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Forest Survey of India  
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RJINZ-8

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GOVERNMENT OF INDIA  
**MINISTRY OF AGRICULTURE & IRRIGATION**  
(DEPARTMENT OF AGRICULTURE)

REPORT ON  
FOREST RESOURCES OF RAJASTHAN  
(UDAIPUR FOREST DIVISION)  
VOLUME II  
METHODOLOGY ADOPTED



PREINVESTMENT SURVEY OF FOREST RESOURCES  
DEHRA DUN  
**1979**

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P A R T - I

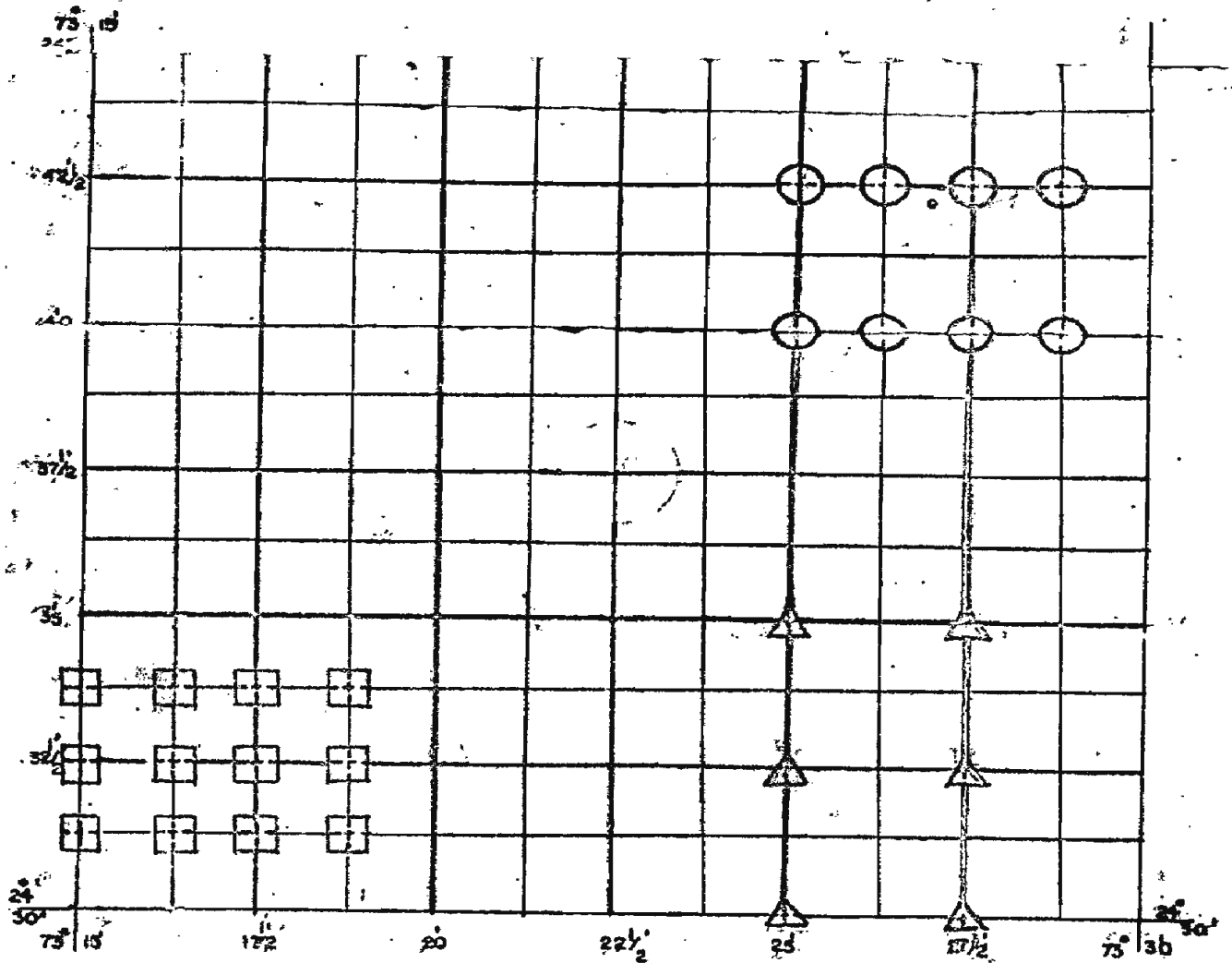
INVENTORY PROCEDURE




SECTION - I

SAMPLING DESIGN (SKETCH)

