and slopes. Forest settlement in the Nilgiri division was probably unique in respect of the complication of claims and multiplicity of small reservations.

175. The general result was that in despite the best intentions the new broom was hardly more successful than the old.

Taungya was started in 1896 and the clearings planted up with Teak, Blackwood and Vengai, most of which died.

A fillip was given to the improvement fellings and up to 1900, 700 acres of forest were treated at a cost of Rs. 1,168-7-6 involving a loss of Rs. 768-7-9. Conservancy, which meant in other words 'fire protection', was confined to the Teak plantation and a very small area under improvement felling.

176. There are, by the way, some striking figures given in the annual reports previous to Mr. Douglas taking charge. It is stated for instance that 47,191 acres of Mudumalai were under rigid protection and successfully protected at a cost of Rs. 31. Mr. Douglas made a clean sweep of the whole of this area from the statement of protection, and when doing so sarcastically remarked that these and similar figures must constitute a record for successful protection of inflammable forest in India.

At the same time whether for want of establishment, labour or funds, he appears to have been unable to extend protection beyond a very small area.

177. In 1897, the boundary dispute concerning the Mudumalai—Mysore boundary (paragraph 158) was finally settled after nine years of discussion. A commission consisting of Mr. Douglas, the District Forest Officer, Mr. Tremenhare, the Collector, Major Grant, Superintendent of Survey, Mysore, and Colonel Campbell-Walker, Conservator of Forests, Mysore, perambulated and settled the boundary which was demarcated with six large stones marked A to F, and cleared to some extent of jungle.

178. In the same year the original proposal of the Board of Revenue to have a simple working plan prepared was given partial effect to by the appointment of Mr. Arbuthnot on special duty to value the forests.

That officer's work began and ended in Benne reserve, for which a valuation of the standing timber was made and rough notes for a working plan prepared.

179. Mr. Arbuthnot estimated that there were only 1,800 Teak trees which contained saleable timber on the whole area of 11,191 acres and between 3,000 and 4,000 Blackwood, Vengai and Ventek. The dominant tree was no longer the Teak but the Karimathi (*Terminalia tomentosa*) of which he estimated about 20,000 to be ripe for removal.

His proposals were to convert this timber into sleepers and at the same time to introduce rigid protection to restore the Teak which was being exterminated by fire.

180. No working plan was prepared, but the forest was opened to sleeper-felling, under the general scheme of railway sleeper supply carried out in many of the forests of the Southern Circle during the years 1899-1902.

The Benne forest was indented on for a supply of 7,500 broad gauge Karimathi sleepers to be delivered in January 1901 at the Calicut railway depot for the Cannanore extension.

181. Work began with the monsoon in June 1900 and while sawing contractors were being collected, some 1,700 trees were felled by the Kurumbers.

The plan of operations was to saw the timber up in the forest, to cart the sleepers to the right bank of the Karampoya, thence (by river if possible, but if not by cart) to Mombat, and to float them down the Nilambur river to Calicut.

All kind of difficulties were at once encountered. The sawing contractors, of whom 30 to 40 were recruited from Ootacamund, Malabar and Mysore, soon found that the logs provided were so full of flaws that the contract rate of 14 annas for each accepted sleeper not only did not give them any profit but did not provide them with sufficient funds to keep their gangs in food. By the middle of August only one lot of 166 sleepers had been prepared by 36 gangs and the Ranger had had to give advances to the amount of Rs. 1,000.

Another great difficulty was the want of elephants and the sawing gangs, instead of being able to work in the depot under shelter, had to saw up the logs in the forest exposed to heavy rain and cold winds with the result that the most of the men bolted and work came to a stop.

Warrants were issued in every direction and by enforcing the terms of contract and by Mr. Hadfield's personal exertions some defaulters were induced to return and other contractors obtained for a higher rate.

182. Fair progress was made in September and October, but, towards the end of the latter month, smallpox, dysentery and malarial fever broke out severely. Several men died at the Gudalur hospital and elsewhere and most of the rest again bolted.

By June 1901, with an amount of trouble, sickness and loss of life out of all proportion to the results obtained, nearly 6,000 sleepers were delivered at Calicut and the work was stopped.

183. The accounts show that the actual expenses of the sleeper supply amounted to Rs. 19,757-1-8 and the sale of sleepers to Rs. 20,153-0-0, while the wastage of timber felled but not converted amounted to 70 per cent.

The whole undertaking left the Benne forests with an evil reputation that will last for years. It is impossible now to attract skilled labour there and the moral of the story is that we must in future rely on local labour for all work within the forest.

184. In 1903, attempts were made to supply some part of the large demands for mine timber at Kolar, which amounted to 75,000 cubic feet, per annum.

It was reported from the Nilgiris that 250,000 cubic feet of Karimathi and 50,000 cubic feet of Dinduga were available.

A conference was held at the mines between the Mining Board and the District Forest Officers of the Nilgiris (Mr. Jackson), Coimbatore and Malabar. Nothing definite was settled, as the Mining Board had already placed its contracts for 1904-1905; but as it appeared probable that in future years a contract would be made, Mr. Jackson commenced the felling of Dinduga in anticipation.

185. In June 1905, Mr. Gass, the Conservator, stated that a Government depot would be started in Mysore under the control of the District Forest Officer, North Malabar, and 35,000 cubic feet of timber were to be stored there before the expiry of the 1904-05 contracts above referred to.

Mr. Jackson was directed to place himself in communication with Mr. P. M. Lushington, District Forest Officer, North Malabar, under whose management sales were to be conducted.

186. In accordance with these arrangements, 16,457 cubic feet of Dinduga were felled in the Mudumalai forests, of which 14,218 cubic feet were sold for Rs. 8,917-2-6 in the North Malabar divisional depot at Nanjangode. The greater part, if not all, was sold to the Ordinance Department and not to the Gold Fields, but the actual details of sales, which were conducted by Mr. P. M. Lushington, are not available.

Out of the balance of about 2,200 cubic feet, 1,920 cubic feet were later written off as unsaleable, leaving 280 cubic feet at the Nanjangode depot.

Most of this material was felled by the side of various cart-tracks and roads in the Mudumalai working circle.

187. We now come to the last of the fellings of mature timber, which took place from October 1906 to January 1908 in the north-west corner of Block I in accordance with the prescriptions of Mr. Jackson's Working Plan. The following material was felled :—

					C. FT.
Teak	...	...	...	427 logs	14,798
Vengai	...	...	...	210 "	6,717
Rosewood	...	...	...	61 "	3,018
Venteak	...	...	...	148 "	4,649
Teak	...	...	...	124 tholais	1,338
Vengai	...	...	...	47 "	528
Jal	...	...	...	86 logs	974
Rosewood	...	...	...	10 tholais	128
Venteak	...	...	...	6 "	103
Total				1,119 logs and tholais	32,253

Of this, 10,525 cubic feet of Teak, Vengai and Venteak were sold in the forest during December 1906 for Rs. 4,344-8-11.

In February 1908, 1,201 cubic feet of Venteak were sold in the forest for Rs. 750-11-6 and in April 1909, 1,708 cubic feet of Venteak were dragged to the Jaldari depot and sold for Rs. 567-13-2.

188. The balance of 18,925 cubic feet had been left lying in the forest unsold for some years, owing to the difficulty of extraction and to its inaccessibility. During the year 1910, the whole of it was dragged out, partly to the Maragaddai depot, whence a forest cart-track was constructed through the Wynad forest by Mr. Foulkes to join the main road, and partly to the Jaldari depot.

The timber dragged to Maragaddai, consisting of about 12,000 cubic feet of Teak, Rosewood, Vengai, Jal and Venteak, was recently sold (January 1910) and fetched Rs. 14,393-1-2.

189. In their Resolution Forest No. 268, dated 19th November 1910, the Board sanctioned Mr. Cox's revised preliminary working plan for the Mudumalai and Kumbarakolli leased forests and the Benne Reserved forest in the Nilgiri district. This plan superseded Mr. Jackson's preliminary working plan which had been sanctioned by the Board in 1907.

190. From the executive point of view great strides were made under Mr. Cox's plan.

The forest was rendered more accessible by much needed internal roads and the serious problem of the unhealthiness of the staff was resolutely tackled.

Existing camp sites were either improved or abandoned.

191. In January 1913 the Range headquarters were moved from Benne, the old headquarters, to Mudumalai. Kakkanhalla and Teppakadu camps were permanently abandoned and a new camp site was selected at Doddakatti and a Ranger's and District Forest Officer's inspection sheds were erected between 1914 and 1917 in order to open up those portions of the forests north of the Jainbarribetta ridge.

192. The present camp at Kargudi was erected between the years 1912 and 1917 and further additions were made between 1920 and 1924. Kargudi became the Range headquarters with effect from 1st April 1915.

193. Benne camp was removed in 1923 from its previous site in the Benne hole valley to a much healthier and pleasanter situation on a hill a mile or so to the west.

The immediate effect of the removal of the camp sites out of the stream beds was a distinct improvement in the health and morale of the staff.

194. On the silvicultural side Mr. Cox's plan provided for the continuation of improvement fellings, inaugurated by Mr. Gamble in 1884, and subsequently modified by Mr. Popert in 1885, but on more concentrated and definite lines than had hitherto been attempted, and these were carried out for some 12 years. All improvement fellings were, however, stopped by the Chief Conservator (Mr. Tireman), in his Memorandum No. 3917/23, dated 2nd June 1923, who was not prepared to countenance their continuance on the grounds of—

(a) their ineffectiveness,

(b) the difficulty of supervision and lack of concentration involved in their execution.

195. From 1923 onwards a few experiments in raising Teak by artificial means or naturally from seedbearers have been carried out on a small scale, but several of the sites were ill-chosen.

A more ambitious attempt at artificial regeneration was made in 1922–23 under the orders of the Chief Conservator when 226·5 acres were clearfelled near Kargudi camp. The locality was unhappily chosen and the result is largely a failure.

196. For the last two or three years the District Forest Officer has taken up small areas for experimenting with different methods and treatment of artificially regenerated Teak, *Pterocarpus Marsupium*, *Lagerstroemia lanceolata*, *Gmelina arborea*, *Albizzia odoratissima*, *Albizzia Lebbeck*, *Eucalyptus*, *Acacia*, etc. The most promising of these experiments was commenced in 1925 when Mr. Dyson the District Forest Officer carried out sowings of Teak and a field crop of ragi simultaneously by departmental agency; this experiment was continued and elaborated in the following year and will be discussed in detail in Part II, Chapter II, section 3, paragraphs 290 and 291. Several experiments with exotics have been carried out in the past. Specimens of both the Mahoganies are found and the Ceara Rubber is found at Benne (old camp). The Silver Oak (*Grevillea*) grows well at Benne and Mudumalai and there is a specimen of *Eucalyptus maculata* 600 yards from the Kraals at Teppakadu on the Masinigudi road. In 1925–26, an attempt was made to grow *Eucalyptus robusta* in the Kargudi clearing but failed on account of browsing—one or two trees are however doing well in the Nursery at Lower Kargudi. *Acacia dealbata* was tried on a small scale but failed.

Sandalwood sowings were commenced in 1920 round the Kargudi camp, but the percentage of success is probably not more than 14 per cent altogether.

The existing trees are mostly healthy and some of them have put on very good growth. The sambur which are so numerous round Kargudi, so far have made very little, if any, attempt to browse on them.

197. Elephant capturing operations were commenced in 1910 and have been carried on every year since.

198. The following is a brief summary of the elephant capturing operations during the period of the last Working Plan :—

Operations were commenced in 1910. A permanent kraal was erected at Teppakadu and three pits were excavated on the migratory tracks which cross the Moyar River above the falls.

The first attempts resulted in failure owing to lack of training on the part of the staff.

1911.—Ten pits were dug and four temporary kraals were erected.

Seven elephants were caught and in addition two wild elephants died as the result of operations.

The covering of the bottom of the pits was increased to 6 feet in depth to prevent the elephants from being damaged by rock out of which the pits had to be blasted.

A new permanent kraal was put in hand.

1912.—Ten of the old pits being useless, eleven fresh ones were dug.

Two new temporary kraals were constructed.

Twelve elephants were captured and there were three casualties in addition.

The first annual sale of elephants was held at Walayar at which two of the 1911 captures were sold.

1913.—No fresh pits were dug.

A third double permanent kraal was completed.

Nine elephants were captured and kraaled.

There was one casualty.

1914.—Three new pits 12' × 12' × 12' were dug.

In all 22 pits were in use.

Ten captures.

The number of elephants seen was noticeably fewer than in previous years.

There was one casualty.

Eleven elephants from the range were sold at Walayar for Rs. 27,200.

1915.—Twelve captures of which one was captured at Peepigaddai in Benue Block where one solitary pit was dug.

One casualty.

1916.—There was only one capture.

Various reasons were advanced to account for this—

(1) That elephant breeding is less rapid than elephant catching.

(2) That the unusual fires kept the herds away.

(3) That the herds had learnt to avoid the pits.

1917.—Four new pits were dug south of the old ones.

Five captures.

Two elephants died shortly afterwards.

More elephants were observed in the forests this year.

1918.—One new pit was completed.

There was only one capture but a herd passed through the pits.

1919.—Three captures.

Six herds however crossed the Moyar through the pit area.

1920.—Five new pits were dug on the left side of the Moyar and 30 pits were in use. There were three captures. The Ranger reported that five herds crossed the Moyar, some near the fourth mile Gudalur—Mysore Road.

One elephant died.

1921.—Thirty-one pits were covered.

Nine captures and in addition there was one casualty.

1922.—Twelve new pits were dug—43 pits in all being covered.

There was only one capture in a specially dug pit.

There was one casualty.

1923.—Five new pits were dug; in all 48 pits were covered.

Two cows fell and both died of pit injuries.

1924.—Forty-seven pits were in use.

There was one capture who died immediately after being enkraaled.

1925.—Twenty-five pits were covered on the left bank of the Moyar and 21 on the right bank.

The feature of the season was that thirteen elephants fell between 18th and 21st January. Of these nine were enkraaled, one very young calf was released, one injured calf was shot and two tuskars dug themselves out.

1926.—Forty-six pits were covered.

There were 12 captures, five of which (calves) were sold a few days after capture for Rs. 4,300. One calf was born in captivity and there were two casualties.

The period during which the pits are covered has varied from year to year, generally from December to June.

The earliest time of covering has been October and occasionally pits have been uncovered as late as mid-July.

199. Since 1915 there has been a marked decrease in the number of falls, 1925 and 1926 being exceptions.

The District Forest Officer notes that the district is short of good 'kumakis' and that new pits are needed.

There is a certain amount of evidence in support of the notion that the elephants know the location of the pits.

The Working Plans Officer in March 1926 watched a small herd of about seven elephants crossing the Moyar somewhere below the seventh mile on the Gudalur-Mysore Road.

The forest guard says that this is a regular crossing place.

200. The question of digging pits higher up the Moyar may have to be seriously considered in a year or two unless the number of falls in 1925 and 1926 is maintained.

Since 1910 there have been in all 130 elephants captured, of which 65 have been sold and 24 have died.

201. In 1911 the elephant nursery was transferred from Chedleth in Wynad district, to the Mudumalai Range, the reason being the damage done by constant elephant grazing in the Chedleth forests, the necessity for supplying the District Forest Officer, Nilgiris, with some young elephants fit for carrying fodder to captures and the facilities for training young elephants to timber work which the improvement fellings provided.

Through this nursery all elephants from the VI Circle, which for the time being are for any reason not classed as working elephants, are passed.

202. This nursery was moved from time to time to different places throughout the forest and on 4th February 1927 was transferred to Begur Range in Wynad.

203. *Bullocks*.—Four pairs of bullocks are at present maintained in the Mudumalai Range. They are employed in carrying water to the buildings, in the carriage of building and road materials, elephant provisions, etc.

204. *Bamboo*.—A general flowering of bamboo in the south and west of the forest commenced about 1915 and was complete by 1924.

SECTION 2.—PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS.

205. It is obvious from the history of the forest that its present condition is due to two causes, over-exploitation in the past and fires—in other words, to want of conservancy. This has led to the establishment of a dense growth of coarse grasses over the greater part of the forest which to a great extent prevents any natural regeneration from establishing itself, causes deterioration of the soil through non-aeration, and at the same time affords a highly inflammable medium for the spread of fire. The most degraded condition of the forest is found in Doddakatti Block and in Compartment 28 in the north of Mudumalai Block where a scrub savannah is often all that is left of what must have once been high forest.

206. In 1907 a working plan was prepared by Mr. Jackson, the main provisions of which were the subdivision of the forest into manageable blocks and the continuation of the improvement fellings prescribed by Mr. Popert on a more extensive and localised scale.

In reality these 'improvement fellings' consisted in nothing more than the removal of trees of six feet girth and over and of unsound trees of over three feet girth.

The importance of fire protection was not realized and protection was confined to those compartments in which fellings had taken place, for a period of five years only.

The plan, in short, was one of exploitation and aimed only at showing a profit on the working which was to the detriment of the forest's future.

207. This plan was superseded in 1910 by Mr. Cox's revised working plan which marked a turning point in the history of the Mudumalai forests.

Mr. Cox wisely decided to subordinate financial considerations to silvicultural working and to make a really determined effort to cope with the fire problem, conservancy and not exploitation was to be the guiding principle of management.

We are not here concerned with the very necessary opening up of internal communications of the forest nor with such permanent demarcation as was carried out under Mr. Cox's plan, mention of which has been made elsewhere (Chapter V, section 1).

208. Firstly, the improvement fellings as prescribed and carried out under Mr. Cox's plan must be considered in some detail—no other timber exploitation was provided for.

The actual results of improvement fellings which were commenced in 1886 under Mr. Gamble's direction had, up till 1910, been trifling, the area felled over in 20 years being less than what Mr. Gamble had intended should be felled over in three years.

209. Mr. Cox's prescriptions were as follows:—

(1) All inferior species to be ringed when interfering with the growth of sound young teak; but not otherwise.

(2) All unsound, dying and dead Teak trees to be cut flush with the ground, provided their removal would not cause excessive blanks and they were not useful nor required for reproduction by seed.

(3) All young Teak poles and saplings which were rotten at the foot and otherwise illgrown to be cut back.

(4) In the case of coppice poles from old stumps, unless there was a single sound pole likely to detach itself from the stump, the latter was to be cut flush with the ground, provided the application of rule (2) was not ignored.

(5) The coppicing to be carried out from June to January as far as possible and the ringing from January to June. The general idea was to produce a young crop of Teak as soon as possible and to bring it to maturity under rigid fire protection.

210. Improvement fellings were carried out on these lines with some subsequent modifications for about twelve years.

In practice most of the marking was entrusted to the rangers and the subordinate staff with the not unnatural result that the work was more often than not carried out in an unsatisfactory manner, as a perusal of the contemporary inspection notes will show. Mr. Cox's own remarks as Chief Conservator twelve years after his Working Plan came into operation are full of significance.—(Chief Conservator's Proceedings No. 23, dated January 1923, on an Inspection Note of the Conservator of Forests, VI Circle).

* * *

Their object [Improvement

fellings] was three-fold :—

Firstly, to produce a young crop of Teak under the standing forest, partly by natural seed regeneration and partly by coppice from the stumps of inferior Teak cut back in the process of felling.

Secondly, to improve the condition of the growth of the existing forest partly by removal of trees containing saleable timber which were not required for the final crop and partly by removal or killing of useless species which were cramping the growth of Teak and other valuable trees.

* * *

“Of these three objects, *the first has failed.*”

The inspection of these forests after ten years' absence shows that there is no more natural seedling regeneration than there was before the fellings took place * *

The second object has been attained to a considerable extent, although the fellings have not in places been carried out as carefully or as fully as might have been the case; and the second operation (cutting back and ringing) provided for in the working plan has not been carried out at all.”

211. Compartments 1, 2, 3, 4, 5, 6, 7 and 8 have had improvement fellings carried out in them according to Mr. Cox's prescriptions, representing all three types of forest, but the improvement felling in Compartment 8 carried out between 1921 and 1923 was on much more drastic lines than anything attempted before, and amounted in places almost to a clearfelling.

212. Statistics showing the results of these fellings are available (vide Chapter VI, Para. 249, et seq.) and show beyond any possibility of doubt that the benefit to individual Teak trees has been little short of remarkable. A word of warning must, however, be uttered. Compartment 8 consists of type III forest on the higher ground and a modified type II in some of the valleys *but it is not typical* of the great areas of No. II type forest, the type in these forests most in need of improvement. There is not the dense growth of coarse grasses and hence the natural regeneration has a fair chance of coming up and fires are not nearly so serious. The severe opening up of the canopy has consequently not let in a crop of coarse grass, though it has, in places, encouraged the spread of Lantana.

A heavy improvement felling of this nature while comparatively harmless or even beneficial in type No. III would be absolutely fatal in the heavy grass type II areas.

213. Parts of Compartments 4 and 5 and the whole of Compartment 6 are of type No. I.

The stocking in these localities, chiefly owing to the presence of large bamboo clumps which have died, is generally very open and, for the same reason, natural regeneration is deficient. It follows therefore that improvement fellings though no doubt benefiting individual trees, of which comparatively few are Teak, have little or no effect in increasing a seedling crop on the ground.

214. The result in the heavy grass areas (Type II) is similar. Improvement fellings, made to encourage a crop of young Teak, must be severe but the seedlings stand no chance against the grass. It therefore seems justifiable to draw the following conclusions :—

(1) With the exception of type III areas any improvement fellings successfully carried out are of necessity of the nature of what is known in Burma as ‘O’ Improvement fellings, i.e., fellings for the benefit of the older crop.

(2) That ‘Y’ Improvement fellings, i.e., fellings for the benefit of the young growth are, with the exception perhaps of those in type III areas, a failure in so far as the establishing of a seedling crop of Teak goes. But that, if growth is still in the sapling stage and already out of reach of the grass benefit will result. Much of the Teak, however, apparently in the sapling stage is in reality often much older than it looks, through constant suppression by grass and damage by fire in its youth; in this case the response to a greater admission of light may be very slow and in all probability such Teak will never attain exploitable dimensions.

(3) That, in the case of type III areas, both ‘O’ and ‘Y’ Improvement fellings may prove successful, but that such areas are not really worth improvement as there is good reason to believe that a considerable percentage of the Teak of over middle age, say 80—90 years, in such areas is unsound (out of 25 trees felled at random by the writer in Compartment 8, 4 were found to be very unsound, i.e., 16 per cent) and that this type of forest being unsuited to the production of large sound Teak lends itself more to coppice felling. The number of 6 feet girth Teak in genuine type III areas is very small, while the rotation necessary to attain this girth would be excessive.

Mr. Whitehead as District Forest Officer in 1921 found that the age required for Teak in this type of forest to reach an average 3' 11" girth is 155 years.

(4) That the subordinate staff cannot be trusted to carry out the marking operations properly.

(5) That it is not possible to build up a new forest of value entirely by these methods but that some form of compromise must be adopted, e.g., clearfelling and artificial regeneration of suitable areas and except in type III, selection fellings of saleable timber of a given girth combined with modified improvement operations in areas not so suited.

215. Between 1907 and 1917 various attempts were made to induce the local Kurumbers to take up portions of forest for Tuckle cultivation in Benne Block.

In 1909 the District Forest Officer (Mr. Cox) wrote as follows :

"I object altogether to the Tuckle system as at present worked in the Benne forests. Nearly 150 acres of forest appear to have been hacked down in Benne. Only a small part of it has been cultivated and the necessity of planting or sowing the clearings with Teak, etc., apparently has been more or less lost sight of."

The, for the most part, deplorable state of what remains of these Tuckle areas in Benne block to-day are witness to the truth of the above statement. The system as worked was a failure. The Kurumbers took no interest in the raising of forest plants and it is preferable that they should be employed direct by the department.

216. Next, there is the question of fire protection and the possibility of the grass being sufficiently reduced to give natural regeneration a chance.

Prior to 1909 no regular system of fire protection was in force.

217. From 1910 onwards a serious attempt was made to fire protect the Mudumalai forests on the lines laid down in Mr. Cox's Plan. His scheme briefly consisted of a system of major and minor fire lines amounting to a total length of 120 miles.

Fire patrols were employed throughout the fire season, which varies in duration from year to year.

218. A reference to the list of fire occurrences (Chapter II, Section 2, paragraph 80) will show that while fires of varying extent have been reported each year since 1910, the years 1911, 1914 and 1920 when 13,000, 12,000 and 30,500 acres, respectively, were burnt were notoriously bad.

219. A brief analysis of the fires between 1910 and 1922 when early burning was introduced (except in Block I) may help to illustrate more clearly the results of fire protection under the last plan.

During these 12 years over 84,000 acres of forest were burnt.

Of this, approximately 41,570 acres were burnt in Doddakatti Block which leaves 41,137 acres. Several of the big fires that burnt Doddakatti Block also burnt the north of Mudumalai Block and may be put at (3,000 plus 10,425) 13,425 acres.

Deducting this figure from 41,137 acres we get 29,712 acres.

Of the other Mudumalai Block fires amounting to about 10,000 acres perhaps we may assume that half were in the northern part of that block, say 5,000 acres.

This leaves (29,712 minus 5,000) 24,712 acres.

