

PART – I  
CHAPTER – V

PAST SYSTEM OF MANAGEMENT

1.5.1 History of reservation :- The Kolhan estate, which embraces the forests of Saranda Division, was formerly the property of the Raja of Porahat, then known as the Raja of Singhbhum. It was placed under the management of Government in the year 1886. The first settlement took place in the following year. Subsequent settlements were made in the years 1855, 1897 & 1918. The forests were reserved in 1882. Prior to reservation the forests were subjected to extensive “jhumming: or shifting cultivation, while on the lower slopes and level lands “gora” or dry cultivation was practiced. Large stretches of well-stocked even-aged pole crop are evidence of shifting cultivation while the serious degradation of the lower lands has been the result of “gora” cultivation.

1.5.2 The first investigation into the question of reserving forests in Chhotanapur was sponsored by Dr. Anderson, the Conservation of forests, Bengal in 1864. The forests of Singhbhum district were examined for the first time for this point of view by capital Losack, Deputy Conservator of Forests in 1870-71 and again by Mr. Davis, Deputy Conservator of Forests in 1879-80. The latter carried out futher investigations and specially reported on the damage done by fires and resin tapping. Following upon there enquiries the work of selection and demarcation was taken up and carried out chiefly by Messrs Fuchs, Maining, Manson and W. Onston.

1.5.3 An area of 1,99,740 acres, as originally estimated was notified under section 4 of the Indian Forest Act (Act VII of 1978) on 26<sup>th</sup> November, 1880 and was finally declared on 17<sup>th</sup> May, 1882 as reserved forest under section 19, but with effect from the 1<sup>st</sup> April, 1882.

1.5.4 Although Saranda was notified as a reserve with effect from 1882 and the demarcation was reported as complete on 1882, parts of the boundaries long remained uncertain. The notification speciefied the boundaries, here the common border of Singhbhum with that of the States of Keonjhar, Bonai and Rajgangpur. The State boundaries however were not clearly marked on the ground. The Keonjhar boundary, for instance, was not finally degrees until the forest survey of 1903 finally clarified the position. A smakll dispute on the Bonai State involving 166 acres was settled in favour of Saranda in 1912.

1.5.5 Protected forests :- The history of Protected forests dates back to 1903-05 when 18 blocks were declared protected. Block No. 20 – a (Hatnaburu) was disforested in 1910 when no. 24 (Kumbia) and No. 15 were reserved the latter comprising the forest villages of Nayagaon, Bhangaon and karampada. Certain portions of the protected forests are subsequently excluded for cultivation. In 1910-11 there was a proposal to reserve 31 protected forest blocks, but it does not appear to have been implemented. After a long time 4 blocks were reserved, viz P.F. 17 (Usuria) and P.F. 16 (Kodalibad) in 1940 and P.F. 13 (Samta) and P.F. 15 (Makaranda) in 1942. Details are there in Paragraph 1.1.24.

1.5.6 Administrative history :- After the demarcation was completed in 1880-81 the forests of Singhbhum were attached for administrative control to Hazaribagh. Subsequently the following administrative reshufflings took place :-

- (i) In 1884-85 Chhotanagpur Forest Division was created, comprising all the forests of Singhbhum, Palamau and Koderma. The Singhbhum forests formed Singhbhum Sub-division under the charge of a Gazatted Forest Officer. It had three Ranges, namely Saranda, Kolhan and Porahat. Thus in 1885, 306 sq. miles of Saranda forest was constituted into a Range with a Forest Ranger in charge of it. The Forest Range Officer was Ranger incharge of it. The Forest Range Officer was Abiram Tung, the Jagirdar of Manoharpur. He had a staff strength of three Forest Guards and six Chaukidars in his Range.
- (ii) In 1890 a separate Singhbhum Forest Division was created with the existing three Ranges namely, Saranda, Kolhan and Porahat and a fourth namely Chaibasa Range was newly formed.
- (iii) In 1893-94 Saranda Range was split up into Samta and Koina Ranges.
- (iv) In 1906-07 a separate Chaibasa Forest Division was created comprising Kolhan Protected forests.
- (v) In 1912 (with effect from the 4<sup>th</sup> May, 1912) the Saitba, Santra and Latua R.F. Blocks were transferred from the Singhbhum Division to Chaibasa Division.
- (vi) In 1916 with effect from the 1<sup>st</sup> October, 1916 a separate Porahat Division was created. It comprised within its jurisdiction all the reserved and protected forests of Porahat estate. At the same time Saitba, Santara and Latua blocks were retransferred from Chaibasa division to Singhbhum Division.

- (vii) In 1924 (with effect from 1<sup>st</sup> April, 1924) the Singhbhum Forest Division was split up into two independent Divisions namely Kolhan Division and Saranda Division. Saranda Division embraced Koina, Samta and Tirilposi Ranges.
- (viii) In 1927, the Koina Range proving unwieldy was split up into Koina and Gua Ranges.
- (ix) In 1931-32, Tirilposi Range was absorbed into Samta Range.

1.5.7 Progress of Management :- Mr. H.H. Haines introduced the first Working Plan of Saranda Division from 1903 to 1918. Previous to him several attempts were made to estimate the yield capabilities of Singhbhum forests. Dr. Schlich first calculated the annual yield at 5000 matured trees which was subsequently revised to 3000 matured trees by Mr. Dansey in 1891-92. Mr. Chester further revised this figure and brought it to 1200 to 1500 matured trees only. From early days of reservation upto 1903, irregular exploitation took place mainly from the northern and more accessible parts of Ankua, Samta and Tirilposi Blocks. Until 1890-91 the traders used to be allowed to select best trees and fell and remove on payment of Rs. 10/- each tree. After the opening of Bengal Nagpur line to traffic (now South Eastern Railway) in 1891-92 exploitation in the forests was intensified. Between 1895 and 1898 two lakhs of broad guage railway sleepers were departmentally supplied to then Rai Bareilly Benaras Railway. This also included the sleepers supplied by Porahat and Kolhan forests. The exploitation of Saranda forests during this period is shown by the following figures.

Block	Area in acres worked over	No. of matured tree felled	Remarks
Ghatkuri	1027	597	Area close to Salai
Ankua	29874	3760	
Samta	15742	2850	
Tirilposi	15034	4456	The northern half of Tirilposi Block

Between 1898-99 and 1901-02 the intensity of fellings were as follows:-

Block	Trees		Poles	
	Number	Cft.	Number	Cft.
Ankua	1722	119811	651	4804
Ghatkuri	82	1297	-	-
Samta	3221	211036	930	8842
Tirilposi	2145	152202	848	7642
Tholkabad	8	421	116	400
Karampada	3	111	108	189
Kodalibad	-	-	-	-

It was generally believed at the time that Singhbhum forests as a whole were being over-worked. Looking at the extraction figures in the light of any of the three assessments of the yield potentiality there certainly was over-exploitation. But whether the yield estimation itself was mere guess from ocular assessment or was built upon reliable data is not known.

1.5.8 The other forests produce which was in demand next to timber was Sabai grass. It was leased to Messrs Balmer Lawrie & Co. Ltd., in 1984 originally as a concession but the Company completed at open tenders and continued as lessees of Sabai grass in Saranda, Kolhan and Porahat Divisions till its lease expired and no fresh lease was granted.

#### 1.5.9 HAINES PLAN 1903-18

Mr. Haines' Plan came into force in the year 1903-04. It covered all the reserved forests of Singhbhum district, now separated into three forests divisions, namely, Saranda, Kolhan and Porahat. The forests of entire Singhbhum district comprised an area of 725 sq. miles. Six Working Circles were constituted of which five were worked under Selection-cum-improvement felling and one under the Coppice system. The plan was for 15 years period ending on the 30<sup>th</sup> June 1918, being half of felling cycle of 30 years. In fact these Working Circles according to silvicultural terminology should have been called felling series. Three out of these six Working Circles, covered the reserved forests of Saranda Division, namely (I) Samta Working Circle (comprising Samta, Tirilposi, Tholkabad and Kodalibad blocks, total area 1,24,955 acres), (II) Koina Working Circle (comprising Ankua and Ambia blocks – the latter since transferred to Kolhan Division), and (III) Kolhan Working Circle (comprising Ghatkuri and Ieda blocks – the latter again since transferred to Kolhan Division).

1.5.10 In course of the preparation of the plan, the forests of Saranda Division were divided into 137 compartments. The average area of the compartment was 1465 acres, though in certain cases it exceeded to 4000 acres. Stock map of the entire forest was prepared but only areas of good quality valley type sal were shown therein, since the hill area was not considered suitable for exploitation and the valley sal was believed to be only crop which could yield marketable timber.

1.5.11 The silvicultural system was selection-cum-improvement with felling cycle of 30 years. The yield was prescribed by area. Since only valley type sal forests were worked, the area of annual coupe was fixed at one thirteenth of the total area of such type of forest

including the hill areas of that particular compartment in which if fell. Exploitable girth was fixed at 6' but bad trees of lesser girth were also allowed to be felled. The felling went on considerably in areas and by the time this plan expired there was as much as 2180 acres of prescribed area left unfelled. Pending revision of the working plan this area was included in the lease of Bengal Timber Trading Co., Ltd., and was actually felled during the period 1919 to 192. Of cultural operations the plan prescribed subsidiary improvement felling including thinning, cleaning and climber cutting at the time of marking. Complete fire protection was also enjoined upon. In practice, however, the cultural operations were almost entirely neglected. It was only possible to introduce selection system at that time. This system may be called to have worked fairly satisfactorily from revenue realization point of view but from silvicultural aspect it was not so. The cream of the forest naturally got cut and removed and unsound trees were left behind. It appears to have operated without discrimination resulting in heavy fellings of sal inmost of the areas, where excellent sal trees of larger dimensions must have been growing. The drastic opening out and neglect of cultural operations resulted in coming up of the miscellaneous species chiefly Asan and Jamun took places of sal in moist valleys.

1.5.12 Regarding the intensity of exploitations it is believed that on the whole there was no over-felling though locally the incidence was too severe, specially during the latter part of the 1914-18 war. The result of such local over fellings of sal obtrudes itself more accessible valleys, which had already suffered from the department's sleep operations of 1895-98.

#### 1.5.13 PHILIP'S PLAN 1924-35

Philips introduced Conversion to Uniform system, which had been earlier applied to Porahat forests in 1919-20, for the valley areas of Saranda. Three Working Circle were formed, namely (a) Conversion Working Circle (b) Hill Working Circle, and (c) Miscellaneous species working circle.

#### 1.5.14 (a) Conversion Working circle

This contained QI, QII an QIII sal forests. The respective areas under each quality was mentioned in the description of each compartment. But the area allocated to the working circle was netiher indicated on the map nor demarcated on the ground. The total area allotted to this working circle amounted to approximately 56,000 acres. The conversion period was 120 years and six periodic blocks were formed. The area of each periodic block

was approximately equal and the various quality classes were also supposed to be proportionately represented.

1.5.15 Periodic Block I – The area under this periodic block was 10,647 acres. All trees of 12” and over were enumerated and the yield was fixed by volume at 27,299 units. The unit value was fixed by the sawn sleeper capability of each diameter class as follows:-

12”	to	16”	diameter	=	1	unit
16”	to	20”	diameter	=	2	units
20”	to	24”	diameter	=	3	units
24”	to	28”	diameter	=	3	units
Over		28”	diameter	=	5	units

The yield was later recalculated on the basis of different unit value and fixed at 15,297 units, equaling 79,635 cubic feet sawn timber in the form of sleepers. What the other set of unit values were, is not recorded.

1.5.16 Wherever established regeneration was available, clear felling was prescribed, but in the areas with deficient regeneration suitable number of trees were to be retained. Cultural operations were suggested to give aid to the regeneration plantation was recommended in moist valleys containing mixed and evergreen forests.

1.5.17 During the first ten years of the plan, clear felling system was not actually adopted in practice, even in the areas where regeneration was complete and established. The disinclination to clear fell in the beginning was not based on sound logic but perhaps due to the natural inertia against sudden swing from selection to clear felling results fully proved, to quote Mr. Mooney – “that a wholesale removal of the canopy in one operation is possible in almost all cases, and is most likely the soundest procedure to follow. Regeneration is so universally abundant in this Working Circle and responds so promptly to removal of the canopy, thus no good but rather harm is done by the retention of any appreciable canopy. Further where regeneration is scanty or absent, as in some of the damp valleys, it appears that little is to be gained by retaining any of the overwood, since such areas, very limited, are not likely to regenerate naturally within a reasonable period. It would appear sound to clear fell and plant up such localities.”

It was observed that the results were best where the fellings had been heavies and most of the young crop looked healthy and promising. There was under felling

in Periodic Block I, the reasons being that the marking officer went out side the enumerated area which was shown neither on the map nor on the ground. The necessity of thorough and repeated cleanings was not appreciated in the beginning and young crop became seriously infested with weeds and creepers.

1.5.18 Periodic block Inter :- Periodic blocks II to IV were grouped together to be called P.B. Inter. Each of the constituent periodic blocks comprised about 5000 acres of QI /QII and approximately equal area of QIII. The limits of these periodic blocks were not shown on the map and these were also not demarcated on the ground. There were prescription for light improvement fellings in P.B. II and selection-cum-improvement fellings in P.B. III to V. But these were not carried out in the field.

1.5.19 Periodic Block VI :- This periodic block naturally contained the youngest crop but it also contained some of the most mature crop of the division which should have been allotted to P.B.I. or P.B. II. The felling operations were to be completed in the first nine years but actually they covered the entire period of the plan. The fellings consisted in (a) removal of the overwood over healthy poles and sapling crops, (b) selection-cum-improvement fellings, and (c) cleaning and thinning in sapling and pole crops. Fellings were very heavily indistinguishable from the final fellings of P.B. I. Indeed between 1924-25 and 1933-34 while P.B. I yielded 850056 cubic feet of timber, the output from P.B. VI was 2067499 cubic feet.

1.5.20 Hill Working Circle :- It includes the remainder of the crops principally QIII to QIV sal forests. The area allotted was approximately 45682 acres. Unfortunately no stock map was prepared and as a result, except where whole compartment was allotted, its extent was rather vague. The system was selection-cum-improvement fellings on a 20 year felling cycle with an exploitable diameter of 18" for sal. In certain good quality having adequate established regeneration, the Divisional Forest Officer was permitted to clearfell the overwood. The ultimate objective was to include such areas in due course in conversion Working Circle, provided the prescription operated satisfactorily. In the hill portion of a compartment P.B. I and P.B. VI were worked simultaneously with the Conversion working circle portion, and the entire yield was counted towards the conversion working circle. But where the whole compartment had been allotted to Hill Working Circle, the latter was worked as independent felling series. The more distant areas were not exploited.

1.5.21 Miscellaneous Working Circle:- It consisted of a rather indefinite area, estimated 17622 acres, but not defined in any way. The object was to work the mixed forests of the division on a 30 years felling cycle under selection-cum-improvement fellings. Various

exploitable girths were fixed for the different species. Since there was no demand for miscellaneous species, so no fellings under this Working Circle were carried out.

1.5.22 Mooney's Plan (1936-55) :- Mr. Mooney constituted six Working Circle in his plan.

They are as follows :-

- (1) Sal Conversion Working Circle
- (2) Hill Working Circle
- (3) Mixed Forest Working Circle
- (4) Coppice Working Circle
- (5) Bamboo Working Circle
- (6) Miscellaneous Working Circle

1.5.23 SUMMARY OF PRESCRIPTIONS :-

(1) Sal Conversion Working Circle :- This Working Circle consisted of QI, QII and QIII sal forests and moist type mixed forests. The area under this was 50506 acres. The compartments were reconstituted and complete stock map in details of the entire division was prepared. Three felling series were formed, namely, Koina, Gua and Samta with an area of 9697 acres, 15262 acres and 25547 acres respectively. Yield was fixed after carrying out complete enumeration of P.B.I areas. All sal, asan, bija, karam, dhaura, jamun, gamhar, semal and mango of 12" diameter and over were enumerated in standard 4" diameter classes. Trees not for sale were left out of enumeration. Former six periodic blocks and the rotation of 120 years were retained. The area of each periodic block was kept almost equal. Areas of P.B.I and P.B. VI were demarcated on the ground. The extent of other periodic blocks were shown only on the map. They were not actually demarcated on the ground. Remaining periodic blocks III to V were limped together to form P.B. Inter.

1.5.24 Periodic Block I – All sal trees of 12" diameter and over were taken into consideration for calculation of yield in P.B.I and it was fixed in volume. Unmarketable trees did not count towards the yield. The total annual yield for P.B. I was prescribed at 10880 units which was further divided for the three felling series separately fixing 2470 units for Koina Felling series, 3350 units for Gua felling series and 5060 units for Samta felling series. Departure from the prescribed yield upto 10 per cent was permitted in any one year but the total of units not to be exceeded during the first ten years. Following unit values were fixed – 12" -16" trees = ½ unit, 16" – 20" – 1 unit, 20"-24" = 2 units, 24"-28" = 3 units and 28" and

over = 4 units. The exploitation was to be of clear felling nature with reservation of 3 to 5 standards and groups of well grown thrifty poles. Though Mr. Mooney as Working Plans Officer was against the retaining of standards in P.B. I area, the Conservation of Forests introduced it. Since there was adequate regeneration in all the P.B. I areas. Mr. Mooney was right in not prescribing the retention of standards, rather these standards did positive harm. Mr. J. S. Owden, the Conservator of Forests, however, acknowledged in his forwarding letter to Government in his no. 1012-3 –W- (2), dated the 6<sup>th</sup> May, 1936 that his prescription was his and that Mr. Mooney had disagreed with it. Trees down to 12” diameter were marked for felling. After the main felling was over, all the rest, leaving standards and retained groups of poles, was to be cut down departmentally.

Cultural operation :- Climber cutting along with cleaning was to be done in July and September, so as to free the regeneration from overtop. This practice was to be continued in successive years till was found necessary. The first thinning was prescribed in the tenth year after felling, with recommendation that a preliminary thinning might be done in the fifth year.

1.5.25 Periodic Block II :- In P.B. II only such trees of 28” and over diameter were prescribed for felling which were found not to remain sound if left longer. The Working Plans Officer had, however, advised that no felling whatsoever be done in P.B. II except where it might be necessary for obtaining complete established regeneration before the area would pass on to P.B. I. The alteration was made by the Conservator of Forests who acknowledges it in his aforesaid letter to government. The yield was to be regulated by area. Climber cutting on a ten year cycle along with shrub cutting and burning of undergrowth in moist localities to induce regeneration was prescribed as cultural operation.

1.5.26 Periodic Block Inter :- Selection –cum-improvement felling was prescribed in this periodic block on a felling cycle of 20 years. All sal trees of 24” diameter were to be removed. In addition dead and obviously diseased trees and miscellaneous or unsound trees interfering with the growth of better ones were prescribed for felling. Climber cutting was to be done along with marking.

1.5.27 Periodic Block VI :- No felling except two thinning at ten years interval, was prescribed. An area of 462 acres was to be thinned annually. Strict fire protection was recommended in the entire Conversion Working Circle specially for the coupes upto twenty years age. Grazing was prohibited in P.B. I and recently regenerated P.B. VI areas.

1.5.28 (2) Hill Working Circle :- The sal forests of quality IV to V along with dry mixed forests on upper and sleeper hill slopes constituted this Working Circle. The total area under this was 134328 acres. Out of the twelve felling series formed in each Range four corresponded with the areas of Compartments in P.B. I, II, Inter and VI respectively. This coordination was made because there was apprehension that Hill working circle coupes would not sell themselves without the leaven of Conversion Working Circle crop. The system was Selection-cum-Improvement fellings. A felling cycle of 20 years was adopted. Since no enumeration was done the yield was fixed by area. But due to above said synchronization the area of annual coupes varied much. For example minimum and maximum areas were as given below:-

In P.B. II compartment – Koina Range - 150 to 544 acres  
Gua Range - 757 to 1266 acres  
Samta Range – 5963 to 1368 acres

In P.B. Inter compartments - Koina Range – 1033 to 1024 acres  
Gua Range – 342 to 1024 acres  
Samta Range – 1082 to 1921 acres

1.5.29 The area of the coupe in Hill Working Circle in P.B. I compartment was not fixed. It had to correspond with the area that would be covered in Conversion Working Circle by marking for the prescribed volume yield. The minimum exploitable diameter for Sal was fixed at 18" diameter, for Asan 28", Semal 24", Bija and Gamhar 20", Dhaura 16" etc. Sal trees between 18" and 24" diameter in open grass QIII/II areas could also be felled provided they were dead hollow, stag-headed and diseased. The main condition of any felling in this Working Circle largely depended on the presence of adequate regeneration and avoidance of undue openings.

1.5.30 In the year following the main fellings all damaged materials were prescribed for being cut back. The climbers left over at the time of marking were also to be cut away. Thinning had been recommended in patches of thrifty pole crop.

1.5.31 (3) Mixed Forest Working Circle :- This Working Circle comprised the forest belt containing mixed crop stretched mostly in 100 to 300 yards along the main streams. The main object was the utilization of miscellaneous species other than sal. Selection system was adopted on 20 years cycle. The yield was fixed by area which widely varied. Exploitable

diameter was kept the same as in Hill Working circle. Total enumeration was done but no work could be carried out in this Working Circle.

1.5.32 (4) Coppice Working Circle :- It comprised three Protected Forest Blocks (P.F. 11, 12 and 14), one entire R.F. compartment (Ankua 38) and part of 8 R.F. compartment (6 in Ankua block and 2 in Samta Block). The total area was 5904 acres. Four felling series were formed and the rotation was fixed at 40 years. In total 160 annual coupes were formed with areas varying from 10.1 acres to 62.19 acres. Ten standards per acre was prescribed for retention cultural operations in the year following the main felling was also recommended. Second cleaning with climber cutting was to be done in the 5<sup>th</sup> year thinning, one in 14" year and other in 27" year were prescribed.

1.5.33 Bamboo (Overlapping) working circle :- This Overlapping Working Circle consisted of eight compartments of Tirilposi Block, five compartments of Samta Block and 13 of Ankua Block. Total area was 4992 acres. Two felling series were constituted. The cutting cycle was three years. After setting apart one fourth of the area of annual coupe for local consumption the remainder could be exploited. The usual bamboo cutting rules were prescribed.

1.5.34 (4) Miscellaneous Working Circle :- This working circle included (a) Ten Forest villages, (b) 4 Preservation Plots, (c) Karampada compartments 31 to 36 and Tirilposi Compartments 49 and 50 (d) 16 protected Forest Blocks.

1.5.35 No prescription was given for the maintenance and improvement of forest villages, but maintenance and fire protection measures for the Preservation Plots were recommended. To preserve the unique vegetation in Karampada Block 9 Compartment 31 to 36), these were excluded from the normal working in Hill working circle. However 200 sal trees of 24" diameter and all pia-sal trees of 20" diameter and over, falling within the area of sal marking were allowed for removal. These compartment were also formed in to game sanctuary.

1.5.36 For protective purposes the compartments Tirilposi 49 and 50 on steep slopes above Nawagaon village were completely closed.

1.5.37 The protected forests were closed to fellings. However, it was recommended that a scheme for regular coppice fellings could be drawn up to meet the demand of forest produce to the local people.

## REVIEW OF RESULTS OF MR. MOONEY'S PLAN (1936-55)

### (i) Sal Conversion Working Circle

1.5.38            Periodic Block I :- Mr. Mooney in his plan did not prescribe the retention of standards in P.B. I. But this was changed by the Conservator of Forests and 3 to 5 standards per acre were ordered to be retained in P.B. I. The decision of the Working Plans Officer about not retaining the standards was quite correct as it was found from the examination of felled over areas of P.B. I and P.B. VI that there retention in no way supplemented the regeneration. At the time of felling the regeneration was full every where. It was also later seen that the standards standing in the young regenerated crop did positive harm. By getting sufficient space and that too without any competition, the standards turned into wolf trees and by their abnormal crown spread the saplings and poles got suppressed. When uniform system was first introduced, there was reasonable apprehension that the established regeneration on the ground might not be sufficient to form the future crop. It was therefore, quite natural at that time to have the thought of keeping standards for supplementing possible failure of regeneration. Now since uniform system was in practice for a long period and there was no evidence of the failure of the regeneration specially in P.B. I acres in Saranda Division, the standards therefore proved fully unnecessary for regeneration. The probable object of keeping standards for the purpose of getting bigger size trees in the next rotation would not also have been achieved as these would not survive for 120 years and instead they would have caused reduction in the total yield per acre.

1.5.39            The prescription regarding retention of standards was later amended by subsequent orders. The standards were to be gradually reduced in number. Accordingly standards of 20" and above in diameter were only be removed. There was no point in keeping the remaining standards in fully stocked areas. It was found that these standards when felled caused much damage to the growth of the future crop. Even soft wood species like Semat, Kamdamb and Bhurkund, etc. left over in P.B. I areas developed giant crown and suppressed the young sal crop. The facts discussed above therefore proved that the retention of standards was inadvisable and their subsequent fellings did cause damage and set back to the growth of future crop.

1.5.40            (b) Method of executing felling in P.B. I :-

All trees of 12" diameter and above were to be marked, which the contractors had to exploit. After the main felling were over the remaining standing crop was to be cut departmentally except the retained standards and thrifty poles. The felled materials were later auctioned. The prescription was not quite suitable as it involved unnecessary expenditure and departmental attention in less important work like cutting back etc. The bulk of fund sanctioned for silvicultural attention was unnecessarily diverted in this cutting back operation while cleaning, thinning and climber cutting etc. which were much more required, were neglected. The other objection to this prescription was that cutting back operation used to be done before rains and that left over materials in the coupe could be auctioned only after rains. These materials got partially ruined by borer attack which consequently fetched less price in the auction.

1.5.41 Periodic Block II :- The Working Plan Officer prescribed no felling in P.B. II. But this prescription was later changed by the Conservator of Forests and accordingly trees over 28" in diameter and above were allowed to be removed. The idea behind this change in prescription was that trees of 28" and over in diameter would deteriorate by the time the areas moved on to P.B. I. But there was no such evidence. Even trees of 8' to 10' in girth (32"-40" diameter) had commonly been found quite sound. This prescription ultimately resulted in the forest becoming devoid of all the big trees and so it was inadvisable.

1.5.42 Periodic Block Inter :- In this periodic block the Working Plans Officer prescribed the fellings of trees only upto 24" in diameter, but this was also changed by the Conservator of Forests and the limit was brought down to 22" in diameter. However, this was again revised in 1939 and original limit was fixed. This again resulted in depletion of the large size trees in Saranda Division. Thinning was not carried out in this P.B. In fact the felling was only of the nature of revenue felling and little consideration was given to silvicultural aspect.

1.5.43 Periodic Block VI :- Thinnings were prescribed in this periodic block but it lagged behind due to the intervention of World War II and the general upset it caused. No felling had been prescribed except the removal of standards. It would be better to remove all the standards at one sweep to avoid further damage to the future crop. Shortage of fund due to the war caused diversion in the work of cutting back operation after main felling in P.B. I. However, arrears were later subsequently made up.

1.5.44 Cultural Operations :- The work of cultural operations in Conversion Working Circle was much in arrears which was later completed after the sanction of the special fund.

1.5.45 (ii) Hill Working Circle :- Prescription for removal of 50 per cent of the available exploitable trees was given by the Working Plans Officer in this Working Circle. This was changed by the Conservator of Forests and all trees of 18" and over in diameter were allowed to be felled. This resulted again in the removal of almost all the big sized trees from this working circle. As regards cultural operations only climber cutting at the time of marking and in the year following the main fellings had been prescribed. But in practice it was not carried out in the field with all seriousness.

Thinning in the thirty sal poles had also been recommended by the Working Plan Officer, but it was not done in the field. In fact no operation for improvement of the forest was carried out in this working circle. Only bit size trees were removed in wholesale manner.

1.5.46 (iii) Mixed Forest Working Circle :-

No operations were at all carried out in this working circle.

1.5.47 (iv) Coppice Working Circle :- The result of the felling in Coppice Working Circle was satisfactory. Certain R.F. compartments were included in this Working Circle for working under coppice system. The object of this inclusion was to grow timber suitable for pit props, small building materials, firewood and charcoal etc. which would yield much better financial return in these localities. These objectives admirably suited the condition prevailing in those days (1936-37). But later on, the inclusion of R.F. compartments in coppice Working Circle was found inadvisable since all the erstwhile private forests of Bihar came under the control of Forest Department and these forests produced timber suitable for pit props, small building materials, fuel and charcoal, etc. Therefore exploitation of the R.F. Compartments under Coppice system was no longer advisable.

1.5.48 Cleanings were prescribed in the year following the main fellings. Thinning was to be done in 14" year. But these operations were never carried out in the field.

1.5.49 (v) Bamboo Working Circle :- The area of annual coupe was so large that the bamboo cutting rules could not be properly implemented. Elephant damage was quite extensive especially in Digha area. Bamboo in Saranda Division was generally considered a minor side issue and accordingly it was given less attention.

1.5.50 (vi) Miscellaneous Working Circle :- This Working Circle contained all elements which did not find place in other working circles, as a result of which none of them received adequate attention. Forest villages were allocated in this Working Circle which progressively dwindled in prosperity and population and rehabilitation measures were thought necessary.

1.5.51 Karampada 31 to 36 compartments were allotted to this Working Circle where 200 trees of sal and bija of 24" and 20" diameter and above respectively were removed annually. But no silvicultural operation like cleaning, climber cutting and thinning were carried out to improve the crop. The idea behind allowing these compartments in this Working Circle was to preserve its exceptional fauna and maintain them as game sanctuary. But no measures were taken to achieve this aim. Poaching was very frequent from Burbul side on Orissa border. These compartments were then also inaccessible and so the conception of a modern sanctuary was also vague. The patches containing exclusive type of flora were mostly in damp valleys down the very steep hill side and these patches could have been very well isolated and put to Preservation Plots.