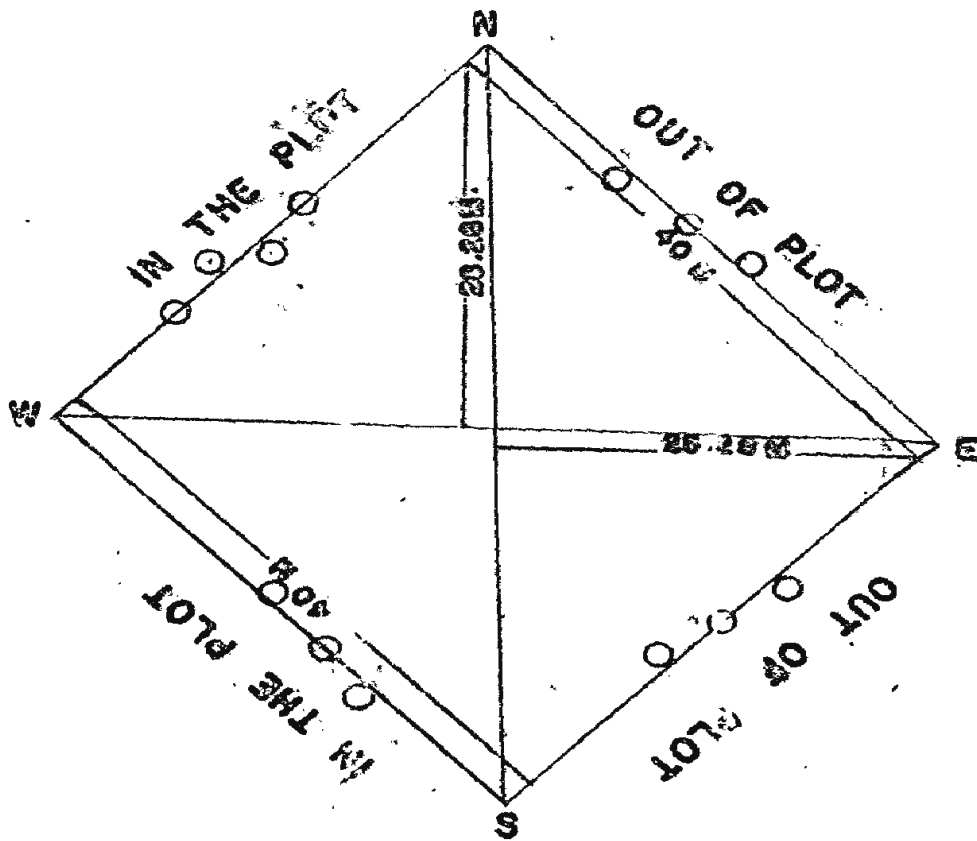
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~~GENERAL INSTRUCTIONS~~

SKETCH SHOWS THE DISTRIBUTION OF SAMPLE POINTS



1. GOCUNDA 2. KURABAR 3. BANSI 4. UDAIPUR 5. BALUMBER 6. PARSHAD 7. KUMBALGARH 8. DHARIWAD	$1/4 \times 1/4$	
1. KHERWAKA 2. PANARWA 3. JHADOL	$1/2 \times 1/2$	
1. KOTRA	$1/2 \times 1/2$	

SKETCH OF A SAMPLE PLOT



SECTION - II

GENERAL INSTRUCTIONS

SECTION-II

1. SAMPLING DESIGN

A systematic fixed plot sampling has been adopted for the survey. To begin with the sampling units were distributed systematically all over the area at a spacing of approximately  $2\frac{1}{2}' \times 2\frac{1}{2}'$ . The grid lines at  $2\frac{1}{2}'$  longitudinal and  $2\frac{1}{2}'$  latitudinal intervals were drawn on the map sheets and the cross sections of these grid lines were taken as centres of the sampling units. Later on Rajasthan Forest Department revised its requirement of survey and wanted to estimate the growing stock by Ranges and Working Circles also. Therefore, the final lay out of sampling units were systematically distributed at the intervals given below against each range :-