The total area of the forest *omitting* Doddakatti Block and say 5,000 acres for the north of Mudumalai-Benne Blocks comes to about 38,000 acres. (This area does not take into account the portion of Masinigudi Range added under this Plan.)

220. It seems fairly safe to conclude therefore that about 13,000 acres (38,000 less 24,712 acres) have probably escaped fire altogether. This area may well be greater on account of many areas being burnt on several occasions.

221. Look-out stations and signalling devices have been tried but, with people like the Kurumbers, were doomed to failure.

222. In 1922 new methods were tried—the system of early burning was applied to Blocks II, III and IV, Block I being protected by fire lines and patrols as before; this has been repeated in subsequent seasons.

223. In 1922 and 1923 no fires were reported. In 1924 in the early burnt area 100 acres were burnt. In 1925 no fires were reported in the early burnt areas but it was realized that to early burn Block III was a fatal mistake as the profuse natural regeneration of Jal (Shorea Talura) which was occurring in this block was thereby destroyed. In 1926 a reversion to the older method was made in the case of Block III and a line about one-fourth of a mile broad was burnt along the Mysore boundary; unfortunately fires from Mysore crossed the line before burning was completed.

224. In 1926 Mr. Dyson, the District Forest Officer, stopped all early burning on February 13th as the fires were becoming too fierce. His remarks on the subject are on record " . . .

the writer (Mr. Dyson) has no hesitation in condemning the system as far as this locality is concerned. Unless the District Forest Officer is on the spot to stop the firing when it becomes too fierce it is very apt to continue too long (and the District Forest Officer cannot be everywhere). It leads nowhere and undoubtedly destroys a great deal of much needed undergrowth, tending to encourage the grass, our greatest enemy."

At the Conservators' Conference in June 1926 held at Coimbatore the system of early burning in heavy grass forests was unreservedly condemned. The whole question is extremely difficult.

225. The trouble with ordinary methods of fire protection is not the fires that cross from Mysore and elsewhere which are *preventable* and are often due to slackness or inefficient organization, but the fires that are started inside the forest by people like the Jain Kurumbers who fire the jungle to facilitate movement. Another type of fire difficult to detect are the fires started by people burning fire lines to cover up their own mistakes.

226. To sum up, reasonable degree of success has been achieved in the case of Block I. Protection in Block III and in the north of Block II has been a hopeless failure.

227. In the remainder of Block II and the eastern half of Block IV protection has failed only in so far as there have been three serious fires in 16 years after a varying number of years comparative immunity, so that here successful protection seems quite possible if the system is modified to suit the conditions.

228. The western part of Block IV is more or less naturally immune from fire owing to the isolation afforded by large areas of swamps and the less inflammable nature of the forest itself.

229. How to keep fire out of the ruined and uninhabited Doddakatti Block is a very difficult problem.

Early burning in this block is sheer folly. In the other blocks there might be something to be said in its favour if the grass would, in practice, burn early; the trouble is that it generally won't or, if it does, the period during which it can be *safely* burnt may be extremely limited so that there is no time for a large area to be carefully gone over.

But if these forests are to have a future at all, they must be successfully fire protected and success does not consist in more or less keeping out fire for ten years and then having about half the forest burnt just when the young growth is getting a chance to master the grass

SECTION 3.—SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN.

230. A.—Roads and bridges constructed since 1910.—

Name.	Years of construction.	Length in miles.	Cost of construction.	Remarks.
			RS. A. P.	
1. Kargudi Hill road	1911-13	1 mile 4 furlongs.	2,604 0 0	Metalled.
2. Teppakadu Elephant Camp road ..	1911-12	A short length of road from Masinigudi road to the kraals.	61 0 0	Metalled
3. Thorapalli-Mudumalai road. (This road is metalled from Thorapalli to Block line I/11, a distance of 27 furlongs.)	1911-24	6 miles 4 furlongs.	7,981 0 0	Cost of planting mile and furlong stones is also included.
4. Malkarahalla Bridge	1916-18	..	1,813 0 0	..
5. Bidurhalla Bridge	1916-18	..	3,203 0 0	..
6. Mudumalai-Doddakatti bridle path and extension to Karboi.	1913-17	10 miles 1 furlong 149 yards.	5,510 0 0	Bridle path.
7. Conversion of General Morgan's cart-track into a road (Kargudi Mudumalai).	1913-14	4 miles 3 furlongs.	584 0 0	Gravelled.
8. Path along the Mysore boundary ..	1916-18	1 mile 4 furlongs.	6 0 0	Inspection path—a trace only.
9. Honnarhatti-Jaldari path	1916-18	8 miles 6 furlongs 33 yards.	1,798 0 0	A bridle path.
10. Kargudi Range Quarters road	1916-18	10 chains.	300 0 0	Metalled.
11. Jaldari-Maragaddai path	1918	8 miles.	11 6 0	A trace only. Would require realigning for cart traffic.
12. Conversion of the Madras Forest College Inspection path into a road (to the Ram site).	1920-21	1 mile 7 furlongs 6 chains.	419 4 0	..
13. Road from upper Kargudi to Ram site.	1922-23	3 furlongs 8½ chains.	412 2 0	Earth road—conversion of inspection path by Madras Forest College.
14. Depot road from the new subordinates' line at Kargudi to a depot in compartment.	1923-24	2½ furlongs.	77 11 6	..
15. New Range Quarters road	1923-25	11 chains.	222 0 0	Metalled.
16. Branch of Benne-Mukkatti road to the new camp site at Benne.	1924-25	6 furlongs.	201 6 0	..
	1925-26	Nil.		
	1926-27	Nil.		

An amount of Rs. 17,987 has been spent on repairs from 1909-10 to February 1927.

231. B.—Buildings improved or erected since 1910.

Name.	Years of construction.	Cost of construction.			Remarks.
		RS.	A.	P.	
1. Benne Inspection serambi and godowns	1890	550	0	0	Dismantled and re-erected at the new site at a cost of Rs. 473-4-0 in 1924-25.
2. Benne Ranger's quarters and godowns	1898	238	0	0	There is some doubt about the date of erection and the cost of construction of these buildings.
3. Benne Office quarters and godowns	1898	350	0	0	..
4. Benne Elephant shed	1909	75	0	0	Dismantled and re-erected at Mudumalai at a cost of Rs. 330 in 1913-14.
5. Mudumalai Inspection serambi and godowns ..	1890	1,000	0	0	Burnt down in March 1920.
6. Mudumalai Rangers' quarters and godowns ..	1899	380	0	0	Improved in 1911-12 at a cost of Rs. 511.
7. Teppakadu Ranger's serambi and godowns ..	1899	530	0	0	Improved in 1903-10 at a cost of Rs. 455. Dismantled and re-erected at Kargudi as clerks' serambi and for store accommodation in 1914-16 at a cost of Rs. 876.
8. Teppakadu 3 double elephant kraals, eight temporary single kraals and lines.	1909-13	1,856	0	5	..
9. Kargudi Inspection bungalow and out-houses ..	1912-13	4,848	0	0	..
10. Stables to the above bungalow	19 5-17	938	0	0	..
11. Kargudi Ranger's serambi and godowns	1913	1,849	7	0	..
12. Out-houses for the Ranger's serambi at Kargudi and at Teppakadu.	1915-17	1,462	0	0	..
13. Kargudi Depot-keeper's serambi and godowns ..	1913	1,153	0	7	..
14. Kargudi subordinates' line	1915-17	1,703	0	0	..
15. Doddakatti bungalow with out-houses and Ranger's quarters with out-houses (Temporary type).	1914-17	859	0	0	..
16. Motor shed at Kargudi bungalow	1920-21	224	0	0	..
17. New Range officer's quarters at Kargudi	1921-25	3,958	0	0	..
18. New subordinates' line at Kargudi	1922-24	2,730	0	0	..
19. Rangers' Rest-house at Benne (new site)	1923-25	502	0	0	..
20. Subordinates' lines at Benne (new site)	1923-25	989	0	0	..
	1-25-26 and 1926-27—Nil				

232. *Improvement of water supply.*—All camps except the most important one (Kargudi) and Doddakatti, where the supply is deficient in the hot weather, have a fairly adequate water-supply more or less close to them.

233. Since the Kargudi camp was built, till 1926, water was carried up the hill in carts, originally from a stream near Lower Kargudi. Since the construction of the Ram-site road in 1921, originally a path made by the Madras Forest College, water was taken up the hill in carts from stream near the spot selected as a site for an hydraulic ram.

234. Efforts to improve the water-supply at Kargudi have been as follows:—

1914. Installation of a pump obtained from Mount Stuart to pump water from near Lower Kargudi to the District Forest Officer's Rest House; the erection of iron cisterns at the Rest House and in the Range compound and the laying out of piping.

The pump failed to work satisfactorily after Rs. 3,719 had been spent on it and was handed over to the Madras Forest College in 1920.

1917. A trial well was dug half a mile from the Range Officer's quarters and water was found close to the surface.

Three other wells were sunk but were failures. The cost was Rs. 37-8-0.

1918. Mr. Arnott, a water diviner, located water in six places near Kargudi at a depth of from 22 to 40 feet.

A well was sunk and by March 1920 had reached a depth of 45 feet without water being found.

1920-21. Rs. 214-7-0 was spent on deepening the above well without success.

Trial wells were sunk at Huligal, Manalishola and Jenbarai and completed the following year at a cost of Rs. 64-5-0.

1921-22. Two more trial wells were sunk at Kargudi without success at a cost of Rs. 420-14-6. A scheme for installing an hydraulic ram was taken up.

1922-1925. Consideration of the above scheme.

1925-26. An hydraulic ram was installed by Messrs. Harrison & Crosfield. This ram delivers water into a cistern near the range headquarters, thence it is taken in a water-cart to the District Forest Officer's Rest House. The installation was working satisfactorily in February 1927.

The total cost of the ram was Rs. 919-5-0.

SECTION 4.—PAST YIELD.

235. *Note.*—The figures relating to past yields as given in the various records maintained in the Range Office and the District Forest Office show apparently irreconcilable differences and in only two cases—1913-14 and 1925-26—agree with the abstract of yield given in the Mudumalai Control Journal.

The figures given in column 5 up till 1918 are taken from the Range Office records and from 1918 onwards from the figures given in the Mudumalai Control Journal maintained by the District Forest Officer.

Figures given in Column 6 up till 1918 are taken from the Range Office and would appear to refer to the quantity of timber actually disposed of.

The records after 1918 till the last year or two are missing from the Range Office.

Abstract figures of the revenue obtained by the sale of timber are given in chapter V, section 5.

Statement of past yield, 1910—1926.

Year of working.	Block of forest.	Nature of fellings made.	Area exploited in acres.	Out turn.		Price obtained
				Actual yield of timber in cubic feet.	Quantity of timber disposed of in cubic feet.	
1910-11	I—Compartments 1, 4 and 5.	Improvement felling.	Not known..	27,203.62	15,831.11	Rs. 7,805 11 8
1911-12	I—Compartments 4, 5 and 1 new.	Improvement felling and clear felling compartment lines and road trace.	Do. ..	39,772.22	18,395.13	7,360 7 9
1912-13	I—Compartment 1 (old), 1 and 2 (new).	Do.		45,744.61	18,666.23	(a) 6,165 6 0
1913-14	I—Compartment 2 ..	Improvement fellings.	22 acres ..	3,522.50	31,920.28	16,532 2 2
1914-15	I—Compartments 2 and 3.	Do.	820 acres ..	51,044.60	51,044.60	19,961 11 1
1915-16	I—Compartment 3 ..	Do.	854 acres ..	42,762.32	42,762.32	7,750 0 0
1916-17	I—Compartments 3 and 5.	Do.	1398 acres ..	24,822.82	24,715.68	(b) 5,355 6 10
1917-18	I—Compartments 5, 4, and 7.	Do.	1370 acres ..	33,525.25	33,525.25	13,996 0 0
1918-19	I—Compartments 2, 3, 4 5 and 7.	Do.	Not known..	77,135.00	Not known.	..
1919-20	I—Compartments 4, 5 and 6.	Do.	Do. ..	46,145.00	..	..
	I and II	Clearing block line ..	..	9,244.00	..	..
	I	Clearing Madras Forest College camp site at Kargudi ..	..	654.00	..	..
1920-21	I—Compartment 6 and depots 1—6.	Improvement felling.	Not known.	19,680.00	45,227.73	(c) 23,959 7 1
	II and IV	Clearing block line ..	} ..	10,133.00	..	..
1921-22	I—Compartment 8 ..	Improvement felling.		70,645.00	34,134.00	20,760 0 0
1922-23	Do.	Do.		221.00	..	..
1921-22	I—Compartment 9 ..	Not known.	..	65.00	..	..
	I	Felled for specimen 1, Chickrassia tabularis.	..	..	..	..
	IV	Clearing Benne camp site (old).	..	266.00	..	..
	II	Thinning in Mudumalai Plantation.	..	9,778.00	..	..
	II—Compartment 1 ..	Clear felling near Kargudi Rest House ..	20 acres ..	3,641.00	..	(d) ..
	I—Compartment 8 ..	Clear felling.	20 acres ..	1,432.00	..	..
1922-23	I—Compartment 1 ..	Do.	173 acres ..	52,127.00	..	..
	IV	Do.	7 acres ..	591.00	..	..
		(Benne new camp site).				
	I—Compartment 1 ..	Clear felling.	58.5 acres ..	17,416.00	..	..
	II	Do.	11 acres ..	408.00	..	(e) ..
		(Mandakarai tunkle).				
	I	Clearing round Elephant camp at Teppakadu.	10 acres ..	2,703.00	..	..

(a) The timber shown includes balance of old fellings and miscellaneous timber lying at Teppakadu and Kakkabhalla not derived from Improvement fellings. Out of the quantity shown in column 6 nearly 10,000 cubic feet comes from balance in Compartment 1.

(b) Includes timber from experimental felling in Block I.

(c) Must include balance over from previous years.

(d) Low yield due to heavy improvement fellings carried out just before.

(e) Low yield due to its being a bamboo area.

Statement of past yield, 1910-1926--cont.

Year of working.	Block of forest.	Nature of fellings made.	Area exploited in acres.	Out turn.		Price obtained.
				Actual yield of timber in cubic feet.	Quantity of timber disposed of in cubic feet.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	I	Clearing the College path of 1921 and 1920.	..	744.00	..	RS. A P.
	II	Clear felling 7 patches on Kargudi-Mudumalai road for experimental planting of teak.	2 acres ..	81 00	..	..
	I—Compartment 1 ..	Clearing round Lower Kargudi.	10 acres ..	3,492 00	..	..
1923-24	IV	Thinning Benne Plantation.	..	3,124 poles.	3,124 poles.	843 0 0
	IV	Thinning tuckle area between 1909 and 1917.	2.75 acres ..	100 poles.	100 poles.	21 0 0
1924-25	I—Compartment 1 ..	Clear felling (by mistake).	1 acre ..	310.00	..	..
	II	Clear felling by a Chetty for house site.	1 acre ..	408.00	..	..
1925-26	I—Compartment 9 ..	Selection fellings of rosewood over 6" girth and dead and dying Rosewood.	..	6,980.00	..	..
	I—Compartment 3 (part).	Clear felling for coppice regeneration.	25 acres ..	5,296.00	..	..
	I—Compartment 3 (part).	Clear felling for artificial regeneration.	15 acres ..	10,337.00	..	..
	I—Compartment 6 (part).	Do. ..	10 acres ..	5,225.00	..	..

SECTION 5.—REVENUE.

236. *Note.*—The figure (†) given in the Mudumalai Control Journal is obviously a clerical error, the correct figure is given here.

Range Office and District Forest Office figures for the years 1924-25 and 1925-1926 show serious discrepancies. The latter are given and are presumably the correct ones. Records between 1914 and 1920 are missing from the Range Office.

The totals in the Mudumalai Control Journal are incorrectly added up for the years 1913-1914 and 1925-1926.

The correct totals are given here :—

Revenue—1910—1926.

Year.	Timber and other produce removed by Government agency.		Timber and other produce removed by purchasers or consumers.					Confiscated forest produce.	Miscellaneous Revenue.		Total.
	Timber.	Grass and other minor produce.	Timber.	Firewood and charcoal.	Bamboos.	Grazing and other fodder grass.	Other minor produce.		Fines and forfeitures.	Other sources including sale of elephants.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1910-11 ..	RS. 14,443	RS. 153	RS. 6	RS. 2	RS. 5	RS. 461	RS. 36	RS. 21	RS. ..	RS. 319	RS. 15,446
1911-12 ..	6,043	239	1	12	2	263	89	6	14	236	6,905
1912-13 ..	7,474	101	..	7	5	691	17	8	2	6,333	14,638
1913-14 ..	8,497	191	221	7	8	581	23	..	32	17,267	26,837
1914-15 ..	17,993	279	8	..	9	575	178	1	2	27,382	43,427
1915-16 ..	11,911	876	..	..	3	651	35	..	16	32,5. 6	45,588
1916-17 ..	10,052	208	..	24	13	672	71	1	45	14,520	25,616
1917-18 ..	17,037	128	6	4	20	536	23	..	56	17,955	35,765
1918-19 ..	42,636	..	..	..	23	177	19	..	5	173	43,093
1919-20 ..	28,336	340	..	..	28	566	28	18	65	686	30,067
1920-21 ..	18,648	69	† 8,758	50	42	612	52	..	183	24,215	52,629
1921-22 ..	30,532	487	50	..	57	465	34	..	190	2 271	34,086
1922-23 ..	33,214	123	1,881	..	116	455	34	..	122	68,604	1,04,549
1923-24 ..	16,791	..	2,667	4	53	501	82	2	165	19,236	39,591
1924-25 ..	26,292	499	12	6	44	985	897	1	50	11,656	40,443
1925-26 ..	11,437	2,025	242	73	50	960	121	1	..	8,506	23,415

SECTION 6.—PAST EXPENDITURE.

237. *Note.*—The figures under column 17 also include local allowance and from 1921 to 1923 pay and allowances of an Assistant Conservator of Forests.

The totals for the years 1910-11 to 1914-15, 1916-17, 1918-19 to 1922-23, 1924-25 and 1925-26 in the Mudumalai Control Journal are incorrectly added up. The correct totals are given here:—

Expenditure—1910-1926.

Year.	A. Conservancy and Works.									
	Departmental extraction timber.	Grass and other minor produce.	Contractors' ex- traction timber.	Rent of leased forest.	Purchase of cattle including capture of elephants.	Feed and keep of cattle.	Stores, tools and plant	Roads and bridges.	Buildings and other works.	Demarcation.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1910-11	3,188	95	319	4,500	684	4,212	328	1,213	649	183
1911-12	3,014	114	319	4,500	3,237	6,955	411	3,117	2,964	718
1912-13	3,022	92	326	4,500	4,904	11,298	1,212	1,878	2,883	121
1913-14	993	70	228	4,500	4,877	20,496	837	5,665	4,533	167
1914-15	4,150	142	204	9,000	3,588	22,496	660	4,634	2,069	..
1915-16	4,237	53	201	4,500	7,043	24,648	1,151	4,651	3,543	..
1916-17	3,435	65	45	4,500	1,601	22,633	434	3,368	3,112	102
1917-18	5,435	156	89	4,500	1,280	16,489	1,175	7,192	408	..
1918-19	8,284	75	..	..	1,172	19,805	1,123	1,208	575	..
1919-20	5,661	42	..	..	2,085	31,897	908	1,058	331	55
1920-21	2,824	40	..	..	1,548	89,845	1,159	636	1,154	274
1921-22	5,639	140	..	..	3,061	49,388	1,861	2,129	3,049	..
1922-23	10,042	76	..	..	671	33,440	675	4,449	3,928	..
1923-24	9,526	175	..	..	3,302	25,710	619	2,118	4,609	..
1924-25	2,526	61	..	..	1,415	19,906	721	1,528	3,191	..
1925-26	6,736	111	..	..	1,542	16,227	883	1,056	4,480	186

Year.	A. Conservancy and Works—cont.					Establishment and Office.			Total.
	Sowing and planting.	Fire protection.	Cultural opera- tion, timber cutting and other works.	Law charges.	Miscellaneous other charges.	Forest and Depot estab- lishment.	Office estab- lishment.	Office postage and service telegrams.	
(1)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1910-11	438	2,133	310	..	103	4,749	766	148	24,088
1911-12	338	2,968	132	..	5	5,786	1,042	181	35,791
1912-13	91	2,631	3	7	4	5,668	1,110	276	40,526
1913-14	119	2,977	63	..	217	9,881	1,361	355	57,059
1914-15	340	2,301	72	..	3,014	7,663	905	267	61,505
1915-16	96	2,849	85	..	(valuation). 1,71,850 (acquisition)	7,862	1,029	232	2,34,030
1916-17	240	2,437	105	8	4	8,382	1,008	298	51,772
1917-18	175	3,247	103	..	373	7,029	2,286	282	50,219
1918-19	201	2,867	158	9	10,361	7,737	540	422	54,637
1919-20	511	4,507	255	..	535	9,812	526	487	59,144
1920-21	531	3,776	206	1,941	1,548	19,395	2,805	1,009	78,691
1921-22	968	2,740	245	2,127	..	23,678	5,380	1,159	1,02,104
1922-23	1,697	1,859	536	..	106	21,182	1,500	449	80,610
1923-24	1,757	1,757	208	..	..	15,266	1,257	169	66,803
1924-25	2,984	1,742	..	..	42	14,060	1,584	383	50,148
1925-26	3,382	1,979	..	..	..	15,598	4,763	958	57,901
						(Forest and Office establish- ment.)	(Forest and Office travelling allowance).		

SECTION 7.—STATEMENT OF PROFIT AND LOSS.

238. The following statement is given for what it is worth :—

Year.	Expendi- ture.	Revenue	Profit.	Loss.	Remarks.
	RS.	RS.	RS.	RS.	
1910-11	24,088	15,446	..	8,642	
1911-12	35,791	6,905	..	28,886	
1912-13	40,526	14,638	..	25,888	
1913-14	57,059	26,837	..	30,222	
1914-15	61,505	46,427	..	15,078	Includes Rs. 3,000 for valuation.
1915-16	2,31,030	45,588	..	1,85,442	Includes Rs. 1,71,849 for acquisition.
1916-17	51,772	25,616	..	26,156	
1917-18	50,219	35,765	..	14,454	
1918-19	54,637	43,093	..	11,544	Includes Rs. 10,295 for acquisition.
1919-20	59,144	30,067	..	29,077	
1920-21	78,691	52,629	..	26,062	
1921-22	1,02,104	34,086	..	68,018	
1922-23	80,610	1,04,549	23,939	..	Includes Rs. 95,900 by sale of elephants.
1923-24	66,803	39,501	..	27,302	
1924-25	50,143	40,443	..	9,705	
1925-26	57,901	23,415	..	34,486	

Under "Expenditure" is included all Capital expenditure as well as Ordinary.

Range establishment charges are included.

Revenue and expenditure figures include sale-proceeds of elephants captured and sold, and nursery and elephant capturing expenses.

The Nursery was not a proper charge on the range and formed the biggest item of expenditure.

CHAPTER VI—STATISTICS OF GROWTH AND YIELD.

239. Extracts from the Control Journal—

"In 1921 the District Forest Officer (Mr. Whitehead) felled 7 Teak trees in Block I, (Compartments 1 and 2) in the areas in which improvement fellings were carried out in 1911, his object being to see from a study of the rings what effect the improvement fellings had had on the rate of growth of the trees.

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Too much reliance cannot of course be placed on results from such a small number of measurements, but the results, so far as they go, indicate a very remarkable increase in rate of growth following the improvement fellings.

240. The following table compares the annual increment per cent for the 10-year periods preceding the improvement fellings :—

Tree No.	Average annual increment per cent. 1901-1911. (Volume).	Average annual increment per cent— 1911-1921. (Volume).	Average annual increment per cent in period 2 if diameter growth had gone on as in period 1
1	0.75	1.04	0.72
2	1.55	3.27	1.44
3	1.16	1.35	1.10
4	0.46	0.82	0.45
5	0.69	1.66	0.66
6	6.06	5.80	4.67
7	3.37	5.23	2.87

241. A decided increase in increment per cent is evident in all trees except No. 6. This was a young tree and a fall in the increment per cent is to be expected even though the tree has grown more quickly in the second period.

242. In 1921 the District Forest Officer (Mr. Whitehead) found the average age for Teak in type II to be 127 years for an average girth of 5' 1", and in type III to be 155 years for an average girth of 3'-11" (by ring counting).

243. In 1921, 30 sample Teak trees in each of types I, II and III were marked and measured by the District Forest Officer in areas which had been subjected to improvement fellings.

244. An analysis of the rate of growth for period November 1921 to January 1925 ($3\frac{1}{4}$ years) in types I and II is given below. Contrary to expectation it is seen that the rate of growth in type II is greater than in type I. The explanation for this is evident when the trees are examined on the ground as those put down as type I are in many cases growing on land which, though near a stream, is ill-drained and unsuitable to teak.