1.5.52 Tirilposi 49 and 50 compartments were excluded from working for protection of the steep slopes; but these slopes were not steeper than that of Ankua 10 and 12 and Ghatkuri 19 where normal exploitation had been prescribed. Selection fellings in these compartments would not have upset the required degree of soil conservation.

1.5.53 Though it was not clear from the prescription of the Working Plan Officer, the circumstances under which these compartments were withdrawn from normal operations but the consideration might have been that the produce of these compartments would not be properly exploited due to their being inaccessible in those days. Since Jamda is closed to Karampada 31 to 36 compartments, limited exploitation of sal and pia sal of higher diameter had been permitted. Of course Tirilposi 49 and 50 were poor compartments and their location being quite remote and with less exploitation facilities in those days, these would not possibly be properly exploited.

1.5.54 Protection Forest Blocks numbering 16 had been included in this Working Circle. The forests of these blocks were closed to fellings and so silvicultural operations were prescribed in them. This was done since there was no demand in timber in those days. Local people were quite contented with the timber and fire-wood available in left over area. But from the point of view of silviculture and forest economics, normal working in these forests was essential. There were profuse climbers and most parts of the crop generally needed

cultural operations. Most of the overmature trees were deteriorating. In Dhobil P.F. some over-mature trees had been selection felled to prevent wastage from negative increment.

1.5.55 Fire Protection :- During the period of preceding plan forest fire were of minor nature and so intensive prescription against fire was not recommended. But later on the incidence of fire was on increase and even P.B. I areas got burnt. It was therefore essential to recommended strict fire protection measures.

1.5.56 Plantation :- There was no regular scheme for plantation, but it was done in moist valley bottoms and it was quite successful. For further plantations the Divisional Forest Officer was left with discretion to select areas and carry out plantations within the limit of funds at his disposal.

#### REVIEW OF MANAGEMENT UNDER SINHA'S PLAN

1.5.57 The Fourth Revised Plan of the Saranda Forest Division (by Sri J. N. Sinha) was prepared for a period of 20 years from 1975-76. Accordingly statement of annual coupes in P.B. I programme of subsidiary cultural operations in Conversion Working Circle, sequence of fellings in Selection Working Circle, programme of cultural operations in Coppice working circle, thinning programme in P.B. Inter, V, VI and Scheme for removal of standards from P.B. V have been drawn up for twenty years and incorporated in the working plan.

Sinha's Plan has constituted the following Working Circles :-

- (i) Sal Conversion Working Circle.
- (ii) Sal Selection Working Circle.
- (iii) Coppice Working Circle.
- (iv) Bamboo Overlapping Working Circle.
- (v) Protection Working Circle.
- (vi) Plantation Working Circle.
- (vii) Forest Village Working Circle.

1.5.58 Sal Conversion Working Circle :- The area of the Working Circle is 55820.00 acres. There are three Felling Series corresponding to the three Ranges (a) Koina F.S. 11875.00 acres, (b) Gua F.S. 16769.00 acres, (c) Samta F.S. 27185.00 acres. This Circle contains the best quality of sal forests of Saranda Forest Division situated in the valley

bottoms and on the lower and middle slopes. Here concentrated regeneration fellings were justified by the state of established regeneration in the preceding converted crop. The ultimate intention was to convert irregular crop into approximately regular even aged crop since the latter is the ideal silvicultural condition for production of the finest timber trees of maximum volume and value. The system adopted is conversion to uniform. The regulation of yield has been by volume controlled by area. The annual yield for each Felling Series has been fixed at (a) Koina F.S. 2080 units with area restriction between 70 to 80 acres, (b) Gua F.S. 5540 units with area of 120 acres, (c) Samta F. S. 9670 units with area 250.00 acres.

1.5.59 The forests of this Working Circle are predominantly composed of sal of average QIII with fair proportion of QII and in place also QI. He also included some quality IV area in this Working Circle. The quality of the crop and its composition vary from block to block. The crop of Karampada block in the aggregate is the best of all. The Conversion Working Circle areas of this block are situated at the foot of the towering Sasangda hill and receive subterranean irrigation by the extensive slopes. At the other extreme is the Tirilposi block which generally may be said to be poorest, though certain patches in Tirilposi are excellent. Ghatkuri block comes next to Tirilposi in dryness and poverty of crop quality.

#### Enumeration and Sampling

1.5.60 In Mooney's plan total enumeration of all the compartments allotted to P.B. I was carried out. For Sinha's plan 20% statistical sampling was carried out.

The method followed was stratified random sampling. The Conversion Working Circle portion of each compartment was constituted a stratum except for Ankua 6 where in two strata were carved out. In a stratum a number of sampling units of suitable sizes were formed along the fertility gradient by means of topographical features chiefly nallas. By random selection the required number of sampling units were selected for enumeration so that the total area enumerated in each compartment would approximately be equal to one fifth of the total Conversion Working Circle areas in the compartment. Care was taken that not less than two sampling units would be enumerated in each stratum.

All sal, asan, piasal, kadam, gamhar, jamun, semal, sandan and mango of 8" diameter and over were enumerated in the standard diameter classes. In the enumeration only marketable trees were counted. No enumeration was carried out in any other Periodic Block.

## Classification of Trees :-

1.5.61 In order to avoid embarrassing situation earlier classification of trees into “normal” (N) and “defective” (D) was abolished and a new set of classification was ushered in. The new classification was :-

- (i) Green (G)
- (ii) Dry (D)
- (iii) Hollow-rotten-useless (URU)

## Silvicultural system :-

1.5.62 The system is conversion to Uniform system. The object is to convert the existing irregular crop into one of regular age gradation as quickly as possible with the minimum sacrifice ensuring at the same time more or less equal sustained yield. Since advance growth of natural regeneration is not easily obtained in the portions of the forests allotted to this Working Circle the Conversion to Uniform system without any hesitation or danger was applied. The merits of this system need hardly any discussion. The resultant crop in P.B. V and P.B. VI stand out as stouter advocates.

1.5.63 In the areas allotted to P.B. I established regeneration is prolific and complete – indeed on the basis of this criterion itself the allotment has principally been made. Standards as has been shown are not necessary for the purpose of supplementing regeneration except in blanks or areas of deficient regeneration which are rare.

1.5.64 In Periodic Block II there will be crown thinning, the chief object being to enable the mature trees to receive the final spurt of diameters growth increment.

1.5.65 Periodic Block III and IV (Inter) will be subjected to periodical thinning so as to ensure continued height growth and enable the area to produce timber of the largest possible diameter within the prescribed rotation.

1.5.66 In Periodic Block V and VI the standards will be removed as early as possible and thinning will be done. Cultural operations will be considered most vital for these areas.

## Rotation and Conversion period

1.5.67 The average quality of this Working Circle is good QIII though there are considerable areas of QI and QII and some QIV. The sal yield tables indicate that for a rotation of 120 years the main crop diameter of QIII is 18" of QII 21" and of QI 26". Thus the major portion of the crop in this Working Circle may be expected to reach 12" diameter while a considerable proportion will attain 20" to 24" and in the best area trees of 24" to 26" diameter will also be found.

The M. A. I timber production for QII sal culminates at 90 years and that of QIII at slightly over 100 years. But there is little decrease in increment upto 120 years. There is, however, now doubt that the price increments between 90 to 120 years will counterbalance the slight drop in volume production.

The rotation of 120 years is therefore adopted as it appears to be the most suitable.

1.5.68 There will be six periodic blocks as in the earlier plan. The time allotted for complete conversion of P.B. I the regeneration block, is 20 years. Efforts to induce and establish regeneration will commence in P.B. II itself though special efforts here are not required. As such the regeneration period in effect will be 40 years.

The periodic block I of the preceding plan (Mooney's) automatically transfer itself to form periodic block VI. Periodic Block IV to Mooney's plan automatically forms periodic block V except Ghatkuri 14 and 15, Samta 20 & 21, etc. where selective fellings were carried out in the past and the resultant crop corresponds more to periodic blocks Inter.

All the periodic blocks have been definitely allotted on the map. Periodic Block III and IV have been lumped together to form periodic block Inter. All the periodic blocks have been demarcated on the ground.

1.5.69 The following criteria have been adopted in making the allotment to the different periodic blocks:- Periodic Block I – Areas having the most mature crop and adequate established regeneration. Such areas have as a rule been taken from periodic block II of Mooney's plan, but certain areas of P.B. Inter have also been allotted to periodic block I. On the other hand certain periodic block II areas of Mooney's plan have not been found fit for passing on to periodic block I, for example Ghatkuri 31.

Periodic Block II – Crop approaching maturity in which established regeneration should usually be present but this is not obligatory.

Periodic Block Inter :- This comprises periodic block III and periodic block IV consisting of unevenaged crop generally of middle age.

Periodic Block V :- This comprises converted crop of poles. There areas are generally those that were felled over during the period preceding Mooney’s plan. There are however certain exceptions. For example Ghatkuri 14 and 15 which though felled over under Phillip’s plan are not yet fit for P.B. V.

Periodic Block VI :- Contains sapling to pole crop resulting from conversion fellings in periodic block I of Mooney’s plan.

Yield :-

1.5.70 The plan by Mr. J. N. Sinha, has constituted three felling series viz (i) Samta Felling Series, (ii) Koina Felling Series, and (iii) Gua Felling series in the conversion working circle. The yield has been prescribed in terms of volume but a safeguarding check has been imposed by area. Taking the figures upto the last year of the plan (1975-76) in respect of each felling series the position was as mentioned below :-

1956-57 to 1975-76

Samta Felling Series

(i)	Prescribed annual yield	9670 units
(ii)	Total prescribed yield for the plan period	193400 units
(iii)	Units actually marked during the plan period	214842.46 units
	Difference between (ii) & (iii)	(+) 21442.46 units
	Deviation percentage	(+) 11 units

Koina Felling Series :-

(i)	Prescribed annual yield	2080 units
(ii)	Total prescribed yield for the plan period	41600 units
(iii)	Units actually marked during the plan period	41506.99 units
	Difference between (ii) & (iii)	(+) 93.01 units
	Deviation percentage	(+) 0.22 units

Gua Felling Series :-

(i)	Prescribed annual yield	5540 units
(ii)	Total prescribed yield for the plan period	110800 units
(iii)	Units actually marked during the plan period	106942.43 units
	Difference between (ii) & (iii)	(-) 2897.57 units
	Deviation percentage	(+) 3.5 units

Picture of the division as a whole :-

(i)	Prescribed annual yield	17290 units
(ii)	Total prescribed yield for the plan period	345800 units
(iii)	Units actually marked during the plan period	363251.88 units
	Difference between (ii) & (iii)	(+) 17451.88 units
	Deviation percentage	(+) 5.04 units

The yield position has been very satisfactory.

1.5.71 The following pages give the yield obtained from the three felling series yearwise along with an analytical note for each felling series.

Statement of annual coupe along with annual outturn :

Samta Felling Series, Prescribed yield 9670 units/year

Coupe No.	Year	Prescription		Results		Units Marked
		Name of Compt.	Areas in acres	Name of Compt.	Areas in acres	
1	2	3	4	5	6	7
i.	1956-57	TK 42	248.00	TK 42	248.00	9670.00
ii.	1957-58	TK 41	260.00	TK 41	260.00	10751.00
iii.	1958-59	TK 10	213.00	TK 10	213.00	7044.00
		TK 11(P)	32.00	TK 11	31.00	
iv.	1959-60	TK 11(B)	220.00	TK 11	220.00	2231.83
		TK 13(P)	26.00	TK 13	26.00	
v.	1960-61	TK 13(B)	88.00	TK 13	88.00	10276.73
		TK 27(P)	160.00	TK 27	160.00	
vi.	1961-62	TK 27 (B)	54.00	TK 27	54.00	9867.95
		TK 26(P)	190.00	TK 26	190.00	
vii.	1962-63	TK 26(B)	14.00	TK 26	14.00	13673.90
		TK 21(P)	90.00	TK 21	90.00	
		TK 22	129.00	TK 22	139.00	
viii.	1963-64	TK 21 (B)	141.00	TK 21	141.00	11239.19
		TK 28 (P)	100.00	TK 28	100.00	
ix.	1964-65	TK 22 (B)	239.00	TK 28	219.00	9393.60
x.	1965-66	TK 18 (P)	240.00	TK 18	240.00	16160.00
xi.	1966-67	TK 18 (P)	25.00	TK 18	25.00	10415.70
		S 50 P)	222.00	S 40	178.00	

xii.	1667-68	S 40 (B) S 44 (P) S 47	70.00 144.00 32.00	S 40 S 44 -	112.00 144.00 -	10031.18
xiii.	1968-69	S 232 S 24 (P) - -	191.00 60.00 - -	S 23 - S 44 S. 47	191.00 - 46.00 32.00	13146.61
xiv.	1969-70	S 23 (B) S 24 (P)	100.00 148.00	S 24 S 47	141.00 28.00	8908.02
xv.	1970-71	S 26 (B) S 35 S 36 (P)	80.00 145.00 26.00	S 26 S 35 -	200.00 51.00 -	10399.46
xvi.	1971-72	S 36 (B) S 32 (P) -	60.00 184.00 -	S 26 - S 35	42.00 - 94.00	9981.70
xvii.	1972-73	S 32 (B) S 33 - -	47.00 205.00 - -	- - S 36 S 32	- - 49.00 231.00	13115.53
xviii.	1973-74	S 37 S 33 (P)	129.00 120.00	S 37 S 34	129.00 78.00	10111.45
xix.	1974-75	S 34 (P) S 15 (P) -	146.00 100.00 -	- - S 33	- - 205.00	11599.03
xx.	1975-76	S 15 (B) TI 9 -	136.00 118.00 -	- - S 15	- - 89.00	9719.92
			4942.00		4641.00	214842.46

1.5.72 During the year 1957-58 in the Conversion coupe no. II the yield was 10751 units against the prescribed 9670 units. During 1960-61 Conversion coupe no. V the yield was 10276.73 units. During 1961-62 Conversion coupe no. VI the yield was 9867.95 units. During 1962-63 Conversion coupe no. VII the yield was 13878.9 units. During 1963-64 Conversion coupe no. VIII the yield was 11239.19 units. During 1965-66 Conversion coupe no. X the yield was 10421.7 units. During 1967-68 Conversion coupe no. XIII the yield was 13146.61 units. During 1970-71 Conversion coupe XV the yield was 10399.46 units. During 1971-72 Conversion coupe XVI the yield was 9971.72 units. During 1972-73 Conversion coupe XVIII the yield was 10111.45 units. During 1974-75 conversion coupe XIX the yield was 11599.03 units and finally in 1975-76 Conversion coupe no. XX. The yield was 9719.9 units. The variation has been on accumulation side amounting to +11 %. The Working Plan sanctions a deviation of +10%. On the whole area control has worked well. In this felling series a total of 4641 acres against a prescribed area of 4942 acres has been converted during the plan. A net surplus area of 301 acres still lies in hand which awaits conversion.

1.5.73 Statement of annual coupes along with annual outturn  
Koina Felling Series Prescribed yield – 2080 units/year

Coupe No.	Year	Prescription		Results		Units Marked
		Name of Compt.	Areas in acres	Name of Compt.	Areas in acres	
1	2	3	4	5	6	7
i.	1956-57	Ank 45 (P)	75.00	Ank 45	75.00	2317.22
ii.	1957-58	Ank 45 (P)	75.00	Ank 45	75.00	1636.00
iii.	1958-59	Ank 45 (B) Ank. 44 (P)	50.00 20.00	Ank 45 Ank 44	74.00	816.00
iv.	1959-60	Ank 44 (P)	70.00	Ank 44	77.00	2810.00
v.	1960-61	Ank 44 (P)	70.00	Ank 44	71.00	2835.00
vi.	1961-62	Ank 44 (P)	70.00	Ank 44	70.00	2252.67
vii.	1962-63	Ank 44 (P)	70.00	Ank 44	75.00	1944.33
viii.	1963-64	Ank 44 (B) Ank 42 (P)	14.00 16.00	- Ank 42	60.00	2068.67
ix.	1964-65	Ank 42 (P)	78.00	Ank 43	78.00	3042.00
x.	1965-66	Ank 42 (P)	78.00	Ank 42	78.00	2007.70
xi.	1966-67	Ank 42 (B)	80.00	Ank 42	7.00	254.00
xii.	1967-68	Ank 29 (P)	72.00	Ank 42	74.00	3631.33
xiii.	1968-69	Ank 29 (P)	72.00	Ank 29	17.00	954.00
xiv.	1969-70	Ank 29 (P)	72.00	Ank 29	28.00	2082.00
xv.	1970-71	Ank 29 (P)	72.00	Ank 29	50.00	2080.40
xvi.	1971-72	Ank 29 (P)	72.00	Ank 29	34.00	2056.67
xvii.	1972-73	Ank 29 (B) Ank 6 (P)	56.00 18.00	Ank 29 -	17.00 -	2141.67
xviii.	1973-74	Ank 6 (P) -	78.00 -	- Ank 29	- 69.00	2184
xix.	1974-75	Ank 6 (P) -	73.00 -	- Ank 29	- 40.00	2274.33
xx.	1975-76	Ank 6 (B) -	74.00 -	- Ank 29	- 33.00	2119.00
			1484.0		1102.00	41506.99

Analysis :-

1.5.74 In Koina felling series the prescribed volume yield has been exceeded on ten occasions. During the year 1956-57 in conversion coupe no. III the yield obtained was 2317.00 units against a prescribed yield of 2080 units. In 1960-61 conversion coupe no. V the yield was 2835 units. In 1961-62 conversion coupe no. VI the yield was 2252.67 units. In

1964-65 conversion coupe no. IX the yield was 3042 units. During 1967-68 conversion coupe no. XII the yield was 3631.33 units. During 1972-73 conversion coupe no. XVII the yield was 2141.67. In 1973-74 conversion coupe no. XX the yield was 2119.00 against the prescribed yield of 2080 units. The variation has been extremely small of an intensity of - 0.22% against a working plan allowance of +/- 10%.

The area control imposed by the working plan has worked well. In this felling series a total of 1464 acres were to be converted during the whole working plan period. As against the prescribed area of 1494 acres a total of 1102 acres were converted leaving a balance of 362 acres which awaits conversion.

#### 1.5.75 Statement of Annual Coupe Alongwith Annual Outturn

Coupe No.	Year	Prescription		Results		Units Marked
		Name of Compt.	Areas in acres	Name of Compt.	Areas in acres	
1	2	3	4	5	6	7
i.	1956-57	Kd 18 Kp 9	60.00 64.00	Kd 18 Kp 9	60.00 64.00	5170.00
ii.	1957-58	Kp 8	116.00	Kp 8	116.00	4055.00
iii.	1958-59	Kp 7	146.00	Kp 7	146.00	5179.00
iv.	1959-60	Kp 2	156.00	Kp 2	156.00	5414.00
v.	1960-61	Kp 1 (P)	138.00	Kp 1	138.00	3319.00
vi.	1961-62	Kp 1 (B) G 22 (P)	58.00 80.00	Kp 1 G 32	58.00 80.00	5287.00
vii.	1962-63	G 32 (B) G 30 (P)	36.00 102.00	G 32 G 30	36.00 102.00	5998.27
viii.	1963-64	G 30 (B) G 23 (P)	39.00 100.00	G 30 G 23	39.00 100.00	2931.00
ix.	1964-65	G 23 (B) G 18 (P)	62.00 80.00	G 23 G 18	62.00 80.00	4642.00
x.	1965-66	G 18 (P)	138.00	G 18	138.00	5864.00
xi.	1966-67	G 18 (B) G 20 (P)	100.00 40.00	G 18 G 20	100.00 40.00	7301.00
xii.	1967-68	G 20 (B)	131.00	G 20	131.00	8982.00
xiii.	1968-69	G 22 (P)	150.00	G 22	153.11	5758.00
xiv.	1969-70	G 22 (P)	150.00	G 22	152.00	4838.00
xv.	1970-71	G 22 (B)	149.00	G 22	107.00	
xvi.	1971-72	G 27	137.00	G 27 G 22	158.00	
xvii.	1972-73	G 28 (P)	145.00	G 28	131.00	
xviii.	1973-74	G 28 (B) G 29	23.00 114.0	G 28 G 29	82.00 73.16	

xix.	1974-75	G 29 (B) G 25	120.00 27.00	G 29 G 25	97.00 22.16	
xx.	1975-76	G 26 Kd 11	64.00 82.00	G 26 Kd 11	64.00 82.00	
			9817.00		2767.27	106902.43

## Analysis

1.5.76 In Gua felling series the prescribed yield (5540 units) has been exceeded seven times. During 1962-63 the yield in conversion coupe no. VII it has been 5998.67 units against the prescribed yield of 5540 units. During 1965-66 in conversion coupe no. X the yield has been 5864 units. During 1966-67 in conversion coupe no. XI the yield has been 5758 units. During 1971-72 in conversion coupe no. XVI the yield had been 5627 units. During 1972-73 in conversion coupe no. XVII the yield had been 5628 units. In following years there had been a short-fall too. The variation has been rather small and that too on the minus side i.e. – 3.5%. the working plan sanctions a deviation of +/-10%. The area control imposed by the working plans had behaved very well. In this felling series the total area prescribed for conversion was 2817 acres and a total of 2767.27 acres had been converted during the plan period. This therefore works out to a deficit of 49.73 acres which have consumed in plantation etc. as there is no area left as balance in Gua Range.

## Yield

### General Conclusion

1.5.77 From the foregoing paragraph it is crystal clear that the prescribed volume yield has been available from the prescribed area. At best the deviation is negligible. It has worked very well.

## Regeneration

1.5.78 The regeneration position is on the whole excellent and consequently the future crop is assured. All the converted P.B. I compartments have fully regenerated.

1.5.79 Some prescriptions of Sinha's Plan need to be modified with regard to Conversion Working Circle.

- (a) Para 190 of sinha's plan laid down though with very reluctance, the retention of 3 to 4 of the best trees of 12" to 16" diameter as standards in P.B. I after the main feelings. In this paragraph as well as in paragraph 121 and 122 of the plan Shri Sinha has very categorically stated that the standards were not only unnecessary but definitely harmful. It is harmful in many ways. It suppresses the saplings and poles in the surround. The isolated standards themselves are subject to wind damage. Their removal damages regeneration over a considerable area. The discontinuance of this prescription is advocated.
- (b) Para 215 (I) lays down that climber cutting would be done in felled over P.B. I areas "year after year till the crop no longer needs such an operation. It is expected that this operation will be necessary for the first five years." The first part of the prescription is very sound. Climber infestation is particularly severe in clear-felled areas and it was of utmost importance that climber cutting is done year after year till the crop no longer needed such an operation. Unfortunately the last sentence of the prescription limits this operation to the first five years. This limit needs to be waived. In driers areas the five year limit may be alright but in moister localities where climber infestation is heavier, the Divisional Forest Officer should have the authority to continue the annual climber cutting even beyond the five year limit.

#### PERIODIC BLOCKS ANALYSED

1.5.80 (I) In P.B. I, II para 222 of the Working Plan a thinning cycle of 10 years was prescribed. One cycle of this thinning cycle was completed and quite rightly the second cycle was not started. The crop in the P.B. II areas did not require any further thinning. Blind implementation of the thinning programme has some times meant revenue felling as was rightly apprehended in para 221 of the plan.

(II) In P.B. Inter the thinning cycle was of 200 years. Climber cutting was to be done along with thinning (para 224 to 225). While there was no objection to the thinning cycle continuing at 20 years this was unquestionably a very big gap between two successive climber cutting operations in a Conversion Working Circle area. Climbers grow very fast and specimen of such damages are not unusual. They do great harm to the crop. The climber cutting cycle should therefore be brought down to 10 years in the case of P.B. Inter (that is P.B. II and P.B. III of the proposed plan).

## Sal Selection Working Circle

15.81 The Working circle had got an area of 134866 acres. There were eight felling series :-

		Compartment	Area in acres
(1)	Ankua Felling Series Note:- A 38 No area in S.W.C. A-10 (P)-A.11,A-12 Allotted to protection W.C.	To 54	28963.00
(2)	Ghatkuri Felling Series G 19 and G 30 (P) allotted to protection W.C.	1 to 32	24086.00
(3)	Karampada Felling Series. Kp 28 – a forest village Kp 22 & Kp 26 No area has been allotted to S.W.C. Kp 34 – allotted to protection W.C.	1 to 30	11497.00
(4)	Sasangda Felling Series Kp 34 allotted to protection W.C.	Kp 31 to 36	4449.00
(5)	Kodalibad Felling Series	1 to 18	7418.00
(6)	Tholkabad Felling Series Tk 19 – forest village Tk 48 – no ara to S.W.C.	1 to 48	15156.00
(7)	Samta Felling Series Samta 49 – allotted to Coppice W.C.	1 to 49	21584.00
(8)	Tirilposi Felling Series Ti. 6, 29, 46 and 51 are forest villages. Ti. 10 – no area in S.W.C.	1 to 52	21713.00

1.5.82 The Working Circle comprises the poorer quality sal forests and dry mixed forests situated generally on the higher or middle hill slopes. The silvicultural system has been selection cum improvement.

1.5.83 The object of management had been to exploit mature trees on percentage selection basis and at the same time to improve the crop by suitable cultural operations. Assuming suitable values for “A” the yield percentage prescribed for each block after rounding off were :-

- (i) Ankua 50% or 1 in 2 trees of 18” diameter and above.
- (ii) Ghatkuri 50% or 1 in 2 trees of 18” diameter and above.
- (iii) Kodalibad 50% or 1 in 2 trees of 18 diameter and above.
- (iv) Karampada 40% or 2 in 5 trees of 20” diameter and above.
- (v) Sasangda 40% or 2 in 5 trees of 20” diameter and above.

- (vi) Samta 60% or 3 in 5 trees of 18" diameter and above.
- (vii) Tirilposi 50% or 1 in 2 trees of 18" diameter and above.
- (viii) Tholkabad 50% or 1 in 2 trees of 20" diameter and above.

That is to say in Ankua, Ghatkuri, Kodolibad and Tirilposi felling series for instance one tree in two or marketable green sal "selection trees" of and over 18" diameter at breast height present in the coupe at the time of marking, will be marked for felling provided these are silviculturally available.

In Samta felling series 3 out of 5 marketable green sal "selection trees" of 18" and over diameter at breast height present in the coupe at the time of marking will be marked for felling provided these area silviculturally available.

Marking rules have been framed meticulously and mentioned in detail for the guidance of the marking officer.

Subsidiary silvicultural operations had been prescribed in detail.

Digging contour trenches for improving the crop had also been advocated as work of improvement.

1.5.84 After introduction of Sinha's plan, a very large area of the sal selection working circle has gone to mining leases. Approximate calculations indicate the extent of this area to be in the neighbourhood of 19,881 acres. Most of the new leases are confined to the Ghatkuri and Karampada blocks. Sasangda felling series of Sinha's Plan which consisted of Karampada compartments 31 to 36 has almost entirely gone under lease to Messrs. N.M.D.C. Due to this, balance area of Sasangda felling series will have to be merged with the Karampada Felling Series.

1.5.85 The yield in this felling series had been regulated by area (para 254). As there has been reduction in the areas of some felling series of this working circle due to mining leases, the areas of the annual coupes would have to be calculated afresh. The sequence of felling would also have to be rearranged.

1.5.86 The other prescriptions of Sinha's plan in respect of this working circle were very sound and do not need any modification. Two of the prescriptions which were not being implemented in the field are reproduced below :-

Para 274 (VII) - In open areas or blanks where regeneration has been or is to be induced, cleaning and climber cutting should be carried out and shall be repeated year after year till the need may exist.

Para 277 - The recommendation of the preceding plan is repeated namely, that efforts should be made to contour-trench as areas in this working circle as extensively as may be possible for that is the surest and the quickest means of improving the site quality and stock of the forests of this working circle. Although the hill forests form the bulk of the wooded area in this division it does not receive even a fraction of the attention that is due to it. It will be against the laws of economy to neglect these extensive forests which with effort can be improved and made to yield better financial returns than at present.

Implementation of the above prescriptions would go a long way towards the improvements of these forests of the Working Circle and the territorial authorities may be requested to implement them.

1.5.87 Large number of selection coupes marked during the currency of the plan could not attract purchasers due to poor quality of crop. The following list will give an idea. The coupes are of Samta Range. Other Ranges are having the same problem.

Compartment	Section No.	Coupe No.
Samta	18 Section 1	20
	18 Section 2	20
	18 Section 3	20
	18 Section 4	20
Samta	20 Section 3	20
Samta	21 Section 1	20
Samta	10 Section 1 & 2 16 Section 1 to 5	19
Samta	5 Section 1	18
Tirilposi	23 Section 1	20
Tirilposi	27 Section 1 & 2	20
Tirilposi	28 Section 3	20
Tirilposi	19 Section 1 & 8	19
Tirilposi	21 Section 1	19
Tirilposi	21 Section 1	19
Tirilposi	21 Section 3	19
Tirilposi	21 Section 4	19
Tirilposi	Section 2	18

Tirilposi	22 Section 2	18
Tirilposi	22 Section 2	18
Tholkabad	25 Section 2	20
Tholkabad	31 Section 1	20
Tholkabad	3 Section 2	18
Tholkabad	3 Section 3	18
Tholkabad	3 Section 4	18
Tholkabad	1 Section 2	17
Tholkabad	3 Section 1	17

This is enough to high-light that the stock in the Sal Selection Working Circle was deteriorating, as a matter of fact, had already deteriorated as result of which the lots were not getting bidders.

#### COPPICE WORKING CIRCLE

1.5.88 Out of the 1 P.F. Blocks the working circle comprises 14 of them, the remainder, namely, Gua P.F. (No. 38) and Bahda (P.F. 19) have been allotted to Protection Working Circle. In addition Makranda R.F. (Samta 49) (formerly P.F. 14), had also been included in this working circle. All these forests were right burdened.