<u>Range</u>	<u>Interval</u>
1. Udaipur	$1\frac{1}{4}' \times 1\frac{1}{4}'$
2. Parsed	$1\frac{1}{4}' \times 1\frac{1}{4}'$
3. Salumber	$1\frac{1}{4}' \times 1\frac{1}{4}'$
4. Kurabar	$1\frac{1}{4}' \times 1\frac{1}{4}'$
5. Kherwada	$2\frac{1}{2}' \times 1\frac{1}{4}'$
6. Gogunda	$1\frac{1}{4}' \times 1\frac{1}{4}'$
7. Bansi	$1\frac{1}{4}' \times 1\frac{1}{4}'$
8. Panarwa	$2\frac{1}{2}' \times 1\frac{1}{4}'$
9. Jhadol	$2\frac{1}{2}' \times 1\frac{1}{4}'$
10. Kotra	$2\frac{1}{2}' \times 2\frac{1}{2}'$
11. Dhariawad	$2\frac{1}{2}' \times 1\frac{1}{4}'$
12. Kumbalgarh	$1\frac{1}{4}' \times 1\frac{1}{4}'$

The shape and size of sample plot, which is a square of 0.16 ha. area, is uniform all over the area.

2. INSTRUCTIONS TO CREW LEADERS

2.1 A crew leader is over all in-charge of the party and is responsible for correct location and collection of data. He should, therefore, read the instructions very carefully.

2.2 Referencing The Sample Plots.

A sampling unit will be referred to by a four digit code number of the 1" = 1 mile or 1:50,000 scale map sheet and the coordinates of the grid centres - cross section of the  $1\frac{1}{4}'$  interval longitudinal and latitudinal lines. The code numbers of the map sheets which will be relevant to survey area given below :-

46 E/1	2101	46 E/6	2106	46 E/11	2111
46 E/2	2102	46 E/7	2107	46 E/12	2112
46 E/3	2103	46 E/8	2108	46 E/13	2113
46 E/4	2104	46 E/9	2109	46 E/14	2114
46 E/5	2105	46 E/10	2110	46 E/15	2115

46 E/16	2116	45 H/11	0811	45 K/6	1106
45 G/1	0701	45 H/12	0812	45 K/7	1107
45 G/2	0702	45 H/13	0813	45 K/8	1108
45 G/3	0703	45 H/14	0814	45 K/9	1109
45 G/4	0704	45 H/15	0815	45 K/10	1110
45 G/5	0705	45 H/16	0816	45 K/11	1111
45 G/6	0706	46 I/1	2501	45 K/12	1112
45 G/7	0707	46 I/2	2502	45 K/13	1113
45 G/8	0708	46 I/3	2503	45 K/14	1114
45 G/9	0709	46 I/4	2504	45 K/15	1115
45 G/10	0710	46 I/5	2505	45 K/16	1116
45 G/11	0711	46 I/6	2506	45 L/1	1201
45 G/12	0712	46 I/7	2507	45 L/2	1202
45 G/13	0713	46 I/8	2508	45 L/3	1203
45 G/14	0714	46 I/9	2509	45 L/4	1204
45 G/15	0715	46 I/10	2510	45 L/5	1205
45 G/16	0716	46 I/11	2511	45 L/6	1206
45 H/1	0801	46 I/12	2512	45 L/7	1207
45 H/2	0802	46 I/13	2513	45 L/8	1208
45 H/3	0803	46 I/14	2514	45 L/9	1209
45 H/4	0804	46 I/15	2515	45 L/10	1210
45 H/5	0805	46 I/16	2516	45 L/11	1211
45 H/6	0806	45 K/1	1101	45 L/12	1212
45 H/7	0807	45 K/2	1102	45 L/13	1213
45 H/8	0808	45 K/3	1103	45 L/14	1214
45 H/9	0809	45 K/4	1104	45 L/15	1215
45 H/10	0810	45 K/5	1105	45 L/16	1216

On each map sheet longitudinal and latitudinal lines at  $1\frac{1}{4}$ ' interval will be drawn. The cross-sections of these lines called grid centres will be the plot centres also. These longitudinal and latitudinal lines will be given two digit numbers starting from 00 number at the South-west corner of the map sheet. The serial number of the lines will increase from West to East in case of longitudinal lines and from South to North in case of latitudinal lines. The grid centre or the plot centre will, thus, have four digit's coordinates. Finally, the sample point will be referred to by a eight digit number, first four digits will refer to the map sheet and last four digits to the coordinates of the plot centre on the map sheet. Thus, a sample point reference number 08110211 will mean that the sample point is on the map sheet number 45 H/11 and lies at the cross-section of longitudinal line No. 02 and latitudinal line No. 11.

### 3. LOCATION OF THE SAMPLE PLOT

3.1 Before leaving the camp for the day's work, you should locate on the map and the photograph, the sampling plot(s) to be surveyed. Study the map and the aerial photographs carefully and decide the route to be followed to reach the sample plot. Also locate some important referencing features both on the map and the aerial photographs for identification on the ground and subsequent route for reaching the sample plot. The referencing features so selected should be as far as possible nearest to the sample plot. Some of such reference features which will be helpful in the correct location of the sample plot are listed under para 3.2.