Girth class.	Type I.			Type II.		
	Number of trees measured	Average annual increase in girth.	Average annual increment per cent in volume.	Number of trees measured.	Average annual increase in girth.	Average annual increment per cent. in volume.
INCHES.		INCHES.	PER CENT.		INCHES.	PER CENT.
6-12	2	0.70	13.85	6	1.18	16.50
12-18	..	..		4	1.04	
18-24	6	1.14	8.48	2	1.62	9.89
24-30	1	0.77		1	0.85	
30-36	5	0.82	3.65	5	0.89	4.76
36-42	2	0.54		3	1.00	
42-48	4	0.96	3.34	3	1.02	3.90
48-54	5	0.56		3	0.96	
54-60	1	0.92	3.07	3	0.85	2.93

245. The number of measurements taken is, of course, small, but the figures are fairly consistent and the results appear to show —

(1) that up to a girth of 5 feet a properly freed tree in the natural forest of types I and II will put on nearly one inch in girth annually;

(2) that with a girth of 5 feet a properly freed tree is yielding a volume increment per cent. of 3 per cent; and that (quality increment being ignored) a girth of 5 feet would be a suitable exploitable size to fix for selection fellings. For silvicultural reasons, however, it would probably be found necessary to fix the limit at 5 feet 6 inches or 6 feet.

Note.—The types of forest referred to above are according to the classification of Mr. Hart, Inspector-General of Forests which are as follows—

246. “*Type I.*—What may be termed the best quality which is generally naturally marked out by being stocked with *Bambusa arundinacea* and scattered stems of teak and other species with good height growth. This type occurs on the well-drained valley bottoms in the neighbourhood of streams.

247. “*Type II.*—Mixed deciduous forest containing principally Teak, *Terminalia*, *Lagerstroemia*, *Pterocarpus*, *Datbergia* and *Anogeissus* of fair quality, with only a moderate proportion of Teak. This type is situated in the valleys and along the slopes of the hills.

248. “*Type III.*—Poorest forest of the same class but with a larger proportion of Teak, generally malformed and unsound, situated on the hill tops and higher lying ground generally.”

249. In 1926 the writer of this plan felled 25 Teak trees in block I, compartment 8, in order to see what effect the very heavy improvement fellings carried out there in 1921-22 had had on the growth. The trees were selected in different parts of the compartment and either in the valleys or on the slopes or crests of hills on varying depths of soil

Note.—Compartment 8, according to the classification adopted in this plan, is type III on the ridges and a modified type II in some of the stream beds.

250. It has been assumed that the improvement felling was commenced after the growing season of 1921 was completed and, as the trees were felled in 1926 before the growing season was completed, the effects of the improvement felling would be shown in the last four rings. Actually, it was found that the percentage of increase in the thickness of rings, after the improvement felling, varied between 25 per cent and 338 per cent. In no less than 18, out of the 25 trees, the percentage of increase exceeded 100 per cent.

This does not give much data for comparison but the results, as recorded in a tabular statement in the Working Plans Conservator's office, bear out that even on poor soil middle-aged teak will respond in a remarkable manner to a drastic admission of light.

251. It was noticed that, in almost every case, the crowns had not yet had time to get over the effects of years of suppression and it is unlikely that they ever will.

PART II.

Future Management Discussed and prescribed.

CHAPTER I.—BASIS OF PROPOSALS.

SECTION 1.—GENERAL OBJECTS OF MANAGEMENT AND BRIEF STATEMENT OF TREATMENT REQUIRED TO SECURE THEM.

252. The objects of management are twofold viz :—

(1) Silvicultural.

(2) Exploitation, as far as is compatible with the silvicultural management.

By silvicultural management is meant the improvement, by silvicultural operations, of the existing forest, or its replacement, where justifiable, by artificial regeneration. This latter operation is to be regarded as essentially of an experimental nature.

By exploitation is meant the removal of overmature saleable timber which would otherwise be left to rot in the forest.

253. No attempt will be made at this stage to attain the 'normal' forest, or to establish normal regeneration, except in such portions of the forest as will be worked under the Clear-felling Working Circle; in the remainder of the forest, however, fire protection and such silvicultural operations as will be carried out should make for the attainment of these objects in some degree.

254. The principal species found in the forest are :—Teak, *Terminalia tomentosa*, *Pterocarpus Marsupium*, Rosewood, *Lagerstræmia lanceolata*, *Shorea Talura* (Jal) and *Anogeissus latifolia*.

Of these there is at present not a profitable market for *Anogeissus*, and a profit from *Terminalia tomentosa* can only be obtained under the most favourable conditions as regards cheap extraction. *Shorea Talura* will not require special prescriptions during the period of this plan beyond that of careful protection.

SECTION 2.—METHODS OF TREATMENT TO BE ADOPTED.

255. The methods of treatment to be adopted will vary according to the conditions prevailing in the several types of forest.

Briefly, they will consist of :—

(a) clear felling and artificial regeneration where the factors of the locality would appear to justify expenditure on this method (type I) ;

(b) the removal, in the type II areas, of mature timber of exploitable dimensions (6' girth), and, combined with the above, the carrying out of 'Improvement fellings' for the benefit of the valuable species, especially Teak, where necessary ;

(c) the introduction of Sandalwood into the poorer areas of forest east of Kargudi camp.

SECTION 3.—WORKING CIRCLES, THEIR AREA AND DISTRIBUTION, REASON FOR THEIR CONSTITUTION.

256. There will be the following Working Circles :—

(1) *The Clear-Felling Working Circle*.—This working circle will embrace all those portions of the forest where the factors of the locality appear to justify expenditure on artificial regeneration.

The type I forest alone would seem to fulfil this requirement.

The total area of forest, less swamps, allotted to this working circle, amounts to 6,658 acres.

(2) *The Selection Improvement Felling Working Circle*.—This working circle deals with the II type areas in blocks I, II and IV which, while not fit for artificial regeneration, carry a certain amount of mature and immature timber fit for exploitation and in which the growing stock has been proved by experiment to be capable of putting on a larger increment under a judicious system of improvement felling.

Established saplings, poles and trees will therefore be given sufficient growing space, in so far as this can be done without opening out the crop unduly, preference being given to Teak.

The total area of forest, less swamps, and areas clear-felled for plantations previously, allotted to this working circle is 27,715 acres.

(3) *The Sandalwood Working Circle*.—This working circle deals with the artificial introduction of Sandalwood into some of the poor type III areas north and east of Kargudi camp.

The area of the working Circle amounts to 10,330 acres. Sandal has already been introduced over an area of 126 acres.

(4) *The Closed Working Circle*.--This working circle will consist of block III and compartment 28 of block II. The total area is 19,727 acres.

This working circle will be fire-protected only.

(5) *The Grazing Working Circle* comprising the whole of the working plan area.

(6) *The Minor Produce Working Circle* also comprising the whole of the working plan area.

SECTION 4.--PERIOD OF WORKING PLAN.

257. This working plan will lay down prescriptions for the ten-year period from 1927 to 1937, in which year it will be due for revision. By the end of that time questions such as the advisability of carrying on with clear fellings and artificial regeneration should have been solved. This ten-year period will be, essentially, one of experiment.

CHAPTER II.—WORKING PLAN FOR THE CLEAR-FELLING WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND CHARACTER OF THE VEGETATION.

258. The whole of the working circle is forest of type I quality (for definition of type I see Part I, Chapter II, section 1) and lies in two separate portions, the one in the south and west of Benne block and the other in the neighbourhood of the Mudumalai-Thorapalli road, in the west of block I and the south-west of block II.

259. Of these two portions the latter is, practically speaking, entirely a seeded bamboo area, while in that portion lying in Benne block only a small area, roughly shown on the working plan map, contains seeded bamboo.

260. The present crop is very variable in quality, the really good parts being very scattered and of limited extent. On account of the presence of large bamboo clumps (dead), the stocking is generally open or very open and the natural regeneration very deficient. The height growth varies from very good, in a few places, to rather moderate in the poorer parts, but is on the whole fair.

261. Teak is found in the northern portion of the working circle lying in blocks I and II but not in any great quantity, though it is generally fairly well grown—in the south of this portion it is either absent or only found occasionally. In that portion lying in Benne block it is, for practical purposes, non-existent, except for some in the north of compartment 32, where the forest begins to approximate to type II.

262. *Pterocarpus Marsupium* (Vengai) occurs sporadically throughout, and also a certain amount of Rosewood.

263. In the Mandakarai plantation (compartment 20), which was clear-felled and is a fairly typical type I area, a great deal of Rosewood has come in naturally; this is also noticeable in other parts of the forest so that every effort must be made to preserve any such regeneration, though it is difficult, on account of browsing by deer, etc.

264. *Lagerstroemia lanceolata* (Venteak) is one of the characteristic species in this working circle.

265. Grass is, on the whole, not very heavy and is confined to the varieties, *Cymbopogon flexuosus*, *Cymbopogon citratus* and *Imperata arundinacea*. In the better localities the grass is often replaced by a species of wild ginger or shrubs such as *Helicteres isora*, etc. In many parts, the actual 'stand' of timber is poor but, except occasionally on the ridges, the soil is usually deep and well drained.

266. Those portions of the working circle in the south-west of Benne block, adjacent to the cultivated or previously cultivated swamps, are, on the whole, noticeably deficient in the more valuable species owing, perhaps, to the fact that the inhabitants have, in former times, denuded the surrounding forest of its better species. The result has been, in many places, that useless species, like *Kydia*, have taken possession of the ground.

Bamboo is usually absent in this locality.

267. The following areas in this working circle have already been worked over:—

(1) The old Benne tuckle areas amounting to 22 acres. In addition to this, a larger area has obviously been tuckled in the past, of which there is no record.

(2) The (1924-25) Mandakarai Teak plantation of 11 acres (compartment 20.)

(3) The 1926 Chinnakolli plantation (1926) of 10 acres (compartment 6). To simplify matters Nos. (2) and (3) plantations will be assumed to have been taken up in advance of the prescriptions of this plan and will be treated accordingly as regular plantations in the working circle.

No. (1) will, for the purposes of the plan, be assumed to have been unworked.

When this part of the forest is taken up for working, the District Forest Officer can either omit part or all of this 22 acres or tackle it afresh.

SECTION 2.—BLOCKS AND COMPARTMENTS.

268. The following statement shows the compartments allotted to this working circle, as well as their areas and the blocks in which they are situated :—

Block.	Compartment.	Gross area.	Deduct area of swamp.	Net area after deducting column (4)
(1)	(2)	(3)	(4)	(5)
I	4 (Part)	ACS. 315	ACS. ..	ACS. 315
I	6	1,483	164	1,319 (10 acres clear-felled and planted).
II	18 (Part)	37	..	37
II	19 "	174	..	174
II	20 "	1,183	98	1,085 (11 acres clear-felled and planted).
II	21 "	42	..	42
II	22 "	178	..	178
IV	32	806	..	780
IV	33	980	165	815
IV	34	866	69	797
IV	35	1,207	91	1,116
Total ..		7,271	613	6,658

NOTE.—The areas of swamp given in column (4) are the areas of swamp actually shown on the map ; the actual area of swamp is probably greater and the available planting land less.

SECTION 3.—METHOD OF TREATMENT.

269. *Choice of species.*—Teak will be the principal species to be regenerated where the locality is suited for it, but it is left to the District Forest Officer, in consultation with the Forest Research Officer, to discover what other species can be grown profitably.

270. The following species are suggested in Chief Conservator's Proceedings, Press No. 170, dated 12th May 1926 :—

Artocarpus hirsuta.—This species has already been tried in one of the Benne tuckle areas and was a complete failure, partly through browsing and partly on account of the locality (a site on the top of a ridge). It is found growing naturally extremely well, however, in a small moist valley just off the Benne-Muthanga road.

Acrocarpus fraxinifolius.—This may be tried in Benne block. An occasional natural tree is found in this block.

Gmelina arborea.—This has been tried near Kargudi on rather a poor locality and has been very badly browsed.

Albizzia Lebbek.—This may be tried in the localities not considered good enough for Teak. It has been tried in the Chinnakolli plantation (compartment 6) but, at the time of writing, is only a few months old.

Adina cordifolia and *Stephegyne parvifolia*.

Terminalia tomentosa.—This grows naturally in abundance.

Rosewood.

Jarrah (*Eucalyptus emarginata*).—A native of the dry hot country of Western Australia. Mr. Tireman considers that it might succeed at elevations such as Kargudi. It is believed to have been tried in Ceylon at 4,000 feet.

271. *Silvicultural system*.—This will be clear-felling with artificial regeneration.

272. *Rotation*.—In accordance with the orders of Mr. Tireman (Chief Conservator's Proceedings, Press No. 170, dated 12th May 1926), the rotation will be one of 100 years. This is purely empirical as there are no data to go on, but that it must be longer than the rotation adopted for Teak at Nilambur (70 years) is obvious.

273. *Division into periods---*

		ACRES.
The total net area of the working circle is	... ..	<u>6,658</u>
		YEARS.
The rotation is	... ..	100
		ACRES.
The annual coupe will therefore be theoretically	... ..	66 (approximately).

The rotation of 100 years will be divided into ten periods of ten years each.

This working plan will cover the first period of ten years only.

274 *Allotment to periodic blocks.*—Six hundred and sixty acres, approximately one-tenth of the working circle, will be taken as the first period block. This will be treated as a 'floating' Periodic Block, that is to say, the location of this 660 acres will not be definitely laid down; but at the end of the first period, i.e., 1936, one-tenth (660 acres) of the working circle should have been worked over.

275. This will have the advantage of allowing the District Forest Officer to choose, himself, the locations of the annual coupes. This provision is essential when, at any rate for some years, the whole of the working will be on an experimental basis.

276. It is not even necessary for the whole of one year's coupe to be in a single compact area if it is desirable, for any reason to split it up. It is, however, advisable, for convenience of control and supervision, not to have separate areas of less than ten acres.

277. Nor is it necessary that the annual coupe be 66 acres. During the earlier years of experimenting it is unlikely to be so much; moreover, this allows the District Forest Officer to work in any year up to what his labour supply will permit of.

278. For the first five or six years of the first period it is recommended that operations be confined to Benne block, if possible. This special provision is desirable on account of the whole of the working circle in blocks I and II being a seeded bamboo area. In Mr. Tireman's opinion young bamboo is easier to deal with when it is five or six years old than earlier, as fire fails to kill very young bamboo plants, the rhizomes of which would be likely to develop vigorous shoots for some years after normal weeding should have become unnecessary.

279. There is also some seeded bamboo area in the working circle in Benne block, but this has been roughly shown on the working plan map and can easily be avoided on the ground.

280. *Calculation of the yield.*—This is not feasible, nor is the omission a serious one, in view of the following considerations:—

(i) The total proportionate area available for clear-felling during the first period having been laid down, overfelling cannot be found to have taken place at the end of the period.

(ii) Should petty inequalities in the yield from year to year, in this working circle, occur, no upsetting of the market is likely to take place, owing to the fact that large quantities of timber will be available annually from the Selection Improvement Felling Working Circle.

(iii) A further regulating factor which will tend to lead to approximately equal quantities of timber being put on the market annually from the whole working plan area is the dragging capacity of the elephants, which is likely to remain fairly constant and may prove to be less than the possible outturn of timber.

SECTION 4.—METHOD OF EXECUTING THE FELLINGS.

281. The District Forest Officer will personally select and lay out on the ground the annual coupe.

This shall be done not later than the end of September, to allow plenty of time for the felling to be carried out. The boundaries of the coupe, or portions of the coupe, must be clearly laid out, preferably by clearing a two-foot line.

282. The felling and dragging of saleable timber should be carried out from October, the felling being done by imported labour, if possible.

283. Clear-felling of unsaleable species must be completed in December.

SECTION 5.—TABULAR STATEMENT OF OPERATIONS MONTH BY MONTH.

Month.			Operations.
284. January	...	...	Collection of seed.
February	...	...	Burning and clearing.
March	...	...	Piling and reburning.
			Clearing.
			Lining and staking.
			Preparation of nursery.
April	...	...	Sowing.
May ...	...	...	Fencing of tuckle.
June	...	...	Stump planting.
			Sowing cereal in tuckle.
			Planting germinating seed
			in nursery.
July ...	...	...	Weeding.
			Replacing casualties.
August	...	...	Weeding.
			Replacing casualties.

Month.	Operations.
September	Weeding. Harvesting cereal crop ... Selection of coupe. Reporting on necessity of thinning from 1930 onwards. Marking saleable timber.
October	Weeding. Felling and dragging saleable timber
November	Commencement of clear- felling unsaleable tim- ber.
December	Collection of seed ... Completion of clear-felling.

SECTION 6.—SUBSIDIARY SILVICULTURAL REGULATIONS.

285. *Burning*.—The area clear-felled will be burnt in February or early in March. A fierce fire in the first instance is highly desirable. The necessity for piling and reburning must be reduced to a minimum on account of the expense

286. *Lining*.—An espacement of 6 feet by 6 feet, for all species, will be adopted.

Lining and staking the area with three-feet bamboo stakes should be completed by the end of March.

For lining, two long ropes which have been alternately soaked and stretched for two days previously are required. When the ropes have been stretched to their full capacity small bamboo pegs should be let into the strands at 6 feet intervals.

The area to be regenerated having been quadriseated by two lines at right angles, intersecting near the centre of the area, lining should be started in any one quarter of the area, from the centre. The first rope should be held in position parallel to one of the intersecting lines whilst the second rope is stretched at each peg in the first rope, the correct espacement at the far end of the second rope being obtained by means of a 6 feet bamboo.

287. *Regeneration*.—The correct method of regeneration in the case of Teak, much more so in the case of other species, is still a subject for experiment in the Mudumalai forests.

288. Planting of Teak is known to give very doubtful results and is expensive.

289. Sowing not less than six seeds at each stake in early April, and also the planting of stumps have given a certain amount of success in the case of Teak.

290. A method tried with some success on a small experimental scale during the last two years has been that of sowing Teak with ragi and with horsegram. For this method a fence, capable of keeping out deer, is necessary. From a two acre experimental plot started in 1925–26 ragi, estimated to be worth Rs. 216, was harvested during the first year. The cost of formation and of the fence was necessarily high but, at the end of the first year, the net cost, after deducting the value of the ragi, was only Rs. 13–14–0 or Rs. 6–15–0 per acre. The work was done entirely departmentally and anxiety to obtain a good yield of ragi resulted in failure to give the Teak sufficient light and air by uprooting ragi around the Teak plants. In spite of this, the Teak crop was by no means discouraging at the end of the first year. Further experiments on these lines are in progress in the Bidurhalla 1926 Regeneration area (see Appendix I).

291. As regards the artificial growing of the species, other than Teak, recommended by Mr. Tireman, the Chief Conservator of Forests, little or nothing is known, so far as the Mudumalai forests are concerned.

What little has been learnt from experiments elsewhere is incorporated in the suggestions which follow.

292. The regeneration of the areas to be felled in this working circle being still purely experimental, it would be out of place to attempt to lay down hard and fast prescriptions.

The following suggestions are, however, made for the guidance of the District Forest Officer :—

(i) Until such time as the problem of regenerating successfully one or more of the species other than Teak, suggested by the Chief Conservator, has been solved, 75 per cent of the area felled each year should be regenerated with Teak.

(ii) As large a portion of the area for Teak as the management can deal with satisfactorily should be regenerated as a departmental tuckle. Ragi is recommended for the cereal crop. Somewhat ruthless weeding of the ragi, round the Teak plants, should be insisted upon.

(iii) Of the remainder of the Teak area, half should be sown in April and half should be planted with one-year old stumps in June.

(iv) The whole Teak area, outside the tuckle, should be clean weeded, mamuties being used for destroying the roots of weeds and grass during the first year at any rate.

(v) For replacing casualties amongst the Teak, the use of germinating seeds should be tried. For this purpose about one-fourth of a bag of Teak seed should be dumped on each acre on May 15th. No preparation of the seed is necessary; it should be spread out on the bare ground and it should form an even heap about 4 inches high. The locality being a drier one than those in which these dumps have been tried previously, watering of the dumps may prove desirable after the 10th June on days when there is no rain.

(vi) On the 25 per cent of the area, not destined for Teak, it is considered inadvisable to go to the expense of completely clear-felling the area, after the saleable timber has been removed. It should be sufficient to burn the debris and weeds, leaving the unsaleable trees standing, in order to afford some broken shade for the new crop.

(vii) In the case of Rosewood half the area allotted to this species should be planted with plants raised in a nursery and half should be sown.

(viii) For other species, sowing only is advocated.

(ix) As knowledge and experience is gained in the raising of species other than Teak, the desirability of trying them in tuckles with a cereal crop should be considered.

(x) *Pterocarpus Marsupium* and *Lagerstroemia lanceolata*, the ripe fruit of the latter to be lopped from the trees before 8 a.m., some three days after the capsules are first noticed to open, should be added to the list of species suggested by the Chief Conservator.

293. *Thinning*.—It is definitely prescribed that in the sixth year of each plantation's life, the District Forest Officer shall examine it and make a special report to the Conservator in September, stating whether a thinning is necessary or not. The first of these reports will relate to the Mandakarai plantation and will be made in September 1930.

294. *Nurseries*.—When regeneration work is started near Benne a nursery, in which to raise a limited number of Teak plants for stumping, will be required in that locality. Nursery work is well understood by the subordinate staff and the existing Kargudi nursery may be taken as a model for the formation of new nurseries.

295. Instead of pricking out seedlings required for stumping from seed beds to an espacement of 6 inches by 6 inches in nursery beds, a procedure which often involves a number of casualties and costs a good deal of money, the cheaper method of putting in germinating seeds from a dump at an original espacement of 6 inches by 6 inches should be tried.

SECTION 7.—CONTROL.

296. The following records will be maintained by the District Forest Officer who will be personally responsible for the correct posting of them :—

The Control Book.

The Record of Works.

The Plantation Journal.

The Control Map.

(a) *The Control Book*.—In this will be recorded annually the area felled, the yield of saleable timber extracted and prices obtained for the various classes and species of timber.

A sample form is given in Appendix III.

(b) *The Record of Works*.—This will be an annual record of all operations in the working circle connected with the exploitation of the original crop and the replacement of it by a new crop. Special care should be paid to recording the expenditure on each individual item separately.

A sample form is given in Appendix III.

(c) *The Plantation Journal*.—This will be a running record from year to year, to be written by the District Forest Officer himself, showing briefly and concisely the work attempted and the results obtained.

(d) *The Control Map*.—A map on a scale of 8 inches to one mile, showing the compartments in this working circle only, will be prepared in the District Forest office. On this will be shown the area felled and regenerated each year. This map is to be a permanent record and should not leave the District Forest office. Ample space is to be left in the margin, in which a tabulated statement will be given, showing the species and method of introduction attempted in each year's area, the subdivisions of which may be marked in the body of the map by means of capital letters thus :—

	ACRES.
A.—Teak-sown tuckle	15
B.—Rosewood planted under broken shade	4

CHAPTER III—WORKING PLAN FOR THE SELECTION IMPROVEMENT FELLING WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND CHARACTER OF THE VEGETATION.

297. Generally speaking, this Working Circle consists of forest of No. II type though isolated areas, rightly falling into type I, occur—the largest of these areas is in the western end of Compartment 5. At the eastern end of the Working Circle the dividing line between types II and III is often ill-defined so that areas rightly belonging to type III are found.

298. The Working Circle forms a composite block in the centre of the forest, with the exception of Compartment 14 which lies south of the Moyar.

299. There is a small area (about 20 to 30 acres) of ever-green forest containing a number of finely grown *Artocarpus hirsuta* in a small moist valley just to the north of the Benne-Wynad road.

300. The remainder of the Working Circle consists of type II areas of every variety, the best areas, possibly, being in Benne Block and the worst lying north of the Kakkanhalla-Benne road in Block II.

301. This Working Circle contains the bulk of the heavy grass areas and is, with the exception of Doddakatti Block and Compartment 28, the most subject to serious fires.

302. On the whole, the middle age classes (trees of 3' to 5' girth) predominate, both the oldest and youngest age classes particularly of the better species, being deficient. In Benne Block, however, the deficiency of the older age classes is not so pronounced, there being a considerable number of trees which ought to reach 6 feet girth within the next 10—20 years.

303. In the areas that approach type III, in the east of the Working Circle, the younger age classes are fairly well represented.

304. The principal species are—

Teak, *Terminalia tomentosa* (which is the commonest in Benne Block), *Pterocarpus Marsupium*, Rosewood and, in the poorer areas in the east, *Anogeissus latifolia*; *Schleichera trijuga* occurs sporadically and *Jal* (*Shorea Talura*) is found in patches north of the Kakkanhalla-Mudumalai road and in the east of the Working Circle near Kargudi.

SECTION 2.—BLOCKS AND COMPARTMENTS.