The crop in different areas allotted to this working circle varies from QT/II (Marang ponga P.F. 18) to QIV in some other P.F. The sal crop was commonly pole to middle aged.

#### Silvicultural System

Coppice with standards.

1.5.89 For the forest of better quality, for example Marang-Ponga P.F. No. 18 which was not inferior to forests included in the Conversion Working Circle, the Coppice rotation was kept at 60 years and for the rest the rotation was 40 years.

#### Felling Series and area of coupes

1.5.90 The following table shows the felling series, area, rotation and area of the annual coupes :-

Sl. No.	Name of F.S. & the name of forest included	Area in acres	Rotation (year)	Area of annual coupe in acres	Remarks
1	2	3	4	5	6
1.	Marang ponga P.F. 18	446.00	60	7.7	
2.	Rabangada Sunsuna P.F. 11	2191.80	40	54.8	
3.	Sagjor P.F. 12	400.80	40	10.1	
4.	Sonapi P.F. 10	1729.60	40	43.2	
5.	Chhotanagpur P.F. 21	257.50	40	6.4	
6.	Jojobatu P.F. 22	501.30	40	12.50	
7.	Dhobil P.F. 23	756.40	40	18.90	
8.	Kasia Pencha P.F. 26	1596.60	40	39.90	
9.	Nuia P.F. 37 A	373.40	40	9.30	
10.	Tatiba-boraiburi P.F. 27 B	600.00	40	15.00	289 acres under P.W.C.
11. 12.	Tagoedaburu P.F. 185 Karujagdaburu P.F. 186	140.375 80.125	40	5.7	Right holders belong to Kodalibad village
13. 14.	Saturiburu P.F. 187 Karketapi P.F. 188	56.325 33.875	40	2.2	Right holders belong to Usuria village
15.	Makaranda Samta Compt. 49 R.F.	1097.50	40	27.5	

Detailed instructions had been given in the working plan regarding demarcation of coupes, marking of standards, method of executing fellings, subsidiary silvicultural operations and thinning.

The total area under the coppice working circle was 10267.80 acres. This would have to be stock-mapped showing the worked over areas. The sequence of felling would then be shown on the map for the entire rotation period.

#### PROTECTION WORKING CIRCLE

1.5.91 The working circle comprises an area of 4438.55 acres. These areas include Ligirda swamp; steep mining faces, mining lease areas, preserved areas for their scenic worth preservation plots and trees.

Cautious fellings on mining faces, protection of the area from types of felling are the main recommendations in this working circle.

## PLANTATION WORKING CIRCLE

1.5.92 The working circle comprises moist valley bottoms and flats, fringes of perennial streams and the lower slopes on either side thereof where sal is in minority or totally absent. Exact area of such localities could not be given for want of survey but it is expected that the area would exceed 3000 acres in the whole division. The plan says that if each of the Range takes up to 50 acres annually the target would be achieved. The species recommended, was box wood species viz. Semal, Bhurkund, Kadam, Chhatni, *Acrocarpus fraxinifolius* for plantation sites within ten miles radius of the rail head, for the more distant localities teak, mahogany, rose wood, champa, etc were prescribed.

Technique for clear felling and planting had been given. Species had been elaborated upon. Subsequent tending and thinning had been discussed. Spacing of 6' x 6' for teak, rose wood, mahogany and 9' x 9' for box wood viz. Semal etc. had been indicated.

Instructions regarding maintenance of plantation journal and that it had to be regularly written, had been given and emphasized. Each plantation should have name boards, the year of formation and spacing. A cleared line should be maintained all around and during summer the line should be burnt as a measure of protection against fire. Each plantation shall be rigorously protected from fire.

1.5.93 At the time of completion of the Plan Shri Sinha could not get time and staff, to be able to get the areas allotted to the plantation working circle and delineated on the compartment maps 9 (para 317). He left it to the territorial staff. A detailed working plan for the plantation working circle of this division was prepared by Sri A. Haidery. All the areas allotted to this working circle have since been shown in the maps of the respective compartments. In 1960-61 when Shri Haidery wrote this plan, 584 acres were under teak, 938 acres under semal, 33 acres under miscellaneous species and 4577 acres of this working circle to 6132 acres. Since then plantations were being done in the areas allotted to this working circle by Sri Haidery.

1.5.94 In these plantations Sri Haidery has prescribed 3 weeding in the first, two weeding in the second and one weeding in the third year. As the areas included in the plantation working circle are generally moist valley bottoms or moist lower slopes, the weed growth in these areas are very profuse. The above scale of weeding at times, therefore, is

quite inadequate. The Divisional Forest Officer may be given the discretion to continue the weeding up to five years in such areas where they are considered necessary by him.

Preparation of detailed table of thinning for plantations would have to be done after site quality class assessment of each plantation. The thinning and tending operations for teak plantation have subsequently been revised by Shri A. Haidery in the year 1974. The revised prescriptions are as follows:-

- (a) The cleaning and climber cutting should be regularly done for 4 years.
- (b) Preliminary thinning of "B" grade in 8<sup>th</sup> and 12<sup>th</sup> year.
- (c) The third thinning will be done in 15<sup>th</sup> year, 4<sup>th</sup> year.

This prescription of tending and thinning operation will also continue in the proposed plan.

#### WORKING PLAN FOR BAMBOO (OVER LAPPING) WORKING CIRCLE

1.5.95 The working circle comprises all the compartments, 28 in number which contain bamboo in varying proportions. The scale is *Dendrocalamus strictus*, the common bamboo of Bihar forests.

#### Cutting Cycle

1.5.96 The cutting cycle had been adopted as that of 4 years just as in the case of bamboo of other divisions.

#### Cutting Series

1.5.97 Four cutting series have been constituted. Kolbonga cutting series and Rabangda cutting series which have been carved out from Ankua block. Phulwari cutting series embraces bamboo bearing compartments of Samta Block. In Digha cutting series following are the details :-

Name of cutting series	Constitution (block & compt.) plus total area of the cutting series	Coupe A		Coupe B		Coupe C		Coupe D	
		Compt. No.	Area in acres	Compt No.	Area in acres	Compt . No.	Area in acres	Compt. No.	Area in acres
Kolhonga	Ankua 1,2,3,4,32,34,45 & 43-1758 acres.	A 1	50	A3(R)AA4	286	A 46	436	A45	52
		A 2	60	A 32	82			A 47	147
		A 3 (P)	303	A 34	38			A 48	136
					186				
	<b>Total</b>		<b>440</b>	<b>542</b>			<b>436</b>		<b>337</b>
Rabangda	Ankua 50,51,52,53 & 54-980 acres	A 50	152	A51(B)	153	A53	61	A54(B)	231
		A51(P)	100	A52	133	A54(P)	150		
	<b>Total</b>		<b>252</b>	<b>286</b>		<b>211</b>		<b>231</b>	
Phulwari	Samta 1,2,3,5, & 6-914 acres	S1	184	S2	202	S3	293		235
	<b>Total</b>		<b>184</b>	<b>202</b>		<b>293</b>		<b>235</b>	
Digha	Trilposi 1,2,3,5,7,8,9 & 10 – 1453 acres	Ti. 1	239	Ti. 2 (B)	220	Ti. 5	218	Ti. 9	280
		Ti. 2 (P)	70	Ti. 3	136	Ti. 7	36	Ti. 10	108
						Ti. 8	148		
	<b>Total</b>		<b>309</b>	<b>356</b>		<b>402</b>		<b>388</b>	

1.5.98 Cutting rules have been laid down in detail. Recommendation for supply to Turis have been made. Tending operations have not been prescribed. Miscellaneous species interfering with bamboo has been recommended to be girdled. Elephants continue to be the main destroyers of bamboos. In a gregariously flowered area clumps are to be cut after the seed-fall. Grazing has been banned and fire protection measures recommended.

Bamboo overlapping working circle in Saranda is not a very sound management unit as the bamboo coupes either do not sell or at best if they sell they do it for very small sum.

#### FOREST VILLAGE WORKING CIRCLE

1.5.99 The area comprised in this Working Circle are all parts of reserved forests. Entire compartments of Reserved Forest blocks or parts of them have not been apart for the purpose of establishing forest villages in order that labour for culture or exploitative work may be readily available. Since this Division was formed, but for the few enclaves an unusually compact mass of forests, villages being non-existent for long distance, it was deemed necessary to sacrifice the crop on some of the fine valley flats for availability of labour.

The objects of management are :-

- (a) To silviculturally manage the forests still standing within the limits of each forest village and to prevent wasteful deforestation.

- (b) To achieve maximum availability of fit and healthy labour.
- (c) To rationalize the agricultural practices.
- (d) To make provision of medical and irrigational facilities.

Detailed prescription have been laid down for keeping down destruction of forests.

1.5.100 Prescription have been formulated to increase the earning power of the labourers by the following :-

- (a) Proper utilization of the Kusum trees standing in the forest villages.
- (b) Constitution of Lac cultivation series.
- (c) Protection against theft of lac when still immature.
- (d) Rationalization of agricultural practices.
- (e) Fencing of cultivation land.
- (f) Creation of irrigation facilities.
- (g) Medical and education facilities.
- (h) Drinking water supply.
- (i) Improvement of housing conditions, Provision of funds for general maintenance and improvement of the forest villages.

In view of the proposal for denotification of these villages and their conversion into civil villages this working circle will be deleted in the proposed plan.

1.5.101 Fire Protection :- Fire protection measures have not proved adequate. There has not been any considerable decrease in the incidence of fire rather it has become more. Conditions in this Division has been changing day by day. Mining operations have increased. More and more people have started living inside the forests and unless very serious measures against fire and taken it will be difficult to retain the previous pride and glory of this Division. Results of fire protection during last twenty years under the plan are given in table I as follows :-

TABLE – I  
RESULTS OF FIRE PROTECTION

Year	Area attempted to be protected		Area burnt	Failure %	Cost (in Rs.)	Cost per sq. K.M. (In Rs.)
	In acres	In hac.				
1955-56	1,95,563	79007.45	8,666	4.43	8,247	10.43
1956-57	1,95,563	79007.45	8,711	4.45	6,038	7.64
1957-58	1,95,563	79007.45	38,602	19.73	6,602	8.35
1958-59	1,95,563	79007.45	39,381	20.13	6,397	80.09
1959-60	1,95,563	79007.45	21,896	11.19	6,149	7.78
1960-61	1,95,563	79007.45	43,242	22.11	11,754	14.87
1962-63	1,95,563	79007.45	4,368	2.23	7,896	9.99
1963-64	1,95,563	79007.45	4,369	2.23	13,015	16.47
1964-65	1,95,563	79007.45	5,027	2.57	14,572	18.44
1965-66	1,95,563	79007.45	2,039	1.04	14,131	17.88
1966-67	2,12,211.67	35735.51	5,640	2.65	12,000	14.00
1967-68	2,12,211.67	85735.51	4,496	2.11	10,800	12.60
1968-69	2,11,825.25	85735.51	3,298.04	3.91	13,003.57	15.17
1969-70	2,11,825.25	85735.51	7,653	3.61	16,048	18.72
1970-71	2,11,825.25	85735.51	3,372	1.59	15,500	18.08
1971-72	2,11,825.25	85735.51	10,836	5.11	18,946	22.10
1972-73	2,11,825.25	85735.51	2,277.60	1.07	26,001	30.33
1973-74	2,11,825.25	85735.51	3,087.00	1.45		
1974-75	2,11,825.25	85735.51	2,753.50	1.29		
1975-76	2,11,825.25	85735.51	609	0.28		

1.5.102 Wastage in Exploitation :- Previously much material used to be left behind in the forest by the contractors but since past few years the contractors try to remove most of the materials especially the firewood as they find good market for it. Recently there has been a good demand of Bucklas (slabs) along with dressed firewood by the paper mills. Still some material is left in inaccessible areas or where its extraction is not profitable. In felling of trees by axe, also quite a large quantity of timber is wasted. This could be minimized by introduction of saws for felling and logging. More and more improvement of transport facilities will ensure better utilization of forest produce.

1.5.103 Special work of improvement :- A fairly good system of roads exist in Saranda but they need improvement. Traffic on these roads has increased much. Trucks with heavy load ply on these roads and soon they become very dusty. Hence these roads require thoroughly murruming and also some of the main roads should be metalled.

In 1975-76 the total length of roads in Saranda Division was 299 miles. The following previously aligned roads are still pending for construction.

- (1) Phulbari – Jamsara - 10.7 km
- (2) Bitkilsoya – Raidih - 15.5 km
- (3) Budhaburu – Kumbia - 21.1 km

Building :- The Division is generally well proved with rest houses, but quarters and rest sheds for subordinates need special attention. Living accommodation is not sufficient for the existing staff. Most of the old quarters need to be replaced by new quarters and more and new quarters should be constructed.

1.5.104 Water supply :- Arrangement for the supply of good drinking water has generally been adequate but still some more wells are required to be dug specially at Jaraikele, Nawagaon (Raidih), Karampada Naka, Shaddle Naka and Karo crossing Naka (Baraiburu, Old wells are also required to be repaired.

1.5.105 Past Yield :- The figure of total out turn of the division for the period 1955-56 to 1975-1976 are given in table II following:-

TABLE – II  
STATEMENT SHOWING THE PAST YIELD

Year	Timber (cft)	Fire-wood (cft)	Bamboo (number)	Minor Forest produce (Rupees)
1955-56	7,33,881	78,824	1,89,040	295
1956-57	8,18,512	33,431	4,87,329	675
1957-58	7,39,202	3,34,994	3,21,451	686
1958-59	7,77,270	5,04,605	4,44,346	642
1959-60	7,33,463	2,95,903	1,57,172	599
1960-61	7,67,106	2,83,040	3,78,327	608
1961-62	6,36,172	2,32,058	96,594	727
1962	9,32,003	2,67,340	1,40,819	863
1963-64	10,30,491	4,22,773	2,27,909	1,337
1964-65	7,33,052	2,60,644	1,48,561	862
1965-66	7,30,752	5,92,644	1,29,551	736
1966-67	11,53,805	4,88,115	9,92,206	869
1967-68	6,49,537	6,69,146	22,946	1,096
1968-69	6,51,011	6,00,300	10,787	1,105
1969-70	7,50,100	5,60,300	15,000	-
1970-71	7,02,066	5,80,500	20,394	-

1971-72	7,02,120	5,90,810	40,320	-
1972-73	15,29,912	57,214	5,373	-
1973-74	12,23,678	1,41,270	4,355	-
1974-75	17,94,034	1,91,200	1,370	-
1975-76	24,15,292	1,68,300	1,789	-

#### 1.5.106 PAST REVENUE AND EXPENDITURE

The past revenue and expenditure of the Division from 1955-56 to 1975-76 are given in table III following.

TABLE III  
PAST REVENUE AND EXPENDITURE

Year	Revenue				Expenditure				Remarks
	Major Forest Produce	Minor Forest Produce	Total	Conservancy Work	Establishment	Post war development Scheme	Total	Surplus	
1	2	3	4	5	6	7	8	9	10
1955-56	1639579	49925	1688504	211089	91202	75514	377805	1310699	
1956-57	1347429	64475	1411367	169452	96188	84315	349955	1061412 (Refund)	(-537)
1957-58	1019043	78109	1096861	159861	144174	30841	334876	761985	Refund
1958-59	1606981	70935	1677916	125751	135202	78022	338975	1338941	291
1959-60	1882559	51792	1934351	183993	157143	111549	452685	1481666	
1960-61	2008111	43794	2051905	219042	191399	227262	637703	1414202	
1961-62	2223300	55592	2278892	187742	134333	129200	451775	1827117	
1962-63	2777362	63598	2840960	224172	204447	142552	571171	2269799	
1963-64	3361832	50108	3411940	221516	210577	171865	603958	2807982	
1964-65	3383755	57317	3441072	209476	233752	219851	663079	2777992	
1965-66	3539292	45336	3584628	216597	249423	185058	651078	2933550	
1966-67	4059153	31418	4990571	217518	341097	141127	699742	3390829	
1967-68	3143495	20442	3172937	246980	264620	3252337	563937	2609000	
1968-69	4007471	28185	4035656	266400	285006	53076	604482	3431174	
1969-70	4000175	1145594	5145769	25500	237875	603945	1096820	4043949	
1970-71	4625402	70604	4696006	296735	362919	153312	812966	3883040	
1971-72	5497175	498265	5995440	315755	707860	220400	1244015	4751425	
1972-73	4492350	120383	4612733	375545	398520	215650	989715	36230018	
1973-74	5143646	278350	5421996	461791	580970	99672	1142433	4279563	
1974-75	653724	425697	6962943	316095	509807	77544	904256	6058687	
1975-76	9288847	282888	9571735	175841	632770	294282	1102893	8185954	

#### 1.5.107 Periodic flowering of species :-

No record of the flowering of bamboos in Saranda Division prior to 1929-30 exists. Gregarious flowering of bamboos occurred in 1929-30 in north Ankuwa. Sporadic flowering was noticed in the same tract in 1953.

*Bamboosa arundinacea* flowered in Ghatkuri in 1930.

*Cephalostachyum pergracile* flowered sporadically in Ghatkuri 30 in 1933.

In the year 1973 there was gregarious flowering of bamboo (*Dendrocalamus strictus*) in Ankua and Tirilposi blocks which resulted in their disappearance from these blocks.

*Strobilanthes scaber* flowered along the streams in April 1934 and then during 1953 and again in 1954.

*Strobilanthes auriculatus* :- The following flowering years recorded – 1905 (Steven), 1911 (Haines), 1919-20 (Chatterjee), January, 1924 (Hart), January, 1930 (Chatterjee), 1937-38 (Osmaston), 1945-46, 1953-54 (J.N. Sinha and A. Haidery).

It was again found in gregarious flowering in the entire Saranda Division in 1977.

#### 1.5.108 Subsidiary Silvicultural Operations:-

Subsidiary silvicultural operations have regularly been done in the year following the main fellings in P.B. I of Sal conversion Working Circle.

PART - I  
CHAPTER – VI

1.6.1 STATISTICS OF GROWTH AND YIELD :-

The statistics of growth and yield of Saranda forests have been obtained from the 15 sample plots records maintained by Forest Research Division in these forest on behalf of the silviculture branch of the Forest Research Institute, Dehra Dun. The sample plots give figures, of top height, average height, average diameter of crop-age ranging from about 9 years to 162 years. These also give data of corresponding stem timber volume, number of trees per hectare and basal area. These figures, however, are not quite sufficient. The total below reproduce these data.

1.6.2 Table showing the statistic of growth and yield from the sample plots of Saranda Division. Description of the sample plots as well as their measurements and derivations are given below :-

**Description of sample Plot No. – 01 Saranda Division**

1. Species	:- <i>Shorea robusta</i>
2. Object of Experiment	:- Volume increment of Coppiced sal
3. Area in acres	:- 0.41 (0.16 hec.)
4. Situation	:- 4 miles from Samta F.R.H., 3 miles from Jaraikela on the road from Jaraikela to Ponga, near Phulbari village close to Binkigara stream, Samta block comptt. 1.
5. Height above mean sea level	:- Elevation 800'
6. Climate	:- Average Max. temp 104°F in summer. Average Min. temp. 5.4°F in winter.
a) Minimum rain fall	Annual Rainfall 73" Max. in Monsoon & a few showers in winter
7. Rock, Soil and humus	:- Red Laterite clay & quartz schist
8. Aspect and Slope	:- N. East slope gentle
9. Type of Forest	:- Valley type, quality only moderate. The area appears to be old and all the trees are coppice shoots.
10. Age of crop at first measurement	:- 32 year calculated back from age curve of 1927.
11. Date of Formation	:- 3 <sup>rd</sup> March 1918
12. Interval of measurement	:- 5 years
13. Interval of thinning	:- Every 5 years
14. Method of demarcation	:- Wooden posts on corner

15. Method of numbering and Marking :- Standard trees
16. Condition of plot when formed
- a) Overwood :- Density 0.9  
Suppressed stems of 45' high.  
Dominant stems of overwood upt 80' high.  
Many of the dominant stems infested with Loranthus.
- b) Underwood :- Stems 190 in the Plot or 463 per acre
- c) Weed Growth :- Root fungus not noticed in this plot
- d) Principal species :- Well
17. Details of work carried out at first formation :- Moderate crown thinning made.
18. Details of treatment to be applied :- The crop will be thinned as per yield table.

S.P. NO. 01 OF SARANDA DIVISION

Samta Block Comptt. No. 1

1. Object - Volume Increment and Development of Sal Forest crown thinned.
- a) Year of formation - 3<sup>rd</sup> March 1918
- b) Age of crop at the time of formation - 25 years
- c) No. of trees at the time of formation - 156
- d) Area of S.P. no. 1 - 0.17 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality	Total basal area of sample plot
	2	3	4	5	6	7	8	9
1	1933	22.6	24.38	.0409	255.2840	6.3821	50.00	3.6246
2	1943	24.9	25.70	.0512	399.5950	7.9919	53.21	3.8790
3	1951	28.2	26.64	.0589	532.9446	9.1887	61.54	4.0349
4	1955	28.9	26.70	.0511	590.8414	9.5297	63.46	4.1385
5	1960	30.5	27.46	.0624	651.9837	9.7311	64.10	4.3328
6	1966	32.0	20.56	.0653	743.3488	10.1856	67.95	4.3251
7	1971	32.8	27.68	.0625	799.9462	10.3247	68.59	4.3529
8	1973	33.9	27.73	.0668	833.8160	10.7429	70.52	4.5126
9	1978	34.3	20.18	.0649	861.0330	11.1298	70.52	4.5943
10	1983	35.2	29.41	.0648	910.0600	11.2968	70.52	4.8544
11	1988	36.5	27.94	.0590	874.1520	12.2016	70.52	5.2886
12	1993	37.6	29.69	.0540	841.7900	12.4179	70.52	5.2641

**Description of sample Plot No. – 03 Saranda Division**

1. Species :- *Shorea robusta*
2. Object of Experiment :- Volume increment of crown thinned crop in Valley sal.
3. Area in acres :- 0.816
4. Situation :- On fire line between Rathamati and Tholkabad 1 mile from Tholkabad F.R.H. top of flat spur in Samta Compt – 39.
5. Rock, Soil and humus :- Red Iron Loam
6. Aspect and slope :- Almost Flat Ground
7. Type of Forest :- Half Valley type moderate quality. An old Jhummed area
8. Age of crop at first measurement :- 47 years, calculated back from the age curve of 1938
9. Date of Formation :- 8<sup>th</sup> March 1918
10. Interval of measurement :- 5 Years
11. Interval of thinning :- 5 Years
12. Method of demarcation :- Wooden posts at corners, adjoining ditch all round.
13. Method of numbering and Marking trees :- Standard
14. Condition of plot when formed :- Dense, chiefly *Flemingia chappar* and Sal regeneration, also *Indigofera*, *Bauhinia vallii*, *Melletia auriculata*, *Woodfordia floribunda* & *Grewia*.
15. Details of work carried out at first formation :- Sal root fungus present
16. Details of treatment to be applied :- Vol. increment & development of pole forest crop "Crown Thinned"

**SAMPLE PLOT NO. 3 OF SARANDA FOR SITE QUALITY**

Sl. No.	Year	Top Height	Top age
1.	1923	25.30	65
2.	1928	25.86	70
3.	1938	26.52	80
4.	1948	28.04	90
5.	1958	30.18	100
6.	1968	32.00	110

**S.P. NO. 3 OF SARANDA DIVISIONS AT SAMTA COMPT. NO. 39**

1. Object :- Volume
2. Year of formation :- 8<sup>th</sup> March 1918
3. Age of crop at the time of formations :- 47 Years

4. No. of trees at the time of formation :- 224  
 5. Area of S.P. No. 3 0.37 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
	2	3	4	5	6	7	8	9
1	1943	26.9	28.08	.0191	308.0088	4.2779	51.34	6.9005
2	1948	29.2	27.20	.0207	358.7199	4.587	61.61	6.2957
3	1954	31.4	29.64	.253	472.1870	5.6890	62.50	7.4129
4	1958	33.2	30.33	.264	511.5426	5.8798	63.86	7.5560
5	1964	34.5	30.93	.259	540.7950	5.8150	64.28	7.7925
6	1968	34.7	31.42	.0274	594.4839	6.1287	66.07	7.9370
7	1973	36.5	31.01	.0275	628.6750	6.1625	66.07	8.9455
8	1978	36.7	30.68	.276	659.5801	6.1643	66.07	8.7870
9	1983	37.6	31.83	.0279	699.9552	6.2496	66.07	9.3357
10	1988	38.6	32.72	.297	777.4065	6.6445	67.85	9.6039
11	1993	40.4	32.13	.0300	820.3158	6.7239	69.64	9.5764

**DESCRIPTION OF SAMPLE PLOT NO. – 04 SARANDA DIVISION**

1. Species :- *Shorea robusta*  
 2. Object of Experiment :- Volume increment of crown thinned crop  
 3. Area in hec. :- 0.17 hec.  
 4. Situation :- 4 miles from Tholkabad F.R.H. About 1 mile from Ratamai close to road Jaraikele, on Gonda Jhora : in Tirilposi Compt. 18  
 5. Rock, Soil and humus :- Soil red clay  
 6. Aspect and slope :- Slope Gentle  
 Under Growth :- High dense undergrowth of sal coppice, *Eugenia jambolana*, *Mallotus philipiensis*, *Flemingia*, *Clerodendron*, *Dillenia*, *Gmelina arborea*, *Holarrhaena* etc.  
 7. Type of Forest :- Valley type, quality moderate  
 8. Age of crop at first measurement :- 72 years, calculated back from 1938 age  
 9. Date of Formation :- 9<sup>th</sup> March 1918  
 10. Interval of measurement :- 5 years  
 11. Interval of thinning :- Wooden posts at corner, adjoining ditch around  
 12. Method of numbering and Marking trees :- Standard

SAMPLE PLOT NO. 4 OF SARANDA FOR STTE QUALITY  
 SPEICES – SAL

Sl. No.	Year	Top age	Top height
1.	1923	82	28.35 M
2.	1928	87	24.99 M
3.	1938	97	28.94 M
4.	1948	107	29.57 M
5.	1958	117	32.00 M
6.	1968	127	32.61 M
7.	1983	142	37.40 M

S.P. NO. 4 OF SARANDA DIVISIONS AT SAMTA COMPT. NO. 18

6. Object :- Volume increment and Development of Sal forest severely thinned by removing all suppressed and most dominated stems.
7. Year of formation :- 9<sup>th</sup> March 1918
8. Age of crop at the time of formations :- 72 Years
9. No. of trees at the time of formation :- 33
10. Area of S.P. No. 4 0.16 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1933	39.6	28.31	.0795	228.5229	2.6267	6.06	4.0267
2	1943	43.4	29.87	.0879	281.2321	2.0993	21.21	3.9390
3	1948	44.7	30.56	.0981	296.3916	2.9058	24.24	3.9203
4	1954	47.2	31.01	.958	341.2692	3.1599	33.33	3.8487
5	1958	49.0	31.45	.1013	374.4720	3.3435	33.33	4.2462
6	1964	51.0	32.26	.1073	417.7318	3.5401	39.39	4.1661
7	1968	52.0	31.79	.1058	438.0288	3.5904	39.39	4.3481
8	1973	54.0	32.78	.1129	475.3163	3.7269	39.39	4.8808
9	1978	54.7	34.74	.1214	528.8844	4.0067	39.39	4.8808
10	1983	56.0	34.97	.1229	555.5761	4.0553	39.39	5.0083

Volume Calculation for Sample Plot No. 4 of Saranda Division  
Date of Mea, March 1933, Date of Formation 1918  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
11-14 M -12.5 or M-31.8 (cm)	9	0.7151	9	0.7151			29.05		0.3		6.2321		
14-17 M-15.5 or M-39.4 (cm)	11	1.3417	11	1.3417			27.25		0.3		10.9684		
17.20 M-15.5 or M-39.4 (cm)	10	1.7357	11	1.7357			28.53		0.3		14.8559		
17-20 M-18.5 or M-47.0 (cm)	10	1.7357	11	1.7357			28.53		0.3		14.8559		
20-23 M-21.5 or M-54.6 (cm)	1	0.2342	1	0.2342			32.61		0.3		2.2912		
53.6-60.9 57.3	2	0.5159	2	0.5159			31.54		0.3		4.8814		
			31				4.0267				34.3476		