3.2

Now following the route to the sample plot from the camp locate a referencing feature on the ground. REMEMBER that you should select only such referencing features on the ground which is MORE RELIABLE AND NEAREST to the sample plot. Such referencing features should be prominently appearing either on the map or on the photographs or both. The selected reference feature should invariably be cross-checked and confirmed with reference to other prominent ground features for its correctness. Some of the features which could be seen from the map/photograph are listed below for your information:-

1. Bench marks.
2. Triangulation points
3. Village trijunction Pillars
4. Old Bridges and Culverts
5. Prominent topographical features in hill area such as spurs, knots, reentrants, hillocks etc.
6. Crossing of rail tract with roads and streams.
7. Old temples, mosques and Churches.
8. Junctions of rivers or streams and roads.
9. Junction of roads.
10. Junction of streams
11. Prominent bends of roads, rivers and streams.
12. Old Ponds.

3.3

The location of the sample plot should not present any difficulty because of the various prominent features available in the maps and aerial photographs. REMEMBER THAT THE CREW LEADER IS SOLELY RESPONSIBLE FOR THE CORRECT LOCATION OF THE SAMPLE PLOT.

It is very important that the sample plots are located correctly because any shift in its location will make all the data collected of no practical use. The Crew Leader should convince himself about the correct location before proceeding ahead for the data collection. He should keep a detailed accounts in his note book about the route followed and also mention a brief but clear and informative description of the approach in the Plot Description Form. In the description of the approach to the sample plot besides the route taken the following information should ALWAYS be given :-

- (i) Reference feature
- (ii) Silva compass grade
- (iii) Distance measured
- (iv) Position of reference trees
- (v) Total tally in BAF-2 and total number of enumerated trees in the plot.

3.4

After you have located a reliable reference feature on the ground, proceed to determine the direction and distance of the sample plot. For this orient the top of your map towards North and measure the bearing (Silva compass grade) of the sample plot from the reference feature as shown in the map/photographs. This will give you the direction in which the sample plot lies. Then measure on the map/photograph the distance of the sample plot from the reference feature and

convert it to the actual distance in metres on the ground with the help of the F.R. given in the Map/Photograph.

Note :-

1. While using the aerial photograph for this purpose first orient your photograph with the help of the map and mark the North direction on the photograph. Then proceed as explained above.
  2. Cross-check the Silva compass reading by measuring the bearing with the help of a protractor. The protractor will give the reading in 'degrees' which can be converted to Silva Compass 'Grade' by multiplying the degrees by 10/9.
- 3.5 Now proceed with the help of Silva Compass in the direction of the Sample Point on the bearing already determined as in para 3.4. Measure the HORIZONTAL distance on the ground to reach the Sample plot.

Note :- While using the Silva Compass and measuring the distance on the ground the following precautions should be observed:

1. Hold the Silva compass on the right hand palm, stretched horizontally in the direction of the sample plot. The Silva compass should be further reinforced in position by gently stretching the string of the instrument by the left hand and keeping it in straight line with the viewing slit of the instrument.
2. At any particular station the silva compass should be so held in hand that the centre of the instrument is ALWAYS exactly over the station.
3. Make sure that while aligning with the help of the Silva compass the centre of the needle, the metallic dot and the notch at the top of the mirror of the instrument are in one straight line.
4. Always measure HORIZONTAL DISTANCE on the ground. If the ground is sloping convert the sloping distance into horizontal distance by measuring the angle of slope. The table in appendix III will help you in correcting the sloping distance to the horizontal distance.
5. For traversing the distance from the referencing feature to the sample point follow the method as explained in appendix - III.

3.6 Reference Marking

After reaching the sample plot put a stout peg 50 cms. in length and 10 cms in diameter. Blaze it at the top and fix it firmly on the ground facing the blazed surface towards the direction from which you have approached the sample plot. Write the sample plot

reference number and the date on the blazed surface by a copying pencil. Select two nearby prominent trees preferably at right angles from the peg for permanent referencing of the sample plot. On each reference tree blaze below the breast height facing the peg and write the following references with a carbon pencil.

1. Sample Plot Reference
2. Date
3. Horizontal distance in metres, upto second place of decimal, from the peg to the reference tree.
4. The bearing from tree to the peg in grades (for this take forward bearing from peg to the tree and calculate the back bearing for recording).