305. The following statement shows the Compartments allotted to this Working Circle, as well as their areas and the Blocks in which they are situated:—

Block.					Compartment.	Gross area.	Deduct area of swamp.	Net area after deduct- ing column (4).	Areas not in the Working Circle.
(1)					(2)	(3)	(4)	(5)	(6)
						ACS.	ACS.	ACS.	
I	..	..	..	..	2	940	23	917	
I	..	..	..	..	3	1,188	..	1,188	
I	..	..	..	..	4 (Part)	897	45	852	
I	..	..	..	..	5	805	..	805	
I	..	..	..	..	14	1,808	..	1,808	
II	..	..	..	..	15	1,568	..	1,568	
II	..	..	..	..	16	1,227	..	1,227	
II	..	..	..	..	17	905	..	905	
II	..	..	..	..	18 (Part)	733	24	739	
II	..	..	..	..	19	931	32	899	
II	..	..	..	..	20	175	7	168	
II	..	..	..	..	21	1,254	115	1,139	
II	..	..	..	..	22	1,320	45	1,275	
II	..	..	..	..	23	1,366	..	1,366	
II	..	..	..	..	24	986	..	986	
II	..	..	..	..	25	1,291	..	1,291	
II	..	..	..	..	26	2,096	157	1,939	
II	..	..	..	..	27	1,157	51	1,106	
IV	..	..	..	..	29	930	..	930	
IV	..	..	..	..	30	1,280	..	1,280	
IV	..	..	..	..	31	1,290	..	1,290	
IV	..	..	..	..	36	1,024	5	1,019	
IV	..	..	..	..	37	1,158	..	1,158	
IV	..	..	..	..	38	785	21	764	
IV	..	..	..	..	39	1,206	..	1,206	
Total ..						28,350	525	27,825	

Includes 43 acres of clear-felling.

Includes 5 acres of plantation.

Includes 22 acres of plan-tation.

Includes 40 acres of plan-tation.

306. The compartment boundaries are shown on the Working Plan map. As far as possible natural features and existing artificial boundaries have been made use of.

SECTION 3.—METHOD OF TREATMENT.

307. *Special objects of management.*—(a) Stimulation of the growth of all reasonably well grown, immature trees of saleable species, especially Teak, by freeing the crowns.

(b) Realization of revenue by sale of dead and mature trees as well as of such saleable trees as are felled to free the crowns of others, or, because they are so misshapen or suppressed as to have no future before them or are not required for the maintenance of the canopy.

308. *Exploitable size*—A tree of 6 feet girth or over, at breast height, may be considered to have attained the exploitable size. The decision as to whether such a tree shall be felled or not will be regulated according to the rules given below under “Method of executing the fellings.”

309. *Choice of species.*—The following species are saleable:—

Teak, Rosewood, *Pterocarpus Marsupium* (Vengai), *Lagerstroemia lanceolata* (Venteak), *Albizia odoratissima* (Vagai) and *Terminalia tomentosa* (Mathi).

Of these, good Teak, Rosewood and perhaps *Pterocarpus Marsupium* are saleable at a profit at Nanjangode though it is not necessarily always more profitable to send all such logs there rather than to sell them locally. The remainder can only be sold locally, and any profit is dependant on the costs of extraction.

310. It is reasonable to suppose that selected logs of miscellaneous species might attract purchasers in the local sales if they were put up in mixed lots. Experiments should be made in order to test the market on these lines.

311. *Silvicultural system.*—The system will be that of Improvement fellings combined with Selection fellings, regulated by the rules given below.

312. *Felling cycle.*—It is intended that one of the 24 compartments, allotted to this Working Circle, should be worked over each year. [Compartments 20 (part) and 21 (part) will be worked together.]

The felling cycle will be 24 years.

313. *Yield.*—No calculation of the yield is possible.

SECTION 4.—METHOD OF EXECUTING THE FELLINGS.

314. It is, inevitably, difficult to define in writing a silvicultural operation which must be dependent for success upon the skill and judgment of the marking officer.

315. The following are the main points to be borne in mind by the officer marking for felling:—

(i) Any tree, interfering with a reasonably well grown, immature Teak tree or Teak sapling, unless obviously more desirable than the Teak tree, is to be marked.

At the time of felling, such a tree will be felled if it is saleable or if, though unsaleable, it is of a species which will not die in a short time if girdled.

Amongst species which are to be felled and not girdled are—

Grewia, *Kydia*, *Lagerstroemia lanceolata* and *Anogeissus latifolia*.

(ii) The same rule as the above will be applied to cases in which a reasonably well-grown, immature tree or sapling of any saleable species other than Teak is being damaged by a tree of an unsaleable or less valuable species, provided that the removal of the latter will not result in an unduly large opening in the canopy.

(iii) Teak saplings, not thicker than a man's arm, which have no future prospects of success, will be cut back at the time of marking. It is, however, waste of time to cut back such saplings if they are directly under the shade of Teak or other species which it is decided must be retained.

(iv) Teak trees and Teak poles which are very unsound, very badly shaped indeed or obviously moribund, must be marked for felling.

(v) Trees of all saleable species which are 6 feet in girth or over may be marked for felling.

Discretion is, however, necessary in the matter.

Inordinately large gaps in the canopy must not be made by felling several such trees close together if one or more of them is growing vigorously.

Some trees, notably *Lagerstroemia lanceolata*, which may be 6 feet in girth at breast height, often fork into two or more stems above breast height. If such trees are growing vigorously and there is no special reason for their removal they should be left.

316. In all cases it is preferable, when in doubt, to ‘leave it alone’.

317. If it is cheaper to fell a tree which would otherwise be girdled under rule (i) it should be felled.

318. Trees for removal should be blazed on the side nearest to the adjoining, unmarked strip.

"315. But the object in view must not be lost sight of. It is to improve the forest and to bring it gradually nearer to normality. The first thing is to restore the soil and to eliminate the growth of grass by the closing of the canopy; marking for felling must therefore be conducted with great caution where an interruption of the canopy will not rapidly be made good. Subject to this main consideration marking will be on the following lines:-

(1) A tree interfering with a reasonably well grown teak tree of any size, or with a tree of other more valuable species should be felled or girdled (among trees which are not readily killed by girdling are *Grewia* and *Lagerstroemia*). But it must be borne in mind that a large *Terminalia* for example, should not be destroyed in favour of a small rosewood.

(ii) Stunted teak growth of any size should be cut back if there is any prospect of coppice resulting. In this consideration teak of the smallest size must not be forgotten and where there are groups of such trees or saplings or other small growth it will be necessary to make a clear felling of all species provided the resultant coppice is likely quickly to restore the ground cover.

(iii) It is obviously idle to fell an illgrown tree of valuable species with the object of obtaining sound coppice if the tree or trees which have brought about its suppression are not destroyed.

(iv) All trees from which it is desired to obtain coppice must be cut low.

(v) Trees of saleable species of six ^{feet} ~~inches~~ girth and over may be marked for felling.

Felling will be in two operations. The first, which will be on contract, will deal with the trees intended for timber production and this selection must be most carefully made. The second, which must necessarily be by daily wage labour, to be controlled strictly, will involve the cutting or girdling of the valueless growth interfering with valuable trees, or the regrowth expected from valuable species cut back.

The marking for the two operations will be done at one and the same time and it will be found convenient to mark in a different manner the trees intended for felling in each operation.

The name of the officer who marks the whole or part of a compartment should be recorded on an eight inch map.

319. Marking should be done by the District Forest Officer personally, as far as possible, between November and February and felling should be started as soon, thereafter, as axemen can be obtained, so that elephants may start dragging immediately after their hot-weather rest and continue throughout the rains.

320. *Conversion*.—Much of the timber resulting from the Improvement felling is likely to be crooked or unsound. In converting this material for the market a great deal of unnecessary wastage is likely, unless the forester in charge of the operation is specially trained.

321. The Forest Utilization Officer should be asked to advise, after inspecting a coupe under working, as to whether the practice of dressing and roughly squaring all logs at stump site is desirable or whether the best logs, at any rate, should be sold in the round.

322. *Extraction*.—The timber will be dragged by Government elephants to depots along the nearest road. The Forest Utilization Officer should be consulted from time to time as to whether the state of the market makes it advisable to cart some of the timber to Nanjangode for sale or whether local sales are likely to be more profitable.

SECTION 5.—TABULAR STATEMENT OF ORDER IN WHICH COMPARTMENTS ARE TO BE WORKED OVER 1927-28 TO 1936-37.

323.—

	Year.	Block.	Compartment.	Net area in acres.
1927-28	II	16 ..	1,227
1928-29	II	15 ..	1,568
1929-30	II	17 ..	905
1930-31	II	27 ..	1,106
1931-32	II	18 (Part) ..	739
1932-33	II	19 (do.) ..	899
1933-34	II	14 ..	1,808
1934-35	{ II	21 (Part) ..	1,139 }
		{ II	20 (do.) ..	168 }
1935-36	II	22 (do.) ..	1,275
1936-37	II	23 ..	1,366

SECTION 6.—OTHER REGULATIONS.

324. *Control*.—Control forms will be maintained by the District Forest Officer in accordance with the instructions given for control under the Clear-felling Working Circle except that no Plantation Journal is required for this Working Circle.

325. From the sample forms given in Appendix III it will be seen that, in the case of this Working Circle, the 'Record of Works' is likely to amount to little more than a running account of the marking, felling, dragging and carting.

In writing up the "Control Book" the District Forest Officer will see that the difference, if any, between the area to be worked in any one year and the area actually worked is noted in the 'Remarks' column and that this unworked balance is brought forward to the left-hand columns for the following year, at the time of posting the register.

326. No special control maps will be required for this Working Circle.

CHAPTER IV.—WORKING PLAN FOR THE SANDALWOOD WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND CHARACTER OF THE VEGETATION.

327. This Working Circle deals with the introduction of Sandalwood into the poorer areas of forest lying to the east of Kargudi in Block I.

328. The forest in the more westerly part of the Working Circle is a mixture of rather poor type II and type III, the latter type becoming more pronounced on proceeding eastwards, except for some of the stream valleys and in Compartment 8, where the growth is sometimes fairly good on the lower ground.

329. The chief species are—

Teak, *Terminalia tomentosa* and *Anogeissus latifolia*, the first and the last being very numerous in the poorest areas.

A few small patches of Jal (*Shorea Talura*) occur near Kargudi.

330. Dead *Bambusa arundinacea* is found along the stream beds and near the Moyar river.

331. Regeneration and stocking are both good in the poorest parts but the height growth on the ridges is generally very poor.

332. Probably a high percentage of the Teak in the worse areas is unsound.

333. The chief grass in these poor areas is almost entirely the variety *Themeda imberbis*, but the other varieties are found also to some extent, especially near Kargudi.

SECTION 2.—BLOCKS AND COMPARTMENTS.

334. The following statement shows the Compartments allotted to this Working Circle as well as their areas and the Blocks in which they are situated :—

Block.	Compartment.	Area.	Areas not in the Working Circle.
I	1	ACS. 1,315	227 acres under clear-felling.
I	11	929	
I	10	808	
I	9	791	
I	7	1,171	
I	8	1,042	
I	12	1,629	
I	13	2,872	
	Total ..	10,557	

335. With the exception of Compartments 12 and 13 which are new ones the compartment boundaries in this Working Circle are the same as under Mr. Cox's Plan. No special demarcation is necessary.

SECTION 3.—SPECIAL OBJECTS OF MANAGEMENT.

336. The special objects of management are—

(1) To increase the potential value of the forest by the artificial introduction of sandalwood in suitable localities.

(2) To help nature, by means of fire protection, as indicated in Chapter VII, Section 1, to improve the soil covering by gradually replacing the grass by woody undergrowth and tree species.

337. Though it has been proved that it is possible to stimulate the growth of immature Teak in this type of forest by a sufficient opening up of the canopy, no Improvement fellings are prescribed. Improvement fellings are more urgently required elsewhere and there is neither the supervision nor the labour available to deal with additional areas.

SECTION 4.—METHOD OF TREATMENT.

338. *Exploitable size.*—This question can be left in abeyance for the period of this plan; the oldest Sandal are now only six years old.

339. *Silvicultural system.*—Sandalwood will be artificially introduced under the existing forest crop by the most expeditious method.

340. Sandalwood has already been dibbled at an espacement of 20' × 20' in Compartment I over 125·5 acres with varying degrees of success. On the southern slopes of the Kargudi bungalow hill splendid specimens are to be seen, whereas, in some other parts of the Compartment, very few surviving plants are to be found.

341. Experiments with Sandalwood stumps are in progress close to the Mettupalaiyam Ghat road near mile stone 21 from Ootacamund, in the Nilgiri district. Though results up to date are promising, it is too soon to base definite prescriptions on them but, if they prove successful, this method may well be tried at Kargudi.

342. *Calculation of the rotation.*—This question cannot be decided at present.

SECTION 5.—SUBSIDIARY SILVICULTURAL REGULATIONS.

343. *Sowing.*—Mr. H. A. Latham, in a note on Sandal written for the Madras Forest Pocket Book which is under compilation makes the following remarks about direct sowing :—

“ . . . The seeds should be sown in June as soon after the south-west monsoon begins as possible. Seeds should be put out singly in holes $\frac{1}{4}$ of an inch to $\frac{1}{2}$ an inch deep, made by a sharpened stick, where there are likely to be tender roots . . . it likes to have its head free but does not like sun on its roots . . . ”

344. Up to date individual Sandalwood plants at Kargudi have been protected by basket-work frames. This must cease as the operation is too costly and the seedlings must take their chance.

345. Sambhur, which are usually so fond of eating the leaves, do not appear to have browsed the plants at Kargudi as yet, to any great extent.

346. *Tending.*—Experience shows that established plants at Kargudi require very little attention during the first few years of their life.

Paras 348 and 349: For the existing paras substitute

"The aim is to get patches of sandalwood established here and there throughout the area allotted to the working circle so as to provide 'centres of infection' from which it is hoped that sandalwood would spread to adjoining areas. Centres from which sandal will spread by natural means, should be established in the better localities, it sufficing if such centres, ten to be formed in each year, extend to an acre each and if the centres are distributed at about one per each hundred acres of the total area to be dealt with. It will then be possible to concentrate attention on the centres and to ensure that they succeed - it will probably be necessary to fence them."

(G.C.P. No. 198 Mis., dated 15-5-1931.)

SECTION 6.—OTHER REGULATIONS.

347. *Selection of areas for introduction of Sandalwood.*—It is not intended that Sandalwood should be introduced into every acre of forest included in the Working Circle. Heavy grass areas should be avoided, but localities covered by the grass *Themeda imberbis* ought to prove suitable. The District Forest Officer is at liberty to choose the area into which Sandalwood is to be introduced each year anywhere within the area allotted to the Working Circle.

348. It is laid down, however, that not less than 25 acres should be tackled annually, and that the raising of not less than 100 plants per acre should be attempted.

349. The aim is to get patches of Sandalwood established here and there throughout the area allotted to the Working Circle so as to provide 'centres of infection' from which it is hoped that the Sandalwood will spread to adjoining areas. Adjacent areas should therefore not to be taken up each year—the available area is large so that varying localities should be tried each year.

350. The area taken up each year will be surveyed by the Range Officer.

351. The replacement of casualties with a view to getting an even stocking will not be insisted upon. It is considered probable that the first object of management is more likely to be attained if a fresh area is dealt with each year, especially if the District Forest Officer endeavours to stimulate a competitive spirit amongst those responsible for the work.

352. Only seed in really good condition is to be used and it must be inspected and passed by the District Forest Officer before sowing.

353. *Enumerations.*—Enumerations of each Sandalwood area will be carried out annually about October and the percentage of success will be recorded separately, year by year, for each area, in the History of Compartments.

In the sixth year after the introduction of the Sandalwood the District Forest Officer will make a special inspection of each Sandalwood area and carry out such lopping and climber cutting as may be necessary in order to give more room to the Sandal.

354. *Control.*—The following records will be posted annually by the District Forest Officer :—

- (1) The Record of Works.
- (2) The History of Compartments.
- (3) The Control Map.

Record of Works.—The same form as that used for other Working Circles will be maintained. A sample form is given in Appendix III. The cost of each item of work, such as collection and transport of seed, sowing, tending, etc., must be shown separately.

History of Compartments.—Brief entries under "Miscellaneous notes regarding management" will be made each year against the appropriate compartments. Such entries will relate to the area treated, the number of patches sown and the results, which will be elaborated each year by entering the enumeration figures.

Control Map.—A special map of the Working Circle on a scale of 8" to one mile will be prepared and maintained in the District Forest Office. It is, on no account, to be taken out of the office. On it, the area taken up each year will be marked, according to the Range Officer's survey. A second copy of the map will be prepared in the District Forest Office and sent to the Conservator, VI Circle, who will keep it and post it up to date each year from a tracing, showing the area last dealt with, which must accompany the copies of Control form entries which have to be sent to the Conservator annually.

CHAPTER V—WORKING PLAN FOR THE GRAZING WORKING CIRCLE.

355. This Working Circle comprises the whole Working Plan area.

356. The question of grazing is not of importance in the Mudumalai forests, the incidence falling very unevenly on the 65,000 odd acres.

357. Residents have, for many years, been allowed free grazing. This only affects the south-west of Benne block and some of the west of Mudumalai block. This practice may be continued.

358. Cattle being driven from Mysore to Ootacamund for slaughter as well as 'draught' bullocks and buffaloes are allowed to graze free of charge for a distance of 50 yards on either side of the Mysore-Gudalur road. They usually spend a couple of days in passing through the forest.

359. The revenue from grazing under these conditions is negligible.

360. The annual grazing rates for such cattle as are not allowed free grazing will continue to be—

For cows and bulls	..	...	...	...	...	...	3 annas per head.
For buffaloes	...	...	...	...	...	...	6 „ „

361. All regeneration areas in the Clear-felling Working Circle and elsewhere will be closed to grazing for ten years after their formation.

362. The area in the neighbourhood of the Government elephant pits will continue to be closed to grazing, at the discretion of the District Forest Officer.

363. *Control.*—A special control form for this Working Circle will be found in Appendix III.

CHAPTER VI—WORKING PLAN FOR THE MINOR PRODUCE WORKING CIRCLE.

364. This Working Circle comprises the whole Working Plan area.

365. The principal minor produce is honey, wax, horns, seakoy and occasionally elephant tusks.

366. These are all collected and disposed of departmentally owing to the risk of fire, and possibly of poaching, which would be involved if Contractors' coolies had the right to roam over the forests at will.

The existing practice will be continued.

367. *Control.*—A special control form for this Working Circle will be found in Appendix III.

N.B.—Details regarding the sale of elephants and the revenue derived therefrom will find place in the Control Form.

CHAPTER VII—MISCELLANEOUS REGULATIONS.

SECTION 1.—FIRE PROTECTION.

368. Past experience has established the following facts :—

(i) Attempts at wholesale early burning are comparatively cheap. The system is, however, highly objectionable for the following reasons :—Either the burn is so incomplete that there is danger of fire on the same area later in the season or the burn is so fierce as to be highly injurious to the woody undergrowth.

(ii) Attempts at complete protection, as contemplated in Mr. Cox's Plan, are expensive and could only be justified if practically complete immunity from fire could be guaranteed which is impossible.

369. One of the weak points in Mr. Cox's system, in practice, was that, with the labour available, it was often impossible to complete the line burning before the fire season was well under way.

370. It is necessary to arrive at some compromise which will approximate, in thoroughness, to Mr. Cox's system, only at a lower cost, and which will permit of some degree of protection being guaranteed by the commencement of the fire season. Such a system must involve the minimum amount of guide line cutting each year and must take advantage of the possibilities of early burning over limited areas, during the short time when the forest is in a fit state for the operation.

371. The aim will be to have lines of varying width, up to a maximum of 400 yards in the case of the Mysore frontier line, burnt as early in the season as possible.

372. To endeavour to attain this object, the limited period during which true early burning is possible will be devoted to firing the forest from certain existing lines, mostly roads and outer boundaries, which are detailed below.

373. Experience shows that the result of this preliminary operation will be to have imperfectly burnt belts, of varying width, with a straight boundary—e.g., a road—on one side and a very irregular meandering boundary on the other.

374. This operation is cheap (about Rs. 2 to Rs. 3 per running mile) and can be carried out fairly rapidly.

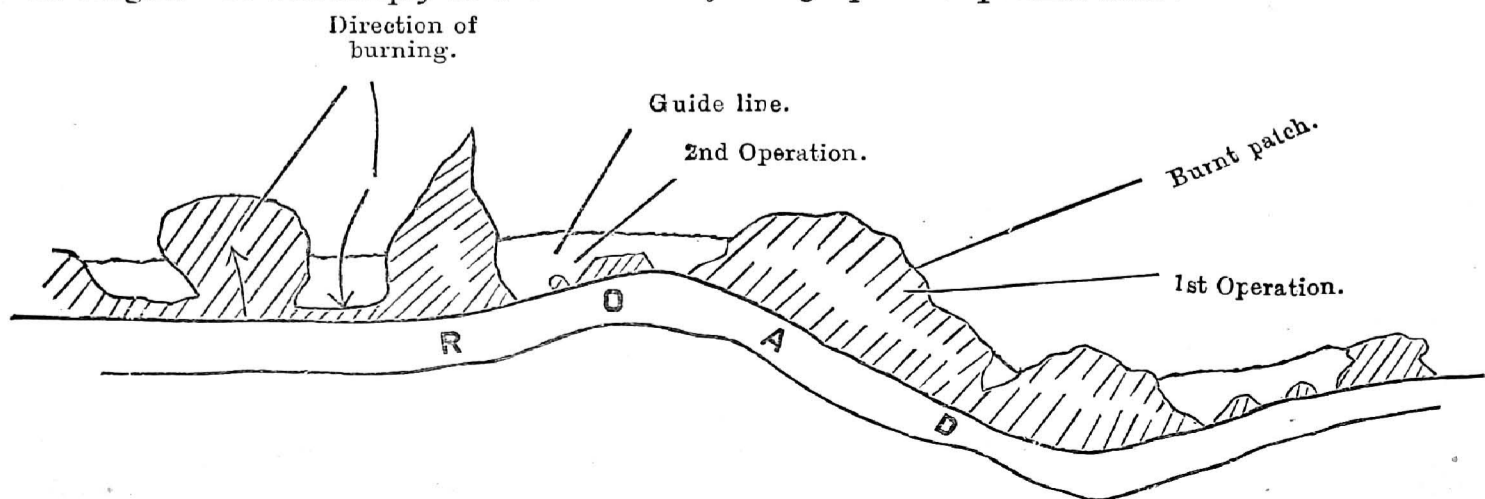
375. Unfortunately, owing to the very imperfect burn which results over large lengths of the line, further work is necessary. The preliminary burn does, however, serve as a basis of immunity and renders it possible for subsequent work to be carried on, with comparative safety and cheapness, for many weeks.

376. The essentials of this system are—

(i) A clear line from which to fire the forest in the early burning operation.

(ii) A comparatively straight guide line from which to burn back to the early burnt belt subsequently.

In practice, this guide line need not be equidistant from the original clear line throughout its length. It will simply be a broken line joining up burnt patches thus :—



377. For the sake of the cheapness in the secondary burning operation, only one side of internal lines, such as roads, will be burnt, as above.

N.B.—The Gudalur-Mysore road (No. 6 Interior line) between Kakkanahalla and Thorapalli will be burnt on the west side between Teppakadu and Thorapalli.

378. Special and expensive protection for Block I must cease; it is, incidentally, least subject to serious fires of all the blocks and is easily accessible from Kargudi.

379. The system outlined above is to be applied to all the lines, both external and internal, given in the list below, with one exception—the Nilgiri-Mysore State boundary line (from Maragaddai to the junction of the Imburhalla and Kakkanhalla). In the case of this line a permanent guide line, in the form of an ungraded inspection path, 3 feet wide, is to be constructed at a distance from the frontier of approximately 400 yards throughout. This path, which is unlikely to cost more than Rs. 200 is to be cut in the ground and on it the grass roots are to be extracted at the time of construction. It will be roughly cleared as a guide line each year in November and from it early burning will be done. Subsequently, the whole 400 yards width of line must be burnt thoroughly.

380. List of fire lines and their length—

	Approximate length in miles.
Exterior lines—	
1. Nilgiri-Malabar boundary line (from Kaikatti on Sultan's Battery road to Maragaddai).	10
2. Nilgiri-Mysore State boundary line (from Maragaddai to the junction of the Imburhalla and Kakkanhalla).	13½
3. New range boundary (north-east corner of Compartment 12 to south-west corner of Compartment 14).	9
4. South-west boundary of Mudumalai Block (Moyar to Aduppu-kuttisal).	10
5. South boundary of Benne Reserved Forest (Aduppu-kuttisal to Kaikatti on Sultan's Battery road).	8
	<hr/> 50½
Interior lines—	
6. Kakkanhalla-Thorapalli (Mysore-Gudalur road)	10
7. Block II and Block III line—Honnurhatti-Jaldari road ...	8½
8. Block II—Block IV line (Mudumalai-Benne boundary, Aduppu-kuttisal to Karubetta).	4½
9. Block I and Block II line	8
10. Mudumalai-Kakkanhalla road	5½
11. Mudumalai-Thorapalli road	6
12. Mudumalai-Kargudi road	3
13. Church Estate path	2
14. Mudumalai-Karboi path (via Doddakatti)	9
15. Mudumalai-Benne-Wynad boundary road	10
16. Imburhalla-Teppakadu road	3½
17. Benne-Mukkatti road	2¾
18. Fire lines round buildings at Mudumalai, Benne, Doddakatti, Kargudi and Teppakadu.	3
19. Fire lines round depots and cart stands	½
20. Fire line round each future plantation in the clearfelling working circle.	½ annually
	<hr/> 76¾
Grand total ...	<hr/> 127¼

381. The employment of a limited number of fire patrols, to be recruited as far as possible from the Jain Kurumbers, is considered a necessary and justifiable expense, as it tends to keep these born incendiaries out of mischief and to enlist their sympathies on the side of the forest department.