Volume Calculation for Sample Plot No. 4 of Saranda Division  
Date of Mea, March 1943  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
11-14 M -12.5 or M-31.8 (cm)	2	0.1589	2	0.1589			29.05		0.3		1.3948		
14-17 M-15.5 or M-39.4 (cm)	11	1.3417	11	1.3417			28.04		0.3		11.2864		
17.20 M-15.5 or M-39.4 (cm)	10	1.7357	11	1.7537			30.55		0.3		15.9077		
20-23 M-21.5 or M-54.6 (cm)	3	0.7027	3	0.7027			32.61		0.3		6.8745		
			26	3.9390							35.4534		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1951  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
11-14 M -12.5 or M-31.8 (cm)	1	0.0795	1	0.0795			29.05		0.3		0.6928		
14-17 M-15.5 or M-39.4 (cm)	7	0.8538	7	0.8358			30.64		0.3		7.8507		
17-20 M-15.5 or M-39.4 (cm)	6	1.0414	6	1.0414			31.39		0.3		9.8069		
20-23 M-21.5 or M-54.6 (cm)	8	1.8740	8	1.8740			32.11		0.3		18.0522		
			22								34.4026		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1958  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
14-17 M-15.5 or M-39.4 (cm)	5	0.6099	5	0.6099			29.57		0.3		5.4104		
17-20 M-18.5 or M-47.0 (cm)	8	1.3886	8	1.3886			29.26		0.3		12.1891		
20-23 M-21.5 or M-54.6 (cm)	7	1.6937	7	1.6937			32.20		0.3		15.8395		
23-26 M 24.5 or 62.2 (cm)	2	0.6080	2	0.6080			35.66		0.3		6.5044		
			22								39.9434		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1964  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
14-17 M-15.5 or M-39.4 (cm)	1	0.1220	1	0.1220			29.57		0.3		1.0823		
17-20 M-18.5 or M-47.0 (cm)	9	1.5621	9	1.5621			30.28		0.3		14.1901		
20-23 M-21.5 or M-54.6 (cm)	8	1.8740	8	1.8740			32.92		0.3		18.5076		
23-26 M 24.5 or 62.2 (cm)	2	0.6080	2	0.6080			36.88		0.3		6.7269		
			20	4.1661							40.5069		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1973,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
44.1-49.0 M-46.6	6	1.0238	6	1.0238			32.92		0.3		10.1110		
49.10-54.0 M-51.6	4	0.8368	4	0.8368			32.46		0.3		8.1488		
54.1-59.0 M-56.0	5	1.2586	5	1.2586			31.39		0.3		11.8522		
54.1-64.0 M-61.6	4	1.1926	4	1.1926			34.14		0.3		12.2146		
64.1-69.0 M-66.6	1	0.3485	1	0.3485			34.14		0.3		3.5693		
			20	4.6603							45.8959		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1978,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
44.1-49.0 M-46.6	4	0.6825	4	0.6825			33.60		0.3		6.8796		
49.1-54.0 M-51.6	6	1.2553	6	1.2553			33.33		0.3		12.5517		
54.1-59.0 M-56.6	3	0.7552	3	0.7552			36.15		0.3		8.1901		
59.1-64.0 M-61.6	5	1.498	5	1.498			37.95		0.3		16.9728		
			20	4.8808							51.2854		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 4 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1983,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
44.1-49.0 M-46.6	3	0.5119	3	0.5119			34.60		0.3		5.3135		
49.1-54.0 M-57.6	6	1.2553	6	1.2553			35.03		0.3		13.1919		
54.1-59.0 M-56.6	3	0.7552	3	0.7552			33.50		0.3		8.0429		
59.1-64.0 M-61.6	6	1.7889	6	1.7889			38.45		0.3		20.6350		
64.1-69.0 M-66.6	2	0.6970	2	0.6970			32.00		0.3				
			20	5.0083							52.9336		

## DESCRIPTION OF SAMPLE PLOT NO. – 04 SARANDA DIVISION

- |  |   |
|--|---|
| 1. Species   | :- <i>Shorea robusta</i>  |
| 2. Object of Experiment                            | :- Volume increment   |
| 3. Area in hectare                                 | :- 0.15 hec.  |
| 4. Situation                                       | :- 4 miles from Tholkabad F.R.H. About 1 mile from Ratamai close to road Jaraikela, on Gonda Jhora  |
| 5. Rock, Soil and humus                            | :- Soil gravelly red clay   |
| 6. Aspect and slope                                | :- Slope Gentle   |
| Under Growth                                       | :- Sal regeneration and <i>Mikletia auriculata</i> . No grass   |
| 7. Type of Forest                                  | :- Valley type, quality moderate  |
| 8. Age of crop at first measurement                | :- 69 <sup>th</sup> years, calculated back from 1938 Age  |
| 9. Date of Formation                               | :- 9 <sup>th</sup> March 1918   |
| 10. Interval of measurement                        | :- 5 years  |
| 11. Interval of thinning                           | :- 5 years  |
| 12. Method of demarcation                          | :- Wooden posts at corner, adjoining ditch around   |
| 13. Details of work carried out at first formation | :- Crown thinned  |
| 14. Details of treatment to be applied             | :- Volume increment and development of tree forest, crown thinned, severely. Under thinning most of the dominated and all suppressed stems removed. |

### SAMPLE PLOT NO. 5 OF SARANDA FOR STTE QUALITY SPEICES – SAL

Sl. No.	Year	Top age	Top height in metre
1.	1918	69	25.91
2.	1923	74	28.04
3.	1928	79	27.13
4.	1938	89	29.57
5.	1948	99	32.61
6.	1958	110	33.53
7.	1968	119	31.09
8.	1983	138	35.10

### S.P. NO. 5 OF SARANDA DIVISIONS AT GONDAGHARI

- |   |  |
|---|--|
| 11. Object                                | :- Volume increment and Development of Sal forest crown thinned. |
| 12. Year of formation                     | :- 9 <sup>th</sup> March 1918                                    |
| 13. Age of crop at the time of formations | :- 69 Years  |
| 14. No. of trees at the time of formation | :- 57  |

15. Area of S.P. No. 5

0.15 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1933	36.7	29.72	0.0822	393.6744	4.6866	50.90	3.2567
2	1943	40.1	30.42	0.0871	466.4938	4.9627	59.65	3.0638
3	1948	41.4	30.94	0.0926	522.5418	5.2782	61.40	3.3107
4	1954	44.9	31.61	0.0916	590.3205	5.6221	63.16	3.4009
5	1958	46.7	32.58	0.1107	687.7464	6.3096	63.16	3.8397
6	1964	49.0	33.58	0.1211	794.0405	6.9047	64.91	4.1352
7	1968	50.3	32.61	0.1151	780.5924	6.5596	64.91	4.1750
8	1973	55.0	33.79	0.1405	993.3392	8.0108	70.20	4.3821
9	1978	55.6	34.25	0.1371	1007.7351	7.8119	71.93	4.0544
10	1983	57.5	35.00	0.1428	1090.0528	8.1392	73.70	4.0499

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION**

**DATE OF MEA, MARCH 1933.**

Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.5-20.3 M-17.9	1	0.0252	1	0.0252			20.80		0.3		1572		
20.3-25.4 M-22.9	2	0.0824	2	0.0824			23.30		0.3		5760		
25.4-30.5 M-27.9	7	0.4281	7	0.4281			25.39		0.3		3.2608		
30.5-35.6 M-33.0	2	0.1711	2	0.1711			26.21		0.3		1.3454		
35.6-40.6 M-43.1	5	0.5703	5	0.5703			30.35		0.3		5.1926		
40.6-45.7 M-43.1	3	0.4397	3	0.4397			30.00		0.3		3.9411		
45.7-50.8 M-48.2	6	1.0953	6	1.0953			30.97		0.3		10.1764		
50.8-55.9 M-53.3	2	0.4464	2	0.4464			32.54		0.3		4.3578		
			28	3.2567							29.0073		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION**  
**DATE OF MEA, MARCH 1943,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.3-25.4 M-22.9	1	0.0412	1	0.0412					0.3		0.2825		
25.4-30.5 M-27.9	5	0.3058	5	0.3058					0.3		2.0972		
30.5-35.6 M-33.0	4	0.3423	4	0.3423					0.3		2.9267		
35.6-40.6 M-43.1	2	0.2281	2	0.2281					0.3		2.0652		
40.6-45.7 M-43.1	3	0.4397	3	0.4397					0.3		4.1053		
45.7-50.8 M-48.2	3	0.5476	3	0.5476					0.3		5.2882		
50.8-55.9 M-53.3	4	0.8929	4	0.8929					0.3		8.8719		
55.9-60.9 M-58.4	1	0.2680	1	0.2680					0.3		2.5977		
			23	3.0638							28.2347		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION**  
**DATE OF MEA, MARCH 1948,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.3-25.4 M-22.9	1	0.0412	1	0.0412			21.00		0.3		0.2596		
25.4-30.5 M-27.9	2	0.1223	2	0.1223			22.90		0.3		0.8402		
30.5-35.6 M-33.0	6	0.5134	3	0.5134			24.97		0.3		3.8549		
35.6-40.6 M-43.1	2	0.2281	2	0.2281			30.94		0.3		2.1172		
40.6-45.7 M-43.1	2	0.2919	2	0.2919			28.90		0.3		2.5308		
45.7-50.8 M-48.2	3	0.5476	3	0.5476			33.45		0.3		5.4952		
50.8-55.9 M-53.3	2	0.4464	2	0.4464			31.40		0.3		4.2051		
55.9-60.9 M-58.4	3	0.8040	3	0.8040			32.92		0.3		7.9403		
60.9-66.0 M-63.4	1	0.3158	1	0.3158			31.85		0.3		3.0175		
			22	3.3107							30.2518		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1954,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.3-25.4 M-22.9	1	0.0412	1	0.0412			22.40		0.3		0.2763		
25.4-30.5 M-27.9	1	0.0612	1	0.0612			25.00		0.3		0.4590		
30.5-35.6 M-33.0	4	0.3423	4	0.3423			25.19		0.3		2.6607		
35.6-40.6 M-43.1	5	0.5703	5	0.5703			29.26		0.3		5.0061		
40.6-45.7 M-43.1	1	0.1460	1	0.1460			30.00		0.3		1.3140		
45.7-50.8 M-48.2	1	0.1825	1	0.1825			32.61		0.3		1.7854		
50.8-55.9 M-53.3	3	0.6697	3	0.6697			35.36		0.3		7.1042		
55.9-60.9 M-58.4	4	1.0719	4	1.0719			34.43		0.3		11.0717		
60.9-66.0 M-63.4	1	0.3158	1	0.3158			31.09		0.3		2.9455		
			21								32.6229		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1958,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
25.4-30.5 M-27.9	1	0.0612	1	0.0612			23.80		0.3		0.4370		
30.5-35.6 M-33.0	3	0.2567	3	0.2567			25.60		0.3		1.9715		
35.6-40.6 M-43.1	5	0.5703	5	0.5703			27.12		0.3		4.6400		
40.6-45.7 M-43.1	2	0.2919	2	0.2919			33.83		0.3		2.9625		
45.7-50.8 M-48.2	1	0.1825	1	0.1825			30.20		0.3		1.6535		
50.8-55.9 M-53.3	4	0.8929	4	0.8929			35.20		0.3		9.4290		
55.9-60.9 M-58.4	1	0.2680	1	0.2680			31.70		0.3		2.5487		
60.9-66.0 M-63.4	3	0.9475	3	0.9475			37.49		0.3		10.6565		
66.0-71.1 M-68.5	1	0.3687	1	0.3687			33.53		0.3		3.7088		
			21	3.8397							38.0075		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1964,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
25.4-30.5 M-27.9	1	0.0612	1	0.0612			24.10		0.3		0.4425		
30.5-35.6 M-33.0	1	0.0856	1	0.0856			26.25		0.3		0.6741		
35.6-40.6 M-43.1	4	0.4562	4	0.4562			28.04		0.3		3.8321		
40.6-45.7 M-43.1	4	0.5838	4	0.5838			30.67		0.3		5.3173		
45.7-50.8 M-48.2	1	0.1825	1	0.1825			33.20		0.3		1.8177		
50.8-55.9 M-53.3	-	-	-	-			-		0.3		-		
55.9-60.9 M-58.4	5	1.3399	5	1.3399			34.82		0.3		13.9966		
60.9-66.0 M-63.4	2	0.6317	2	0.6317			36.89		0.3		6.9910		
66.0-71.1 M-68.5	1	0.3687	1	0.3687			39.43		0.3		4.3614		
71.1-76.2 M-73.6	1	0.4256	1	0.4256			34.14		0.3		4.3590		
			20	4.1352							41.7919		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION  
DATE OF MEA, MARCH 1973,  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
40.1-45.0 M-42.5	5	0.7096	5	0.7096			26.82		0.3		5.7094		
45.1-50.0 M-47.5	2	0.3546	2	0.3546			32.92		0.3		3.5020		
50.1-55.0 M-52.5	1	0.2166	1	0.2166			31.00		0.3		2.0143		
55.1-60.0 M-57.5	2	0.5196	2	0.5196			33.00		0.3		5.1440		
60.1-65.0 M-62.5	3	0.9808	3	0.9808			35.56		0.3		10.4632		
65.1-70.0 M-67.5	2	0.7160	2	0.7160			34.40		0.3		7.3891		
70.1-75.0 M-72.5	1	0.4130	1	0.4130			39.62		0.3		4.9089		
75.1-80.0 M-77.5	1	0.4719	1	0.4719			37.49		0.3		5.3075		
			17	4.3821							44.4384		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION**  
**DATE OF MEA, MARCH 1978,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
40.1-45.0 M-42.5	5	0.7096	5	0.7096			27.20		0.3		5.7919		
45.1-50.0 M-47.5	1	0.1773	1	0.1773			33.20		0.3		1.7659		
50.1-55.0 M-52.5	2	0.4331	2	0.4331			34.30		0.3		4.4566		
55.1-60.0 M-57.5	2	0.5196	2	0.5196			34.85		0.3		5.4324		
60.1-65.0 M-62.5	2	0.6139	2	0.6139			35.40		0.3		6.5198		
65.1-70.0 M-67.5	2	0.7160	2	0.7160			38.60		0.3		8.2913		
70.1-75.0 M-72.5	1	0.4130	1	0.4130			39.60		0.3		4.9064		
75.1-80.0 M-77.5	1	0.4719	1	0.4719			37.20		0.3		5.2664		
			16	4.0544							42.4305		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 5 OF SARANDA DIVISION**  
**DATE OF MEA, 31.03.1983,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
40.1-45.0 M-42.5	5	0.7096	5	0.7096			28.15		0.3		5.9926		
45.1-50.0 M-47.5	-	-	-	-			-		0.3		-		
50.1-55.0 M-52.5	2	0.4331	2	0.4331			34.00		0.3		4.4176		
55.1-60.0 M-57.5	2	0.5196	2	0.5196			33.35		0.3		5.1986		
60.1-65.0 M-62.5	1	0.3069	1	0.3069			32.70		0.3		3.0107		
65.1-70.0 M-67.5	3	1.0740	3	1.0740			39.20		0.3		12.6302		
70.1-75.0 M-72.5	-	-	-	-			-		0.3		-		
75.1-80.0 M-77.5	1	0.4719	1	0.4719			40.30		0.3		5.7053		
80.1-85.0 M-81.5	1	0.5348	1	0.5348			38.00		0.3		6.0967		
			15	4.0699							43.0517		

## DESCRIPTION OF SAMPLE PLOT NO. 6 SARANDA DIVISION

1. Species :- *Shorea robusta*
2. Object of Experiment :- Development of Sal sapling crop thinned to "C" gradewith the usual N/D numerical check based on the Sal forest yield
3. Area in hectare :- 0.60
4. Situation :- 4 miles from Tholkabad F.R.H. about 1 mile form Ratamati close to road Jaraikela, on Gonda Jhora, in Tirilposi Compt. 18.
5. Height above mean sea level :- 1272'
6. Climate :- Average Max. Temp. 104°F in summer, & Min. temp. 51.4° in winter.
  - (a) Minimum rain fall :- Average annual rainfall 73" Maximum rain falls in Monsoon and a few showers in winter.
7. Rock, Soil and humus :- Red Clayey Loam
8. Aspect and slope :- Very Gentle
9. Type of Forest :- Valley type Good quality
10. Age of crop at first measurement :- 9 year, calculated back from 1928 age curve
11. Date of Formation :- 10<sup>th</sup> March 1918
12. Interval of measurement :- 5 years
13. Interval of thinning :- 5 years
14. Method of demarcation :- Wooden posts at corner, adjoining ditch around
15. Method of numbering and Marking trees :- Standard
16. Condition of plot when formed :- Density 1
  - (a) Under Growth :- Sal regeneration and a little *Flemingia chappar*. No grass

### SAMPLE PLOT NO. 5 OF SARANDA FOR STTE QUALITY SPEICES – SAL

Sl. No.	Year	Top age	Top height in metre
1.	1918	49	22.25
2.	1923	54	24.38
3.	1928	59	24.08
4.	1938	82	23.45
5.	1948	92	23.45
6.	1958	102	24.99
7.	1968	112	24.70

### S.P. NO. 5 OF SARANDA DIVISIONS AT GONDAGHARI

1. Object :- Development of Sal sapling Plot

2. Year of formation :- 10<sup>th</sup> March 1918
3. Age of crop at the time of formations :- 9 Years
4. No. of trees at the time of formation :- 152
5. Area of S.P. No. 6 0.24 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1943	16.8	16.59	0.137	70.6044	2.0766	11.84	3.1141
2	1951	18.8	15.59	0.0158	100.7958	2.3999	22.36	3.4086
3	1955	19.8	20.27	0.0176	123.0638	2.6755	22.36	3.8415
4	1964	21.8	22.34	0.0191	159.7695	2.9049	26.97	4.2602
5	1968	22.6	21.97	0.0191	171.2593	2.9027	30.92	4.4187
6	1973	24.1	23.65	0.0223	216.8704	3.3386	34.21	4.8113
7	1976	24.9	23.90	0.0225	236.1870	3.4230	35.52	4.9511
8	1985	25.6	24.12	0.0221	248.6178	3.3597	36.16	5.1215

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA, 1943.**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10.2-12.7 11.4	15	0.1531	15	0.1531			12.49		0.3		0.5736		
12.9-15.2 14.1	38	0.5936	38	0.5936			14.01		0.3		2.4949		
15.5-17.1 16.6	40	0.8661	40	0.8661			14.32		0.3		3.7207		
18.0-20.3 19.1	20	0.5732	20	0.5732			17.52		0.3		3.0127		
20.6-22.8 21.7	12	0.4440	12	0.4440			17.75		0.3		2.3643		
23.1-25.4 24.2	2	0.0920	2	0.0920			17.98		0.3		0.4962		
25.6-27.9 26.7	7	0.3921	7	0.3921			19.35		0.3		2.2761		
			134	3.1141							14.9385		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA, 1951.

Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10.2-12.7 11.4	5	0.0510	5	0.0510			16.91		0.3		0.2587		
12.9-15.2 14.1	15	0.2343	15	0.2343			18.28		0.3		1.2849		
15.5-17.1 16.6	35	0.7578	35	0.7578			15.54		0.3		3.5328		
18.0-20.3 19.1	28	0.8026	28	0.8026			17.52		0.3		4.2184		
20.6-22.8 21.7	18	0.6660	18	0.6660			19.50		0.3		3.8961		
23.1-25.4 24.2	9	0.4141	9	0.4141			20.34		0.3		2.5268		
25.6-27.9 26.7	6	0.3360	6	0.3360			21.18		0.3		2.1349		
28.2-30.5 29.3	1	0.0674	1	0.0674			21.10		0.3		0.4266		
30.7-33.0 31.8	1	0.0794	1	0.0794			21.03		0.3		0.5009		
			118	3.4086							18.7801		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA, 1955.

Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10.2-12.7 11.4	17	0.2154	17	0.2154			18.89		0.3		1.2206		
15.5-17.1 16.6	53	1.3343	53	1.3343			16.97		0.3		6.7929		
20.6-22.8 21.7	35	1.4421	35	1.4421			20.82		0.3		9.0073		
23.1-25.4 24.2	11	0.6776	11	0.6776			23.26		0.3		4.7282		
30.7-35.5 33.1	2	0.1721	2	0.1721			22.86		0.3		1.1802		
			118	3.8415							22.9292		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION  
DATE OF MEA, 1964.  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10.2-12.7 11.4	7	0.0887	7	0.0887			23.46		0.3		0.6242		
15.5-17.1 16.6	44	1.1077	44	1.1077			18.69		0.3		6.2108		
20.6-22.8 21.7	37	1.5246	37	1.5246			22.55		0.3		10.3139		
23.1-25.4 24.2	18	1.1088	18	1.1088			22.85		0.3		7.6008		
30.7-35.5 33.1	5	0.4304	5	0.4304			25.19		0.3		3.2525		
			111	4.2602							28.0022		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION  
DATE OF MEA, 1968.  
 Species - SAL

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
12.9-15.2 14.1	15	0.2723	15	0.2723			22.25		0.3		1.8176		
18.0-20.3 19.1	45	1.4714	45	1.4714			18.48		0.3		8.1574		
23.1-25.4 24.2	33	1.6860	33	1.6860			22.70		0.3		11.4816		
28.2-33.0 30.6	8	0.5885	8	0.5885			22.70		0.3		4.0076		
33.3-38.1 35.7	4	0.4005	4	0.4005			24.38		0.3		2.9292		
			105	4.4187							28.3934		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA, 1973,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
14.0-19.0 16.5	16	0.3422	16	0.3422			18.59		0.3		1.9084		
19.1-24.0 21.5	35	1.2712	35	1.2712			21.02		0.3		8.0161		
24.1-29.0 26.5	32	1.7657	32	1.7657			26.51		0.3		14.0426		
29.1-34.0 31.5	13	1.0135	13	1.0135			23.31		0.3		7.0874		
34.1-39.0 36.5	4	0.4187	4	0.4187			25.39		0.3		3.1892		
			100	4.8113							34.2437		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA, 1978,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
14.0-17.0 15.5	8	0.1510	8	0.1510			22.37		0.3		1.0133		
17.1-21.0 19.1	20	0.5732	20	0.5732			24.25		0.3		4.1700		
21.1-25.0 23.1	22	0.9224	22	0.9224			20.50		0.3		5.6727		
25.1-29.0 27.1	28	1.6157	28	1.6157			28.00		0.3		13.5718		
29.1-33.0 31.1	13	0.9879	13	0.9879			22.90		0.3		6.7868		
33.1-37.0 35.1	6	0.5808	6	0.5808			25.60		0.3		4.4605		
37.1-41.0 39.1	1	0.1201	1	0.1201			24.20		0.3		0.8719		
			98	4.951							36.5470		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA, 1983,**  
**Species - SAL**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
14.0-18.0 16.0	9	0.1810	9	0.1810			21.27		0.3		1.1549		
18.1-22.0 20.0	22	0.6914	22	0.6914			19.15		0.3		3.9720		
22.1-26.0 24.0	20	0.9052	20	0.9052			23.40		0.3		6.3545		
26.1-30.0 28.0	27	1.6632	27	1.6632			28.60		0.3		14.2702		
30.1-34.0 32.0	13	1.0459	13	1.0459			23.45		0.3		7.3579		
34.1-38.0 36.0	5	0.5091	5	0.5091			26.46		0.3		4.0412		
38.1-42.0 40.0	1	0.1257	1	0.1257			24.60		0.3		0.9276		
			97	5.1215							38.0783		

**DESCRIPTION OF SAMPLE PLOT NO. 7 SARANDA DIVISION**

1. Species :- *Shorea robusta*
2. Object of Experiment :- Volume increment
3. Area in hectare :- 0.10
4. Situation :- 4 miles from Tholkabad F.R.H. about 1 mile from Ratamati close to road Jaraikela, on Gonda Jhora, in Tirilposi Compt. 18.
5. Rock, Soil and humus :- Red Clayey Loam
6. Aspect and slope :- Very Gentle
7. Type of Forest :- Valley type Good quality
8. Age of crop at first measurement :- 45 years by ring counting in 1938
9. Date of Formation :- 10<sup>th</sup> March 1918
10. Interval of measurement :- 5 years
11. Interval of thinning :- 5 years
12. Method of demarcation :- Wooden posts at corner, adjoining ditch around
13. Method of numbering and Marking trees :- Standard
14. Condition of plot when formed  
Underwood :- Lower storey mostly suppressed sal dense
15. Details of work carried out at first formation :- Volume increment and development of pole crop crown thinned (Ordinary Thinning was made in 1923)
16. Remarks :- Annual rings indicate rapid growth

SAMPLE PLOT NO. 7 OF SARANDA FOR STTE QUALITY  
SPEICES – SAL

Sl. No.	Year	Top age	Top height in metre
1.	1923	64	25.30
2.	1928	69	25.60
3.	1938	79	24.69
4.	1948	89	27.43
5.	1958	100	27.43
6.	1968	110	29.26

S.P. NO. 7 OF SARANDA DIVISIONS AT GONDAGHARI

1. Object :- Volume increment and development of valley type sal crown thinned
2. Year of formation :- 10<sup>th</sup> March 1918
3. Age of crop at the time of formations :- 45 Years
4. No. of trees at the time of formation :- 59
5. Area of S.P. No. 7 0.11 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1933	25.4	24.60	0.0612	216.7680	3.6128	30.51	2.1460
2	1943	28.4	25.74	0.0670	276.5210	3.9503	40.68	2.3792
3	1948	28.7	27.05	0.0657	290.8425	38779	42.37	2.3136
4	1954	31.5	27.36	0.0749	357.8337	4.4177	49.15	2.4025
5	1958	32.7	26.04	0.0763	382.8145	4.5037	49.15	2.5847
6	1964	34.0	27.47	0.0778	417.8447	4.5917	54.24	2.5505
7	1968	34.8	26.14	0.0798	447.7160	4.7128	54.24	2.5505
8	1973	38.7	28.34	0.0972	573.6200	5.7362	64.41	2.5565
9	1978	32.5	27.58	0.0985	610.2390	5.8118	64.41	2.7003
10	1988	42.5	29.31	0.1029	698.4985	6.0739	67.80	2.8057

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA,1933,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10.1-15.0 M-12.6	1	0.0125	1	0.0125			12.74		0.3		0.478		
15.2-20.3 M-17.7	14	0.3446	14	0.3446			22.48		0.3		2.3240		
20.3-25.4 M-22.9	9	0.3708	9	0.3708			26.52		0.3		2.9501		
25.4-30.5 M-27.9	5	0.3058	5	0.3058			23.90		0.3		2.1926		
30.5-35.6 M-33.0	9	0.7701	9	0.7701			26.94		0.3		6.2239		
35.6-40.6 M-38.1	3	0.3422	3	0.3422			27.58		0.3		2.8314		
			41	2.1460							16.5069		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA,1943,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	7	0.1723	7	0.1723			21.64		0.3		1.1186		
20.3-25.4 M-22.9	7	0.2884	7	0.2884			21.64		0.3		1.8732		
25.4-30.5 M-27.9	8	0.4893	8	0.4893			26.60		0.3		3.9046		
30.5-35.6 M-33.0	3	0.254	3	0.254			26.10		0.3		2.0100		
35.6-40.6 M-38.1	9	1.0265	9	1.0265			25.60		0.3		7.8835		
40.6-45.7 M-43.1	1	0.1460	1	0.1460			28.65		0.3		1.2549		
			35	2.3792							18.0439		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA,1948,**  
**Species – SAL**  
**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	6	0.1477	6	0.1477			21.79		0.3		0.9655		
20.3-25.4 M-22.9	8	0.3296	8	0.3296			21.79		0.3		2.1564		
25.4-30.5 M-27.9	8	0.4893	8	0.4893			25.68		0.3		3.7696		
30.5-35.6 M-33.0	3	0.2567	3	0.2567			27.45		0.3		2.1139		
35.6-40.6 M-38.1	7	0.7984	7	0.7984			29.21		0.3		6.9964		
40.6-45.7 M-43.1	2	0.2919	2	0.2919			27.82		0.3		2.4362		
			34	2.3136							18.4362		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**  
**DATE OF MEA,1954,**  
**Species – SAL**  
**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	4	0.0985	4	0.0985			20.88		0.3		0.6170		
20.3-25.4 M-22.9	4	0.1648	4	0.1648			20.88		0.3		1.0323		
25.4-30.5 M-27.9	9	0.5505	9	0.5505			26.06		0.3		4.3038		
30.5-35.6 M-33.0	3	0.2567	3	0.2567			28.88		0.3		2.2241		
35.6-40.6 M-38.1	4	0.4562	4	0.4562			31.70		0.3		4.3385		
40.6-45.7 M-43.1	6	0.8758	6	0.8758			28.54		0.3		7.4986		
											20.0143		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**

**DATE OF MEA,1958,**

**Species – SAL**

**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	2	0.0492	2	0.0492			22.60		0.3		0.3336		
20.3-25.4 M-22.9	4	0.1648	4	0.1648			33.80		0.3		1.1767		
25.4-30.5 M-27.9	9	0.5505	9	0.5505			24.60		0.3		4.0627		
30.5-35.6 M-33.0	4	0.3423	4	0.3423			26.00		0.3		2.6699		
35.6-40.6 M-38.1	4	0.4562	4	0.4562			31.70		0.3		4.3385		
40.6-45.7 M-43.1	7	1.0217	7	1.0217			28.80		0.3		8.8274		
			30	2.5847							21.4115		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**

**DATE OF MEA,1964,**

**Species – SAL**

**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	2	0.0492	2	0.0492			23.98		0.3		0.3539		
20.3-25.4 M-22.9	2	0.0824	2	0.0824			23.98		0.3		0.5928		
25.4-30.5 M-27.9	8	0.4617	8	0.4617			23.98		0.3		3.3215		
30.5-35.6 M-33.0	4	0.3423	4	0.3423			25.32		0.3		2.6001		
35.6-40.6 M-38.1	2	0.2281	2	0.2281			26.66		0.3		1.8346		
40.6-45.7 M-43.1	7	1.0217	7	1.0217			29.43		0.3		8.9930		
45.7-50.8 M-48.2	2	0.3651	2	0.3651			30.48		0.3		3.3385		
			27	2.5505							21.0344		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA, 1968,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-20.3 M-17.7	2	0.0492	2	0.0492			19.81		0.3		0.2924		
20.3-25.4 M-22.9	2	0.824	2	0.824			19.51		0.3		0.4823		
25.4-30.5 M-27.9	8	0.4893	8	0.4893			24.69		0.3		3.6242		
30.5-35.6 M-33.0	3	0.2567	3	0.2567			27.28		0.3		2.1008		
35.6-40.6 M-38.1	2	0.2881	2	0.2881			28.20		0.3		1.9279		
40.6-45.7 M-43.1	6	0.8758	6	0.8758			24.11		0.3		7.6484		
45.7-50.8 M-48.2	4	0.7302	4	0.7302			29.49		0.3		6.4684		
			27	2.7117							22.5379		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION

DATE OF MEA, 1973,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
22.1-27.0 M-24.5	1	0.0472	1	0.0472			25.95		0.3		0.3675		
27.1-32.0 M-29.5	6	0.4103	6	0.4103			25.95		0.3		3.1942		
32.1-37.0 M-34.5	2	0.1870	2	0.1870			29.87		0.3		1.6757		
37.1-42.0 M-39.5	2	0.2452	2	0.2452			29.92		0.3		2.2009		
42.1-47.0 M-44.5	7	1.0892	7	1.0892			29.97		0.3		9.7929		
47.1-52.0 M-49.5	3	0.5776	3	0.5776			30.17		0.3		5.2278		
			21	2.5565							22.4590		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 6 OF SARANDA DIVISION**

**DATE OF MEA, 1988,**

**Species – SAL**

**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
27.1-32.0 M-29.5	3	0.2051	3	0.2051			28.00		0.3		1.7228		
32.1-37.0 M-34.5	5	0.4671	5	0.4671			26.00		0.3		3.6473		
37.1-42.0 M-39.5	-	-	-	-			-		0.3		-		
42.1-47.0 M-44.5	4	0.6224	4	0.6224			29.30		0.3		5.4709		
47.1-52.0 M-49.5	3	0.5776	3	0.5776			29.40		0.3		5.0944		
52.1-57.0 M-54.5	4	0.9335	4	0.9335			31.45		0.3		8.8076		
			19	2.8057							24.7430		

**DESCRIPTION OF SAMPLE PLOT NO. 8 SARANDA DIVISION**

1. Species :- *Shorea robusta*
2. Object of Experiment :- Volume increment
3. Area in hectare :- 0.10
4. Situation :- 4 miles from Tholkabad F.R.H. about 1 mile from Ratamati close to road Jaraikela, on Gonda Jhora, in Tirilposi Compt. 18.
5. Rock, Soil and humus :- Red Clayey Loam with quartz stones
6. Aspect and slope :- Moderate slope, aspect S.W.
7. Type of Forest :- All valley type pole crop
8. Age of crop at first measurement :- 49 years calculated back from the age/diameter curve of 1938
9. Date of Formation :- 11<sup>th</sup> March 1918
10. Interval of measurement :- 5 years
11. Interval of thinning :- Whenever necessary
12. Method of demarcation :- Wooden posts at corner, adjoining ditch round
13. Method of numbering and Marking trees :- Standard method
14. Condition of plot when formed
  - Underwood :-
  - a) Overwood Density 0.8 Pole crop
  - b) Undergrowth *Phoenix, Indigofera, Millettia auriculata lemingia*

SAMPLE PLOT NO. 8 OF SARANDA FOR STTE QUALITY  
SPEICES – SAL

Sl. No.	Year	Top age	Top height in metre
1.	1918	49	22.25
2.	1923	54	24.38
3.	1928	59	24.08
4.	1938	69	25.45
5.	1948	79	23.45
6.	1958	89	23.45
7.	1968	99	24.70

S.P. NO. 8 OF SARANDA DIVISIONS AT GONDAGHARI

1. Object :- Volume increment of Sal rope valley type, crown thinned
2. Year of formation :- 1918
3. Age of crop at the time of formations :- 49 years
4. No. of trees at the time of formation :- 66
5. Area of S.P. No. 8 0.10 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1933	26.4	20.77	0.0295	251.5810	3.9310	42.42	2.2056
2	1943	29.9	24.45	0.0655	319.1694	4.3134	54.54	2.1603
3	1948	31.5	24.25	0.0654	341.2226	4.3194	56.06	2.0955
4	1954	31.7	25.06	0.0668	374.8415	4.4099	62.12	1.9909
5	1958	32.2	23.64	0.0707	415.7991	4.6719	66.66	1.9589
6	1964	33.3	24.12	0.0728	456.8550	4.8090	66.66	2.0958
7	1968	33.0	24.43	0.0734	479.7540	4.8460	68.18	2.0335
8	1973	34.3	24.03	0.0940	620.7240	5.9685	71.12	3.0947
9	1978	36.8	24.35	0.0908	653.5422	5.9958	71.12	2.5302
10	1988	39.1	23.20	0.0816	641.4576	5.3904	71.12	2.4507
11	1993	39.1	25.30	0.0813	666.1280	5.3720	71.12	2.4411

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1933,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	15	0.1255	15	0.1255			17.68		0.3		2.2569		
22.9-30.5 M-26.7	12	0.6722	12	0.6722			25.19		0.3		5.2250		
30.5-38.1 M-34.3	9	0.8320	9	0.8320			20.35		0.3		5.1193		
38.1-45.7 M-34.3	9	0.8320	9	0.8320			20.51		0.3		5.1193		
38.1-45.7 M-41.9	2	0.2759	2	0.2759			22.76		0.3		14.4850		
			38	2.2056							14.4850		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1943,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	8	0.2269	8	0.2269			17.68		0.3		1.2034		
22.9-30.5 M-26.7	8	0.4481	8	0.4481			25.30		0.3		3.4011		
30.5-38.1 M-34.3	11	1.0169	11	1.0169			21.00		0.3		6.4064		
38.1-45.7 M-41.9	2	0.2759	2	0.2759			24.39		0.3		2.0188		
45.7-53.3 M-49.5	1	0.1925	1	0.1925			25.60		0.3		1.4784		
			30	2.1603							14.5081		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1948,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	7	0.1986	7	0.1986			22.20		0.3		1.3227		
22.9-30.5 M-26.7	9	0.5041	9	0.5041			24.10		0.3		3.6446		
30.5-38.1 M-34.3	10	0.9244	10	0.9244			23.47		0.3		6.5087		
38.1-45.7 M-34.3	2	0.2759	2	0.2759			23.78		0.3		1.9683		
45.7-53.3 M-49.5	1	0.1925	1	0.1925			26.82		0.3		1.5489		
			29	2.0955							14.9932		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1954,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	4	0.1135	4	0.1135			20.10		0.3		0.6844		
22.9-30.5 M-26.7	7	0.3921	7	0.3921			22.00		0.3		2.5879		
30.5-38.1 M-34.3	11	1.0169	11	1.0169			23.62		0.3		7.2058		
38.1-45.7 M-34.3	2	0.2579	2	0.2579			25.91		0.3		2.1446		
45.7-53.3 M-49.5	1	0.1925	1	0.1925			27.28		0.3		1.5754		
			25	1.9909							14.1981		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1958,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	5	0.1418	5	0.1418			20.42		0.3		0.8687		
22.9-30.5 M-26.7	5	0.2801	5	0.2801			20.73		0.3		1.7419		
30.5-38.1 M-34.3	5	0.4622	5	0.4622			22.86		0.3		3.1698		
38.1-45.7 M-34.3	5	0.6897	5	0.6897			24.24		0.3		5.0155		
45.7-53.3 M-49.5	2	0.3851	2	0.3851			26.52		0.3		3.0639		
			22	1.9589							13.8598		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1964,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15.2-22.9 M-19.0	4	0.1135	4	0.1135			20.73		0.3		0.7059		
22.9-30.5 M-26.7	3	0.1680	3	0.1680			21.03		0.3		1.0599		
30.5-38.1 M-34.3	8	0.7395	8	0.7395			23.47		0.3		5.2068		
38.1-45.7 M-34.3	5	0.6897	5	0.6897			24.84		0.3		5.1396		
45.7-53.3 M-49.5	2	0.3851	2	0.3851			26.98		0.3		3.1170		
			22	2.0958							15.2292		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1968,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.1-25.0 M-22.6	4	0.1605	4	0.1605			20.42		0.3		0.9832		
25.1-30.0 M-27.6	2	0.1197	2	0.1197			21.95		0.3		0.7882		
30.1-40.0 M-37.6	6	0.5010	6	0.5010			23.47		0.3		3.5275		
35.1-40.0 M-37.6	3	0.3333	3	0.3333			25.61		0.3		2.5607		
40.1-45.0 M-42.6	4	0.5704	4	0.5704			26.51		0.3		4.5364		
45.1-50.0 M-47.6	2	0.3486	2	0.3486			27.43		0.3		2.8686		
50.1-55.0 M-52.6													
55.1-60.0 M-57.6													
			21	2.0335							15.2646		

VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION

DATE OF MEA,1973,

Species – SAL

Date of Formation – 1918

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.1-25.0 M-22.6	3	0.1204	3	0.1204			18.29		0.3		0.3306		
25.1-30.0 M-27.6	1	0.0599	1	0.0599			20.40		0.3		0.3665		
30.1-40.0 M-37.6	3	0.5010	3	0.5010			22.00		0.3		3.3065		
35.1-40.0 M-37.6	4	0.4443	4	0.4443			22.86		0.3		3.0470		
40.1-45.0 M-42.6	5	0.7130	5	0.7130			25.16		0.3		5.4780		
45.1-50.0 M-47.6	1	0.1780	1	0.1780			22.99		0.3		1.2277		
50.1-55.0 M-52.6	1	0.2174	1	0.2174			26.82		0.3		1.7492		
55.1-60.0 M-57.6	1	0.2607	1	0.2607			26.00		0.3		2.0334		
			19	3.0947							17.8690		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION**

**DATE OF MEA, 1978,**

**Species – SAL**

**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.1-25.0 M-22.6	3	0.1204	3	0.1204			18.20		0.3		0.6574		
25.1-30.0 M-27.6	1	0.0599	1	0.0599			22.80		0.3		0.3953		
30.1-40.0 M-37.6	3	0.5010	3	0.5010			23.60		0.3		3.5471		
35.1-40.0 M-37.6	4	0.4443	4	0.4443			23.40		0.3		3.1890		
45.1-50.0 M-47.6	2	0.3651	2	0.3651			25.50		0.3		4.3636		
50.1-55.0 M-52.6	1	0.2174	1	0.2174			27.80		0.3		1.8131		
55.1-60.0 M-57.6	1	0.2607	1	0.2607			27.30		0.3		2.1351		
			19	2.5303							18.8141		

**VOLUME CALCULATION FOR SAMPLE PLOT NO. 8 OF SARANDA DIVISION**

**DATE OF MEA, 1988,**

**Species – SAL**

**Date of Formation – 1918**

BY DIAMETER CLASSES			BY GROUPS		CALCULATED MEAN TREE						VOLUME		
Diameter cm class cm	Number of dia.	Basal area sq. m.	Number of dia.	Basal area sq. M	Basal Area sq. cm	Diameter	Height	Stem timber	Form Factor		Stem timber	Small wood	
									Stem	Total		Stem	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.1-25.0 M-22.6	3	0.1204	3	0.1204			19.10		0.3		0.6899		
25.1-30.0 M-27.6	1	0.0599	1	0.0599			22.00		0.3		0.3953		
30.1-40.0 M-37.6	1	0.0835	1	0.0835			19.50		0.3		0.4885		
30.1-35.0 M-42.6	4	0.4443	4	0.4443			24.10				3.2123		
35.1-40.0 M-37.6	6	0.8556	6	0.8556			26.20		0.3		6.7250		
45.1-50.0 M-47.6	3	0.5341	3	0.5341			26.55		0.3		4.2541		
50.1-55.0 M-52.6	-	-	-	-			-		0.3		-		
55.1-60.0 M-57.6	-	-	-	-			-		0.3		-		
60.1-65.0 M-62.6	1	0.3079	1	0.3079			28.00		0.3		2.6704		
			19	2.4057							18.4661		

## DESCRIPTION OF SAMPLE PLOT NO. 9 SARANDA DIVISION

1. Species :- *Shorea robusta*
2. Object of Experiment :- Volume increment
3. Area in hectare :- 0.20
4. Situation :- 1 miles from Ponga F.R.H. on the road built in Samta comptt. 21 on the right side of Ponga road about  $\frac{3}{4}$  mile from the first ause way.
5. Height above mean sea level :- 1272 feet
6. Climate :- Average max. temp. 104°F in summer and average min. temp. in winter 51.4°F.
  - a) Minimum rain fall - Rainfall 73" annually
7. Rock, Soil and humus :- Clayey
8. Aspect and slope :- Slope less than 10°
9. Type of Forest :- Valley type good quality
10. Age of crop at first measurement :- 43 years based on 1940 age curve
11. Date of Formation :- 13<sup>th</sup> March 1918
12. Interval of measurement :- 5 years interim, 10 years full
13. Interval of thinning :- Whenever necessary
14. Method of demarcation :- Wooden posts at corner, adjoining ditch round
15. Method of numbering and Marking trees :- Standard method
16. Condition of plot when formed
  - Underwood
  - a) Overwood - Valley type forest good quality, lower torey suppressed
  - b) Undergrowth - *Flemingia chappar, Woodfordia, Milletia & Sal coppice robusts*

### SAMPLE PLOT NO. 9 OF SARANDA FOR STTE QUALITY SPEICES – SAL

Sl. No.	Year	Top age	Top height in metre
1.	1918	47	26.21
2.	1923	52	29.57
3.	1928	57	26.65
4.	1940	69	30.48
5.	1945	74	30.78
6.	1955	84	33.83
7.	1965	94	32.92

### S.P. NO. 9 OF SARANDA DIVISIONS AT GONDAGHARI

1. Object :- Volume increment of Sal crop valley type,

- crown thinned
2. Year of formation :- 11<sup>th</sup> March 1918
  3. Age of crop at the time of formations :- 43 years
  4. No. of trees at the time of formation :- 58
  5. Area of S.P. No. 8 0.21 ha.

Sl. No.	Year of measurement	Av. Dia. In cm.	Av. Ht. in Mt.	Vol/ha/Year/tree in M <sup>3</sup>	Vol/ha in M <sup>3</sup>	Vol/ha/Year M <sup>3</sup>	Mortality %	Total basal area of sample plot
1	2	3	4	5	6	7	8	9
1	1933	32.5	28.41	0.0636	214.0258	3.6901	22.41	4.1090
2	1940	34.0	28.49	0.0612	230.7695	35503	34.48	3.6953
3	1945	36.1	29.72	0.0638	259.0000	3.7000	34.48	7.4480
4	1950	38.4	31.29	0.0742	322.8000	4.3040	36.21	4.5585
5	1955	39.6	33.03	0.0765	355.5680	4.4446	39.66	4.5199
6	1960	41.6	35.32	0.0898	442.6885	5.2081	41.38	5.0633
7	1963	41.6	35.41	0.0854	473.5140	4.9501	41.38	5.0989
8	1970	43.7	35.42	0.0860	473.5940	4.9852	43.10	5.3171
9	1973	45.0	35.53	0.0909	516.6070	5.2715	43.10	5.7059
10	1978	45.3	36.05	0.0877	524.1773	5.0891	43.10	5.7059
11	1988	48.0	36.70	0.0920	602.7646	5.3342	46.55	6.0410
12	1993	49.1	36.90	0.0941	643.9378	5.471	48.28	6.1375

1.6.3 Quality Class :- The yield and stand tables for sal High Forests by Griffith and Sant Ram accept the following different site qualities :-

Generally these qualities are assumed to indicate localities capable of growing trees of more than 110' 90' 70' 50' in qualities I to IV respectively. These quality classes have been adopted for stock mapping in this plan as in the preceding plan though the stock maps of the previous plan have not been changed.

1.6.4 The sample plots of this division can not be taken as pure representative of the crop, because the crop has been irregular in the past and it has suffered from the influence of suppressed development in their earlier growth. It has also suffered from inaccurate thinning intensities during the occasion of interium or full measurements. However from the figures available following graphs have been drawn.

List of graphs

- 1) Top height/top age,

- 2) Crop diameter/crop age,
- 3) Stem timber volume /crop age,
- 4) Number of trees per hectare/crop diameter,
- 5) Crop age/basal age,
- 6) Number of trees/crop age.

1.6.5 It is seen from the graphs that the best quality compares favourable with the all India yield and stand table though the data for this quality class is inadequate. The data of QII, III and IV also compare quite well with the All India Quality classes.

1.6.6 There is no sample plot in Coppice area of the division. The stock maps of the previous plan for coppice forests have been retained. These areas are now kept in JFM Working circle.

1.6.7 Commercial timber in round and unit values :-

Since unit values established by Mooney for different diameter classes were not based on reliable and adequate data, Sinha in his plan recalculated them. He took the help of the registers of coupe Overseers in which, while passing the coupes, records of the outturn of each sound tree are kept. The outturn figures of about 35000 sound trees categorised under diameter class representing both Conservation and Selection Working Circles of all the seven blocks were analysed. Thus a total of about 5000 trees were taken in each block under each diameter class and has arrived at the following unit values. These figures are maintain as in the previous Working Plan.

Diameter class	Unit Value	Commercial outturn in cft. Round
8"-12"	1/3	5.3 cft
12"-16"	1	16 cft
16"-20"	2	32 cft
20"-24"	3	48 cft
24"-28"	4	64 cft
28" & Over	5	80 cft

1.6.8 The above unit values have worked quite satisfactorily. In this plan also similar method for calculating the unit values was adopted with a view to check whether these unitvalues need any change in the present conditions when the utilization of timber has increased much. The outturn figures of a total of 21057 sound trees in each diameter class representing both Conversion as well as Selection working circles of all the seven blocks have been analysed. However, it has not been possible to take equal number of trees in each diameter class and for both Working circles inspite of efforts. The removal of timber

from a tree is wholly in the form of round timber as sawing is not permitted in the field. It appears from the results arrived at that the existing unit values need no change.

1.6.9 The distribution among different blocks and diameter classes of 21057 trees whose marketable value of timber was measured, is given in the following tabular statements :-

The distribution of the 21057 trees whose marketable value of timber was measured is given in following tabular statement as distributed between the two working circles and among the different blocks and diameter classes.

Name of Block	W.C. conversion & S.W.C.	Commercial outturn in round timber per diameter class actually removed.								
		Diam. 12"-16" girth 0.91-1.22 mt.		Diam. 16"-20" girth 1.22-1.52 mt.		Diam. 20"-24" girth 1.52-1.83 mt.		Diam. 24"-28" girth 1.85-2.13 mt.		Diam. 28" & Over girth
		Total no. of trees	Total vol. in cft.	Total no. of trees	Total vol. in cft.	Total no. of trees	Total vol. in cft.	Total no. of trees	Total vol. in cft.	Total no. of trees
1	2	3	4	5	6	7	8	9	10	11
Tolkabad	C.W.C.	612	7080.3	375	10556.2	355	13445.4	87	3936.1	73
	S.W.C.	629	9631.5	598	12919.0	203	7735.0	44	1858.5	51
Tirilposi	C.W.C.	339	6719.6	557	16489.5	335	13602.4	212	11887.4	39
	S.W.C.	754	10745.0	459	10850.5	180	6918.0	72	4508.8	43
Samta	C.W.C.	596	8624.7	296	8132.3	203	7598.3	375	15715.3	65
	S.W.C.	832	9381.1	438	9645.9	144	4921.7	62	3144.7	30
Ankua	C.W.C.	560	10099.0	490	13894.0	329	13380.4	120	6756.6	10
	S.W.C.	551	8310.4	700	18080.1	174	2460.9	60	3777.70	35
Ghatkuri	C.W.C.	600	14578.0	539	15579.0	241	10133.5	92	6680.5	23
	S.W.C.	650	7815.4	500	11734.5	249	9559.0	66	2621.7	40
Kodalibad	C.W.C.	375	7905.0	574	16832.2	270	12285.0	160	12208.0	75
	S.W.C.	580	10440.0	549	11309.4	200	7520.0	148	6245.6	25
Karampada	C.W.C.	532	8353.8	565	14295.8	294	12783.0	78	5282.8	37
	S.W.C.	508	8206.5	589	12132.1	270	9864.8	120	3580.9	21

Diameter	CONVERSION WORKING CIRCLE			SELECTION WORKING CIRCLE			Grand total of S.W.C. & C.W.C. (Average for the division)			Approximate between average
	Total no. of trees	Total vol. in cft.	Average per tree	Total no. of trees	Total vol. in cft.	Average per tree	Total no. of trees	Total vol. in cft.	Average per tree	
1	2	3	4	5	6	7	8	9	10	11
12"-16" (0.91-1.22 mt girth)	361	63360.4	17.53	4504	64529.9	14.32	8118	127890.3	15.75	1
16"-20" (1.22-1.52 mt. girth)	3396	95779.0	28.20	3833	86671.5	22.61	7229	182450.5	25.23	2
20"-24" (1.52-1.83 mt. girth)	2027	83228.0	41.05	1420	48979.4	34.49	3447	132207.4	38.35	3
24"-28" (1.83-2.13 mt. girth)	1124	62466.7	55.57	572	25737.9	44.99	1696	88204.6	52.00	4
28" & over (2.13 mt girth & over)	322	28263.0	87.77	245	15100.4	61.63	567	43363.4	76.47	5

Total	10483	333097.1	31.77	10574	241019.1	22.79	21057	574116.2	27.26	
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1.6.10 It is felt that the fixation of unit value should not be based on the volume of timber alone. These should be co-related with the price also. The main use of unit value is in determining the reverse price of coupes for auction and in keeping a control over extraction, so that it is kept upto the value paid. In both cases price comes into picture. It is well known that with the increase in size, the rate per cft., rises. It would therefore be more rational to fix unit values after taking into consideration the price variation due to size. An attempt to do so has been made below :-

1.6.11 As stated under table I the cubical contents of trees of the different diameter class have been calculated. The possible unit values based on cubic contents would be as under :-

Diameter class in inches	Girth class in cm	Unit Value	Commercial outturn of round timber	
			In cft.	In cubic metre
8"-12"	0.61-0.91	1/3	5.3	0.15
12"-16"	0.91-1.22	1	16	0.45
16"-20"	1.22-1.52	2	32	0.90
20"-24"	1.52-1.83	3	48	1.35
24"-28"	1.83-2.13	4	64	1.80
28" & up	2.13 & up	5	80	2.25

All the 1st class trees, namely bija, gamhar, panjan, etc., will have the same unit value as that of sal. In case of dry trees of 1st class it will be 1/3<sup>rd</sup> of its green counterparts. For second class species green and dry trees will have 1/2 and 1/4<sup>th</sup> respectively of the unit values of their sal counterparts. Similarly for miscellaneous green and dry trees (III class) the unit value will be 1/3<sup>rd</sup> and 1/6<sup>th</sup> respectively of their sal counterparts.

PART – II  
MANAGEMENT PRESCRIBED  
SAL CONVERSION WORKING CIRCLE

GENERAL CONSTITUTION

This working circle embraces the best quality sal forests of the division. The said position of sal forests are generally situated in the valley bottoms and on the lower slopes. It includes Quality I, Quality II and Quality III sal areas, with a condition to exclude such forests found in very small and isolated patches. Besides these, some area of quality IV sal forests are also included, which are mainly found on gentler slopes. This inclusion depends on the condition that there is abundance of established regeneration.

Generally, forests of this working circle occupy the valley and the lower slopes riding some times higher to middle slopes on northern aspects of the division. The forests confirm to sub-type 3c/c2e (Revised survey – Seth & Champion).

Constituion of this working circle is guided with the following strict conditions:-

- (1) The existence of established regeneration in adequate intensity.
- (2) Abundance and fullness of the crop.
- (3) Suitability of the forests surface to produce sufficient regeneration.

Allotment of the areas to this working circle has generally been retained.

SPECIAL OBJECTS OF MANAGEMENT

- (1) To bring the normally of the over exploited forests by natural means.
- (2) To convert uneven aged to even aged normal forests implying normal increment by natural regeneration.
- (3) Felling has been closed in this working circle up to 2005-06. After this period on review of the results, if suitable conditions are achieved (if political fellings stop), then only felling in this circle may be prescribed.
- (4) Only the removal of dead, dying, diseased and illicitly felled trees are to be removed to make the existing crop a healthy one and promising.

## BLOCKS AND COMPARTMENTS

Blocks and compartments have been retained same as in the previous plan. The previous seven blocks namely :- Tholkabad, Kodalibad, Karampada, tirilposi, Samta, Ankua and Ghatkuri are being retained. Total of 282 compartments still exist.

## FELLING SERIES

There will be three felling series as in the previous plan, which are also follows :-

1. Koina Felling Series
2. Gua Felling Series
3. Samta Felling Series.

## AREA STATEMENT OF THE WORKING CIRCLE

Details of area by Ranges, Blocks & Compartments are given in Appendi I.

## THE STOCK MAPS

Stock maps of all the compartments have been shown on 4"=1 mile scale & placed in the respective compartment histories. Compartment Histories for all protected forests have also been proposed.

To make these compartment histories more accurate in regard to stock maps, help of satellite imageries were taken. These were bought from NRSA, Hyderabad and processed through the Geographical Information System in the computer. After detailed ground truth verifications, type of forests were derived. After verification, these were computed in computer and final stock maps for every detail were prepared. In this way the stock maps processed are more accurate in comparison to those of the previous plan. This working plan is the first plan in the State prepared through the GIS.

## ANALYSIS AND VALUATION OF THE CROP

Description of Forests :- The forests of this working circle are mainly composed of sal (*Shorea robusta*) of average quality II and III. The condition of the sal and

other associate spp. are found excellent and regenerations of main crop are in enough ratios. The entire vegetation represents the present climatic climax. The condition for germination, establishment and development of sal are so favourable on the floor of these forest that this division perhaps may be the locality of optimum suitable conditions for growth and development of sal. All the major factors responsible for poor growth and establishment of sal are absent. Forest is very rare. Drought is not experienced. High humidity in the valley bottoms are not found. The favourable climate conditions are fully supportive for natural regeneration, growth and development of sal in very excellent manner. Here with very little variations in places, the crop of this working circle is remarkably homogenous in nature. Some of the smaller adjoining sal area which were earlier in selection working circle, having homogenous character with the sal of this conversion working circle have been included in this working circle.

Moist valleys were also planted with Teak, which proved very successful and brought the forest crop to a higher value in comparison to that of natural sal. Large size plantation spp. (i.e. Teak) were felled and being felled by illegal traders and also by Jharkhand agitationists. Thus very little of planted teak are present in the forests.

Large size sal trees are very seldom found in this working circle, as these have been already felled by the department itself in part and also by Jharkhand agitationists. Some of the trees have been girdled by the persons who are interested for encroachment of lands afterward.

The crops in P.B. IV, V & VI are excellent and are well representation of age – gradation in the field of sal forests.

The quality and composition of the crops vary from block to block. At present, the crop condition may be called as very rich.

## ENUMERATION

In the previous plan, only 2.5% enumeration was carried out in P.B. I areas by Random stratified sampling method. 2.5% enumeration was done for this working plan only to calculate the growing stock since yield was not to be prescribed in this working circle the reason being most of the Jharkhand fellings took place in this working circle only. This circle will be given rest for the next five years in order to bring all the felled areas to rejuvenate properly. For the purpose of this working plan these areas are kept in the P.B. VI.

## CLASSIFICATION OF TREES

The categorization of trees shall continue as per the method laid on the previous plan.

A dry tree will be that which is dry from the top to bottom. (These will be given symbol –“d”). Half dry or partially dry trees will be classified as green trees.

A tree having two distinct holes one at the top and other at the bottom, and which is infested with Ficus will be classified as “hollow tree” and its symbol will be “h”.

Another classification as “dead and moribund” trees will include dead trees and also bent over and badly leaning trees usually of whip type. (These will be given a symbol “m”).

Lastly the diseased trees which are infected with parasites to such an extent that their growth is seriously affected or they are a danger to their neighbours. (These trees will be given a symbol – “K” which is suggested of canker – a disease).

## SILVICULTURAL SYSTEM

As mentioned in the main objects of this working circle no felling is being prescribed here, hence only subsidiary systems have to be adopted for the betterment of the existing crops.

All the Periodic block I to IV as in the previous plan are being retained here. During half of this plan period felling is being closed for review purposes. Only felling for silvicultural needs are to be carried out. This operation will result in systematic age gradation of the crops in different periodic Blocks.

Accordingly, yield regularization will be done in the next revised working plan, that is after expiry of this plan period of ten years.

In the areas allotted to P.B. I, adequate regeneration and establishment of crops in its fullness is essential. Since the areas are facing problems of over felling due to illegal felling and theft, old practice of clear felling is not recommended now. Only removal of

dead, dying, moribund, dried and diseased trees are to be done. And these will be removed by the department.

In the area allocated to P.B. II (i.e. the approach clan of P.B. I), similar to P.B. I only removal of dead, dying, diseased moribund trees are being prescribed as in the same manner.

In the areas allotted to P.B. III, IV, V and VI thinning operations shall be carried out. None of these periodic blocks will be grouped with.

All these P.B.s (III to VI) will be kept in their separate identification, as maintained in the previous plan.

## ROTATION AND CONVERSION PERIOD

The rotation and conversion period were retained same as had been fixed by Mooney, J.N. Sinha and Rajhands at 120 years on the following agreements :-

- (a) The Mean Annual Increment (M.A.I.) of timber production for Q II sal culminates at 90 years, and Q III sal at slightly over 100 years. But there is a little decrease in increment up to 120 years. There is, however, no doubt that the price increment between 90 years to 120 years will counter balance the slight drop in the volume production.
- (b) The average quality of this working circle is good (Q III) sal though there are considerable areas of Q I and Q II sal and also that of Q IV in previously Jhummed patches. The sal yield table indicates that for a rotation of 120 years, the main crop diameter of Q III is 18", Q II is 21" and Q I is 26".

Thus, the major portion of the crop in this working circle may be expected to reach 18" diameter while a considerable proportion will attain 20" to 24" and in less areas trees of 24" to 26" diameter will also be found.

Hence the rotation of 120 years is found most suitable since presently in this working circle no regular felling is being prescribed, therefore, consideration of rotation and conversion period is not of much significance now.

## DIVISION IN TO PERIODS

As prescribed in the Rajhan's plan in the same fashion six periodic blocks will be retained. Accordingly, time allotted for full conversion of one P.B. into next is 20 years. In the previous plan, efforts to establish regeneration were taken in P.B. II. Thus actual regeneration period was of 40 years (i.e. conversion period of P.B. I & II).