382. A maximum of 16 men will be employed as fire patrols in the following localities:—

Doddakatti Block	10
Teppakadu	1
Gudalur-Mysore road	2
Southern boundary of Block II	1
Block line between Block I and Block II	2

Taking the average period during which their services are necessary each year as three months, and their pay as Rs. 12, the maximum cost of fire patrols will amount to Rs. 576.

383. It is hoped that under this system effective fire protection for the whole 65,000 odd acres will not cost more than Rs. 1,500 annually as compared with about Rs. 2,700 for 59,600 acres under Mr. Cox's scheme.

384. *Records*.—Records of cost relating to fire protection will be maintained by the District Forest Officer in the special Miscellaneous Record of Works prescribed below (Chapter VII, section 8, paragraph 415).

385. All areas accidentally burnt will be entered in the History of Compartments year by year (see below Chapter VII, section 8, paragraph 407).

386. *Map*.—A special fire map showing the exterior and interior fire lines on a scale of 2 inches to 1 mile will be maintained in the District Forest Office and a copy of it will be maintained in the Range office also. All areas accidentally burnt will be marked on it every year.

SECTION 2.—EXPERIMENTAL OBSERVATION AREAS.

387. The following existing plantations, all situated in type, II forest, will be treated as observation areas for studying the ultimate results of the various operations which have been carried out in them :—

	ACS.
(1) The 1924 and 1925 Regeneration area round Kargudi ...	149½
(2) The Kargudi Coppice area (Compartment 1) ...	57
(3) The plot near Kargudi Rest House (Compartment 1) ..	20
(4) The Bidurhalla 1926 Regeneration area (Compartment 3) ...	15
(5) The Bidurhalla 1926 Coppice area (Compartment 3) ...	25
(6) The experimental plots in Compartment 3 ...	3
(7) Do do do 4 (Thorapalli road) ...	5
(8) The Benne Plantation (Compartments 29 and 30) ...	40
(9) The Mudumalai Plantation (Compartment 26) ...	22¼

388. Details of the work carried out in these plantations will be found in Appendix I.

389. For purposes of fire protection they will come under the general scheme.

390. The only treatment that they will receive during the period of this plan is thinning where necessary.

391. The following table shows the years in which the various plantations must be inspected by the District Forest Officer to see if thinning are necessary.

A note to the effect that they have been so inspected must be entered in the History of Compartments.

Plantation.	Area.	Date of last thinning.	Years in which inspection for thinning is to be done.	Remarks.
Benne Teak Plantation	ACS. 40	1923-24	1928 and 1934	Only 20 acres thinned in 1923-24. May not require thinning in 1928 as it is much more open than the Benne Plantation.
Mudumalai Teak Plantation	22.25	1921-22	1928 and 1934	
Experimental plots in Compartment 4 (Thorapalli road).	5		1929 and 1935	
Experimental plots in Compartment 3 ..	3		1929 and 1935	
Bidurhalla 1926 Regeneration area ..	15		1932	
Plot near Kargudi Rest House	20		1932	
1924 and 1925 Kargudi Regeneration area..	149.5		1933	

SECTION 3.—ELEPHANTS.

392. *Elephant capturing operations*.—These operations should be carried on on the lines at present in force. The only question of importance is whether an additional series of pits should be made higher up the Moyar, above Teppakadu. There is evidence to prove that elephants do cross the Moyar considerably higher up than Teppakadu and the matter is one which should receive the District Forest Officer's consideration.

393. In view of the increased logging operations prescribed in this plan more elephants may be required than are in the range at present and it is essential that at least three of the elephants should be good kumakis.

394. The elephants are likely to be employed in dragging during the following months :—

November to February	...	...	in the Clearfelling Working Circle.
May to November	...	...	in the Selection Improvement Working Circle.

395. All elephants must be rested during March and April.

SECTION 4.—SALES.

396. The timber classification at present in force (see Part I, Chapter III, Section 5, Paragraph 117) will be continued subject to any alterations which the Forest Utilization Officer may suggest from time to time.

397. The sending of picked logs to Nanjangode for sale will be dependent on the recommendations of the Forest Utilization Officer who is to be consulted in this matter from time to time.

398. Local, roadside, sales will be held by the District Forest Officer as at present.

SECTION 5.—ROADS AND INSPECTION PATHS.

399. See under fire protection Part II, Chapter VII, Section 1, Paragraph 379 for details of the permanent guide line to be cut from Maragaddai to the junction of the Imbarhalla and Kakkanhalla. This will also serve as an inspection path.

400. All existing roads and paths will be maintained.

SECTION 6.—BUILDINGS.

401. No new permanent buildings will be required.

402. Temporary coolie lines, etc., will be put up as required to house imported labour.

403. All existing buildings will be kept in a good state of repair.

SECTION 7.—MAINTENANCE OF BOUNDARIES.

404. *External boundaries.*—The following sections of external boundary require special attention.

(1) The eastern side of Compartment 12 from the Moyar to the Masinigudi road will form the new range boundary and must be demarcated as such by a 20 feet line. This should be done at once.

(2) From the Sultan's Battery road to about a mile short of the Beane-Muthanga road. This portion is completely overgrown and should be cleared.

(3) From the Sultan's Battery road to the Moyar river in Compartment 5.

This portion of the boundary adjoins the Tirumalpad of Nilambur's forest and private estates.

The boundary is, in places, very much overgrown, and the earthen mounds and wooden posts erected to demarcate it have, in a great many cases, almost disappeared.

The boundary should be cleared and the earthen mounds, with posts, should be repaired.

405.—*Compartment boundaries.*—Blocks I, II and IV have been divided into compartments for purposes of control as shown on the Working Plan map, use being made of existing artificial boundaries where possible. Some of the compartment lines in Block I were laid out on the ground under Mr. Cox's plan.

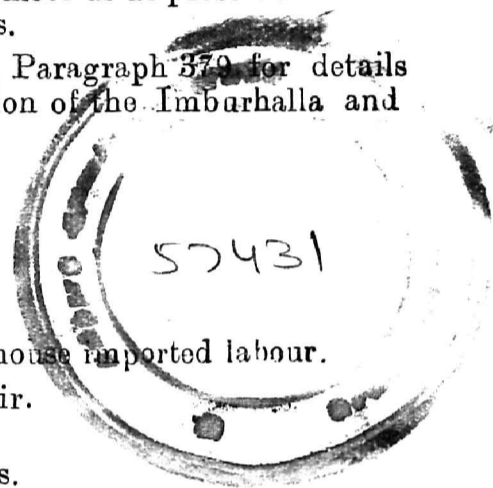
406. It is laid down that as compartments are taken up for working under the clearfelling, Improvement Selection and Sandalwood Working Circles, compartment boards showing the numbers of the compartments concerned are to be affixed to trees at the corners of the compartments; the figures must be cut into the wood, not painted on, arabic numerals being used.

SECTION 8.—CONTROL.

407. *History of Compartments.*—In order to have a permanent history of the forest, compartment by compartment, a special volume entitled the "Compartment History" is to be maintained by the District Forest Officer, in which details of all operations carried out in the forest should be entered.

408. The Compartment History will take the place of the Control Journal, the maintenance of which, in its present form, will be discontinued.

409. There will be two copies of the Compartment History. One—the working copy—will be kept in a bound book in the Range office and entries, signed and dated, will be made in manuscript. Only two columns are required—"Year" and "Miscellaneous notes regarding management."



410. Soon after the close of each year, the District Forest Officer will edit the entries of the past year, making any additions that are necessary, and a clean, typed edition of the approved entries will be entered in the second copy of the book, which will be kept permanently in the District Forest office. This fair copy should take the form of a loose leaved book.

411. In the working copy of the Compartment History the District Forest Officer will allot sufficient pages to each compartment and, before sending it to the range, the details given against each compartment in the Compartment Register (Appendix II of this Plan) will be entered as the heading, for each compartment, in the history.

412. Doddakattai Block, which is not divided into compartments, will form a unit of its own in the History and pages must be allotted to it.

413. There are three items of primary importance which relate to the forest as a whole and which can best be dealt with individually in the history.

"Fire protection", "Elephants", and "Labour" will, therefore, each be allotted a separate series of pages at the end of the Compartment History. It is, however, intended that a very brief note should be made under each compartment, every year, saying whether it has been burnt or not.

414. The maintenance of the Compartment History up to date and in good order is one of the most important duties of the District Forest Officer. The working copy should, invariably, be put up when the District Forest Officer or Conservator inspects the range. The Ranger should be encouraged to take an interest in his Compartment History and to make notes therein. The Compartment History is an integral part of the system of control.

415. *Record of Works*.—All works and their cost, relating to the forest as a whole, which will not be controlled automatically in the control forms of the respective Working Circles will be entered in a separate "Record of Works - Miscellaneous." The same form as is given in Appendix III will be used.

416. Amongst the works to be entered will be those relating to Fire protection, Roads, Buildings, Experimental observation areas, Elephant capturing and Maintenance of boundaries.

CHAPTER VIII.—ESTABLISHMENT AND LABOUR.

417. The present establishment should prove sufficient to cope with the work prescribed in this plan.

418. As regards labour, the local labour force should be able to carry out such regeneration as is prescribed, assisted, if necessary, for short periods, by gangs from Gundalpet and its neighbourhood. No difficulty is anticipated in recruiting such emergency labour; the coolies would be willing to stay ten days or so in the forest at a time.

419. Felling will have to be done chiefly by imported axemen from Malabar and there is not likely to be any difficulty about obtaining them.

420. In connexion with the labour question the desirability of getting people to settle in the forest should not be lost sight of.

421. It is, however, waste of time trying to induce Kurumbers to settle on the swamps—they do not understand wet cultivation and are better employed direct by the department.

422. But every encouragement in the shape of grants of land, a free pair of buffaloes, etc., should be given to Chetties and the like—only from such a nucleus can there be any chance of increasing the labour available on the spot. Only sufficient land for the actual necessities of each family must be given or the object of the settlement will defeat itself.

CHAPTER IX.—FINANCIAL FORECAST AND COST OF THE PLAN.

A.—Financial Forecast.

423. Anything, apart from mere guess work, in the way of forecasting the financial results of the Plan is out of the question.

424. Without data, the amounts likely to be realized from the Selection Improvement Felling Working Circle are impossible to estimate.

425. Regeneration costs in the Clearfelling Working Circle, too, depend on whether a method such as that of raising a forest crop in conjunction with a cereal crop is successful or not; if it succeeds, regeneration cost may be kept very reasonably low, if not, they will certainly be very high.

426. It can only be said that in the present state of the market there is little or no likelihood of the Mudumalai forests showing a profit during the period of this plan, when the cost of the establishment and the cost of maintaining a number of elephants are taken into account.

B.—Cost of the Plan.

427. The following charges make up the direct cost of the preparation of this Working Plan :—

Budget Head.	Cost of the Plan.		
	RS.	A.	P.
52-A-c-ii-Regeneration—			
Pay of Officers—Non-voted	4,345	14	0
Pay of Establishment—Voted	1,668	11	0
Allowances—			
Travelling Allowances—Voted	2,133	15	0
Other Compensatory	187	13	0
• Non-contract Contingencies	61	6	0
52-A-b-Conservancy and Works—			
vii. d. 4. Working Plans	45	10	0
	<hr/>	<hr/>	<hr/>
	8,443	5	0

CHAPTER X.—SUMMARY OF PRESCRIPTIONS.

428.

Working Circles.	Prescriptions.	Paragraph.
1. Clearfelling Working Circle.	Method of treatment	269 to 280
	1. Choice of species.	
	2. Silvicultural system.	
	3. Rotation.	
	• 4. Division into periods.	
	5. Allotment to Periodic Blocks.	
	6. Calculation of the yield.	
	Method of executing the fellings ...	281 to 283
	Tabular statement of operations month by month.	284
	Subsidiary silvicultural regulations ...	285 to 295
	1. Burning.	
	2. Lining.	
	3. Regeneration.	
	4. Thinning.	
	5. Nurseries	
2. Selection Improvement Felling Working Circle.	Control	296
	1. Control Book.	
	2. Record of Works.	
	3. Plantation Journal.	
	4. Control Map.	
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	1. Special objects of management.	
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	3. Choice of species.	
	4. Silvicultural system.	
	5. Felling Cycle.	
	6. Yield.	
	Method of executing the fellings ...	314 to 322
	1. Conversion.	
	2. Extraction.	
	Tabular statement of order in which compartments are to be worked over from 1927–28 to 1936–37.	323
	Other regulations	324 to 326
	Control.	

Working Circles.	Prescriptions.	Paragraph.
3. Sandalwood Working Circle.	Special objects of management ...	336 and 337
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	2. Silvicultural system.	
	3. Calculation of the rotation.	
	4. Sowing.	
	5. Tending.	
	Other regulations ...	347 to 354
	1. Selection of areas for introduction of Sandalwood.	
	2. Enumerations.	
	3. Control—	
	(i) Record of Works.	
	(ii) History of Compartments.	
	(iii) Control Map.	
4. Closed Working Circle.	.....	256 (4)
5. Grazing Working Circle.	.....	355 to 362
6. Minor Produce Working Circle.	.....	364 to 367
7. General to all Working Circles.	Fire protection ...	368 to 386
	Experimental observation areas ...	387 to 391
	Elephants ...	392 to 395
	Sales ...	396 to 398
	Roads and inspection paths ...	399 and 400
	Buildings ...	401 to 403
	Maintenance of boundaries ..	404 to 406
	Control ...	407 to 416
	Establishment and Labour ...	417 to 422
	Financial forecast ...	423 to 426

Proceedings of the Chief Conservator of Forests

Proceedings No. 311, Press, 27th September 1927

Revised Working Plan—Mudumalai forests—Prepared by Mr. Hicks.

R. D. RICHMOND, Esq., I.F.S.,

Acting Chief Conservator of Forests.

READ—the following papers :—

I

Letter from A. WIMBUSH, Esq., Conservator of Forests, Third (Working Plans) Circle, to the Chief Conservator of Forests, through the Conservator of Forests, VI Circle, dated Ootacamund, 26th April 1927, No. A. 82/26

[Revised Working Plan—Mudumalai Forests—Prepared by Mr. Hicks—Sanction.]

I send herewith the revised Working Plan for the Mudumalai Forests prepared by Mr. Hicks with material assistance from me, so far as Part II is concerned.

2. The history leading up to the preparation of the Working Plan in its present form must be recorded in the file in your office.

3. In my A. No. 82 of 26, dated 1st May 1926, I sent you an addendum to my proposals for the lines on which the plan should be prepared. In it I said that a subsequent and extensive inspection during the fire season with the District Forest Officer and Working Plans Officer had led the Working Plans Conservator to consider that no areas really are undoubtedly good enough to justify clearfelling and artificial regeneration under existing conditions of soil and rainfall.

4. The above opinion was not altogether unconnected with a realization of the fact that, should the Teak plantations in Mudumalai be a success, as also the large ones ordered to be prescribed in Begur and Chedleth, a time would come when a very large number of small poles from thinnings would be thrown simultaneously on to the same Mysore markets where, at present at any rate, the demand is very strictly limited.

5. A clearfelling Working Circle has been prescribed according to orders. The prescriptions are very elastic and the work is to be of an experimental nature. Under these circumstances I have no wish to lay further stress on the opinion referred to in paragraph 3 above and consider that the working plan may be sanctioned as it stands.

6. One copy of the working plan map is sent herewith. Eventually, after printing, a printed copy of this should be put into the pocket in the cover of each copy of the working plan.

7. Ten uncoloured copies of this map, required in connexion with the Van Dyke printing process are being sent separately to your office.

8. Two working copies of the map on the 2" Survey of India Sheets are being prepared in my office for the use of the District Forest Officer and Ranger to whom they will be sent shortly.

9. Two typed copies of the plan are now being sent to the District Forest Officer.

Copy to the District Forest Officer, Nilgiris, with two typed copies of the Plan.

II

*Endorsement of the Conservator of Forests, VI Circle, No. R. 312/26,
dated the 15th July 1927.*

Forwarded to the Chief Conservator of Forests, Madras.

2. I have no personal knowledge yet of the areas dealt with; but have read the plan with interest, and find nothing with which I disagree. Arrangements are in hand for carrying out the works prescribed for 1927-28 and the next year.

A. A. F. MINCHIN,

Acting Conservator of Forests, VI Circle.

Proceedings—No. 311, Press, dated 27th September 1927.

Sanctioned, with the following remarks :—

(i) It is not believed that so much as 6,653 acres is suitable for clearfelling and planting. And the Working Plan Officer should have selected and shown on the working plan map the area to be so treated in the period of the plan. It will suffice to allot 300 acres to the first period and this area should be selected as soon as possible by the Working Plan Conservator in consultation with the Conservator of Forests, VI Circle.

(ii) The method by which sandal is to be introduced in the Sandal working circle should have been more closely prescribed. Centres from which Sandal will spread by natural means, should be established in the better localities, it sufficing if such centres extend to an acre each and if the centres are distributed at about one per each hundred acres of the total area to be dealt with. It will then be possible to concentrate attention on the centres and to ensure that they succeed—it will probably be necessary to fence them.

(iii) It should have been possible for the Working Plan Officer to make some forecast of yield and of the financial results. Very complete records of past working exist, but these do not appear to have been consulted to the extent they should have been.

(iv) Free permits should be issued to cover the cattle which are permitted to graze without payment and it must be seen that the numbers are not in excess of the reasonable requirements of the residents in the forest.

(v) The Conservator of Forests, Sixth Circle, is particularly enjoined to see that the old control books are carefully preserved in his office. The District Forest Officer, the Nilgiris, has forwarded five volumes to this office—the original Volume II is stated to be mislaid ; it is to be found.

R. D. RICHMOND,
Acting Chief Conservator of Forests.

(True copy)

C. SHELSWELL,
Personal Assistant.

To the Conservator, Third (Working) Plan Circle.	} In manuscript.
„ Conservator, Sixth Circle, with five control books.	
„ District Forest Officer, the Nilgiris.	
Copy to other Conservators.	
„ other District Forest Officers.	
„ the Principal, Forest College.	
„ the Forest Research Officer.	

APPENDICES.

APPENDIX I.

Areas which were clearfelled and or regenerated prior to 1927.

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Benne Teak Plantation, Compartments 29 and 30.	▲ CS. 40	1864-75	<p>Originally the planted area was greater, but much of the area was apparently planted on swamp land and has disappeared.</p> <p>1913.—About 5 acres on the west side were thinned and 1,550 poles were extracted producing a revenue of Rs. 239-1-0.</p> <p>1916-17.—About 7 acres lightly thinned. 490 poles extracted producing Rs. 400 at a cost of Rs. 21-6-7.</p> <p>1917-18.—About 6½ acres lightly thinned; 504 poles extracted.</p> <p>Mr. Richmond (District Forest Officer) gave the following figures (from a sample plot of 1.37 acres):—</p> <p>Age—45 years</p> <p>Stemps per acre—350</p> <p>Ten rings per inch of radius on average.</p> <p>(Below Nilambur III class; compare 350 trees per acre at Benne with 96 at Nilambur at age 45 years).</p> <p>1919-20.—Two acres thinned. 175 trees extracted. (Mean girth—2' 10". Mean height 58' 3".</p> <p>1923-24.—Twenty acres thinned; 3,124 poles extracted producing Rs. 843-0-0 at a cost of Rs. 131-4-0.</p>	<p>Rupees 16,727 arrived at by taking proportionate cost of Benne and Mudumalai plantations allowing for area that has failed. Benne plantation must have cost nearly Rs. 300 per acre.</p> <p>..</p> <p>..</p>	<p>The growth is extremely poor. Writing in 1910 and 1912 Mr. Cox attributes this to the soil being unsuited to teak and to fires in the past.</p>
Mudumalai Teak Plantation, Compartment 26.	22.25	1869-75	<p>Originally a larger area appears to have been planted up.</p> <p>1909-10.—Four acres thinned; 428 poles extracted producing Rs. 270 at a cost of Rs. 19.</p> <p>1910-11.—Ten acres thinned; 829 poles extracted producing Rs. 731 at a cost of Rs. 28.</p> <p>1913-14.—Hundred poles extracted at a cost of Rs. 12-8.</p> <p>1914-15.—Balance of the area thinned; 1,093 poles extracted producing Rs. 500 at a cost of Rs. 43-11-6.</p> <p>1920.—The great fire of 1920 passed through the plantation.</p> <p>1921-22.—Whole plantation thinned fairly heavily, yielding poles measuring 9,778 cubic feet producing Rs. 8,720 at a cost of Rs. 148-1-0.</p> <p>1922-23.—The coppice shoots resulting from the last thinning were thinned leaving two shoots per stool.</p>	<p>Rupees 10,455 proportionate cost of Benne and Mudumalai plantations combined.</p> <p>Allowing for failed areas Mudumalai plantation must have cost Rs. 300 per acre.</p> <p>..</p> <p>..</p>	<p>The plantation shows better growth than Benne and has been more opened up.</p>
Benne Tuckle, Compartment 33	5.6	1907-08	<p>About 10 acres planted with Teak, Pterocarpus Marsupium and Mahogany, most of which died in the hot weather.</p> <p>1908-09.—Weeded</p> <p>1909-10.—Weeded. Two acres nearly cleared, 10 acres lined and 5,225 pits dug. Plantation fenced.</p> <p>1910-11.—Five acres cleared and 3,209 pits dug and planted with Teak Pterocarpus Marsupium, Mahogany and Rosewood and the area fenced. Ten acres weeded and 2,000 Teak casualties replaced. Seed beds prepared, etc.</p> <p>1911-12.—Seven acres cleared, 4,960, pits dug and planted. Twenty-two acres of previous year's tuckles were weeded and casualties replaced, fencing repaired and seedlings staked.</p> <p>1913-14.—Clearing grass</p> <p>1914-15.—Cutting inspection paths, clearing lantana and weeding.</p>	<p>RS. A. P. 20 0 0</p> <p>15 0 0</p> <p>161 12 3</p> <p>220 0 6</p> <p>275 4 0</p> <p>5 5 0</p> <p>233 13 0</p>	<p>Only 5.6 acres of this tuckle (known as the 1909 tuckle) remain.</p> <p>Of the Aini seedlings put in, only 3 were found in April 1926.</p> <p>The Teak growth is very slow. There is a lot of grass—(Imperata arundinacea).</p>

Areas which were clearfelled and or regenerated prior to 1927—*cont.*

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Benne Tuckle, Compartment 33— <i>cont.</i>	ACB.		<p>1916-17.—Weeding etc.</p> <p>1917-18. Do.</p> <p>1920-21.—Seed of <i>Artocarpus hirsuta</i> (aini) was dibbled over $3\frac{3}{4}$ acres.</p> <p>1921-22.—Sowing aini seed ;</p> <p>Clearing lantana where Teak existed</p> <p>Two hundred and fifty <i>Erythrina</i> cuttings were planted, but almost all died during the hot weather as did 95 per cent of the aini.</p> <p>1922-23.—One acre of aini was dibbled 6' X 6'. Germination fair but in July 1923 only 250 survived.</p> <p>Only one <i>Erythrina</i> cutting survived</p> <p>1923-24.—Two hundred aini seedlings reported to have survived. Lantana clearing.</p> <p>1924-25.—Two hundred and thirteen stumps from Kargudi nursery planted in blanks. Weeding done round stumps.</p> <p>Forty-five aini survivors basketted and lantana uprooted.</p> <p>1925-26.—Tending, lantana clearing, etc.</p>	<p>RS. A. P.</p> <p>99 15 6</p> <p>25 0 0</p> <p>21 6 0</p> <p>42 12 0</p> <p>7 14 0</p> <p>..</p> <p>..</p> <p>19 14 0</p> <p>..</p> <p>15 3 0</p> <p>9 15 0</p>	
	5.6— <i>cont.</i>	1907-08— <i>cont.</i>	<p>This area seems to have been lost sight of till recently.</p> <p>No details are available</p>	<p>..</p> <p>..</p>	The situation and soil appear favourable but the growth, though better than on any of the other tuckles at Benne is very slow.
Benne Tuckle, Compartment 32.	2.75	Probably about 1907.			
Benne Tuckle, Compartment 32.			<p>Collection of Teak and <i>Pterocarpus Marsupium</i> seed and preparation of nursery beds.</p> <p>Staking and dibbling with field crop</p> <p>Clearing and burning done by Chetties—</p> <p>1918-19.—The tuckle failed and planting was done in 1918 but in December only 50 per cent survived due to a deficient monsoon.</p> <p>1919-20.—The area was considered to have failed and was burnt and cleared. Nilambur teak seed raised in a nursery and area replanted.</p> <p>1920-21.—Weeding and replacing casualties and uprooting lantana.</p> <p>1921-22.—Weeding and uprooting lantana.</p> <p>1922-23.—Weeding and uprooting lantana.</p> <p>1923-24.—Weeding and uprooting lantana.</p> <p>1924-25.—Weeding and uprooting lantana.</p> <p>1925-26.—Weeding and uprooting lantana.</p>	<p>47 14 6</p> <p>22 5 0</p> <p>..</p> <p>Not recorded.</p> <p>52 14 0</p> <p>26 0 0</p> <p>109 0 0</p> <p>110 5 0</p> <p>40 8 0</p> <p>42 6 0</p> <p>38 10 0</p>	<p>The whole area is a sea of grass (<i>Imperata arundinacea</i>).</p> <p>The teak is very patchy and slow grown.</p> <p>Failure to secure 100 per cent stocking has done a lot of harm to this area.</p>
	13.0	1917-18..			
Experimental Plots, Compartment 3.	3.0	1916-17 ..	<p>Mr. Richmond (District Forest Officer) ordered three plots of 1 acre each to be treated as follows :—</p> <p>Plot I.—To be clearfelled of everything but Teak and the soil worked.</p> <p>Plot II.—To be clearfelled and soaked Teak seed dibbled at stake 4' X 4'.</p> <p>Plot III.—To be clearfelled. All plots to be weeded.</p> <p>August 1916.—The work was delayed. Unsoaked seed had been used. Plots I and III were burnt in 1917.</p> <p>1919-25.—Mr. Richmond (District Forest Officer) in 1919 considered that the experiment had failed as far as getting natural regeneration by seed was considered.</p> <p>Various other sowings, burnings, etc., were carried out and the seed bearers in Plot I were removed.</p>	<p>..</p> <p>..</p> <p>..</p> <p>..</p> <p>..</p> <p>..</p> <p>..</p>	<p>Practically nothing on the area except coppice from old stools — a good deal of this in Plots I and II.</p>

Areas which were clearfelled and or regenerated prior to 1927--cont.