## ALLOTMENT PERIODIC BLOCKS

Since previous plan period was up to 1995-96, therefore transfer of one P.B. into another should be considered from 1996-97. The new plan could not be revised in time, and the plan was given extension up to year 2000. For convenience of the calculation of year, the period from 1996-97 to 2000 might not be considered. And accordingly the new entrance of each P.B. to its next corresponding P.B. will be taken into account from year 2000-2001.

Automatic transfer of previous P.B. into new one will be as follows :-

	Area of previous		New plan
1.	P. B. I	Remains as	P. B. I
2.	P.B. II	Change to	P.B. II
3.	P.B. III	Change to	P.B. III
4.	P.B. IV	Change to	P.B. IV
5.	P.B. V	Change to	P.B. V
6.	P.B. VI	Change to	P.B. VI

The following criteria have been adopted in making the allotment to the different periodic blocks.

P.B.I. The areas of P.B. I have chiefly come from P.B. II of the previous plan containing the most mature crops and adequate natural regeneration.

B.B.II The areas of P.B. II have mainly come from P.B. III of the previous plan. Where crops are approaching maturity established Regeneration in its fullness.

P.B. III The areas of P.B. III have come after the conversion of P.B. IV of the previous plan. Here middle aged crop with uneven nature are present.

P.B. IV The area of P.B. IV have come after the conversion of P.B. V areas of the Rajhan's plan. Mainly converted crop as a result of thinning operations are present in this P.B.

P.B. V Areas under P.B. V contains mainly converted photo sized crops The areas of P.B. V have come from P.B. VI of the previous plan.

P.B. VI The areas of P.B. I of previous plan have become the P.B. VI in this plan which has completed conversion felling carried out previously or such P.B. I areas which were illegally by the political agitationists. This P.B. VI is comprised of crops of sapling to pole stage.

#### ALLOTMENT OF AREAS TO EACH PERIODIC BLOCKS

Details of the above allotment of areas is given in the tabular form as follows :-

P.B. No.	Block Name	Compartment No.	Area allotted to C.W.C. (in Ha.)		
P.B. I	Ankua	1	88.25		
		2	31.98		
		3	86.23		
		9	25.91		
		14	48.58		
		23	15.38		
		24	81.37		
		27	23.48		
		32	41.29		
		37	8.90		
		Ghatkuri		3	47.77
				4	23.48
				5	60.30
7	49.39				
9	17.00				
10	35.22				
15	60.32				
TOTAL				744.93	
	Ankua			4	28.34
				13	76.51
		15	80.56		
		16	109.71		
		18	31.57		
		28	146.55		
		30	82.18		
		31	106.47		

		35	22.26
		41	30.76
		43	34.00
		46	24.29
		47	21.45
		48	78.53
		49	58.29
		52	29.14
		54	65.18
		39	4.04
	Ghatkuri	14	51.82
TOTAL			1082.18
	Ghatkuri	11	46.55
		12	80.97
		13	108.90
TOTAL			236.43
	Ankua	7	38.46
		17	115.38
		19	25.10
		20	47.36
		21	41.29
		22	57.89
		25	57.08
		26	8.90
		33	72.87
		34	73.68
		36	143.72
		38	206.47
		40	106.87
		50	104.85
		51	41.70
		53	58.69
TOTAL			1199.59
	Ankua	29 (P)	116.59
		44	112.95
		45	50.60
		42	119.83
TOTAL			400.00
	Ankua	29 (P)	51.82
		6	94.33
		10	70.44
		8	185.82
	Ghatkuri	1	203.64
		2	63.56
		6	104.45
	Ghatkuri (Promoted)	8	112.14
TOTAL			886.23

GUA FELLING SERIES

1	2	3	4
P.B. I	Karampada	17	86.23
		22	387.07
		23	6.47
		24	14.57
		25	196.76
		30	82.18
Total			773.27
P.B. II	Ghatkuri	16	8.90
		17	60.72
		3	77.73
		18	85.02
		21	160.32
		26	139.67
		27	93.92
		29	28.74
Total			655.06
P.B. III	Kodalibad	1	96.35
		2	193.11
		3	214.97
		10	147.36
		12	53.3
		13	32.79
	Karampada	10	97.97
		11	113.36
		12	164.77
		13	234.91
		14	552.63
		15	153.84
Total			1863.15
P.B. IV	Kodalibad	4	21.86
		5	40.48
		7	28.34
		8	15.78
		9	29.55
		14	31.98
		15	108.09
		16	167.20
		18	149.39
	Karampada	16	92.30
		19	97.57
		20	145.74
Total			1001.21
P.B. V	Ghatkuri	18	119.43
		20	181.78

		22	181.78
		23	51.82
		25	10.52
		26	19.43
		27	52.22
		28	67.20
		29	78.94
		30	57.08
		32	14.57
		1	49.39
		2	12.14
		7	59.10
		8	46.96
	Karampada	9	25.91
	Kodalibad	11	33.19
Total			948.58
P.B. IV	Ghatkuri	21	49.39
		24	111.74
		31	56.68
	Karampada	4	28.74
		5	37.24
		6	91.05
	Kodalibad	17	327.93
Total			702.83

#### SAMTA FELLING SERIES

1	2	3	4
P.B. I	Samta	1	67.20
		2	23.38
		7	85.02
		8	134.41
		25	63.15
		29	153.44
		42	193.92
		43	291.90
	Tolkabad	20	171.25
		38	292.32
		40	138.08
	Tirilposi	1	48.58
		2	2.42
		3	51.41
		19	136.03
		21	25.10
		30	29.95

		39	22.26
		40	42.10
		41	26.31
		45	60.72
		52	93.52
Total			2153.03
P.B. II	Samta	20	57.08
		21	93.11
		22	43.72
		27	37.24
		28	70.44
		30	72.06
		31	118.21
		45	242.51
		48	10.02
	Tholkabad	14	40.89
		15	79.75
		16	14.17
		29	150.20
		31	194.73
		39	58.74
		44	201.61
		48	96.75
	Tirilposi	5	37.65
		7	68.82
		34	56.27
		37	60.32
		42	44.12
		47	77.73
		48	34.00
Total			1930.36
P.B. III	Samta	3	41.29
		5	137.65
		10	55.46
		11	90.68
		16	132.38
		17	84.21
		18	59.91
	Tirilposi	23	65.99
		24	87.85
		43	14.17
		44	4.04
	Tholkabad	17	154.25
		23	88.86
		24	52.22
		25	85.42

		33	126.31
		34	69.63
		35	11.33
		36	136.84
		37	88.25
Total			1586.63
	Samta	4	119.02
		6	35.22
		9	60.72
		12	31.17
		13	12.07
		14	57.89
		19	98.38
		41	182.18
	Tholkabad	3	145.74
		6	67.61
		7	45.74
		8	46.55
		46	105.26
	Tirilposi	8	57.48
		10	48.58
		11	82.18
		12	59.51
		15	91.90
		26	55.46
		31	49.39
		32	70.04
		33	74.49
		36	27.53
Total			1735.22
	Samta	15(P)	36.43
		23	77.32
		24	55.06
		26	92.30
		32	93.92
		33	82.99
		34	107.69
		35	58.70
		36	36.84
		37	52.22
		40	117.81
		47	12.95
		44	58.29
		10	86.23
		11	102.02
		13	46.15

		18	106.47
		21	85.02
		22	56.27
		26	60.32
		27	67.61
		28	125.91
		41	105.26
P.B. V	Samta	42	100.40
Total			1823.88
	Samta	15 (P)	59.10
		38	100.10
		39	288.25
		46	27.12
	Tholkabad	1	32.28
		2	141.29
		9	57.89
		12	53.03
		30	87.44
		32	85.82
		43	183.40
		45	84.61
	Tirilposi	4	85.42
		13	44.53
		14	57.48
		16	27.53
		17	102.02
		18	185.02
		20	87.44
		22	57.48
		27	84.21
		28	46.15
		35	54.25
		38	33.60
		9	40.08
Total			2105.86

#### CALCULATION OF YIELD

In the previous plan, on the basis of 2.5% enumeration in all P.B. I areas, the total annual yield was calculated. Regularisation of yield was fixed by volume with an area control. Consequently, it was prescribed that almost an equal area in the P.B. I of each felling series should be exploited annually and if the prescribed yield with 10% deviation became available in only part of the annual coupe, then the balance of the coupe area would

be left for exploitation in the following year. On the other hand, if prescribed yield was not available, then also area control was admitted and area was not allowed to be exceeded.

In this new plan, no felling in this working circle is prescribed, hence calculation of yield is not done. Annual increment with growing stock for the sample plots has been done in detail. From the enumeration data in conversion working circle they almost fit to the data derived from the sample plots. Enumeration of Conversion W.C. is given in Appendix. For removal of dead (Jharkhand Felled) dying, moribund including Jharkhand felled trees, the coupes may be laid out in the following sequence.

#### STATEMENT OF ANNUAL COUPES IN P.B. I KOINA FELLING SERIES

Year	Coupe No.	Block	Compartment No.	Area in Hect.	Total area of annual in acres
1	2	3	4	5	6
2001-02	1	Ankua	29(P)	14.57	14.57
2002-03	2	Ankua	29(P)	15.78	15.78
2003-04	3	Ankua	29(P)	9.31	9.31
2004-05	4	Ankua	29(P)	12.14	
		Ankua	6(P)	5.56	17.70
2005-06	5	Ankua	6(P)	44.53	44.53
2006-07	6	Ankua	6(P)	44.12	44.12
2007-08	7	Ankua	8(P)	44.53	44.53
2008-09	8	Ankua	8(P)	44.53	44.53
2009-10	9	Ankua	8(P)	44.53	44.53
2010-2011	10	Ankua	8(P)	44.53	44.53
2011-2012	11	Ankua	8(P)	7.63	
		Ankua	10(P)	32.79	40.48
2012-13	12	Ankua	10(P)	37.65	
		Ghatkuri	1(P)	6.88	44.53
2013-14	13	Ghatkuri	1(P)	65.58	65.58
2014-15	14	Ghatkuri	1(P)	65.58	65.58
2015-2016	15	Ghatkuri	1(P)	65.58	65.58
2016-17	16	Ghatkuri	2(P)	63.56	63.56
		Ghatkuri	6(P)	6.07	
2017-18	17	Ghatkuri	6(P)	56.68	56.68
2018-19	18	Ghatkuri	6(P)	41.70	
		Ghatkuri	8(P)	10.93	52.63
2019-20	19	Ghatkuri	8(P)	50.60	50.60
2020-21	20	Ghatkuri	8(P)	50.60	50.60
Total				886.23	886.23

GUA FELLING SERIES

1	2	3	4	5	6
2001-02	1	Ghatkuri	31(P)	49.39	49.39
2002-03	2	Ghatkuri	31(P)	7.29	
		Ghatkuri	21(P)	38.05	45.34
2003-04	3	Ghatkuri	21(B)	11.33	
		Ghatkuri	24(P)	32.38	43.72
2004-05	4	Ghatkuri	24(P)	44.53	44.53
2005-06	5	Ghatkuri	24(B)	32.81	32.81
2006-07	6	Karampada	5(P)	28.74	
		Karampada	5(P)	3.64	32.38
2007-08	7	Karampada	5(B)	31.17	31.17
2008-09	8	Karampada	6(P)	31.17	31.17
2009-10	9	Karampada	6(P)	32.38	32.38
2010-11	10	Karampada	6(B)	27.53	
		Kodalibad	17(P)	4.85	32.38
2011-12	11	Kodalibad	17(P)	32.38	32.38
2012-13	12	Kodalibad	17(P)	32.38	32.38
2013-14	13	Kodalibad	17(P)	32.38	32.38
2014-15	14	Kodalibad	17(P)	32.38	32.38
2015-16	15	Kodalibad	17(P)	32.38	32.38
2016-17	16	Kodalibad	17(P)	32.38	32.38
2017-18	17	Kodalibad	17(P)	32.38	32.38
2018-19	18	Kodalibad	17(P)	32.38	32.38
2019-20	19	Kodalibad	17(P)	32.38	32.38
2020-21	20	Kodalibad	17(B)	31.57	31.51
Total				<b>702.83</b>	<b>702.83</b>

SAMTA FELLING SERIES

1	2	3	4	5	6
2001-02	1	Samta	15(B)	59.10	
		Tirilposi	9(P)	32.79	91.89
2002-03	2	Tirilposi	9(P)	7.28	
		Tirilposi	18(P)	46.55	53.84
2003-04	3	Tirilposi	18(P)	59.51	59.51
2004-05	4	Tirilposi	18(P)	51.82	51.82
2005-06	5	Tirilposi	18(P)	27.12	
		Tirilposi	17(P)	89.06	116.18
2006-07	6	Tirilposi	17(P)	12.95	
		Tirilposi	16	27.53	
		Tirilposi	14	57.48	
		Tirilposi	13	44.53	142.51
2007-08	7	Samta	38(P)	93.92	93.92
2008-09	8	Samta	38(P)	6.07	

		Samta	39(P)	110.12	116.19
2009-10	9	Samta	39(P)	116.19	116.19
2010-11	10	Samta	39(B)	61.94	
		Samta	46	27.12	
		Tirilposi	4(P)	27.12	116.19
2011-12	11	Tirilposi	4(B)	58.29	
		Tirilposi	20(P)	57.89	116.19
2012-13	12	Tirilposi	20(B)	29.55	
		Tirilposi	22	57.48	
		Tirilposi	27(P)	34.41	121.45
2013-14	13	Tirilposi	27(B)	49.79	
		Tirilposi	28	46.15	
		Tirilposi	35(P)	34.41	121.45
2014-15	14	Tirilposi	35(B)	28.74	
		Tirilposi	38	33.60	
		Tholkabad	1	32.38	
		Tholkabad	2(P)	36.84	
2015-16	15	Tholkabad	2(B)	105.45	104.45
2016-17	16	Tholkabad	9	57.89	
		Tholkabad	12(P)	43.31	101.21
2017-18	17	Tholkabad	12(B)	9.71	
		Tholkabad	30	87.44	
		Tholkabad	32(P)	20.24	117.40
2018-19	18	Tholkabad	32(B)	56.58	
		Tholkabad	45(P)	55.87	121.45
2019-20	19	Tholkabad	45(P)	28.74	
		Tholkabad	43(P)	84.61	113.36
2020-21	20	Tholkabad	43(P)	98.78	98.78
Total				2105.66	2105.66

In the case of seriously diseased trees which may affect the neighbouring trees should be marked as and when noticed and should be felled as early as possible, so that the rest of the crop may be kept healthy. For this, no need of sequence of coupe to be maintained.

#### METHOD OF EXECUTING FELLING

For removal of only dead, dying, moribund, dried or diseased trees, selection felling will be carried out.

#### MARKING RULE

These unwanted trees should be market singly as and wherever found in the coupe or block of the forest. These operations are meant for the betterment of the crop and not for the prupose of revenue collection.

Since, there is no prescription for general / regular felling in this working circle hence to deal with the method of executing felling and consequently marking, rules in full details is of no importance here.

## SUBSIDIARY SILVICULTURAL OPERATIONS

For the better growth of crops, the following operations are needed to be carried out.

- (1) Climber cutting, creeper cutting should be done during the rains. The process should be continued every year until these are completely suppressed.
- (2) Cut back of all such growth of use less spp. which interfere with the growth of the principal species. This operation too will be carried out every year until their regeneration stops or stops competing with Sal. This miscellaneous cleaning is essential in moist areas. But in dry areas, retention of shrubs which may be beneficial to the stablishment of sal seedlings is advisable.
- (3) The group of thrifty saplings and poles retained shall be thinned, if necessary. While carrying out this operation, case will have to be taken to see that the regeneration from the seeding origin are not cut along with the shrubs and weeds. In the places, where seedling and saplings are in quite good number, coppice shoots will be removed by cutting. But where regeneration from seedling origin is deficient, coppice shoot must be retained to restock the area. Valuable miscellaneous spp. being the common associates of sal, should not necessarily be cut. The aim of the cleaning operation should be to obtain a fair and balanced mixture of importance spp. in good and healthy condition.

Since, in the preliminary plan report also no felling is recommended, therefore in periodic block I only above operations are to be carried out. And there is no need to carry other cultural operation and till a detailed review of the results in P.B. I ascertained after a period of 5 years from the commencement of this revised plan. On the basis of results

obtained if needed, further prescription to felling for different cultural operations will be prescribed by the working plan officer, Southern circle, Chaibasa on the request made by Territorial Divisional Forest Officer of Saranda Division which much be agreed to by the Conservator of Forests, Southern Circle, Chaibasa.

## PERIODIC BLOCK II

The main silvicultural operations in the P.B. II are as follows :-

- (1) To provide conditions by which the growth increment of the Sal may be encouraged.
- (2) To gain complete regeneration before it passes on the periodic block I as mature trees (i.e. ready for exploitation).

In the areas of this division and in this prevailing condition, regeneration is not a problem and generally comes out sufficiently without much attention or providing any special effort. But in the areas or prockets of deficient regeneration, the following operations will have to be carried out to obtain regeneration satisfactorily.

- (a) Area of P.B. II rigidly protected from fire and grazing.
- (b) Climber cutting on a cutting cycle of 10 years is recommended.

## PERIODIC BLOCK III & PERIODIC BLOCK IV

The crops of P.B. III is admittedly irregular in age classes but generally contains middle aged standard occasionally quisi-uniform. Crop is to be improved crop by means of thinning so as to enable the crop to put on maximum diameter increment and height growth.

The crop of P.B. IV are also middle aged varying from 41 to 60 years. These are some even aged. The main requirement of the crop is thinning.

As per the need of the above two P.B.s III & IV to achieve the main objects for the crop only 'C' grade thinning for both the P.B. IV are being prescribed.

The thinning cycle will be of 20 years, where as, climber cutting will be done on 10 years cycle. The programme of thinning and climber cutting is given below.

P.B. III :- Area not available for thinning.

P.B. IV :- Thinning cycle as listed below :-

Name of felling series	Year	Compt. Name and Number	Area in acres	Total area in acres	Total area in ha.
1	2	3	4	5	6
Koina	2001-02	Ankua-19	62.00		
		Ankua-20	117.00	156.00	63.76
	2002-03	Ankua-22	38.00		
		Ankua-25	121.00	181.00	73.88
		Ankua-26	22.00		
	2003-04	Ankua-17	160.00	160.00	65.38
	2004-05	Ankua-40	66.00		
		Ankua-7	95.00	161.00	64.53
	2005-06	Ankua-34	182.00	182.00	72.80
	2006-07	Ankua-36	355	355	143.72
	2007-08	Ankua-33	180	390	157.89
		Ankua-38 (P)	210		
	2008-09	Ankua-38(P)	300	300	121.45
	2009-2010	Ankua-50	259	259	104.85
2010-2011	Ankua-51	103	248	100.40	
	Ankua-53	145			
Gua	2001-02	Kudalibad 16 (P)	250.00	250.00	101.45
	2002-03	Kudalibad 16(B)	250.00	250.00	101.45
	2003-04	Kudalibad 4	54.00		
		Kudalibad-5	50.00		
		Kudalibad 6	180.00	284.00	105.22
	2004-05	Kudalibad – 7	20.00		
		Kudalibad – 8	39.00		
		Kudalibad - 9	73.00	132.00	53.68
	2005-06	Kudalibad – 14	79.00		
		Kudalibad – 15	55.00	134.00	53.68
	2006-07	Karampada – 16	228	228	92.30
	2007-08	Karampada – 17	241	241	97.57
	2008-09	Karampada -20	360	360	145.74
	2009-2010	Kudalibad 18 (P)	300	300	121.45
2010-2011	Kudalibad – 18 (B)	69	129	52.22	
	Kudalibad 20 (P)	60			

Samta	2001-02	Samta – 4	258.00		
		Samta – 12	77.00	335.00	133.97
	2002-03	Samta – 13	234.00		
		Tirilposi- 18	142.00	376.00	150.56
	2003-04	Tirilposi – 11	157.00		
		Tirilposi – 10	120.00	277.00	110.76
	2004-05	Tirilposi – 12	147.00		
		Tirilposi – 15	108.00		
		Samta – 14	143.00	398.00	159.21
	2005-06	Samta – 9	150.00		
		Samta – 19	216.00	366.00	146.38
	2006-07	Samta – 6	87	537	217
		Samta -41	450		
	2007-08	Tholkabad – 6	167		
		Tholkabad – 8	115	542	219.43
		Tholkabad – 46	260		
	2008-09	Tholkabad – 7	113	473	191.49
		Tholkabad – 3	360		
	2009-10	Tirilposi – 36	68		
		Tirilposi – 32	173	378	153.03
		Tirilposi – 26	137		
	2010-11	Tirilposi -31	122	306	123.48
		Tirilposi – 33	184		

The revenue can be contemplated as under :

The table below shows the average number of poles to be obtained from thinning from PB Inter.

Sl. No.	Felling series	Area for C grade thinning in hec.	No. of poles Sal/Asan Avg. 50 hec.	No. of poles Misc. avg. 50 hec.
1	2	3	4	5
1	Konia	968.66	24,216	24,216
2	Gua	924.76	23,116	23,116
3	Samta	1605.31	40,132	40,132
	Total	1456.71	87,464	87,464

According to the Schedule of Rates by CCF, State Trading, Bihar's Office Order No. 32 dt. 25.4.96 the rate/pole is Rs. 29/- for Sal & Asan and Rs. 22/- for Misc. species. Accordingly the revenue would be Rs. (25,36,456+19,24,208) = Total Rs. 44,60,694/- Only.

The year wise area and financial requirement of thinning marking may be summarized as follows :-

Year	Total area in acres	Total area in hectares	Rate 5 x 58.64 Rs. 293.20	Amount required for thinning marking
2001-02	741.00	299.18	5 Man days per Ha.	2,17,261.00
2002-03	807.00	325.89	"	2,36,612.00
2003-04	721.00	281.36	"	2,11,397.00
2004-05	691.00	277.42	"	2,02,601.00
2005-06	682.00	272.86	"	1,99,962.00
2006-07	892.00	453.02	"	2,61,534.00
2007-08	1137.00	474.89	"	3,33,368.00
2008-09	1133.00	458.68	"	3,32,195.00
2009-10	937.00	379.33	"	2,74,728
2010-11	683.00	276.10	"	2,00,255.00
			<b>Total:- Rs.</b>	<b>24,69,913.00</b>

This does not include the cost of thinning felling as it will be done by state trading division on the standard felling rates and with the revenue generated by thinning out poles etc.

#### THINNING RULES

- (1) Thinning shall be generally of 'C' grade, with a precaution that no permanent gap in the canopy may be created.
- (2) Trees of inferior spp. interfering with the growth of crown development of superior species shall be cut back.
- (3) All dead, wind fallen, heavily diseased, dried, top-broken trees shall be cut.
- (4) Dominated trees of badly shaped or otherwise abnormal shall be cut, provided its removal does not create a permanent gap in the canopy.
- (5) Among the dominant trees of superior spp., the best ones will be retained and the malformed and unhealthy ones shall be cut out provided again that no gap in the canopy is created.
- (6) If there is a possibility of the permanent gap in canopy the suppressed ones shall be left standing.
- (7) All climbers shall be cut, at least at the points first at the base, approximately 1' above the ground level, and another at breast height level.

## PERIODIC BLOCK – V

The age of the crop of this P.B. varies from 21 years to 40 years. The crop is young and even aged through out. The main requirement of the crop is thinning to obtain the better health of the crop before passing it to the next periodic block.

Here, mechanical thinning is being prescribed at an average spacing of 2.4 x 2.4 m on 10 years cycle.

## THINNING RULES IN P.B. V

10 years thinning cycle is being prescribed. Thinning rules are as follows :-

1. The general rule of spacing is 1 ½ times the diameter in inches, called feet, shall be followed. It is not found possible always to give an accurate spacing in the field. In those cases the officer-in-charge will have to use his silvicultural knowledge to settle the spacing problem.
2. All the injured, unhealthy, wind-broken, malformed stems will be cut back.
3. Between the stems of seedling origin and that of coppice origin, the stems of seedling origin shall be retained. Even an inferior stem of seedling origin shall be preferred to superior stem of coppice origin.
4. Besides the elimination of the stem, a guided mechanical thinning will be done in the young regenerated crop with an intention to space-out the plants more or less evenly over the area.
5. Before the actual thinning, shrub cutting in the area shall be done first and then thinning will be started from the poorer end.
6. All climbers & creepers shall be cut at the time of thinning.
7. Considering Quality III as the average quality of the crop of this working circle as a whole, the thinning space will be kept 2.4 x 2.4 mt.  
In moist areas i.e. in valley and lower slopes, an average spacing of 3 mt x 3 mt should be kept.
8. All standards shall be removed at the time of 10<sup>th</sup> year thinning.
9. The second thinning will be carried out at the age of 20 years of the crop. The nature of thinning will be same as above, with a slight difference, that it will be less mechanical.
10. The damaged poles and saplings shall be cut.

11. Trees of inferior species over-tapping the young crop shall be felled.

#### PERIODIC BLOCK VI

It have been already clear felled by the Jharkhand agitationists will be included in this P.B.

No other operations in this P.B. (i.e. VI) will be carried out during this plan period.

Sowing of sal seeds in these areas after first showers may also be done, if dispersal of seed by natural means is not satisfactory.

Measures to ensure strict fire-protection is being prescribed till the establishment of young regeneration.

In the fifth year the regenerated crop establishment, this contains much excessive number of stems than what normally the soil is expected to support as a future crop.

Therefore preliminary thinning is carried out to afford the growing species to the young crop. This will include most of the points as mentioned in the thinning rule for P.B. V.

The following tabular statement will provide the programme for subsidiary cultural operation needs, within 5 years.

#### YEAR WISE AND YEAR WISE DETAILS

The area wise and year wise details of the compartments selected for cultural operation as follows :-

Year	Comopartment No.	Area in Ha.
2001-2002	Tirilposi -13	200.00
	Tirilposi – 24	200.00
	Tirilposi – 26	300.00

	Tirilposi – 40	200.00
	Tirilposi – 51	200.00
	Ankua – 8	200.00
	Ankua – 14	200.00
	Ankua – 18	100.00
	Ankua – 21	200.00
	Ankua – 29	200.00
	Ankua – 30	100.00
	Karampada – 8	100.00
	Karampada – 13	200.00
	Karampada – 10	200.00
	Ghatkuri – 18	200.00
	Karampada – 25	200.00
	Karampada – 27	200.00
	Tholkabad – 17	200.00
	Tholkabad – 22	200.00
	Samta – 40	200.00
	<b>Total:-</b>	<b>4000.00</b>

Year	Compartment No.	Area in Ha.
2002-2003	Titilposi – 10	100.00
	Titilposi – 21	100.00
	Titilposi – 28	200.00
	Titilposi – 31	100.00
	Titilposi – 33	200.00
	Titilposi – 34	200.00
	Titilposi – 44	100.00
	Titilposi – 45	100.00
	Ankua – 6	200.00
	Ankua -16	200.00
	Ankua – 22	200.00
	Ankua -42	200.00
	Kudalibad – 3	200.00
	Karampada – 13	200.00
	Ghatkuri - 28	200.00
	Ghatkuri – 10	200.00
	Ghatkuri – 30	200.00
	Kudalibad – 12	200.00
	Karampada – 18	100.00
	Tholkabad – 15	100.00
	Tholkabad – 20	200.00
	Tholkabad – 23	200.00
	Samta – 43	400.00
	<b>Total:-</b>	<b>4000.00</b>

Year	Comopartment No.	Area in Ha.
2003-2004	Tirilposi – 3	100.00
	Tirilposi – 11	200.00
	Tirilposi – 32	200.00
	Tirilposi – 35	100.00
	Tirilposi – 52	200.00
	Samta -9	100.00
	Samta – 4	100.00
	Ankua – 15	100.00
	Ankua – 24	100.00
	Ankua – 28	200.00
	Ankua – 37	200.00
	Ankua – 48	200.00
	Karampada – 7	200.00
	Karampada – 8	200.00
	Karampada – 11	200.00
	Karampada – 15	200.00
	Ghatkuri – 15	200.00
	Samta – 42	200.00
	Karampada – 24	200.00
	Karampada – 30	200.00
	Tholkabad – 24	200.00
	<b>Total:-</b>	<b>4000.00 Ha</b>

Year	Comopartment No.	Area in Ha.
2004-2005	Samta – 6	200.00
	Samta – 10	200.00
	Samta -17	200.00
	Tirilposi – 14	200.00
	Tirilposi – 36	100.00
	Tirilposi – 41	100.00
	Ankua – 7	200.00
	Ankua – 13	200.00
	Ankua – 16	200.00
	Ankua – 24	200.00
	Ankua – 31	200.00
	Karampada – 9	200.00
	Karampada – 12	200.00
	Karampada – 14	200.00
	Kudalibad – 9	100.00
	Ghatkuri – 12	200.00
	Ghatkuri - 18	100.00
	Kudalibad – 17	100.00
	Kudalibad – 18	100.00
	Tholkabad -43	200.00
	Karampada – 25	200.00

	Karampada – 29	100.00
	Karampada – 30	100.00
	Samta – 44	200.00
	<b>Total</b>	<b>4000.Ha.</b>

Year	Comopartment No.	Area in Ha.
2005-2006	Samta – 9	100.00
	Samta – 16	200.00
	Tirilposi – 15	200.00
	Tirilposi – 19	100.00
	Tirilposi – 22	200.00
	Tirilposi – 38	200.00
	Ankua – 18	100.00
	Ankua – 20	200.00
	Ankua – 21	200.00
	Ankua – 29	100.00
	Ankua – 37	100.00
	Ankua – 39	100.00
	Ankua – 43	200.00
	Karampada – 8	200.00
	Karampada – 9	200.00
	Karampada – 13	200.00
	Ghatkuri – 9	200.00
	Ghatkuri – 10	100.00
	Ghatkuri – 13	200.00
	Samta – 47	100.00
	Samta – 42	100.00
	Kudalibad – 13	200.00
	Kudalibad – 14	100.00
	Karampada – 23	200.00
	Karampada -19	100.00
	Tholkabad – 13	100.00
	Tholkabad – 17	100.00
	<b>Total:-</b>	<b>4000.00 Ha</b>

For the period (2006-07 to 2010-11) the DFO Saranda with the approval of them WPO, S.C. Chaibasa will decide the areas for cultural operations but the limit will be up to 5000 Ha. every year.

(D) Amount Required :  
 Rate – 12 Man days / Ha. - 12 x Rs. 58.64 per ha.  
 = Rs. 703.68/ Ha.

The amount required for each year is given in the following table :-

Sl. No.	Year	Area (in Ha.)	Rate per Ha.	Amount (Rs.) in lacs	Remarks
1	2001-2002	4000.00	12x58.64 = Rs. 703.68	28,14,720.00	Increase in the wages will effect the rate correspondingly to every year.
2	2002-2003	4000.00	-do-	28,14,720.00	
3	2003-2004	4000.00	-do-	28,14,720.00	
4	2004-2005	4000.00	-do-	28,14,720.00	
5	2005-2006	4000.00	-do-	28,14,720.00	
6					
7					
8					
9	2009-2010	5000.00	-do	35,18,400.00	
10	2010-2011	5000.00	-do-	35,18,400.00	
<b>Grand Total :- 3,16,65,600.00</b>					

CHAPTER – III  
10-Years Programme for Cultural Operations

GENERAL REGULATIONS

1. Fire Control
2. Grazing Control

1) Fire control :- Fire control measures are required to be taken up. A model 5 years fire control plan is being enclosed here.

After expiry of five years from the newly revised plan; review will be done about the result of fire control & control-methods. On this basis further measures for fire control, with some modification if needed will be prescribed.

PROTECTION OF FORESTS

FIVE YEAR PROGRAMME FOR FIRE PROTECTION WORKS

INTRODUCTION : The fire is a great source of destruction to forest regeneration, timber quality and erosion of soil. Saranda, the best sal forests of Asia due to the paucity of funds, in the last 10-15 years, the forest fire control works were not carried out properly which affected the forests very adversely. Appearance of large scale heart rot and other fungal diseases in the sal trees of Karampada, Tholkabad and Tirilposi blocks of this Division is chiefly due to the frequent fires in these areas.

The following fire protection measures should be taken to curb this menace :-

(A) Deployment of fire watchers

Fire watchers will be deployed for entire fire season i.e. from 15<sup>th</sup> February to 15<sup>th</sup> June for about 120 days who will keep vigil on the forest areas and whenever they will notice forest fire, they will immediately extinguish it with the cooperation of near by villagers or they immediately inform to the near by Range office or forest fire patrol party.

The range wise requirements of fire watchers are as follows :-

The range wise requirements of fire watchers are as follows:-

(i) Samta Range	-	20
(ii) Koina Range	-	16
(iii) Sasangda Range	-	20
(iv) Gua Range	-	16
Total	-	72 fire watchers

(B) Maintenance and clearing of fire lines :-

(a) Saranda Forest Division has got 460 kms of fire line (i.e. 120 kms, actual fire lines and 280 kms road fire lines). The Division has 462 kms of forest roads out of which 280 kms act as fire line. This 480 kms of fire lines will be maintained as follows :-

- (i) On either side of the forest road 16.5 feet wide fire lines will be traced and those will be cleared of all inflammable materials.
- (ii) In case of actual fire lines half a chain i.e. 33 feet wide fire line will be traced and would be clear of all inflammable materials.
- (iii) Control burning will be done at least twice in the fire season.

(b) Apart from these regular fire lines, village areas and mining areas which generally act as the starting point for forest should be provided with a double ring of forest fire lines which will be about 200 kms. Making the total length of forest lines to 780 kms.

(c) Considering the extent of fire incidences in last 10-15 years, it is also proposed to revive the abandoned fire lines and to lay out new fire lines. So during this 5-year period of this plan 150 kms. News fire lines be cut with a rate of 30 kms per annum.

(C) Fire Patrol :- Four fire patrolling parties be established in each range headed by a forester with a fast moving Tata 407 vehicle equipped with fire fighting equipment. Each party will consist one Forester in-charge with fire forest guards and ten fire fighting mazdoors. They party will continuously patrol throughout the range especially in the fire-prone areas. Apart from this, these fire-patrol party also help local staffs and local fire watchers in extinguishing the fire. The fire petrol party will work for 24 hours and as soon as

any incidence fo fire-occurrence is reported, they should immediately rush and control the fire before it spreads over a large area. Installation of wireless sets at Chaibasa, Manoharpur, Gua, Kiruburu, Jaraikella, Tholkabad with four mobile sets fitted with all the four fire petrol vans will give added advantage to the forest fire control measures. Construction of two fire wath towers in Samta and Koina Range will help in quick detection of fire incidence.

(D) Data collection and processing :- A computer with Internet facility is essential for effective data collection analysis and processing so that the policy for effective fire control in a particular fire season can be drawn with all required dimensions.

## ESTIMATE

### (A) Capital investments :-

(i)	Capital of two nos. Tata – 407 fir patrolling van	Rs. 10,00,000.00
(ii)	Cost of 4 x 10 drums @ Rs. 400.00 per drum	16,000.00
(iii)	Cost of knapsack sprayers 40 Nos. @ Rs. 1000/- E knapsack	40,000.00
(iv)	Cost of fire extinguishers 20 Nos. @ Rs. 5,000/- Per extinguishers.	1,00,000.00
(v)	Cost of axes, bill books & sickles (100 Nos. each)	15,000.00
(vi)	Cost of eight Wirless sets at Gua, Kiriburu, Manoharpur, Jaraikela, Chaibasa with Nomaundi & Goelkera as intermediate stations & Four mobile sets with all complete job:-	3,97,231.00
(vii)	Construction of 2 new firewatch towers @ Rs. 2,50,000.00 per watch tower.	5,00,000.00
(viii)	Cost of four binocular @ Rs. 5,000/- per binocular	20,000.00
(ix)	Cost of computer for Data collection & analysis with accessories are as follows:-	
	a) Computer	42,000.00
	b) Printer	12,500.00
	c) Modem & Internet facility	7,500.00
	d) CVT	5,000.00
	e) UPS & Scanner	15,000.00
	<b>Total</b>	<b>21,70,231.00</b>

(Rupees Twenty one lacs seventy thousand two hundred thirty one)

### (3) Recurring expenditure:-

(i)	Wages of 72 fire watchers for 120 days 72x120x51.01	4,40,726.00
(ii)	Cost of maintenance & clearing of 33' forest fire lines @ 620.80/- kms. For 600 kms – 600x620.80	3,72,480.00
(iii)	Cost of laying out new firelines with a rate of 30 kms./year for five years @ 40 M.D./ km 30x40x Rs. 51.01	61,212.00

(iv)	Wages of 40 fire petrol mazdoors 40x120x51.01	2,44,848.00
(v)	Maintenance of four diesel 407 trucks for four months with the cost of diesel, mobile oil and wages of drivers etc.	1,60,000.00
(vi)	Other miscellaneous expenditure including the cost of chura-gur etc. for the distribution of villagers involved in fire fighting.	20,000.00
	Total	12,99,266.00
	Or Say	13,00,000.00

## SAL SELECTION CUM IMPROVEMENT WORKING CIRCLE

### GENERAL CONSTITUTION & CROP COMPOSITION

This working circle shall comprise the forest which were under sal selection working circle in the previous Rajhan's plan except areas which now stand encroached and devoid of any worth while vegetation.

This working circle comprise generally the upper slope which embraces all the dry mixed and dry sal forests of quality IV & V which are not considered fit to be included in the conversion working circle. The forest are irregular and variable in quality. Sal is the predominant species which occurs gregariously. Patches of dry mixed deciduous forests also occur on exposed sites, hill tops and on the southern aspect of the steep slopes. The species which are most commonly met with in these dry mixed patches are *Anogeissus latifolia*, *Terminalia alata*, *Lagerstromia parviflora*, *Diospyros melanoxylon*, *Buchnanian lanzan*, *Madhuca indica*, *Gardenia gummifera* and rarely *Sterculia urens* on rocky exposed sites. Sal is normally of quality IV but quite a lot of areas consists of terribly poor poen grassy patches of quality V. Patches on steep southern aspect of the higher hills and on the tops there of, specially where shales and phyllites occur, are grassy with quality V sal. Trees in such localities are crooked, malformed and stunted seldom attaining a height beyond 15 mts. In sheltered and localities of quality V are the reproduction of sal in seedling to whippy stage is adequate, indeed at some places it may be said to be profuse. Fire is not uncommon in the forests of this working circle specially near the mining bases and habitation. There is a genral lack of poles and saplings in certain proportion. In the open quality V crop particularly on the shales and phyllites, as for example some hills of Kodalibad and Tirilposi blocks, poles and sapling crop is conspicuously absent. In such localities the common associates are *Gardenia gummifera*, *Wedlandia tinctoria*, *symoplocos racemosa* and *Eleodendron glaucum* with Khajur and grass.

Normally the forests corresponding to sub type C IIe.

(i) (Seth & Champions type) have been included in this working circle. The crop of this working circle has not received adequate silvicultural attention. There is no doubt that if the crop is nursed and given due silvicultural treatment forest in this working circle will be much is better than what its appearance at present is.

## Special objects of Management

The forests of this working circle have so far received inadequate silvicultural treatment. Apart from taking away a percentage of the available trees of exploitable diameter no silvicultural treatment what so ever has been given to the crop over bulk of the area. Given the proper aid and silvicultural treatment, there is no doubt that the crop will give positive response as has been found in some of the compartments of Karampada, Kodalibad and Samta blocks where cleaning operations were done coupled with fire protection measures. At some places of Kodalibad and Tirilposi blocks erosion has set in and is now on increase exposing rocks. It is the endeavor of this plan, therefore, to focus more attention on the forests of this working circle and to manage them at par with the areas allotted to conversion working circle. Accordingly the special objects of management are :-

- (a) To maintain the hill slopes under adequate forest cover for the prevention of soil erosion and conservation of soil moisture.
- (b) To improve the composition of crops.
- (c) To protect and develop natural regeneration of sal and other economically valuable species and establish and tend it for the future crop.
- (d) To preserve and tend all trees under the exploitable diameter to replace the big trees.
- (e) To harvest trees, subject to numerical check of exploitable diameter as far as proper silvicultural and management permit and thus to obtain a sustained annual yield.
- (f) To remove silviculturally available trees of exploitable diameter in time to prevent negative increment.
- (g) To adopt means for amelioration of the existing state of progressive desiccation and to improve moisture regime of soil and sub soil.

## Felling Series

For the management of the forests of this working circle, seven felling series, namely Ankua, Ghatkuri, Karampada, Kodalibad, Samta and Tirilposi have been constitute. In the preceeding plan one more felling series namely Saranda Felling series had been formed but this was later abandoned as its forests mostly fell in the minning areas.

Area allotment :-

The total area of this working circle is 121629 acres (49242.50 hect.) The following table shows the allotment to the different felling series.

Range	Name of F.S.	Block	Comptt.	Area under selection W.C. in acres	In hect.	Remarks
1	2	3	4	5	6	7
Konia	Ankua Ghatkuri	Ankua	1 to 54	27,046	10,949.80	
		Ghatkuri	1 to 15	11,816	4,783.80	
Gua	Ghatkuri	Ghatkuri	16 to 32	10,176	4,119.83	
	Kodalibad	Kodalibad	1 to 18	7,180	2,906.88	
	karampada	karampada	1 to 36	9,958	4,031.58	
Samta	Tirilposi	Tirilposi	1 to 52	20,906	8,463	
	Tholkabad	Tholkabad	1 to 48	14,497	5,869.23	
	Samta	Samta	1 to 48	20,050	8117.40	
Total				<b>1,21,629</b>	<b>49,242.50</b>	

The details of area statement is given in Appendix – I.

Stock Mapping :-

The stock mapping is done through the Satellite Imagery Processing. Enumeration was done manually. After processing the image, adequate ground control points for Ground Truth Survey were taken up. Ground Truth Survey was done for the second time to eliminate errors. The Conservator of Forest, Working Plan and Research Circle, Sri P. C. Mishra has done this GIS work himself with the help of a computer professional.

Analysis & Valuation of the crop

On the basis of three percent enumeration (Random stratified method) in the selection working circle area of the division crop valuation have been analyzed.

GROWING STOCK

In selection working circle area of Saranda Forest Division :-

Area :- Total area of selection working circle is 49,242.50 hect. Partial enumeration was carried out in the field. For this purpose Random Stratified sampling method was applied. Sample units are drawn as representative area of entire crop as far as possible in practical approach with unbiased manner. Enumeration was carried out in all seven felling series, namely – Kodalibad, Tholkabad, Karampadad, Ghatkuri, Samta, Tirilposi and Ankua F. S. of this division. Due to scarcity of time and fund, only trees of class (i) group i.e. trees of exploitable diameter & above are enumerated. Enumeration work was done for all the major species as Sal, Bija, Asan, Mahua, Gamhar, Karam, Semal, Dhaura etc.

After enumeration the number of trees of different spp. and of different girth classes were calculated for the entire of each compartment on the basis of simple ratio & proportion method.

The abstract of same (Growing stock) in No. of trees is given below :-

The detailed abstract of each felling series (total Seven) are enclosed with this for ready references.

For fixing unit values of different species for different diameter class prescription of existing plan is taken into account, as its result is quite satisfactory.

Unit Value :- Analysis for unit value established according to Rajhans working plan were based on the out-turn figures circle of the seven blocks. On analysis the following unit values were fixed which have worked quite satisfactorily.

Dia. class	Girth Class	Unit value	Commercial out turn in cft. (M <sup>3</sup> )
8'-12'	60-91	1/3	5.3 cft. (.15) M <sup>3</sup>
12'-16'	91-122	1	16 cft. (0.44307) M <sup>3</sup>
16'-20'	122-132	2	32 cft. (0.90614) M <sup>3</sup>
20'-24'	153-184	3	48 cft. (1.35921) M <sup>3</sup>
24'-28'	184-214	4	64 cft. (1.81228) M <sup>3</sup>
28' & above	214 & above	5	80 cft. (2.26535) M <sup>3</sup>

All the 1<sup>st</sup> class trees, namely Bija, Gamhar, etc. will have the same value as that of Sal. In case of dry trees of 1<sup>st</sup> class, it will be 1/3<sup>rd</sup> of its green counter parts.

For 2<sup>nd</sup> class species green and dry tree will have  $\frac{1}{2}$  &  $\frac{1}{4}$  th respectively of the unit value of their sal counterparts.

The details of No. of trees enumerated for different girth class & species in the field and calculated for the entire forests area (for selection working circle only) in abstract form is opened here.

Calculation for No. of trees are based on sample rate & proportion method fore (class I group tree) i.e. the trees of exploitable diameter class for different major species in different felling series.

#### Selection cum improvement fellings

The main object is to exploit the to bigger trees in time to prevent them from deterioration. This will consists of removal in a certain proportion of the exploitable trees that are silviculturally available and the same time maintaining and improving the soil cover, tending the younger age gradation and ameliorating the soil condition so as to induce recruitment of sal and other species of economic importance.

Briefly, in selection felling every tree of and above exploitable diameter subject to the prescribed percentage limitation shall be removed unless there is definite Silvicultural reason for no providing it.

#### Rotation

Since the yield has been fixed by the percentage removal of selection trees existing at the time of marking, the collation of rotation assume a theoretical interest.

The average quality of the crop in this division is quality IV, it follows the growth curve of site quality IV of all India yield table, according to which an average crop diameter of 40.64 cm (16") at which the exploitable diameter of sal has been fixed, will require an expected age of 120 years.

#### Felling cycle :-

A felling cycle of 20 years as in previous working plan has been prescribed.

Exploitable diameter :-

As per the prescriptions of previous Rajhans plan, the exploitable diameter of different specie are fixed as follows with a condition that their exploitable will depend only in Silvicultural availability.

Spp.	Diameter
Sal	40.64 cm (16")
Bija	45.72 cm (18")
Gamhar	50.80 cm (20")
Karam	50.80 cm (20")
Asan	45.72 cm (18")
Dhaura	40.64 cm (16")
Semal	61.00 cm (24")
Kadam	61.00 cm (24")
Other species	50.80 cm (20")

Calculation of growing stocks

3% enumeration (Random stratified sampling) was carried out for the whole selection working circle of this division in all seven felling series.

Abstract – Total no. of trees available above exploitable diameter. (In selection working circle area) (on the basis of sample enumeration of all the trees of and above exploitable diameter).

Sl. No.	Name of felling series	Area in S.W.C. in ha.	No. of sal trees	No. of other important trees	Total no. of trees available
1	Tholkabad	5869.22	1,24,469	26,247	1,50,716
2	Ankua	10949.80	2,23,838	62,705	2,86,548
3	Ghatkuri	9803.63	3,12,568	48,240	3,60,808
4	Samel	8117.40	1,45,807	22,531	1,68,355
5	Kodalibad	2906.88	43,434	10,977	54,411
6	Tirilposi	8463.98	1m58m622	32,836	1,91,158
7	Karampada	4031.38	1,05,189	13,831	1,19,016
	Total	49242.50	11,14,727	2,16,569	13,31,296

Note :- Other important spp. includes the enumeration of Asan, Dhaura, Jamun, Mahua, Karam, Bija, Semal, Kadamb and other miscellaneous spp.

This chart clearly shows that a total of 13,31,296 trees above exploitable girth class are available in selection working circle area.

## Regulation of yield

The yield is regulated by area. In the given area of the annual coupe only the prescribed percentage of selection trees will be marked and not all the trees.

The percentage to be marked in different felling series is based on the Smithess formula, which define the yield available during the felling cycle, taking the value of 'I' and 'Z' from the Rajhans plan, the yield percent were fixed for different felling series as follows :-

Sl. No.	Felling series	Percentage of yield
1	Ankua	33% of 40.64 cm dia & above
2	Ghatkuri	33% of 40.64 cm dia & above
3	Karampada	33% of 40.64 cm dia & above
4	Tholkabad	33% of 40.64 cm dia & above
5	Samta	33% of 40.64 cm dia & above
6	Kodalibad	33% of 40.64 cm dia & above
7	Tirilposi	40% of the 40.64 cm dia & above

That is to say in Ankua, Ghatkuri, Karampada, Tholkobad, Samta and Kodalibad felling series, one tree in three of markable green sal "Selection tree" of and over 40.64 cms diameter shall be marked for felling provided these are silviculturally available.

Felling Plan :- The sequence of felling together with the area of annual coupes of the sal selection working circle is prescribed as follows :-

### YEAR 2001-2002

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	Ankua	Ankua 32 (P)	123.07			
		Ankua 33	49.96		506.12	1732
		Ankua 51	138.36	506.12		
		Ankua 53	194.73			
2	Ghatkuri	Ghatkuri2 (P)	160.00			
		Ghatkuri 1	238.05	398.05	398.05	2120
3	Karampada	Karampada 9	114.97	114.97	114.97	448
4	Kodalibad	Kodalibad 12	138.05			
		Kodalibad 13	91.49	229.54	229.54	567

5	Tholkabad	Tholkabad 25	76.51			
		Tholkabad 31	69.23	145.74	145.74	492
6	Tirilposi	Tirilposi 28 (P)	65.00			
		Tirilposi 27	167.20			
		Tirilposi 22	180.97			
		Tirilposi 24	60.72			
		Tirilposi 7 (P)	136.00	609.89	609.89	2152
				<b>Total:-</b>	<b>2004.31</b>	<b>7511</b>

Note :- These coupes were to be felled in year 1995-96 of the previous Rajhans working plan but it could not be felled that time due to some unavoidable reasons. So these coupes has been proposed for felling in the very first year of Saranda Development Plan.

#### YEAR 2002-2003

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 50	144.12			
		Ankua 52	83.80			
		Ankua 54	148.98	376.90	376.90	1290
2	Ghatkuri	Ghat.12 (P)	110.93			
		Ghat. 5 (P)	100.00			
		Ghat. 11	148.58	359.51	359.51	1915
3	Karampada	Karampada 2	134.41			
		Karampada 33	76.11	210.52	210.52	820
4	Kodalibad	Kodalibad 4 (P)	170.00	170.00	170.00	420
5	Tholkobad	Tholkabad 33	25.10			
		Tholkabad 34	118.21			
		Tholkabad	106.47			
		Tholkabad	45.74	295.52	295.52	998
6	Samta	Samta 28	101.61			
		Samta 26	172.46	274.07	274.07	748
7	Tirilposi	Tirilposi 7 (P)	136.03			
		Tirilposi 1	117.00			
		Tirilposi 52	150.60	403.63	403.63	1424
				<b>Total:-</b>	<b>2090.15</b>	<b>7615</b>

YEAR 2003-2004

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 23	158.29			
		Ankua 22	100.80			
		Ankua 27 (P)	172.46	431.55	431.55	1477
2	Ghatkuri	Ghat.22	111.74			
		Ghat.25	151.82	263.56	263.56	1404
3	Karampada	Karampada 1	15.78			
		Karampada 3	136.03	181.81	181.81	591
4	Kodalibad	Karampada 5 (P)	100.00	100.00	100.00	247
5	Tholkobad	Tholkabad 37	133.19			
		Tholkabad 32	90.68			
		Tholkabad 26	80.97	304.84	304.84	1030
6	Samta	Samta 25	129.55			
		Samta 22	138.86			
		Samta 23 (P)	103.00	371.41	371.41	1013
7	Tirilposi	Tirilposi 2	185.82			
		Tirilposi	225.50	441.32	441.32	1451
				<b>Total:-</b>	<b>2034.49</b>	<b>7213</b>

YEAR 2004-2005

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 27 (B)	150.00			
		Ankua 21	107.28			
		Ankua 17	83.40	340.68	340.68	1166
2	Ghatkuri	Ghatkuri 24	195.84			
		Ghat. 27 (P)	100.00	295.84	295.84	1576
3	Karampada	Karampada 4	135.22	135.22	135.22	527
4	Kodalibad	Kodalibad 5 (b)	104.04	104.04	104.04	257
5	Tholkobad	Tholkabad 22	172.46	172.46	172.46	582
6	Samta	Samta 23 (B)	100.23			
		Samta 24	153.84			
		Samta 46	144.53	398.6	398.6	1087

7	Tirilposi	Tirilposi 9 (B)	181.78			
		Tirilposi 11	191.09			
		Tirilposi 9 (P)	100.00			
		Tirilposi 13 (P)	138.86	611.73	611.73	2158
				<b>Total:-</b>	<b>2058.57</b>	<b>7353</b>

YEAR 2005-2006

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 18	171.65			
		Ankua 16 (P)	162.34	333.99	333.99	1143
2	Ghatkuri	Ghatkuri 28	163.15			
		Ghat. 29 (P)	200.00	363.15	363.15	1935
3	Karampada	Karampada 5	131.13			
		Karampada 6 (P)				
4	Kodalibad	Kodalibad 6 (P)	122.26			
		Kodalibad 4 (P)	60.36	182.62	182.62	451
5	Tholkabad	Tholkabad 28	125.91			
		Tholkabad 29	151.01	276.92	276.92	936
6	Samta	Samta 47	144.53			
		Samta 48	96.35			
		Samta 45	180.16	421.04	421.04	1150
7	Tirilposi	Tirilposi 8	86.43			
		Tirilposi 10	105.66	192.09	192.09	677
				<b>Total:-</b>	<b>2000.94</b>	<b>7192</b>

YEAR 2006-2007

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	Ankua	Ankua 20	256.68			
		Ankua 25 (P)	40.48			
		Ankua 24	214.58	511.74	511.74	1425
2	Ghatkuri	Ghatkuri 29 (B)	134.82			
		Ghat. 31	67.20			
		Ghat. 32	25.51	227.53	227.53	790
3	Karampada	Karampada 6 (b)	100.81			
		Karampada 7	176.92	227.73	227.73	825

4	Kodalibad	Kodalibad 6 (P)	151.82	151.82	151.82	650
5	Tholkabad	Tholkabad 27	57.89			
		Tholkabad 30	92.71			
		Tholkabad 41 (P)	80.97	231.57	231.57	825
6	Samta	Samta 42	98.78	179.75	179.75	810
		Samta 44 (P)	80.97			
7	Tirilposi	Tirilposi 13	200.00	400.00	400.00	1200
		Tirilposi 14	200.00			
			<b>Total</b>	<b>1980.14</b>	<b>1980.14</b>	<b>6525</b>

YEAR 2007-2008

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	Ankua	Ankua 25 (P)	253.44	253.44	253.44	925
2	Ghatkuri	Ghatkuri 26 (P)	375.30	375.30	375.30	1370
3.	Karampada	Karampada 18 (P)	242.92	242.92	242.92	880
4	Kodalibad	Kodalibad 6 (B)	44.53	125.50	125.50	430
		Kodalibad 7 (P)	80.97			
5	Tholkobad	Tholkobad 41(B)	152.22	152.22	152.22	540
6	Samta	Samta 44 (B)	240.48	240.48	240.48	780
7.	Tirilposi	Tirilposi 12	157.08	394.74	394.73	1440
		Tirilposi 15	237.65			
			<b>Total:-</b>	<b>1784.59</b>	<b>1784.59</b>	<b>6365</b>

YEAR 2008-2009

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 40	302.43	561.54	561.54	1740
		Ankua 41	259.11			
2.	Ghatkuri	Ghatkuri26 (B)	24.70	146.15	146.15	460
		Ghatkuri (P)	121.45			
3.	Karampada	Karampada 17 (P)	202.43	243.41	243.41	750
4.	Kodalibad	Kodalibad 7 (P)	151.82	151.82	151.82	480
5.	Tholkobad	Tholkobad 42	91.90	260.72	260.72	860
		Tholkobad 43	15.38			

		Tholkobad 44	61.94			
		Tholkobad 45 (B)	91.50			
6	Samta	Samta 38	197.97	338.86	338.86	1080
		Samta 39	15.79			
		Samta 40	99.19			
		Samta 41	25.91			
7.	Tirilposi	Tirilposi 16	99.19	394.73	394.73	1270
		Tirilposi 17	52.63			
		Tirilposi 20	95.14			
		Tirilposi 39	147.77			
			<b>Total:-</b>	<b>2088.23</b>	<b>2088.23</b>	<b>6640</b>

YEAR 2009-2010

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 42	364.77	364.77	364.77	1190
2	Ghatkuri	Ghatkuri 23 (B)	227.53	475.70	475.70	1550
		Gjatkuri 21	248.17			
3	Karampada	Karampada 16	63.16	209.31	209.31	660
		Karampada 17 (P)	146.15			
4	Kodalibad	Kodalibad 7 (B)	41.70	142.91	142.91	480
		Kodalibad 8 (P)	101.21			
5	Tholkabad	Tholkabad 47 (P)	283.00	283.00	283.00	920
6	Samta	Samta 35	144.53	428.74	428.74	1400
		Samta 36 (P)	161.94			
		Samta 37	122.27			
7	Tirilposi	Tirilposi	125.91	125.91	125.91	410
			<b>Total</b>	<b>2030.34</b>	<b>2030.34</b>	<b>6610</b>

YEAR 2010-2011

Sl. No.	Name of felling series	Block & compt. No.	Area in ha.	Total area in ha.	Area of the annual coupe	Expected total no. of trees available for felling
1	2	3	4	5	6	7
1	Ankua	Ankua 43 (B)	131.98	590.68	590.68	1170
		Ankua 44	314.57			
		Ankua 45	144.13			
2	Ghatkuri	Ghatkuri 18 (P)	202.43	499.59	499.59	1520

		Ghatkuri 20	297.16			
3	Karampada	Karampada 19	166.80	227.53	227.53	680
		Karampada 20 (P)	60.73			
4	Kodalibad	Kodalibad 8 (B)	40.48	151.82	151.82	460
		Kodalibad 9 (P)	111.34			
5	Tholkabad	Tholkabad 47 (B)	35.22	217.00	217.00	640
		Tholkabad 46	181.78			
6	Samta	Samta 36(B)	52.22	414.97	414.97	1230
		Samta 4	30.36			
		Samta 13	133.60			
		Samta 14	198.78			
7	Trilposi	Trilposi 47	242.91	242.91	242.91	750
			Total	2344.56	2344.50	7050

Estimation Timber quantity and Revenue Unit Value :-

The unit value is taken as it is Rajhans plan in which it was based on the out turn figures of a total of 21057 sound trees in each diameter class representing both conversion as well as selection working unit value has been fixed which have worked quite satisfactorily.

Dia. Class in inch	Girth class in cm.	Unit value	Commercial out turn in cft (P) in M <sup>3</sup>
8"-12"	60-90	1/3	5.3 (0.15M <sup>3</sup> )
12"-16"	91-122	1	16(0.45307 M <sup>3</sup> )
16"-20"	123-152	2	32(0.90614 M <sup>3</sup> )
20"-24"	153-184	3	48(1.35921 M <sup>3</sup> )
24"-28"	184-214	4	64 (1.81228 M <sup>3</sup> )
28" and above	214 & above	5	80 (2.2653 M <sup>3</sup> )

In selection working circle felling of trees of dia class 16" and above is only prescribed so a minimum out tum of timber per tree may be taken as 2 unit/tree i.e. 32 cft. or 0.90614 M<sup>3</sup>/tree.