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Experimental Plots, Compartment 4 along Thorapalli road.	ACS.			RS. A. P.	
	5.36	1918	<p>These plots were started by Mr. Richmond (District Forest Officer) with the idea of making up for the absence or scarcity of natural regeneration by the artificial raising of patches of Teak by planting in blanks caused by the improvement fellings. His idea was to confine the work to the best localities and the largest plot—Plot I—was cleared by the ranger under a misunderstanding.</p> <p>The plots were planted 6' X 6'</p> <p>There is no record of the expenditure incurred up to 1922-23—</p> <p>1922-23.—Weeding</p> <p>Certain areas planted with Teak stumps 6' X 6'—</p> <p>1923-24.—Weeding</p> <p>1924-25.—Weeding by subordinates ..</p> <p>1925-26.—Nil</p>	<p>..</p> <p>..</p> <p>16 2 0</p> <p>22 8 0</p> <p>6 12 0</p> <p>No cost ..</p> <p>..</p>	<p>Except in Plot I where the growth of grass is heavy and the stocking of Teak very patchy, the plots are fairly encouraging but to carry out such operations on a large scale would probably involve prohibitive expenditure.</p> <p>Allowing for the differences in age there is little to choose between the results of seedling and stump planting.</p>
Experimental Teak plots (along Mudumalai road).	Not given.	1921-22	<p>The object of the experiment was to test the suitability of the locality (type II) for artificial regeneration of Teak.</p> <p>Seven patches were clearfelled. The experiment is on too small a scale to give reliable results—</p> <p>1922-23.—Teak dibbled 12' X 12' and twice weeded. Growth of seedlings reported to have been 9".</p> <p>1923-24.—Weeding and mulching. An accidental fire passed through the areas in the hot weather of 1924.</p> <p>1924-25.—Tended by subordinates ..</p> <p>1925-26.—Tended by subordinates ..</p> <p>1926-27.—Tended by subordinates ..</p>	<p>..</p> <p>7 8 0</p> <p>7 8 0</p> <p>..</p> <p>..</p> <p>..</p>	<p>The results are not encouraging.</p>
Plot in Compartment 8.	20.0	1922-23	<p>In accordance with the Conservator's (Mr. Tireman's) orders 20 acres in the poorest type of forest was clearfelled, burnt and dibbled with teak seed in patches 12' X 12'.</p> <p>Two weedings were carried out during the year.</p> <p>Germination was very poor (20 per cent recorded) and the growth miserable—</p> <p>1923-24.—Weeding and tending coppice.</p> <p>1924-25.—Pruning by subordinates ..</p>	<p>Not recorded for 1921-22.</p> <p>147 8 0</p> <p>17 2 0</p> <p>No cost ..</p>	<p>There is a certain amount of coppice, nearly all Teak, but scarcely any result can now be seen of the sowings. A total failure.</p>
Kargudi Rest-House Plantation, Compartment 1.	20	1922-23	<p>In accordance with the Conservator's (Mr. Tireman's) orders 20 acres were clearfelled and burnt.</p> <p>Area dibbled with Teak seed in patches 27' X 27'.</p> <p>Patches were weeded. Coppice shoots from old stools were thinned, leaving two shoots per stool.</p> <p>1923-24.—Of the above 20 acres 9 acres were divided into three plots. These were planted with teak stumps (age not recorded) at the following espacements:—</p> <p>(1) 13½' X 13½'</p> <p>(2) 9' X 9'</p> <p>(3) 6½' X 6½'</p> <p>Area weeded</p> <p>1924-25.—Nine hundred stumps were planted in blanks in the 9 acres referred to above. Weeding of whole area.</p> <p>In March 1925 the area was burnt in the hope of stimulating the Teak and reducing the grass.</p> <p>1925-26.—Cutting back damaged plants after the burn, filling blanks and some weeding.</p> <p>Area again burnt in March 1926 and damaged plants cut back.</p>	<p>Not recorded for 1921-22.</p> <p>..</p> <p>..</p> <p>..</p> <p>137 13 0</p> <p>62 14 0</p> <p>9 1 0</p> <p>94 5 6</p> <p>3 0 0</p>	<p>The results are extremely poor.</p>

Areas which were clearfelled and or regenerated prior to 1927—cont.

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Kargudi Regeneration Area, Compartment 1.	ACS.			RS. A. P.	
	90	1922-23	<p>Clearfelled and area cleared of useless species</p> <p>1923-24.—Regrowth cut and burnt in March 1924.</p> <p>1924-25.—The area was planted with Teak stumps at an espacement of 15' X 15' (under Chief Conservator's orders). Most of the stumps were brought from Nilambur and were small and weedy. Results were deplorable. The grass round the plants was weeded and the soil worked and mulched at intervals till November 1925. In March 1925 under the orders of the Chief Conservator, the area was burnt and damaged. Teak was cut back—</p> <p>Aligning and staking 66 13 0</p> <p>Pitting 127 3 0</p> <p>Planting 68 15 6</p> <p>Inspection paths 27 0 0</p> <p>Replacing casualties 57 6 0</p> <p>Weeding and mulching 328 5 0</p> <p>Soil working 47 1 0</p> <p>Fire protection 18 0 0</p> <p>Miscellaneous 59 10 0</p> <p>Burning in March 1925 49 1 0</p> <p>1925-26.—The burning in 1925 (March) had little, if any, beneficial effect. Blanks were filled by stump planting and dibbling and weeding was done—</p> <p>Replacing burnt pegs 22 11 0</p> <p>Filling blanks 43 6 0</p> <p>Weeding and cutting back damaged plants. 313 13 0</p> <p>Cost of seeds 6 0 0</p> <p>As a last hope the plantation was again burnt in March 1926 under the Chief Conservator's orders. 12 0 0</p>	<p>500 0 0</p> <p>553 12 6</p> <p>..</p>	The locality is unsuitable, the espacement too wide and the area may be considered a total failure.
Kargudi Coppice Area, Compartment 1.	57	1922-23	Timber felled and extracted. Yield about 300 cubic feet per acre—		
		1925-26	<p>Unsaleable species felled 285 0 0</p> <p>Originally cleared for artificial regeneration but in view of the very unsatisfactory results of the planting carried out in 1924-25 in the Kargudi clearing the District Forest Officer obtained sanction to treat the area as coppice.</p> <p>In the belief that coppice after three years' growth was safe from a grass fire the area was burnt in March 1926 in the hope of reducing the grass and of encouraging any natural seedlings on the ground.</p> <p>1926-27.—The Teak damaged by the fire were cut back. 28 0 0</p>	<p>10 14 0</p> <p>8 13 0</p>	
Kargudi Regeneration Area, Compartment 1.	7 $\frac{3}{4}$	1922-23	<p>Clearfelled. Yield about 300 cubic feet per acre</p> <p>Expenditure charged to B. Ia 27 10 0</p> <p>1923-24.—Clearfelling of unsaleable species. 51 12 0</p> <p>1924-25.—Coppice regrowth cut back in January 1925 and the area burnt in March 1925.</p> <p>1925-26.—Teak stumps (two years old) planted in prepared patches 12' X 12'. Patch weeded. Cost up to March 1926 .. 197 10 0</p> <p>1926-27.—Replacing casualties 4 8 0</p> <p>Weeding 30 0 0</p>		A 'sea' of grass, with miserable plants in weeded 'funnels' compare very unfavourably with plot IV (Clean weeded). (March 1926). Condition in December 1926 much worse.
	7 $\frac{3}{4}$	1922-25	<p>Operations from 1922-25 as above except that cutting regrowth and burning cost.</p> <p>1925-26.—Teak seeds sown in prepared patches 6' X 6'. Patch weeded.</p> <p>1926-27.—Weeding—Replacing casualties .. 6 12 0</p>	<p>59 0 0</p> <p>79 4 0</p>	Indifferent to bad but better than Plot I. (March 1926).
	7 $\frac{3}{4}$	1922-25	<p>Operations from 1922-25 as above except that cutting regrowth, etc., cost.</p> <p>1925-26.—Teak seeds dibbled 4$\frac{1}{2}$' X 4$\frac{1}{2}$' and and clean weeded.</p> <p>1926-27.—Weeding—Replacing casualties. 6 12 0</p>	<p>68 4 0</p> <p>87 8 0</p>	In lower (better) parts fair. Stocking good and many seedlings 1 foot high. Upper parts very poor. Almost as good as plot IV (March 1926).

Areas which were clearfelled and or regenerated prior to 1927—cont.

Name and situation	Area.	Year of formation.	Past history.	Cost.	Results.
Kargudi Regeneration Area, Compartment 1—cont.	ACS.			RS. A. P.	
	7½	1922-25	Operations from 1922-25 as above. Cutting regrowth, etc., cost. 1925-26.—Teak seeds sown in prepared patches 6' X 6' clean weeded. 1926-27.—Replacing casualties Weeding	61 9 0 .. 2 8 0 69 12 0	Stocking good. Growth in lower parts good (for the locality). Clean weeding had defeated the grass, its place being taken by a composite weed. (March 1926.)
	1½	1922-23	Timber felled 1923-24.—Useless species felled 1924-25.—Regrowth cut and area burnt in March 1925. 1925-26.—Eucalyptus robusta seedlings planted 6' X 6' Patch weeded. 1926-27.—Sandal dibbled 6' X 6' Weeding	5 8 0 10 3 0 55 0 0 per acre approximately. 4 0 0 2 0 0	A failure—all the seedlings were browsed by deer. (March 1926.)
	11	1922-23	Timber felled Yield 300 cubic feet per acre Expenditure charged to B.Ia 1923-24.—Unsaleable species felled 1924-25.—Regrowth cut and area burnt 1925-26.—Teak stumps (two years old) planted in prepared patches. Clean weeded. Cost up to March 1926 .. 1926-27.—Replacing casualties Weeding Pruning	51 14 0 47 13 0 .. 49 0 0 per acre. 8 10 0 111 14 0 4 2 0	Stocking fair but not so good as in adjoining sown area. Growth about equal to sown area. Possibly slightly better, but bushy and not so healthy looking. (March 1926.)
Kargudi Regeneration Area, Compartment 1.	1	1922-23	Timber felled Expenditure charged to B.Ia Unsaleable species felled 1923-24.—Area left fallow 1924-25.—Area burnt and regrowth out .. 1925-26.—Teak seed dibbled 6' X 6' .. Jal (Shorea talura) seed broadcasted. Patch weeded three times 1926-27.—Weeding Total cost ..	5 6 0 6 12 0 8 4 0 4 8 0 52 6 0	The jal failed to germinate and the seed probably lost its fertility before sowing. Teak indifferent as in other patch weeded areas. (March 1926.) A failure. (December 1926.)
	1	1922-23	Operations up till 1925 and cost as for Plot VII. 1925-26.—Gmelina arborea sown, 6' X 6' in prepared patches. Patch weeded 1926-27.—Replacing casualties Weeding .. ..	.. .. .. 4 14 0 4 12 0	About 50 per cent of the stakes had seedlings but all browsed down to a couple of inches. (March 1926.) In December 1926 less than 15 per cent of seedlings left.
	2	1922-23	Timber felled and extracted Expenditure charged to B.Ia Unsaleable species felled 1923-24.—Area left fallow 1924-25.—Regrowth cut and area burnt .. 1925-26.—Soil worked an inch or two deep all over (grass roots being dug up and burnt in heaps). Area staked 6' X 6' Teak seed dibbled at stake in May 1925. Ragi broadcasted in June 1925. Area fenced with split bamboo. Weeds coming up in Ragi and round Teak removed. Ragi removed immediately round Teak, but not drastically enough.	.. 10 0 0 .. 11 6 0 15 0 0 ..	Stocking of Teak fair, but growth poor owing to insufficiently severe weeding of Ragi round the stakes. But results very encouraging. Ragi crop has practically paid for all operation in the plot. Net cost of Teak crop for 1925-26 Rs. 13-14-0. (March 1926.)
	(Departmental felling) Plot IX				

Areas which were clearfelled and or regenerated prior to 1927—*cont.*

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Kargudi Regeneration area, Compartment 1— <i>cont.</i> (Departmental teling) Plot IX— <i>cont.</i> Plot X.	ACS.		<p>Cost :—</p> <p>Aligning, etc. 5 6 9</p> <p>Working the soil 45 4 0</p> <p>Seed.. .. . 4 8 0</p> <p>Sowing 7 2 0</p> <p>Weeding 22 12 0</p> <p>Fencing 29 4 0</p> <p>Watching Ragi crop, huts and machans, harvesting, etc. 79 4 0</p> <p>Yield of Ragi 1,800 Gundalpet seers worth Rs. 12 per 100 seers—Rs. 216.</p> <p>1926-27.—Cost of leak seed.. .. . 0 8 0</p> <p>Stump planting over one acre 1 8 0</p> <p>Fencing 4 0 0</p> <p>Weeding 14 4 0</p> <p>Working the soil, redibbling 33 2 0</p> <p>Fifteen seers of Ragi sown during 1926-27. 2 0 0</p> <p>Construction of watcher's sheds 3 6 0</p> <p>Watcher's machans 1 8 0</p> <p>Weeding of Ragi 4 4 0</p> <p>Preparing ground for Ragi 1 8 0</p> <p>Pay of watchers and harvesting the Ragi, etc. 34 8 0</p> <p>Yield of Ragi 750 Gundalpet seers worth Rs. 12 per 100 seers—Rs. 90.</p>	<p>Rs. A. P.</p>	
	12	1922-23	<p>Timber felled.</p> <p>Expenditure charged to B. Ia.</p> <p>Unsleable species felled 60 0 0</p> <p>1923-24.—Area left fallow. 51 6 0</p> <p>1924-25.—Regrowth cut and area burnt 82 15 0</p> <p>1925-26.—Teak sown in prepared patches 6'×6' six acres clean weeded and six acres patch weeded Cost up to March 1926. 48 0 0 per acre approximately.</p> <p>1926-27.—Weeding 120 2 0</p> <p>Replacing casualties 6 0 0</p> <p>Pruning 1 12 0</p> <p>Total cost approximately per acre 59 0 0</p> <p>results in the best localities. But the expense is prohibitive even in good areas. (March 1926.)</p>		<p>The yield of Ragi was poor owing to failure of north-east monsoon.</p> <p>Clean weeded area much better than patch weeded area (and cost only about Rs 7 per acre more). Stocking good and growth best of all the 1925 plots. There is little doubt (expenditure apart) that clean weeding and dibbling in prepared patches would give fairly good results.</p>
	5 included in the 90-acre plantation.	1922-23	<p>Clearfelled 28 0 0</p> <p>1923-24.—Regrowth cut and area burnt in March 1924. 10 8 0</p> <p>1924-25.—Patches 3'×3' were dug up 10" deep at an espacement of 6'×6'. This was an impossibly costly operation. Vengai seed was sown in the patches. Germination was fair. 24 7 0</p> <p>Very little weeding was done as this increased the damage from browsing by deer. Most of the seedlings died back in the hot weather of 1925.</p> <p>Aligning and staking 15 9 0</p> <p>Pitting 221 8 0</p> <p>Sowing 7 14 6</p> <p>Weeding and mulching.. .. . 31 3 0</p> <p>Inspection paths 1 4 0</p> <p>Working the soil.. .. . 9 0 0</p> <p>Fire protection 1 0 0</p> <p>Miscellaneous 3 9 8</p>		The area is a failure.
Kargudi Vengai (Pterocarpus Marsupium) Plantation, Compartment 1.					
Kargudi Rosewood Plantation, Compartment 1.	5 included in the 90-acre plantation.	1922-23	<p>Clearfelled 28 0 0</p> <p>1923-24.—Regrowth cut and area burnt in March 1924. 34 15 0</p> <p>1924-25.—Patches 3'×3' were dug up 10" deep at an espacement of 6'×6' an impossibly costly operation. Rosewood seed was sown in the patches in April 1924. Germination was very bad. Damage from browsing was severe. Very little weeding was done.</p> <p>Aligning and staking 15 9 0</p> <p>Pitting 221 8 0</p> <p>Sowing 7 14 6</p> <p>Weeding 19 15 0</p> <p>Inspection paths 1 4 0</p> <p>Miscellaneous 4 9 8</p> <p>The area was re-sown with no success.</p> <p>1926-27.—Seeds of Acacia dealbata dibbled over one acre by subordinates.</p>		<p>A total failure.</p> <p>Nothing germinated.</p>

Areas which were clearfelled and or regenerated prior to 1927—cont.

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Results.
Mandatarai Teak Plantation, Compartment 20.	ACS. 11	1922 1924-25 1925-26	This area was given to Krishna Chetti for tuckle in 1922. The area was cleared by him and partly cultivated with Ragi. It was recleared and burnt for planting in 1924-25 at a cost up to March 1925 of Teak dibbled $4\frac{1}{2}' \times 4\frac{1}{2}'$ and kept clean weeded. Cost up to March 1926. 1926-27.—Replacing casualties Weeding Fencing round Rosewood patches Fire protection	RS. A. P. .. 63 0 0 30 0 0 per acre. 10 10 0 133 4 0 2 0 0 5 0 0	The area is type I and is included in the Clearfelling Working Circle but the height growth of the seedlings is remarkably bad though the stocking is almost 100 per cent and the area has been carefully tended. There is no Teak coppice on the area from old stools. A large number of Rosewood plants have come in.
Moyar Coppice area, Compartment 14.	22	1923-24	Timber felled 1924-25.—Useless species felled 1925-26.—The intention was to clearfell for planting with Teak stumps but the failure experienced in similar jungle at Kargudi resulted in the decision to treat the area as simple coppice.	106 8 0	
Moyar Experimental area, Compartment 14.	5	1925-26	The object of the experiment was to have one more attempt at natural regeneration by seed and coppice. 89 seed bearers were marked in 1925 :— Teak 47; Terminalia tomentosa 23; Anogeissus 14; Rosewood 2; Grewia 2; Adina 1. Everything else was felled. Half the area was burnt.	..	The experiment is a failure as far as natural regeneration goes.
Bidurhalla Plantation, Compartment 3.	11	1925-26	Saleable timber extracted. Expenditure charged to B.I. a. Unsaleable species felled and area burnt .. 1926-27.—Divided into two plots of $5\frac{1}{2}$ acres each :— Plot I.—Stump planting (two years old stumps) of Teak $5' \times 6'$ — Aligning, etc. Pitting Stump planting Replacing casualties Weeding Plot II.—Teak seeds dibbled $6' \times 6'$ — Aligning, etc. Cost of seed Dibbling Weeding Working the soil	187 10 0 .. 11 11 0 52 6 0 25 2 0 1 2 0 67 8 0 10 11 0 7 8 0 5 8 0 74 14 0 4 0 0	The stump planted areas show better growth than the dibbled areas.
Chinnakolli Plantation, Compartment 6.	10	1925-26	Timber extracted Expenditure charged to B.I. a Unsaleable species felled and area burnt .. 1926-27.—Divided into three plots of $3\frac{1}{2}$ acres each :— Plot I.—Stump planting Teak $6' \times 6'$.. Plot II.—Teak dibbled $6' \times 6'$.. Plot III.—Stump planting Teak $6' \times 6'$. Plots I and III.— $6\frac{2}{3}$ acres .. Aligning, etc. Pitting Stump planting Weeding Plot II.— $3\frac{1}{2}$ acres— Aligning Dibbling Weeding Albizia Lebbek seed dibbled on opposite side of stake by subordinates.	191 4 0 14 10 0 67 2 0 30 0 0 93 12 0 7 5 0 3 4 0 48 0 0	The stump planted areas show better growth than the dibbled areas.
Bidurhalla coppice area, Compartment 3.	25	1925-26	In order to see whether some of the poorer areas where Teak is abundant could be worked as coppice on a short rotation this area was clearfelled in 1926 for treatment as simple coppice. The area yielded 10,337 cubic feet of saleable timber. Felling useless species and coppicing stumps. Protecting it when burning adjacent regeneration area.	95 0 0 9 15 0	

Areas which were clearfelled and or regenerated prior to 1927—cont.

Name and situation.	Area.	Year of formation.	Past history.	Cost.	Result.
Bidurhalla Tuckle (Departmental) Compartment 3.	ACS. 4			RS. A. P.	
		1925-26	Saleable timber extracted. Expenditure charged to B. Ia.		
		1926-27	Unsaleable species felled and area burnt ..	23 0 0	
			Burning	45 1 5	
			Aligning, etc.	11 8 0	
			Pitting	62 6 0	
			Seed Teak and Venteak and nursery charges.	3 15 0	
			Dibbling 2 acres	2 0 0	
			Stump planting 2 acres	9 12 0	
			Working the soil	57 4 0	
			Weeding	26 2 0	
			Fencing	63 0 0	
			Divided into 4 plots of 1 acre each. Plot I.—Teak stumps (2 years old) 6' X 6'. Plot II.—Teak dibbled 6' X 6' Plot III.—Teak dibbled 8' X 18" Plot IV.—Venteak (Lagerstroemia lanceolata) dibbled 6' X 6'. Teak stumps planted (2 years old) 6' X 6'. Albizia odoratissima and Pterocarpus Marsupium seeds broadcasted over the whole 4 acres.		No Venteak germinated.
			On two-thirds of each plot Ragi was sown and on one-third of each plot Horsegram was sown. Yield of Ragi—Rs. 1,150. Gundalpet seers Rs. 138.	75 12 0	The gram was sown too late and failed.
			A further area of 10 acres in Compartment 6 adjoining the 1926-27 plantation was clearfelled in November 1926 under the orders of the District Forest Officer.	..	
Karkudi Sandalwood areas, Compartment 1.	25	1920-21	As an experiment Sandal seeds were dibbled on an area of 25 acres near Kargudi rest-house and marked by stakes. Espacement 20' X 20'. About 50 per cent germinated.	Not recorded.	
	27½	1921-22	Seedlings resulting from last year's sowings were basketted, and a further area of 27½ acres was dibbled. Resulting seedlings were basketted. ..	148 4 0	
			Espacement 20' X 20'.	454 10 0	
	30	1922-23	Areas of the last 2 years were re-dibbled where they had failed and fresh area of 30 acres was dibbled 20' X 20'— Basketting and grass knifing Felling overhead branches (82½ acres). Shading young seedlings	34 2 0 112 14 0 308 10 0 20 10 0 22 2 0	
	28½	1923-24	Further area of 28½ acres taken up and dibbled 20' X 20'. About 60 per cent success and seedlings were basketted. Baskets repaired and overhead branches out.	499 7 0	
		1924-25	Blanks in old areas dibbled. Seedlings were basketted and old baskets repaired and replaced.	271 15 0	
		1925-26	Renewing and repairing baskets Sandal dibbled 20' X 20' and seedlings basketted.	79 14 0 46 0 0	
	14½	1926-27	Re-dibbling of previous years' area Dibbling of Sandal was also done on the failed Eucalyptus robusta (Plot No. V) and the Kargudi regeneration area.	13 0 0 4 0 0	

APPENDIX II. Description of Compartments.