On the basis of the timber rates determined by the C.C.F. cum Director, State Trading Bihar vide his Office order No. 61 dated 20<sup>th</sup> October, 1977, the lowest rate for logs of mid girth class 120 cm to 150 cm is Rs. 7697/M<sup>3</sup> and for mid girth class 90 to 120 is Rs. 6561/M<sup>3</sup>. So taking the lower range Rs. 6561 M<sup>3</sup>, the year wise estimated value and quantity of timber and revenue be estimated as follows :-

Sl. No.	Year	Area in Ha.	No. of trees to be extracted	Estimated quantity of timber in M <sup>3</sup> @ 2units/tree or 090614 M <sup>3</sup> trees	Estimated Revenue (Rs. Rounded in lakhs) @ Rs. 6561/M <sup>3</sup>
1	2001-02	2004.31	7410	6714.497	440.538
2	2002-03	2090.15	7415	6719.028	440.835
3	2003-04	2034.49	7210	6533.269	428.647
4	2004-05	2058.57	7050	6388.287	419.135
5	2005-06	2000.94	7045	6383.756	418.838
6	2006-07	1980.14	6525	5912.563	387.923
7	2007-08	1784	6365	5767.581	378.411
8	2008-09	2088.23	6640	6016.770	394.760
9	2009-10	2030.34	6610	5989.585	392.976
10	2010-2011	2344.50	7050	6388.287	419.135
	TOTAL	20416.26	69320	62813.623 M <sup>3</sup>	Rs. 4121.198 or Rs. 4121.20 lakhs

Apart from this some more timber and Revenue may also come through the removal of dead dying diseased and illicit felled in conversion, coppice and also from the removal of thinning polls from the thinning coupes.

Out of this revenue 30% (approx) will be the cost of logging and marketing etc. This cost will include all types of expenditure from felling trees and marketing of timber.

Estimated Cost	Rs. in Lakh
2001-02	132.161
2002-03	132.250
2003-04	128.594
2004-05	125.740
2005-06	125.651
2006-07	116.377
2007-08	113.523
2008-09	118.428
2009-2010	117.892
2010-2011	125.740
Total	1236.356 (lakhs)

Silvicultural availability :-

The exploitable tree will be said to be silvicultural available for following when:-

- Its removal does not cause any lasting break in the company.

- (b) There are sufficient number of established seedling sapling or poles of the same or other superior species, to take its place after removal 'or'
- (c) It forms part of a congested crop and its removal may be justified on above principles. Silvicultural availability will have overriding priority over every considerations.

Marking Rules :-

The following principle shall govern the marking in each annual coupe subject to their Silvicultural availability.

- (1) Marking of trees in different felling series will be done according to the percentage prescribed in that felling series.
- (2) Trees, other than Sal, like Bija, Gamhar, Asan, Karam, Bhurkund, Siris, Jamun, Sidha, Panjam and Dhaura shall be marked according to their exploitable diameter fixed as shown in earlier paragraphs.
- (3) All dry, hollow dead and diseased trees will be marked.
- (4) Mature and over mature trees shall always be marked first in preference to those trees which, though over 16" diameter (P) 40.64 cm) are still young and growing.
- (5) Trees standing over young growth shall be marked before those which have no such crop around them.
- (6) Preference for retention shall be given to more valuable species, but on the whole a well grown sound stem of inferior but marketable species should be favoured over super species.
- (7) All climbers shall be cut.

Method of executing the fellings :-

Felling will be controlled numerically in accordance with the yield fixed. The main object is to utilize the most mature which are silviculturally available so that only the vigorous trees are retained for putting up increment. Mature trees always get preference at the time of marking. It must however be emphasized that silvicultural availability will get over-riding priority over any other considerations. Accordingly it follows that only those trees are marked which are undoubtedly silviculturally available.

Work of improvement :-

In the year following the main felling the following silvicultural operations are prescribed :

- (i) Cutting back of damaged stems of valuable spp.
- (ii) Girdling or felling of only those marked trees, left unfelled by some reason, whose removal is silviculturally desirable.
- (iii) Cutting back of badly grown saplings or poles of Sal, Bija, Gamhar, Panjan and other superior spp.
- (iv) Groupe of sal saplings or poles should be properly thinned even though the produce there of may not be saleable.
- (v) Climber cutting
- (vi) In open area or blank, where regeneration is to be induced, cleaning and climber cutting shall be carried out year after year till the need may exist.

Soil Conservation works :- Digging of contour trenches are prescribed in the areas which are in higher slopes having less regeneration due to desiccation. These contour trenches will conserve the soil erosion also. The desired specification of contour trenches may be given as :-

Size – 10m x 45 cm x 45 cm  
Spacing along the contour – 3m  
Along the slope – 7.5 m  
No. of contours per Ha. – 70

Pilling of soil so dug will be placed down side of the contour trenches and its proper dressing.

Fire Protection and Grazing :- The entire working circle will be protection from and grazing as by adoption of measures as dealt in detail in the respective chapters of Saranda Development Plan.

Other Regulations :- If during the execution of 5 years of plan period, the felling and removal of trees from the selection working circle is done as per prescription, and in the mean time protection measures for the betterment of Saranda Forest from illicit felling (in the name of Jharkhand Felling) encroachment, fire-control, grazing-control, etc. are applied successfully,

then only the removal of the selection trees will be continued for further 5 years of rest plan period.

For this a detailed review will be carried out under the leadership of Divisional forest officer, Saranda and review report with his opinion for further felling will be produced to working plan Officer, Southern Circle, Chaibasa. He will verify the results and consequently send his recommendation to Conservator of Forests, Working Plan & Research Circle, Ranchi. On obtaining the approval from Conservator of Forests, Working Plan & Research circle, Ranchi, the execution of felling proposal will be continued in the selection working circle as per details made by Working Plan Officer, Southern Circle, Chaibasa.

If needed on the basis of review results necessary modification may be implemented by the Working Plan Officer, Southern Circle, Chaibasa.

## WORKING PLAN FOR REHABILITATION WORKING CIRCLE

In this working circle the plantation working circle of the previous plan is merged together.

This working circle will cover all those areas which are mostly damaged, burnt and encroached by the Jharkhand agitationists and afterwards; these are –

- (a) Parts of forests which were under sal conversion working circle in the previous plan and were illicitly felled by Jharkhand agitationists.
- (b) Parts of forests, which were under selection working circle in the previous plan, which are facing the problem of successful regeneration.
- (c) Whole of the areas of plantation working circle of the previous plan.

Also, such forests which are prone to soil erosion, rooted waste, blanks or semi-blanks have been included in this working circle. Areas of above description are extensive and are result of Jharkhand Agitation, which is still continuing though in lower intensity. Uncontrolled fire, indiscriminate fellings, heavy encroachment, backing in the forests close to habitations and failure of earlier efforts to rehabilitate them, are included in this circle. In most of the areas the prominent spp. of sal is struggling for regeneration and establishment. Consequently the soil is becoming prone to erosion.

In Saranda, teak and semal plantations were raised since 1951 by cutting down all the moist miscellaneous patches. Although inclusion of teak in this famous natural Sal zone, which is the climax spp. in its succession was not technically wise, but till 1977, total of 2423.72 ha. of teak plantations were raised. Apart from this, semal plantation was also raised from 1941 to 1972 in Ha. area, which was almost a failure.

The plantation of teak was stopped since 1977 due to peoples resentment in these areas. Even, during the previous plan period, no teak-plantation was prescribed. Now-a-days, teak plantation have become the main point of affection for forest-offenders since the market value of teak is very high. As a result almost large area of teak plantation were illicitly felled by offenders.

OFFICIAL OBJECTS OF MANAGEMENT :- The special objects of management of these areas are as follows :-

- (a) To rehabilitate the area as fast as possible.
- (b) To bring under stocking such areas, which are blank, partially stocked, encroached and burnt area.
- (c) To rehabilitate rooted waste of valuable spp. e.g. sal etc.
- (d) To minimize the loss of soil and run off.
- (e) To meet the ever increasing demand off forest produce by local people.
- (f) To nurse and toster the existing plantation by timely cleaning tending, thinning, climber cutting and fire protection etc.
- (g) To restock such areas where plantations were raised earlier, but ultimately failed.
- (h) To carryout regular cleaning, climber cutting and fire protection measures in worked over areas where neutral regeneration of sal and other valuable associate Spp. have come up in its place.
- (i) To generate employment for local villagers.

Area :-

Total area under this working plan is given in Appendix – I.

Method of Treatment

The treatment will be rehabilitating the rooted waste (both sol rooted waste and plantation rooted waste) depending upon the site condition.

The details of method of treatment has been given in Government resolution No. 0-6179-1371 dated 13/14.09.1979 and the book “Vanropan Padhati” published by the C.C.F. (Dev.), Bihar.

From the experiences, it has been observed that sal and other miscellaneous spp. again appear in bunches, if the rooted waste area is served from fire, grazing and interference of biotic factors etc. soil erosion may be minimized by following the step as given in the “Green Book”.

In no case, under rehabilitation scheme of block plantation scheme, cleaning of natural growth is allowed; because in earlier instances, moist miscellaneous patches of natural growth have been converted into Teak and Salai plantation; which resulted in degradation of site quality and drying up of perennial Nalas etc. Hence, only plantations will be done in the gaps and natural crops of regeneration will be encouraged to come up and managed silviculturally. The main idea of this W.C. is to facilitate growth of miscellaneous natural forest.

Exploitation :- The teak plantation in this Division have responded very well. Lack of departmental exploitation scheme in the past resulted in haphazard illicit felling of Teak by forest smugglers, which hampered the normal management of forests in a serious manner.

Therefore, it is being prescribed here, to mark and fell the teak trees having d.b.h. above 12" (or 30.48 cm) over a period of time depending upon the area control. It will provide considerable amount of revenue which are liable to be a waste otherwise.

#### Subsidiary regulations

The plantations are generally attended up to 3<sup>rd</sup> year. No other operation is done thereafter. It is expected that the plantation would get fully established within 3 years of planting and keep growing without any hindrance and ultimately it would result a good manmade forest. However, this expectation is highly impractical. The plantations do need subsequent operations either over entire area or a part there of.

It is therefore prescribed that besides a few attending the planted areas for first three years, the following operations will be done in the 5<sup>th</sup> year.

- (1) Hoeing would be done all over the plantation.
- (2) Interference in growth by inferior spp. climber etc. would be removed.
- (3) Seedlings of sal or any natural and valuable species, if any should be encouraged.
- (4) Cleaning in the cut back area would be done leaving 2 to 3 shoots per stumps.
- (5) Wherever growth is abnormally not up to the mark application of fresh dose of fertilizer, insecticide or straightening of fencing etc shall be done.

## Other Regulation

It has been observed that the regeneration is not a problem in Saranda and it is coming exceptionally good. This is probably due to the pre-monsoon showers, usually in the end of April. This shower helps sal-seeds to regenerate easily provided with good site conditions.

But Saranda has suffered badly by the planned and continuous illicit felling started since 1980 in this Division by so called Jharkhand Activities, which is still a serious problem. The innocent tribals are wrongly motivated by the leaders to clear fell the forests along the nallah and valleys etc. for cultivation and further settlement. From 1980 to December, 1988 a total of 2762.63 hec. of forest land of this Division has been illicitly felled and cleared for cultivation by Jharkhand activities.

TABLE – 1

Sl. No.	Year	Illicit felling (in areas)
1.	1980	1212.50
2.	1981	454.20
3.	1982	10.00
4.	1983	80.00
5.	1984	789.10
6.	1985	419.50
7.	1986	116.00
8.	1987	271.00
9.	1988	609.00
10.	1989	686.50
11.	1990	586.10
12.	1991	455.00
13.	1992	411.00
14.	1993	107.00
15.	1994	93.05
16.	1995	20.00
17.	1996	35.00
18.	1997	177.00
19.	1998	381.38
	Total	2762.63 hec. (3.22%)

TABLE – II

## BLOCK WISE AND P.F. WISE ILLICITLY FELLED FOREST AREA

Sl. No.	Block	Illicitly felled areas (in ha.)	Total area
1.	Ankua	605.80	16231.174
2.	Ghatkuri	486.64	12466.801
3.	Tholkabad	242.60	10658.299
4.	Tirilposi	284.00	12365.627
5.	Samta	264.00	13224.493
6.	Karampada	219.60	11695.546
7.	Kudalibad	149.20	4752.226
	P.F.S.		
8.	Rabangda-sunsuna PF	18.80	887.360
9.	Sagjuri P.F.	27.60	162.260
10.	Baheda P.F.	24.60	24.930
11.	Sonapi P.F.	110.00	700.000
12.	Jojobutu	52.40	202.950
13.	Marangponga P.F.	45.20	180.600
14.	Chhotanagpur P.F.	23.00	104.250
15.	Dhobil P.F.	35.20	306.250
16.	Kasiapecha P.F.	43.60	646.390
17.	Nuia P.F.	4.84	151.170
18.	Baraiburu P.F.	27.80	360.080
19.	Gua P.F.	41.00	135.200
20.	Tagaidaburu P.F.	34.40	56.830
21.	Karujagdaburu P.F.	4.00	34.860
22.	Sutriburu P.F.	22.80	22.400
23.	Kurkatapai P.F.	12.71	23.600
	Total	2762.63 (3.22%)	85654.15

It is estimated that approximately 70% of such felling has occurred in the conversion working circle area. Most of the areas are still under the control of local villagers.

So, it is prescribed to rehabilitate all these areas by making an effort of 200 Ha. rehabilitate scheme each year as a minimum target. This may be extended as the availability up fund etc. (Rehabilitation scheme for 10 years).

Regulation of grazing :- Grazing must be stopped for at least 5 years in the rehabilitate areas.

Regulation of fire :- Fire has to be kept in control in afforested areas and taken up for rehabilitation. Fire control measures are dealt in great detail in miscellaneous regulation chapter.

### WORKING PLAN FOR PROTECTION WORKING CIRCLE

General constitution :-

This working circle will comprise of all areas of this working circle of previous Rajhan's plan i.e. 4979.97 ha. in addition to this, preserved trees, sample plots and certain patches or stripes of unique flora will form part of this working circle.

In general, this working circle will cover the areas of hill tops, where soil-erosion is a problem and natural regeneration require special attention.

Special objects :- The special objects for constituting this working circle are

- (1) To prevent soil erosion and land slides on the steep mining faces at Chiria, Gua, Kiruburu and Meghahatuburu and to ensure safety of mining labour, staff and structures etc. from falling earth and boulders.
- (2) To continue maintenance of the preservation plots and to protect individual trees of specially large dimensions to serve as proud symbols of the majesty and potentialities of these forests.
- (3) To perpetuate patches of rather unique and interesting flora as it exists around LIGIRDA SWAMP (in Tholkabad 160 in the damp ravines of ever-green type of cooler and moist region of Karampada and Tholkabad blocks.
- (4) To preserve and develop certain areas for their scenic worth.

Area and distribution : - The following table shows the area slotted to this working circle together with its location and purpose :-

Sl. No.	Name of block	Compartment or P.F. No.	Areas		Remarks
			In acres	In hect.	
1	Tholkabad	16 (part)	71.00	28.74	Ligirda swamp & a strips of three chain width around, extended on the southern side to include the caves.

					The area of the swamp should further be extended from both the sides along its length.
2	Ankua	10 (P)	296	188.21	Steep mining
		11	536	217.00	Face of Chiry including preservation plots no. 3 (23.02 ha.)
		12	869	351.82	Face of Chiry including preservation plots no. 3 (23.02 ha.)
		20	204	82.59	Steep Mining face
		21	117	47.36	Steep Mining face
		22	41	16.59	Steep Mining face
		25 (P)	5	2.02	Preservation plot No. 2
		27	4	1.61	Preservation plot No. 2
		44 (P)	20	8.09	Preservation plot No. 4
3	Ghatkuri	17	250	101.21	Steep Mining face
		18	25	10.12	Steep Mining face
		19	1001	405.26	Steep Mining face
	Total	30	580	234.81	Steep Mining face
		31	465	188.25	Steep Mining face
		32	578	234.00	Steep Mining face
4	Karampada	1	49	19.83	Steep Mining face
		2	9	3.64	Steep Mining face
		22	59	23.88	Steep Mining face
		23	839	339.67	Steep Mining face
		24	691	279.75	Steep Mining face
		25	42	17.00	Steep Mining face
		27	164	66.39	Steep Mining face
		29	163	65.09	Steep Mining face
		30	813	329.14	Jilingburu Mining area
		31	1264	511.74	Jilingburu Mining area
		32	1000	404.85	Jilingburu Mining area
		33	660	267.20	Jilingburu Mining area
		34	180	72.87	Sarada Mining area
		35	14	5.66	Sarada Mining area
		36	611	247.36	Sarada Mining area
5	Gua P.F.	38	333.95	135.20	Steep mining face including
6	Baraiburi P.F.	37 B	289.00	117.00	Reservation plot no. 1 (14.54 ha.)
7	Bahada P.F.	19	61.60	24.93	Preserved area for its scenic beauty.

Besides the above, following areas are recommended to be preserved.

These will get demarcated by the Divisional Forest Officer.

- (i) The patch containing natural regeneration of Kadamba in Rangangra valley (in Tholkabad comp. 21)
- (ii) Patch containing natural regeneration of Dhaura on the border of the compartment 11 and 12 (on the forest road going towards Naogaon).
- (iii) Patch contain natural regeneration of Chloroxylon swietenia in Ankua 46 compartment.
- (iv) The area around Tybo fall in Tholkabad 25 compartment.
- (v) Any other patch or strip of unique and interesting flora, chiefly found in the ravines of perennial streams of Saranda slopes.
- (vi) Individual preserved trees as listed in Appendix.

(a) On precipitous hill faces, where iron ore mining is at present in progress, no felling of trees shall be allowed except in a portion where felling etc. will be done only after getting the written permission of the Divisional Forest Office and the trees to be felled, properly marked by the forester of the locality. A list showing the mining areas currently under lease in this division are given below:-

Sl. No.	Name of the Lease	Block	Lease Period	Lease area in Ha.	Broken area before 25.10.80 (in ha.)
<b>(A) IISCO, GUA</b>					
1	Duarguiburu	Ghatkuri	22.7.99 to 21.7.2000	144.846	274.691 ha
2	Jilingburu I	Ghatkuri	12.5.1950 to 11.05.1980	210.437	160.089 ha
3	Jilingburu II	Ghatkuri	12.5.1980 to 11.05.1980	30.44	16.00 ha
4	Topailore	Ghatkuri	09.03.1970 to 08.03.2000	14.17	14.17 ha
<b>(B) MANOHARPUR ORE MINES</b>					
5	Sukri Luthurburu	Ankua	15.07.98 to 14.7.2018	609.83	33.40 ha
6	Bhobil	Ankua	08.03.98 to 07.03.2018	513.03	29.14 ha
7	Ankua	Ankua	18.12.75 to 07.12.2005	823.967	559.81 ha
8	Ajitaburu	Ankua	07.12.47 to 06.12.77	323.88	159.51 ha
9	Loliburu	Ankua	22.03.49 to 30.06.92	38.40	34.40 ha

10	Ankua	Ankua	14.06.82 30.06.92	to	67.178	-
<b>(C) KIRIBURI IRON ORE MINES</b>						
11	Kiriburu	Karampada	28.0390 27.03.2020	to	1936.86	(i) 608.07 (ii) 5.20
12	Meghahatuburu	Karampada	06.01.73 30.09.2003	to	879.439	52.30
13	Ragsing Dam	Karampada	06.01.73 30.09.2003	to	97.76	97.76
14	Kumdi Dam	Karampada	06.01.73 30.09.2003	to	68.90	68.90
15	M/s Shah Brothers	Karampada	10.07.72 29.07.2002	to	233.99	24.856
16	M/s M. L. Jain	Ghatkuri	28.07.72 27.07.2002	to	202.35	49.200
17	M/s Nirmal Kumar Pradeep Kumar	Ghatkuri	28.07.93 27.07.2013	to	149.734	13.960
18	M/s Rungta Mines	Ghatkuri	09.10.73 23.01.99	to	227.54	41.319
19	M/s R. Mc. Dill	Ghatkuri	10.05.76 09.05.96	to	110.08	36.340
20	M/s Singhbhum Mineral com.	Ghatkuri	12.12.76 11.12.96	tio	141.64	18.60
21	M/s T.P. Sao	Ghatkuri	05.02.74 04.02.94	to	202.347	53.546
22	M/s Rameshwar Jute Mills	Ghatkuri & Tateba Baraiburu P.F.	28.05.66 27.05.86	to	134.992	23.233
23	M/s Orissa Manganese & Minerals Ltd.	Ghatkuri	14.01.56 09.08.76	to	276.628	141.50
24	M/s Debikabai Bheljee	Ghatkuri	14.09.53 03.08.83	to	46.62	14.36
25	M/s KJS Ahluwalia	Ghatkuri & Baraiburu-Tateba PF	05.09.89 04.09.2009	to	129.499	2.03
26	M/s KJS Ahluwalia	Ghatkuri & Baraiburu-Tateba PF	05.07.69 04.07.89	to	250.762	24.75
	<b>TOTAL AREA</b>				<b>9165.319</b>	<b>2557.404</b>

(b) Abandoned mining areas which are fully exposed causing loss of soil and moisture due to erosion and desiccation may be planted up with suitable species. A scheme

of plantation for such areas should be prepared by the Divisional Forest Officer and planting done accordingly.

(c) The individual preservation trees have been white painted numbered in the different compartments. Each compartment has serial of its own. By the legend painted on the tree it will be known in which block and compartment it is standing. Details of direction for its location have been given in Appendix. The paint on preservation plots and on these individual trees will be renewed every five years. In the sale lists it should be specially mentioned that such trees are not to be felled.

(d) Ligida swamp in Tholkabad 16 compartment contain interesting flora and therefore it should be preserved. This is a paradise for the botanist. In the preceding plan the area was exclusively contained around the swampy derision in meters width. It is now urgently felt that the area of the swamp should be increase. In extension on both the sides of the swamp along its length will be of much value and it should be got delineated on the map as well as on the ground by the Divisional Forest Officer. The caves on the southern end of the swamp should also be included in the strip. No felling what so ever shall be permitted with in this strip. But in the teak plantation on the south-western corner of the strip, however, necessary silvicultural operation may be carried out but no fellings.

Over the past years the swamp has been silting up. The main reason is the soil arisen from the steep hills around. This has further been accelerated by forest fires. It is therefore necessary to protect the catchment of the swamp from forest fires. Three tire boundaries of TK 16 should be annually cleared to a width of 6 meters and burnth once in the middle of February and second time at the end of March and finally in the first week of May each year. The irrigation channel needs repair and the pucca dam above has also become unserviceable. This may also be repaired to stop that leakage of water from bottom of the dam.

As regards the flora in some of the evergreen valleys of these mountainous slope, Mr. H.F. Mooney has given the following description which is reproduced below:-

“The deep shady, often precipitous, rocky ravines which into the N. Face of the plateau have a very special flora with several species which are not met with any where else in Singhbhum. A few typical species only are mentioned here. *Amora spectabilis* which is nearly always associated with the nettle *Laporten*, attains large dimensions and is extremely limited in its range. It usually appears immediately below the perennial spring at 2500 ft. (2650 feet in the churardagara) usually shaded by precipitous rocks. It does not extend below 2400 ft. where *Michelia* comes in it is found in the following garas kilaite

(Many) Meghahatu, Garuhatu, Poradih (few), Rogra Churarea, Maruli (few). *Mellonema simplicifolia* is common and huge Mango trees are abound. *Gentum* and *Uveria* (below 2500 ft.) which, attains a large dimension *Entada* occurs, an enormous specimen being seen in Maruligara. *Alpina malacoensis* and *Phyrnium* are with numerous forms. The giant form *Angiopteris eveote* was only observed in the three most Westernely ravines. *Visists auriculata* is generally common. *Murraya* is common. The grass *Sataria plicata* occurs at the head of the ravines over 2500 ft. with *Oplismenus* species. In the Muraligara below 2300 ft. and on basis rocks (epidiorite), *Vischofia jaevanica* occurs with *Zenthoxylone budranga*. These were not observed else where". It has not been possible to isolate and demarcate such patches in cause of the field work for this plan. It is recommended that the Divisional Forest Officer and the Forest Research Officer will select and demarcatre, on the map and on the ground areas of especially interesting and by painting trees in white on the periphery. The clearance of the line will be done annually and the white paint will be renewed once in Sasangda slopes ravines, that too will be treated in the same manner.

(e) Karampada 34 compartment of the Saucer shaped Sasangda plateau, once a thing a beauty is now the seat of two massive Iron Ore projects namely, Kiruburu and Meghatuburu projects. Though its natural beauty has been badly affected by the construction of roads, building etc. whater left now needs thorough preservation. The south-wet corner of the saucer, draining into Meghahatu nala, has been dammed up to give it a shape of a lake. This lake at an altitude of 914 meters need further beautification which will ultimately become a good tourist attraction.

Other regulations :-

- (i) Even in the lease hold area of lessee no felling of trees shall be allowed on precipitous hill faces except in a portion where felling is unavoidable for the extension of mining. GOI permission is necessary for that.
- (ii) For the renewal of mining lease renewal only in broken up areas be recommened unless the ore deposit in broken up area is completely exhausted and area properly rehabilitated.
- (iii) Fresh area shall be recommended after very careful consideration of all other alternatives and specific reason be given for it.
- (iv) Abandoned mining areas which are fully exposed and causing loss of soil and moisture due to erosion and desiccation be planted with suitable spp.

- (v) Arrangement for proper soil retaining check dams and plantation of soil binder spp. be done in mining areas to avoid the pollution of local rivers and streams.
- (vi) In the broken forest areas within the lease hold mining companies, which is being returned back to the forest Department by the lessees under the direction of Govt. of India, it is found that most of trees in these areas are heavily infested with climbers and lack of condition to establish regeneration. So cultural operation is prescribed in these areas with an average rate of 300 Ha. per annum.
- (vii) Other schemes of improvement such as contour trenches etc. may also be taken up in the required areas.

Programme for soil Conservation work.

(Model scheme for contour trench)

(A) Introduction :- The considerable part of the crop of the sal selection working circle is on the hilly undulating higher slopes and is poor in quality and deficient in regeneration chiefly because the area gets dry soon after for most part of the year. There is no controversy on the point that the contour trenches will catch and conserve the moisture in the sub soil and there by helpo to improve the regeneration and also minimize the soil erosion.

(B) Objective :-

- (i) To conserve soil and moisture in the area.
- (ii) To stop soil erosion from the hill slopes.
- (iii) To promote natural regeneration of main spp.
- (iv) To save the perennial streams originating from the area from saluation and to maintain their water flow.
- (v) To generate employment for the local people specially the tribal mass of the area.

Brief description of the works :-

- (i) Survey and alignment of contour trenches.

- (ii) Cutting and disposal of bushes etc. from the contour trench site and earth pilling site.
- (iii) Digging contour trenches of following specification :-  
 Size – 10 M x 45 cms. x 45 cms  
 Spacing – along the contour – 3 metres  
 Along the slope – 7.5 metres  
 No. of contours per Hectare – 70
- (iv) Pilling the soil so dug on the need strips on the down side of the contour trenches and its proper dressing.

(D) Area wise and year wise details :-

The area wise and year wise details of the compartments in which soil conservation operation will be taken up are as follows :-

Year	Name of the compt.	Area in ha.	Total area in ha.	
2001-2002	Ghatkuri -	80.00		
	Kudalibad – 9	70.00		
	Tholkabad – 15	60.00		
	Tholkabad – 16	90.00		
	Samta – 6	60.00		
	Samta – 11	90.00		
	Ankua – 30	50.00		
	Ankua – 32	100.00		
		Total		600.00 Ha.
	2002-2003	Tirilposi -31	50.00	
Ankua -51		50.00		
Ankua-53		50.00		
Ankua -33		100.00		
Samta -20		50.00		
Karampad -9		100.00		
Kudalibad -13		50.00		
Tholkabad-25		100.00		
Tholkabad-31		50.00		
		Total		600.00 Ha.
2003-04	Tirilposi -27	100.00		
	Ankua -52	50.00		
	Samta -28	50.00		
	Samta – 26	100.00		
	Ghatkuri -11	100.00		
	Ghatkuri -12	50.00		
	Karampada -33	50.00		

	Tholkabad -34	50.00	
	Tholkabad-35	50.00	
		Total	600.00 Ha.
2004-05	Tirilposi -7	100.00	
	Tirilposi -3	50.00	
	Ankua -22	50.00	
	Ankua -25	100.00	
	Kudalibad0-4	50.00	
	Ghatkuri -22	50.00	
	Ghatkuri-25	50.00	
	Tholkabad -32	100.00	
	Tholkabad-26	100.00	
		Total	600.00 Ha.
2005-06	Ankua-27	50.00	
	Ankua -21	50.00	
	Ankua -19	50.00	
	Tirilposi-9	50.00	
	Tirilposi-10	50.00	
	Tirilposi -11	50.00	
	Kudalibad -6	50.00	
	Ghatkuri -24	50.00	
	Ghatkuri -27	50.00	
	Tholkabad -22	50.00	
	Tholkabad -28	50.00	
	Samta -47	50.00	
		Total	600.00 Ha.

Note :- For the year from 2006-2007 to 2010-2011 every year 600 Ha. will be taken up for Soil conservation measures. The area will be selected by the DFO, Saranda will consequent of WPO Chaibasa and approval from C.F. Territorial circle work will be initiated.

(E) Amount Required

According to CCF Development's office order no. 126 dt. 24/01/98 item no. 7

Rate – 82 Mandays /Ha. = 82 x Rs. 58.64 per ha. = Rs. 4808.48 per ha.

Hence, Amount required for one year = Ra. 4808.48 x 600.00 Ha.

= Rs. 28,85,088/-

Total amount required for ten years = 10 x Rs. 28,85,088.00

= Rs. 2,88,50,880

After the 5 years execution of the above scheme, a detailed review will be done on this point for the whole division. The review will be conducted by the team organized by Divisional Forest Officer, Saranda and he will submit the review report to Working Plan Officer, Souther Circle, Chaibasa. He will verify the scheme for the rest period of the plan, otherwise on the basis of review report, if needed, he will suggested some necessary modifications with the approval of conservator of Forests, Working Plan & Research Circle, Ranchi.