Teppakadu block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compart- ment.	Area and boundaries.				
1	1,315 acres. North—Compartment 17. East—Compartment 11. South—The Moyar River and Compartment 3. West—Compartment 2.	Soil—Black with a few reddish patches. Generally poor. Shallow in places. Aspects—All. Slope—Gentle to steep. Drainage—North and south into streams running diagonally south-east through north of compartment and thence into the Moyar.	Type of forest—Nos. II and III, the type II being poor. Teak occurs throughout, often as small but quite well grown copice from previous improvement felling. There are two or three patches of Shorea Faura, sometimes of middle age. Height growth is generally poor. Stocking is rather open. Grass—All 4 identified species of grass occur, Themeda imberbis being confined principally to the type III areas. Natural regeneration—Fair. 1924-25. 90 acres Kargudi regeneration area. 1922-23. 57 acres Kargudi Coppice area. 1925-26. 59.5 acres Kargudi regeneration area. 1920-21 to 1925-26. Sandalwood dibbled over 125.5 acres 20' x 20'.	Improvement felling—1910-1913—(Yield cannot be separated from that of compartment 2). Clear fellings—1922-23. 20 acres teak plantation. Allotted to Sandalwood Working Circle. 227 acres of observation experiments.	Remaining area of natural forest is suitable for Sandalwood. The Kargudi Forest Rest-House Range quarters, etc., are situated in this compartment. The Mudumalai-Kargudi road runs along the eastern boundary, the Kargudi station, rest-house and ram site roads through the centre and the Mysore-Gudalur road along the south-east. Sandalwood Working Circle.
2	940 acres. North—Compartment 19. East—Compartment 1. South—Compartment 3. West—Compartment 4.	Soil—Black and of medium d.p.th. Aspects—All. Slope—Very gentle to moderate. Drainage—In north and west into Ambhatti stream and from centre into Bidurhalla. There are one or two swamps, along the western boundary.	Type of forest—Generally a medium type II. Teak occurs throughout. Height growth—Fair to poor. Grass—Dense. All the three varieties; Themeda imberbis is confined to the eastern boundary and in the southern portion the variety Imperata arundinacea is the commonest. Eupatorium is found in occasional small patches. There is comparatively little natural regeneration except in the poor areas. Stocking—Generally fair but fairly good in the poorer areas.	Improvement felling—1913-14 and 1914-15—Northern half 450 acres. 1918-19—The whole compartment. Felling of Terminalia tonensis girdled in previous years and dead Vengai (Pterocarpus Marsupium). Total yield - 43 422 cubic feet. The southern half was in improvement felling between 1910 and 1913 but yield cannot be separated from that of compartment 1.	The first of the dense grassy compartments on going west in Block I. The Forest College path runs through the south of the compartment. Allotted to Selection Improvement Working Circle.
3	1,188 acres. North—Compartment 1 and 2. East—The Moyar River. South—The Moyar River. West—Compartment 5.	Soil—Black. Poor to medium. Aspects—All. Slope—Gentle to moderate. Drainage—Into the Bidurhalla and the Moyar.	Type of forest—The eastern portion is intermediate between types II and III, being slightly better south of the Mysore road. The western portion is mostly poor type II except for a bamboo area on the western boundary where the tree growth is better. Teak is found throughout. Regeneration is deficient. Stocking, except in places, is open. The type III areas are the best stocked and show most natural regeneration. Height growth—Poor generally except in the valleys. There is a small area of very fine height growth (no teak but bamboo) on the south bank of the Bidurhalla just before it crosses the Mysore road. Grass—In the eastern part the variety Themeda imberbis is found sometimes in mixture with Imperata arundinacea but the latter has taken possession of the rest of the compartment and is dense. There is very little of the taller varieties. Eupatorium occurs in occasional small patches. 1925-26—Bidurhalla coppice area 25 acres.	Improvement felling—1914-15—370 acres. Yield—17,455 cubic feet. 1915-16—484 acres. Yield—43,486 cubic feet. 1916-17—570 acres. (Balance of 2nd operation) 107 cubic feet. 1916-17—Experimental plots—3 acres. Clearfelling—1925-26—Bidurhalla regeneration area 15 acres.	This compartment shows the change from forest type III to type II and characteristic change of grass. The eastern end is probably suitable for sandal. The College path cuts the western end and the Mysore road runs through the middle of the compartment. Allotted to Selection Improvement Working Circle. 43 acres of observation experiments.

Teppakadu block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries. (2)				
4	1,912 acres. North—Compartment 19. East—Compartment 2. South—Compartment 5. West—Compartment 6.	Soil—Black and of moderate depth except in the west where the red soil, characteristic of compartment 6, begins to appear. Aspects—All. Slope—Gentle to rather steep. Drainage—In east into Ambhatti stream. From centre and west into the Chinnakolli stream and thence into the Bidurhalla. Swamps occur along the Chinnakolli and its tributaries.	Type of forest—No. II ranging from poor in the north to good in the centre to type No. I in the south-west of the compartment. This No. I type is most pronounced south and west of the Chinnakolli stream and along the Thorapalli road. East of this road north of the Thorapalli this No. I type begins to tail off into No. II. In the type I area Teak persists which is not the case in the type No. I areas of Bennie block. The south-east part of the compartment contains a good type No. II with Teak throughout. Grass—Hence. Both Imperata arundinacea and Cymbopogon flexuosus occur. Bamboo—Areas of Bambusa (flowered) occur along the Chinnakolli stream, chiefly on the east bank and in the west of the compartment, but the tree-growth is very open. There is some better mature Bambusa area along the Bidurhalla. Stocking on the type II areas varies from pretty good to open and the height growth from good to moderate. Regeneration—Usually deficient but fairly good in places in type No. II. Eupatorium occurs in small patches occasionally.	Improvement fellings— 1917-18 .. 50 acs. Yield .. 6,223 c.ft. 1918-19 .. 58,713 1919-20 .. 31,373 1918—Experimental Teak plots (along the Thorapalli road.)	The change between forest types Nos. I and II begins in this compartment with the characteristic bamboo growth. 892 acres allotted to Selection Improvement Working Circle. 315 acres allotted to Clearfelling Working Circle. 5 acres Experimental areas.
5	805 acres. North—Compartment 4. East—Compartment 3. South—The Moyar River. West—Compartment 6 and the Tirumalpad of Nilambar's forest.	Soil—Black in the east and red in the west. Fairly deep. Aspects—All. Slope—Very gentle to moderate. Drainage—Into the Bidurhalla or the Moyar.	Type of forest—At the extreme eastern end type II, very open with bamboo, is found with good height growth. Teak is found here. In the centre the height growth falls off and the canopy is very open in places, and Lantana covers the ground. Small areas show better growth. Teak is not so common. This type is intermediate between types I and II. Except for a limited area west of this, which is rather poor type II with much Teak, the extreme western portion is a rather open type I (though some of the grass Imperata arundinacea persists) and of fair height growth. Teak disappears altogether in the extreme west. Regeneration—Generally poor. Grass—Both Imperata arundinacea and Cymbopogon flexuosus are found but the former is by far the commonest.	Improvement fellings— 1916-17 .. 585 acs. Yield .. 23,938 c.ft. 1917-18 .. 240 acs. Yield .. 701 c.ft. 1918-19.—Felling of Terminalia tomentosa trees girdled previously and dead Vengai (pterocarpus Marsupium.) Yield .. 4,663 c.ft. 1919-20 .. 621	The Mysore road runs through the south of the compartment. The Thorapalli-Madumalai road runs through the south-west corner. Most of this compartment appears to have been overfelled judging from its present appearance. Allotted to Selection Improvement Working Circle.
6	1,483 acres. North—Compartment 20. East—Compartment 4 and 5. South—Tirumalpad of Nilambar's forest. West—Tirumalpad of Nilambar's forest.	Soil—Red and generally deep. Aspects—All. Slope—Gentle to moderate. Drainage—In the north and south into the Chinnakolli. There are numerous swamps between the low rounded hills.	Type of forest—No. I throughout; some areas however show much better height growth and stocking than others. Lantana occurs and some of the coarse grasses, in the more open parts, but not to any great extent. There is no Teak except in the north. Regeneration is deficient on account of bamboo.	Improvement fellings. 1919-20. Whole compartment. Yield—14,151 cubic feet. Clearfelling. 1925-26—The Chinnakolli Plantation 10 acres.	The Thorapalli-Madumalai road runs along the eastern boundary. Allotted to Clearfelling Working Circle.

Tappakadu block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
7	1,171 acres. North—The Kakkannahalla River. East—The Moyar River. South—Compartment 8. West—Compartment 9 and 15.	Soil—Black. Poor and shallow. Aspects—All. Slope—Gentle to moderate except on east where it slopes very steeply to the Moyar. Elsewhere Drainage—On the east into the Moyar. There are to the north into the Kakkannahalla. There are several outcrops of gneissic rock.	Type of forest—No. III containing a large proportion of Anogeissus and Teak. Height growth—Poor to very poor. Stocking—Generally pretty good. Regeneration—Fair to good. Grass—Themeda imberbis.	Improvement fellings. 1917-18 } 1,050 acres. 1918-19 } Yield—31,843 cubic feet.	Suitable for sandalwood. Allotted to Sandalwood Working Circle.
8	1,042 acres. North—Compartment 7. East—Compartment 12. South—Compartment 12. West—Compartment 9.	Soil—Black. Poor and shallow. Aspects—All. Slope—Gentle to moderate except that it drops very steeply down to the Moyar. Drainage—In the western part, south into the Moyar. In the eastern part, east into the Moyar.	Type of forest—Nos. II and III with a large percentage of Teak and Anogeissus, poor on the ridges and quite good in the valleys. Height growth—Very poor except along the streams where it is often good. Stocking—Fair to good. Regeneration—Generally good. Grass—Chiefly Themeda imberbis.	Improvement fellings. 1921-23—A much more drastic improvement felling was carried out than had been done previously. Yield—7,06±5 cubic feet. Clearfelling. 1922-23—Failed teak area 20 acres.	Suitable for sandalwood. Allotted to Sandalwood Working Circle.
9	791 acres. North—Compartment 16. East—Compartment 7 and 8. South—The Moyar River. West—Compartment 10.	Soil—Black. Poor and shallow. Aspects—The compartment is situated on two ridges running north and south, hence east and west aspects prevail. Slope—Gentle. Drainage—East and west into a stream running from north to south through the compartment into the Moyar.	Type of forest—No. III with a large percentage of Teak and Anogeissus. Height growth—Poor. Some rather better growth is found in the south-east corner. Stocking—Fair to good. Regeneration—Fair to good. Grass—Chiefly Themeda imberbis. Lantana is found near Ippakadu.	1925-26—336 cubic feet of rosewood were extracted.	Suitable for sandalwood. The Mudumalai-Tappa-kadu road and the Mysore road run through the south of the compartment. Allotted to Sandalwood Working Circle.
10	808 acres. North—Compartment 16. East—Compartment 9. South—The Moyar River. West—Compartment 11.	Soil—Black. Poor and shallow. Aspects—Generally east and west. Slope—Very gentle to moderate. Drainage—East and west into a stream running south through the centre of the compartment into the Moyar.	Type of forest—Nos. II and III. Slightly better than Compartment 9. The type II occurs chiefly in the north and is rather open. Much teak and Anogeissus and two or three small patches of Ja (Shorea Talum) occur. Height growth—Medium. Stocking—Fair to good. Regeneration—Good. Grass—Chiefly Themeda imberbis. Lantana is found in the south.	....	The Mudumalai-Tappa-kadu and the Mysore roads run through the south of the compartment; the former also runs along the western boundary. Allotted to Sandalwood Working Circle.
11	929 acres. North—Compartment 17. East—Compartment 10. South—The Moyar River. West—Compartment 1.	Soil—Black. Poor and mostly shallow. Aspects—All. Slope—Gradual. Drainage—To the Moyar River in the south.	Type of forest—Nos. II and III. The type III areas are fairly good for this type. Teak is one of the commoner species. Height growth—Good for type III. Only moderate for type II. Stocking—Fairly good in the type III areas—far too open in type II.	....	The Mudumalai-Tappa-kadu road runs for three-fourths of the way along the eastern boundary and the Mysore road runs along the southern boundary. Allotted to Sandalwood Working Circle.

A fair amount of Anogeissus with a good deal of regeneration in type III areas. Regeneration in the type II areas is generally deficient. Grass—All three varieties are found—Themeda imberbis on the type III areas only. Cymbopogon flexuosus is commonest in the type II areas. Bambusa (flowered), is also found in the south. Lantana is found in the south.

Teppakadu block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
12	1,629 acres. North—Compartment 7. East—The range boundary. South—Compartment 13. North-west — Compartment 8.	Soil—Black. Poor and shallow. Aspects—All. Slope—Very gentle to precipitous along the Moyar or into the stream in the east. Outcrops—There are several small outcrops of gneiss.	Type of forest—No. III. The type of forest improves however on approaching Teppakadu with the characteristic features of this type. The stocking however is rather open in places. Grass—Themeda imberbis.	....	This compartment was originally part of Sigur Range. Allotted to Sandalwood Working Circle.
13	2,872 acres. North—Compartment 12 and the Moyar River. South—Northern Hay Estate, Kalmalai reserve and the Moyar reserve. West—Compartment 14.	Soil—Generally red in the east, but black elsewhere. Poor to very poor and stony. Aspects—All. The compartment includes Madgitibetta Hill. Slope—Gentle to very steep. The hills are very rocky.	Type of forest—No. III varying from poor, in the west, to very poor, with stunted growth. The species are Anogeissus and rotten Teak and occasional Mathi (Terminalia tomentosa). The growth in the north-west near Teppakadu is a better type III. Grass—Themeda imberbis. But in the poorest parts there is hardly any grass. Lantana—There is a good deal on some of the hill sides.	....	The Teppakadu—Masinigudi road runs along the north boundary and a cart track along the south. The latter joins the Sigur Ghat road near the 19th mile. There is no timber in this compartment. Allotted to Sandalwood Working Circle.
14	1,808 acres. North—The Moyar River. East—Compartment 12. South—Northern Hay Reserved Forest and Northern Hay Estate. West—The Moyar River.	Soil—Black or reddish. Poor to moderate. Aspects—All. The compartment includes Moyarbetta. Slope—Gentle to steep.	Type of forest—Varies from a medium No. II of moderate height growth and stocking with some regeneration, to a good to rather poor No. III type, in which the stocking is better. The better growth is mostly found on the northern or north eastern slope of Moyarbetta and occasionally along the Moyar. South slope is poorer. Teak is found throughout but much of it is unsound. Grass—Themeda imberbis but Imperata arundinacea also occurs. Lantana is found occasionally. Bamboo—Bambusa occurs in places mostly flowered.	....	A cart track runs along the south of the compartment, leading through compartment 13. Allotted to Selection Improvement Working Circle.
15	MUDUMALAI. 1,568 acres. North—Compartment 28 and the Kakkanhalla. East—Gudalur-Mysore road. South—Compartment 16. West—Compartment 27.	Soil—Black, rather shallow on the ridges. Aspects—Including the Pundakerigudde hill has all aspects. Slope—Gentle to fairly steep. Drainage—Into the Kakkanhalla and the Imburhalla. Outcrops—There are few small outcrops of gneissic rock on the north side of the Pundakerigudde hill. Swamps—There are a few small ones.	Type of forest—Varies considerably from fairly good No. II on the south slope of Pundakerigudde hill to very poor No. II type on the northern side. Nearer to the Imburhalla and Kakkanhalla No. II type of medium height growth and stocking with not very good regeneration is found. On proceeding eastwards intermediate stage between types II and III is found with fair height growth and fairly good stocking and regeneration. Further east still this resolves itself into superior type III with fairly good stocking and regeneration but only moderate growth. A poorer type is found on the higher ground. There is some fairly good No. II type in the north of the compartment with moderately good regeneration. Grass—In the poorer type II areas there is a very dense growth of Cymbopogon flexuosus with occasionally some Imperata arundinacea. In the intermediate type II areas this grass is much reduced and in the No. III areas mostly the variety Themeda imberbis is found. Bamboo—There are a few small patches of Bambusa either in the mature or seedling stage.	....	Roads—The Mudumalai-Kakkanhalla and Mysore roads run along the southern and eastern boundaries respectively. Allotted to Selection Improvement Working Circle.

Mudumalai block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
16	1, 227 acres. North—Compartments 15 and 27. South—Compartments 9 and 10. West—Compartment 17.	Soil.—With the exception of a small area south of the Pundakerigudde hill where the soil is deeper, the soil is of medium to poor depth. Aspects—Generally a southern aspect but the flat hills have gentle local slopes. Slope—Very gentle to gentle. Swamps—One or two small swamps occur.	Type of forest—Nos. II and III with two or three small areas approximating to type No. I. This compartment has suffered from fire in the past and generally the growth is poor or very poor. A few places show a poor type II fairly well stocked but of only medium height growth, e.g., along the Teppakadu road. The poor No. III type areas are generally well stocked and regenerated and cover most of the compartment. Some better type III is also found on the lower ground. Teak is found throughout. There is a small bamboo area of much better growth south of the Pundakerigudde hill but the stocking is open and another small better area in the north-west corner. Grass—All three grasses are found—Themeda imberbis being confined to the type III areas on which is also found the wild date. Imperata arundinacea seems to occur on the better stocked type II areas and Cymbopogon flexuosus on the more open type II. Bamboo—A patch of mature Bambusa south of the Pundakerigudde hill and in the north-west corner of the compartment.	....	Roads—The Mudumalai-Kakkanhalla and the Mudumalai-Teppakadu roads form the northern and western boundaries respectively. Allotted to Selection-Improvement Working Circle.
17	905 acres. North—Compartment 27. East—Compartment 16. South—Compartments 1 and 11. West—Compartments 18 and 19.	Soil—Black; fairly deep in hollows to very shallow on some of the ridges. Aspects—All. Slope—Moderate to fairly steep. Drainage—Into the stream running through the centre of the compartment from north to south. Outcrops—There are some small outcrops in the north-west.	Type of forest—No. II varies from quite good growth in some of the hollows but small in extent to very poor burnt-out areas in the west. There is a good patch in the north-west, really a No. I type but small in extent. In between these two extremes generally a crop of moderate to rather poor height growth, but of often fair stocking and a certain amount of regeneration. The growth deteriorates generally in the east, but the stocking is quite good. Teak occurs throughout, good in a few hollows elsewhere moderate to poor. Grass—Both Imperata arundinacea and Cymbopogon flexuosus are found, Cymbopogon flexuosus being perhaps the commonest and very dense but in the east the grass is considerably reduced owing to the better canopy and is mostly Imperata arundinacea. In the poorest areas a little Themeda imberbis is found. Bamboo—Mature Bambusa occurs in the stream beds.	....	Roads—On the north the Mudumalai-Kakkanhalla road. On the east the Mudumalai-Teppakadu road and on the west the Mudumalai-Kargudi road. Allotted to Selection-Improvement Working Circle.
18	800 acres. North—Compartments 26 and 27. East—Compartment 17. South—Compartment 19. West—Compartments 20 and 21.	Soil—A black soil of only medium depth generally, better in the north-east and hollows and poorer in the north. Aspects—All. Slope—Gentle to fairly steep. Drainage—Into the stream in the centre flowing south. Swamps—There is a swamp in the centre of the south of the compartment.	Type of forest—No. II except a small patch of fairly good No. I type in the north-east corner. The rest of the compartment is of poor growth and in the north the growth is very stunted and occasionally blanks occur. Height growth—Rather better in the hollows and poor on the ridges. Stocking—Better in the west and in the east open. Regeneration—Some regeneration in the west and hardly any in the east except on the poorest areas. But a good many seedlings can be found on the ground. Teak is found throughout but much of it appears to be unsound. Mathi (Terminalia tomentosa) is the only timber to assume any size. A little of the variety. Grass—On the worst areas Themeda imberbis is seen. Elsewhere Cymbopogon flexuosus and citratus are dense. Occasionally Imperata arundinacea occurs. Bamboo—In the north-east corner there is some half developed Bambusa—also along streams. The wild date grows in the worst areas. There is some bracken.	....	Roads—The Mudumalai-Kargudi road is on the north and east boundaries and the Mudumalai-Thorapalli road on the west boundary. Spring—There is a perennial spring close to the road in the north. Camp—The Mudumalai camp is situated in the north-west corner of the compartment. 763 acres allotted to Selection-Improvement Working Circle. 37 acres allotted to Clear-felling Working Circle.

Mudumalai block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
19	1105 acres. North—Compartment 18. East—Compartment 17. South—Compartment 20. West—Compartment 20.	Soil—Black or sometimes reddish, deep in places, generally medium but some poor soil in the east. Aspects—All. Slope—Gentle to moderate. Drainage—To the south. Swamps—In the centre and west and on the south boundary.	Type of forest—All varieties from fairly good to poor No. I type in the west and south-west and north-east to very poor in the east and south-west. The Nos. I and II types are mixed a good deal in the south-west and some of it is poor. Much of the compartment however is of a quite good type II of fair to good height growth, pretty fair stocking, and often a certain amount of regeneration. The poorest type II areas show very poor height growth, good stocking and generally considerable regeneration but there are a few small blanks. Type of forest—Generally a mixture of types I and II and much of it poor. Height growth—Fair to good. Stocking—Usually open. Regeneration—There is some in places but often deficient—a good deal of kydia regeneration in the extreme south. In the north-east there is some medium No. II type with rather better stocking and in the south-east limited good areas of types I and II mixed. The height growth in the high ground in the north-west is often poor.	....	Roads—The Mudumalai-Thorapalli road forms the northern boundary and the Mudumalai-Thorapalli road runs for a short distance along the eastern boundary. This compartment is well above the average for the block and contains a good deal of timber. 931 acres allotted to Selection Improvement Working Circle. 174 acres allotted to Clearfelling Working Circle.
20	1,358 acres. North and west—Compartment 21. East—Compartment 18 and 19. South—Tirumalpad of Nilambur's forest and compartment 6. West—Compartment 21 and 22.	Soil—Black, and some red in the south of medium to good depth. Aspects—All. Slope—Gentle to moderate. Drainage—Into the stream in the south flowing east. Swamps—There are large areas of cultivated swamp in the south and east—smaller uncultivated swamps in the north-east and south-east.	Type of forest—Generally a mixture of types I and II and much of it poor. Height growth—Fair to good. Stocking—Usually open. Regeneration—There is some in places but often deficient—a good deal of kydia regeneration in the extreme south. In the north-east there is some medium No. II type with rather better stocking and in the south-east limited good areas of types I and II mixed. The height growth in the high ground in the north-west is often poor.	Clearfelling—1925-26—the dakarai teak. Man-lantation .. 11 acs.	Roads—The Mudumalai-Thorapalli road forms the eastern boundary. 175 acres allotted to Selection-Improvement Working Circle. 1,183 acres allotted to Clearfelling Working Circle.
21	1,296 acres. North—Compartment 26. East—Compartment 18 and 20. South—Compartment 22. West—Compartment 23.	Soil—Generally blackish but some red in the north of medium depth—generally shallower in the west. Aspects—All aspects except north. Slope—Gentle to moderate. Drainage—Locally off the low rounded hills. Swamps—A large area of cultivated swamp runs round the east and south of the compartment.	Type of forest—Types I and II. The No. I type is chiefly found on the low hills round the swamp and in such places is poor, very openly stocked but contains a few Rosewood. Patches of type I also occur in the north of the compartment and the height growth is generally better and in some places the stocking. Regeneration—Poor in the No. I type which very often contains a great deal of Bambusa in the mature or half developed stage. The No. II type is found in the east and west and alternately with the No. I type in the north. In the west the No. II type areas are very poor to medium, with stocking open to fair and areas are very poor to medium, with stocking open to fair and stocking and some regeneration and fairly good height growth.	....	Roads—The Benna-Mudumalai road forms the northern boundary and the Mudumalai-Thorapalli road runs for a short distance along the eastern boundary. 1,254 acres allotted to Selection-Improvement Working Circle. 42 acres allotted to Clearfelling Working Circle.

Mudumalai block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
22	1,498 acres. North—Compartment 21. East—Compartment 20. South—Coffee estate and Tirunelpad of Nilambur's forest. West—Compartment 23.	Soil—Varies from a black to a red soil with intermediate stages usually of moderate depth but poor and stony on high ground. Aspect—Has all aspects but especially north and south. Slope—Moderate to steep. Swamps—A cultivated swamp lies in the south of the compartment.	Type of forest—Nos. I and II. The No. II type areas are found in the west chiefly and vary from a crop showing fair height growth and medium stocking to areas which are poor and in some cases very poor in height growth. The stocking is usually open but is better in places. Regeneration is usually deficient with small patches as exceptions. Bambusa (dead) is found in the valley in the No. II type areas in the south-west. The No. I type areas occupy the remainder of the compartment and vary from fairly good in the south to poor on the high ground in the north of the compartment. There is a good deal of Mathi (<i>Terminalia tomentosa</i>) and Ventek (<i>Lagerstroemia lanceolata</i>) and occasional Rosewood.	....	1,320 acres allotted to Selection-Improvement Working Circle. 178 acres allotted to Clear-felling Working Circle.
23	1,366 acres. North—Compartment 24 East—Compartment 21 and 26. South-east—Compartment 22. South—Tirunelpad of Nilambur's forest. West—Compartment 39.	Soil—Black. Medium to good; the latter being in the south. Aspects—All. Slope—Moderate to rather steep. Drainage—In the south into the stream on the west and in the north into the streams in the west and north respectively.	Type of forest—No. II generally, but some areas in the south show a superior growth with no grass and considerable natural regeneration including one or two evergreen species and considerable bamboo in places; the remainder is rather open No. II type. Teak occurs in the northern part but disappears more or less in the south and south-east along the old Church Estate road. Height growth—Moderate except in the patches above referred to where it is good. Stocking—Rather open except as above. Regeneration—Deficient except as above.	....	The old Church Estate road as shown on the last Working Plan maps is only a foot-path now. Benne-Mudumalai road forms the eastern boundary. Allotted to Selection-Improvement Working Circle.
24	986 acres. North—Compartment 25. East—Compartment 26 and 28. South—Compartment 23. West—Compartment 39.	Soil—Black. From poor to medium. Aspects—All. Slope—Gentle to moderate. Drainage—Into the streams on the north and south boundaries respectively.	Type of forest—No. II varying from very poor on the ridge along the Mudumalai-Benne road to typical rather open No. II type. Height growth.—Very poor to moderately good. Stocking.—Moderate. Regeneration.—Generally deficient. Grass—All three varieties occur. The variety <i>Themeda imberbis</i> being confined to the poorest ridges and the variety <i>Cymbopogon flexuosus</i> being much the commonest.	....	The Mudumalai-Benne road runs through the middle of the compartment. Allotted to Selection-Improvement Working Circle.
25	1,291 acres. North—Dod lakatti-Mudumalai block line and compartment 28. South—Compartment 24. West—Compartment 29.	Soil—Varies from the red in the north-west to black, and from deep to shallow Aspects—Includes Naradibetta hill and has all aspects but apart from this hill generally a south one. Slope—Gentle to steep. Drainage—Into the stream on the south boundary.	Type of forest—No. II varying from rather poor to fairly good in the north-west corner. Teak— <i>Terminalia tomentosa</i> , etc. Height growth—Is correspondingly varied. Stocking.—Fair to fairly good in places. Regeneration.—Poor to moderate. Bamboo—A fair amount of <i>Dendrocalamus</i> in the north-west. Grass—Very dense; chiefly <i>Cymbopogon flexuosus</i> though <i>Imperata arundinacea</i> is found. Wild date is also found.	....	The Jaladari-Honnurhatti road runs along the north boundary and the Benne-Mudumalai road along part of the south boundary. Allotted to Selection-Improvement Working Circle.

Mudumalai and Benne Blocks.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compart- ment.	Area and bound- aries.				
26	2,096 aers. North.—Compartment 28. East.—Compartment 27. South.—Compartment 18 and 21. West.—Compartment 23 and 24.	Soil.—Black and poor in quality. Aspects.—All. Slope.—Gentle. Drainage.—Generally into the Imburhalla. The low rounded hills have large areas of swamp lying in between.	Type of forest.—No. II varying from poor to good, the best areas being in the south along the Mudumalai-Benne road. Teak.—Terminalia tomentosa and Anogeissus predominate with some Lagerstrœmia lanceolata. A few clumps of bamboo are found on the edges of the swamps. Grass.—Almost entirely Cymbopogon flexuosus but Imperata arundinacea is found occasionally. Height growth.—Very poor to good. Stocking.—Fair to good. Regeneration.—Poor to good, especially along the Mudumalai-Benne road in places.	Cl-afelling. 1869-1875 The Mudumalai. Teak plantation— ACS 22-25	The Mudumalai-Benne road skirts the southern boundaries. The Mudumalai-Doddakatti road runs along the eastern boundary. Over much of the compartment there is probably little big timber. 2,074 acres allotted to Selection-Improvement Working Circle. 22 acres Experimental Observation Area.
27	1,157 acres. North.—Compartment 28. East.—Compartment 15. South.—Compartment 16, 17 & 18. West.—Compartment 26	Soil.—Black; mostly poor but better in the southwest. Aspects.—All. Slope.—Gentle to moderate. Drainage.—In the east into the stream. Into the Imburhalla in the south. Swamps.—Lie between the Low hills.	Type of forest.—No. II but much of the northern and eastern parts of the compartment is very poor indeed owing to fires in the past, though the stocking and regeneration are generally fairly good. The best part of the compartment is in the west and south-west where the height growth is often fairly good, the stocking quite fair and sometimes a fair amount of regeneration. Teak occurs throughout and there is a great deal of Mathi (Terminalia tomentosa) especially in the poorest areas. Grass.—Almost entirely Cymbopogon flexuosus, or citratus. Imperata arundinacea may be found occasionally, and the wild date in the worst areas.	....	Roads.—The Mudumalai-Doddakatti road forms the west and the Mudumalai-Kakkanhalla road the south boundary. Allotted to Selection-Improvement Working Circle.
28	3,755 acres. North.—Doddakatti — Mudumalai Block line. East.—The Kakkunhalla River. South.—Compartment 15, 26 & 27. West.—Compartment 24 & 25.	Soil.—Black and poor for the most part. Aspects.—All. Slope.—Very gentle to moderate. Drainage.—Generally to the south. Swamps.—Numerous. Outcrops.—One or two small ones of gneissic rock.	Type of forest.—A fire swept area similar to much of Doddakatti Block. Teak, Mathi (Terminalia tomentosa), Anogeissus and in the east of the Mudumalai-Doddakatti road a good deal of Jal (Shorea Talura) regeneration. The stocking, etc., varies from open savannah with practically no trees to areas of good stocking of young to middle-aged growth. The best areas are found at the extreme eastern end of the compartment. Undergrowth.—Consists of the grass—Cymbopogon flexuosus chiefly. There is also much of the wild date palm.	....	Requires to be strenuously fire protected for many years. There is no timber at present to speak of. Allotted to Closed Working Circle.
29	930 acres. North.—Wynad forests. East.—Compartment 25 and Doddakatti Block. South.—Compartment 38 & 39. West.—Compartment 30.	Soil.—A rather light coloured soil with some admixture of red in it in a few places, e.g., the east boundary, but in the south-west entirely red. Aspects.—All. Slope.—Moderate to steep. Drainage.—To the Benne hole in the south. Swamps.—A few in the south.	Type of forest.—No. II varying from rather poor to good in places but a good deal of it especially on the ridges is only very moderate. Height growth.—Good in hollow to poor on ridges. Stocking.—Fair in places but normal rather open to open. Regeneration.—Quite good casio ally but deficient in some places. A good many seedlings are found on the ground. Teak occurs throughout though in places it is sparsely represented.	Cl-afelling.—A small part of the Benne Teak Plantation lies in the south-west corner (see Compartment 30). eastern end of the compartment. The Benne-Mudumalai road itself forms the south boundary. Allotted to Selection-Improvement Working Circle.	Roads.—The old Jaldari road, now a path runs across the north of the compartment and the road running from it to the Benne-Mudumalai road runs down the eastern end of the compartment.

Grass.—Except for an occasional patch of Imperata arundinacea entirely Cymbopogon citratus.
Bamboo.—Dendrocalamus strictus in half developed to mature stage is found on the southern slopes of the Jaldari ridge.
Bracken and wild date are found occasionally.

Benne Block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
30	1280 acres. North.—Wynad forests. East.—Compartment 29. South.—Compartment 36 and 37. West.—Compartment 31.	Soil.—Generally black but an occasional admixture of red. Of fair depth except in the extreme north where it is shallow and stony. Aspects.—All. The Jaldari ridge runs through the north of the compartment. Slope.—Moderate to steep. Drainage is to the south and on the east into the stream on the eastern boundary. In the extreme north drainage is to the north. Swamps.—Occur south of the Jaldari ridge.	Type of forest.—No. II varying from poor to fair except in the extreme north where there is a strip about $\frac{1}{4}$ th of a mile long by $\frac{1}{2}$ a mile broad of burnt out area mostly Teak, Jal (Shorea Talura) and Mathi (Terminalia tomentosa)—the crop of these three species has however been pretty densely established. Throughout the remainder of the compartment Teak is not always found. Rosewood occurs occasionally but Mathi (Terminalia tomentosa) predominates. Height growth.—Fair to good. Stocking.—Often open but fairly good in places. Are often found on the ground.	(Clearfelling. 1863-1875.—The Benne Teak Plantation—40 acres of which a small part lies just inside compartment 29.	The old Jaldari road runs along the north of the compartment (now only a foot path) and the Fenne-Mudumalai road along the southern boundary. 1,240 acres allotted to Selection Improvement Working Circle. 40 acres Experimental Observation Area of which a small part lies in compartment 29.
31	1,290 acres. North.—Wynad forests. East.—Compartment 30. South.—Compartment 32.	Soil.—Black for the most part with occasional admixture of red. Fair to good depth except in the north-east and north where it is poor. Aspects.—All. The Jaldari ridge runs through the compartment. Slope.—Moderate to steep. Drainage.—To the north and south respectively. Swamps.—Small and mostly in the southern half.	Type of forest.—Mostly No. II varying, south of the Jaldari ridge, from fair to quite good but there is an area of good No. I type along the road to the Wynad (south-west boundary) and also near the eastern boundary which shows fine height growth of Ventrak (Lagerstroemia lanceolata) especially. The grass is replaced by undergrowth and the stocking is fairly good. These areas are however limited in extent. Dendrocalamus is usually found in such localities but Bambusa occurs in the best area on the south-western boundary. The forest has been burnt out but a pretty dense crop of Teak, Jal (Shorea Talura), Mathi (Terminalia tomentosa), etc., has established itself. The soil in this part is however poor, in fact the growth generally north of the Jaldari ridge and excluding the good areas referred to above the crop is typical No. II type generally of poor stocking. Teak is generally not to be found in the better areas in this compartment but a few Rosewood are scattered about. Height growth.—In these last mentioned localities is fair to good and regeneration while fairly good in places is often very deficient. Evergreen patches.—There are two or three small patches of evergreen near the south-western boundary the largest being about 30 acres and containing some fine growth of Artocarpus hirsuta (Aini) and two or three other species. This small area is quite exceptional in these forests. Several of Artocarpus hirsuta are over 10' girth and of splendid height and growth and there is a certain amount of regeneration in all stages. Grass.—Mostly Cymbopogon flexuosus with some Imperata arundinacea. Grass disappears in the best areas. Dendrocalamus strictus is found on the southern slopes of the Jaldari ridge. Bracken occurs in the south in places and the wild date in the burnt-out area in the north-east. Lantana.—Occurs in places.	....	The road to the Wynad runs along the south-western boundary. Allotted to Selection Improvement Working Circle.
32	806 acres. North.—Compartment 31. East.—Compartment 36. South.—Compartment 33. West.—Wynad forests.	Soil.—A light coloured loam usually but in places with a slight reddish admixture. Aspects.—All. Slope.—Moderate. Drainage.—In the south-west to the north-west, elsewhere into the Benne hole on the south boundary. Swamps.—In the south-west and east.	Type of forest.—Ranges from a small area of No. II type on the northern side to good type No. I in the west and in smaller areas elsewhere. The type No. II areas soon show an intermediate stage between that and type No. I but in such areas the height growth is only moderate. The stocking and regeneration are fair. The type No. I areas vary from poorly stocked areas from which all the large trees appear to have been removed and regeneration is mostly of kydia, the rest of the ground being occupied by Bambusa in the mature stage, to a few localities where really good growth, and allowing for the presence of bamboo, good growth, is situated. The average areas show a rather good growth, and the 1927 tuckie is situated. The average areas show a rather good growth, and the 1927 tuckie is situated. The average areas show a rather good growth, and the 1927 tuckie is situated. stocking and regeneration is found, e.g., round the valley where the best part of the 1927 tuckie is situated. The average areas show a rather open stocking, but often good height growth and a fair amount of regeneration interspersed with Bambusa in all stages. Teak is confined exclusively to the No. II type localities on the north Bambusa occurs as mentioned in all stages but is absent in the south-west. In addition to the above however a further set of conditions prevail in the south—areas which have almost certainly been subjected to 'tuckie' at an earlier date. Here the stocking is very open; the growth is poor to quite good and regeneration confined largely to kydia. These areas are usually densely covered with Lantana and in some cases grass. Grass.—Apart from No. II areas, both Cymbopogon flexuosus and Imperata arundinacea occur in the No. I type wherever the canopy has been sufficiently broken. There is a little bracken and some Helicteres Isora in the better areas. Both the grasses—Cymbopogon flexuosus and Imperata arundinacea—occur the former being probably the commonest.	The areas and locations of these plantations are very doubtful. Tuckie cultivation. 1907-08—Tuckie—10 acres planted with Teak, Vengai (Pterocarpus Marsupium) and Mahogany. Only 2-75 acres are now left. 1917—Tuckie—13 acres. likely to be disappointing. Buildings.—The new Benne forest rest house and subordinates quarters lie in the south-east corner. Allotted to Clearfelling Working Circle.	Roads.—The road to the Wynad forms the northern boundary. This compartment is very difficult of access and badly needs a few foot paths through it. It contains in places good forest including Mathi (Terminalia tomentosa) and Vengai (Pterocarpus Marsupium) but the average of large sized timber per acre over the whole compartment is likely to be disappointing.

Benne Block.		Soil and aspect.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
33	980 acres. North—Compartment 32. East—Compartment 36. South—Compartment 34. West—Wynad forests.	Soil—In the north generally a light blackish soil. In the south and east there are patches more or less red in colour of good depth generally. Aspects—All. Slope—Moderate. Drainage—No particular line of drainage. The Benne hole drains west along the south boundary. Swamps—Large areas of swamp lie at the foot of the low rounded hills—the larger of those in the south being cultivated by Chetties.	Type of forest—No. I. Stocking in a few places good but generally poor. Height growth—Fair to good. Regeneration—In a few places good but usually absent. Most of the area in the south and east has been ruined by 'tuckles' cultivation in the past and kydia is often the commonest species to be regenerated. There is no Teak in the compartment, a few Rosewood and in one or two places some good Mathi (<i>Terminalia tomentosa</i>) and Venteak (<i>Lagerstroemia lanceolata</i>). Bamboo—Bamboo in the mature stage and also an exotic bamboo (possibly <i>Dendrocalamus Brandisii</i>) which seems to have flowered. The mentioned being common in the west. In the areas which appear to be tuckled in the past.	....	This compartment carries very little large timber. Roads—the Mukkatti road runs along the east boundary. Allotted to Clearfelling Working Circle.
34	866 acres. North-east—Compartment 33. East—Compartment 35. South—Coffee estates and patta lands. West—Sultan's Battery road. North-west—Wynad forests.	Soil—Varies from blackish to reddish in places often slightly reddish. Aspects—All. Slope—Moderately steep. Drainage—Into the Benne hole or in the west locally into swamps. Swamps—There is a large swamp in the west and smaller ones along the Benne hole.	Type of forest—No. I type—Apart from a few Rosewood, some Mathi (<i>Terminalia tomentosa</i>), mostly badly grown and occasionally Venteak (<i>Lagerstroemia lanceolata</i>) or Vengai (<i>Pterocarpus marsupium</i>) the crop is almost entirely composed of junglewood species. Stocking is very often moderated to good except where there is bamboo and in the extreme west in patches. Height growth while only poor or moderate on tops of ridges is often good in moist valleys. Regeneration—Varies a good deal but in many places is very good and largely of kydia and other useless species. There is also a good deal of the better types of	....	Roads—the Sultan's Battery-Gadalar road forms the western boundary and the Mukkatti-Benne road the eastern boundary. Except as mentioned there is no timber in the compartment. Allotted to Clear-felling Working Circle.
35	1,207 acres. North—Compartment 36 and 37. East—Compartment 38. South—Coffee estates and Tirumalapad of Nilambur's forest. West—Compartment 34.	Soil—A slightly reddish soil but has not the red colour in places. Aspects—All, but mostly north and south. Slope—Moderate. Drainage—Into the two branches of the Mukkatti hole in the north and south respectively. Swamps—Large areas of practically continuous swamp lie along both these streams.	Type of forest—No. I type except for small portions of the northern ridge, chiefly on the crest, which is poor and open No. II. Some of the area at the eastern end of the compartment is intermediate between types I and II and is of moderate stocking but sometimes of quite fair growth. The remainder of the compartment (No. I type) is disappointing. Apparently in earlier times most of the swamps at any rate along the southern stream were cultivated which accounts for the poor condition of much of the surrounding forest. Many of the low rounded hills carry almost nothing but jungle wood species. Height growth—Usually moderate but both poorer and better areas can be found. Stocking—Varies a great deal. The best stocked areas are generally very poor in timber species and some of the crest of the northern ridge and one or two of the hills in the south being practically devoid of tree growth. Regeneration of timber species is deficient but of kydia especially often profuse. There is no Teak. Some Rosewood in places. Mathi (<i>Terminalia tomentosa</i>) is comparatively scarce, much of the northern ridge being without any. It appears at its best on the intermediate areas in the east and a certain amount is found in the south. There is a good deal of Venteak (<i>Lagerstroemia lanceolata</i>) much of which looks as though it had been pollarded, no doubt by previous settlers. Vengai (<i>Pterocarpus marsupium</i>), is found occasionally. Bamboo is found in all stages in patches. Some has flowered in the south. On an area of good timber growth (including Venteak and Rosewood) in the east but of poor stocking and regeneration except for kydia there is much half developed Bamboo. Lantana—Occurs a good deal in the poor open patches. Grass—On the No. II types and intermediate areas <i>Imperata arundinacea</i> seems to be the most prevalent. Bracken—There is a little on some of poorest patches. In the better areas there is plenty of the better kinds of undergrowth.	....	The Mukkatti-Benne road forms the western boundary. Except for the eastern part there is little large sized timber. Allotted to clear-felling Working Circle.

Benne block.		Soil and aspects.	Description of growth.	Past treatment.	General.
Compartment.	Area and boundaries.				
36	1,024 acres. North—Compartment 30. East—Compartment 37. South—Compartment 35. West—Compartment 32 and 53.	Soil—Sometimes black and sometimes a compromise between black and red and varying from poor and shallow to a few good deep patches with, in one case, a mixture of mica flakes. Aspects—All. Slope—Moderate to fairly steep. Drainage—In the north into the Benne hole and in the south into the Mukkatti hole. Swamps—Several small ones, the large swamp known as the Thana Vayal being on the south boundary.	Type of forest—No. II of the typical rather open type some of the ridges parallel to the Mukkatti road in the south-west being exceptionally poor and very open. Height growth—Is generally fairly good except in the poor parts. There are, however, two or three notable exceptions along the line of the eastern boundary and also in the north-east where some fine growth with good undergrowth and no grass is found. On the good area in the east centre mica flakes are found in the soil. Pterocarpus of Dendrocalamus also serve as undergrowth in such areas. These good areas are, however, very limited in extent. Teak is frequently absent in this compartment but there are a fair number of fine Rosewood. Regeneration—Is often deficient but on some of the very open areas in the west there are a great many Rosewood seedlings and some Vengai (Pterocarpus Mar-upium). Grass—Mostly Cymbopogon flexuosus with Imperata arundinacea occasionally on going west. Bracken Lantana—Is found in a few small patches particularly on the southern boundary and in places in the north.	....	Terminalia tomentosa is the commonest species and there are some large sized trees. The Benne-Mudumalai road runs along the north and the Mukkatti road along the western boundary. Allotted to Selection Improvement Working Circle.
37	1158 acres. North—Compartment 30. East—Compartment 38. South—Compartment 35. West—Compartment 36.	Soil—Black; fairly good. Aspects—All. Slope—Gentle to steep. Drainage—In the north into the Benne hole. In the south into the Mukkatti hole. Swamps—Occur throughout, a large one being on the boundary between compartments 37 and 38.	Type of forest—No. II; the crop varies from open to good, the latter quality being fairly extensive. A certain amount of good Rosewood occur in the compartment. There are areas throughout the compartment where Teak is absent. Height growth—Is on the whole fairly good except on some of the ridges. Regeneration—Varies from poor to fairly good. In places there are a lot of Rosewood seedlings on the ground. Grass—Mostly Cymbopogon flexuosus but Imperata arundinacea is found in places and bracken begins to appear in the west of the compartment. There are a few small areas of Dendrocalamus strictus in the half developed stage chiefly in the extreme north and south.	....	Terminalia tomentosa is the predominating species and there are some fair sized trees throughout. The Benne-Mudumalai road runs along the northern boundary. Much of the large sized Rosewood looks as though it was unsound. Allotted to Selection Improvement Working Circle.
38	785 acres. North—Compartment 29. East—Compartment 39. South—Coffee Estate. West—Compartment 35 and 87.	Soil—Black and medium. Aspects—All, but mostly north and south. Slope—Gentle to steep. Drainage—South of the main ridge into the Mukkatti hole. North of this ridge into the stream in the north running north-west into the Benne hole. Swamps—There are several small ones.	Type of forest—No. II; rather better than compartment 39 but often very open. Height growth—Medium to good Teak occurs except south of the main ridge. Some Rosewood also occurs. Regeneration—In the centre and south is fair to quite good but on the whole is rather deficient in the north. Grass—Chiefly a dense covering of Cymbopogon flexuosus with occasionally Imperata arundinacea in the valleys. Bambusa occurs in the seedling stage in some sheltered valleys.	....	Contains a certain amount of large sized timber chiefly Terminalia tomentosa and Teak with an occasional Rosewood in places. The Benne-Mudumalai road runs along the northern boundary. Allotted to Selection Improvement Working Circle.
39	1,206 acres. North—Compartment 29. East—Compartment 23 and 24. South—Compartment 23. West—Compartment 38.	Soil—Flack with one or two small patches of red; of medium depth. Aspects—All. Slope—Moderate to steep. Drainage—In the south into the Mukkatti hole and in the north into the Benne hole. Swamps—There are a few small swamps.	Type of forest—No. II; generally rather poor but some fair sized Mathi (Terminalia tomentosa). Teak occurs except in the south. Height growth—Medium to rather poor. Stocking—Generally open. Regeneration—Deficient except in small patches. Grass—Very dense and mostly Cymbopogon citratus and Imperata arundinacea.	....	Except for Terminalia tomentosa there is not much large sized timber. Allotted to Selection Improvement Working Circle.

APPENDIX III

CONTROL BOOK.

Clearfelling Working Circle.

Prescriptions of Working Plan.		Result of operations.					Remarks.
Year.	Nature of operation.	Block.	Compartment.	Work done.	Yield.	Sale prices.	
1927-28	Clearfelling in floating Periodic Block 1- Normal area-660/10-66 acres ..	IV Benne	34	Clearfelling 45 Felling saleable 10 timber only. Total .. 55	Teak- Class I .. 5,000 Class II .. 8,000 Rosewood, 2,000 and etc.	Rs. A Teak- Class I- Highest .. 2 4 Lowest .. 1 12 Average .. 2 0 Class II, etc.	Class I--Logs over 12 cubic feet. Class II--Logs below 12 cubic feet. 2,000 cubic feet of Class I Teak was carted to Nangade and sold there. Balance was all sold at roadside depots.
1928-29	Clearfelling in floating Periodic Block 1- Proportionate normal area for the year. 660-55-605/9-67 acres						

RECORD OF WORKS.

Clearfelling Working Circle.

Prescriptions of Working Plan.			Result of operations.				Remarks.
Year.	Nature of work.	Year.	Block.	Compartment.	Work done.	Cost.	
1928-29	Regenerating 55 acres felled in 1927-28 .. Marking, felling and extracting timber in coupe to be regenerated in 1929 and burning and lining out the clearing.	1928-29	IV Beune	34—On area of 55 acres felled in 1927-28.	Sowing Fencing tuckie Stump planting Purchase and sowing of ragi Wedding Replacing casualties Harvesting ragi Nursery expenses	Rs. 3 64 16 15 120 25 14 60	1,000 Gundalpet seeds of ragi valued at Rs. 120 were obtained from the tuckie.
1929-30	Regenerating area felled in 1928-29 .. Marking, felling and extracting timber in coupe to be regenerated in 1930-31 and burning and lining out the clearing.	Do.	Do.	34—On an area of 67 acres.	<p><i>Work relating to area to be planted in 1929-30.</i></p> Marking saleable timber Felling saleable timber Dragging (exclusive of cost of elephants and their establishment). Clearfelling unsaleable timber Collection of seed Burning and reburning clearing Lining and staking	5 70 30 100 7 90 40	

Grazing Working Circle.

Year.	Number of foreign cattle grazed.	Revenue.	Remarks.
		RS. A. P.	

Minor Produce Working Circle.

Year.	Kinds of minor produce collected.	Quantity.	Revenue.
			RS. A. P.

APPENDIX IV.

Note on the four most common grasses in Mudumalai forest.

Only the four most noticeable varieties of grasses are mentioned in the Description of Compartments.

The variety *Cymbopogon citratus*, popularly known as 'lemon grass' on account of its smell, is in appearance almost identical with *Cymbopogon flexuosus*. It must be understood therefore that when *Cymbopogon flexuosus* is mentioned that both varieties may be found together and vice versa.

These four varieties may be distinguished as follows:—

(1) *Cymbopogon flexuosus*.—Has a central stalk carrying flowers and grows 10 feet high or more. The base of the stalk is flattened.

(2) *Cymbopogon citratus*.—Similar in appearance to the above and also attains a great height but the stem is rounded all the way down and the leaves, if crushed, have a distinctive smell.

Both the varieties are commonest in the north of Block II and in the east of Block IV.

(3) *Imperata arundinacea*.—A broad leaved grass—grows to a height of 4 or 5 feet.

This grass is commonest in the west of Block I and the south of Block II and seems to require a rather moister soil than Nos. 1 and 2.

It has a fluffy white flower head commonly seen on areas recently burnt. The flowering stalk seldom exceeds 2 feet in height.

(4) *Themeda imberbis*.—Is invariably only found on the poorer areas; grows to a height of about 5 or 6 feet but often less; but is not nearly so dense as the others. Has a tufted appearance on the stem at intervals.

This variety is commonest in the east of Block I.

There are doubtless many others.

APPENDIX V.

Working Plan Map.