Note:-

The reference number of the sample point will be in EIGHT DIGITS. The first four digits will refer to the 1" Map sheet number and the last four DIGITS will refer to the coordinates (the sample Point Number).

3.7 Laying out of plot

Each plot will be a square of 0.16 ha. area. The plot centre will be the point of inter-section of latitude and longitude lines (at  $1\frac{1}{2}'$  interval). Measurements will be taken only for the plot at each cross section point. The plot centre represents the point of inter-section of the diagonals of the plot. The diagonals are North-South and East-West. Length of each diagonal is 56.56 metres. From the plot centre measure the horizontal distance of 28.28 metres using a steel tape in the four directions viz. North, South, East, West (using Silva Compass). These are the four corners of the plot and should be marked by pegs 20 cm. in length and about 5 cm. in diameter. Check the length and directions of the diagonal and relay, if incorrect and MEASURE each side of the plot, record in the field note book and on the back of Plot Description Form. Also record the length of North-South diagonal. Please note that if laying out of the plot is correct, length of each side of the plot will come out to be 40 metres.

3.8 Data Collection

After marking the references at the reference tree and on the peg, record approach description in the space provided in the Plot Description Form. The species of the reference tree and the reference recorded on the tree should also be written on the Plot Description Form. The data should be recorded in the following forms (read instructions to fill up each form carefully.).

Forms:-

1. Plot Description Form - one form should be used for each plot.
2. Sample Tree Form
3. Plot Enumeration Form
4. Bamboo Enumeration Form - only at points which fall in bamboo occurrence area.

Normally, in each case of last three forms, one form should be enough for each plot. However, if all the data in each plot cannot be accommodated in one form, a second form as a continuation sheet may be used. Whenever, a continuation sheet is used, all the columns from 1-8 and 69-70 should be filled in both the forms, which should be stappled together. To facilitate the data collection and avoid wastage of energy following sequence is advised for data collection.

3.9 Stand at the centre of the plot, take a tally for BAF-2. Put a sample tree card on each 'IN' tree. Note down in the field note book total number of 'IN' trees.

4: You, now, start filling the Plot Description Form. In the mean time, you can direct the Asstt. Crew Leader to take measurements of the diameter for all the 'IN' trees and write it on the sample tree card. (This information will be required for the tally sheet),

4.1 Now the Asstt. Crew Leader can number all the trees greater than or equal to 5 cm. d.b.h.o.b. serially from the North side of the plot. After serially numbering the trees, a sweep with relaskop with BAF-2 is taken starting from the North side of the plot. All the 'IN' trees are the sample trees. Blaze these 'IN' trees at about 20 cm. below B.H. facing the point centre and write Sample tree with J K writer.

4.2 By now, you should have completed the P.D.F. if not go ahead. In the meantime, Asstt. Crew leader can continue to collect sample tree data and record it in the sample tree card, tagged on each 'IN' trees.

4.3 Now fill the Plot Enumeration Form, as explained in the instructions for filling up the Plot Description Form.

4.4 Now, you can also start collecting data for sample trees and record on the sample tree card. Between two of you, you can collect the information faster, write it down on the sample tree card. When all the information have been collected and recorded on the sample tree card. You should take up the sample tree form, go to each tree and transfer the data from the sample tree card on the form. While doing so, you would have an opportunity to look at the tree and also in a way check that part of the information, which has been collected and recorded by Asstt. Crew Leader.

4.5 While you are filling up the sample tree form, the Asstt. Crew Leader can have all the instruments collected at the centre. He should check all the instruments properly packed and are according to the list.

4.6 After finishing this plot, you can proceed to the next plot (or to camp, if the days work is over). Before you leave check up that you have filled all the forms and collected all the instruments.

4.7 You should be very precise and accurate in recording the data. The information should always be recorded legibly. If you are in doubt about any information to be filled in a particular column, leave the column blank. Record this information in your field note

book in details with your personal observations and contact the Officer-in-charge for clarifications and guidance. Make it a habit to keep a detailed record of all such points for which you feel the necessity of clarification or guidance from the officer-in-charge.

#### 4.8 Selection of Camping Site

The camping place should be so chosen that atleast five sample points can be conveniently visited from it. This will cut down the camp shift days and consequently you will be able to show better progress of works. Normally you should be able to complete one sample point every day.

#### 5. GENERAL INSTRUCTIONS

- 5.1 You are over all incharge of the party and shall be responsible for the progress of the work allotted to you.
- 5.2 Before proceeding on tour ensure that your party is fully equipped with camp and survey equipments.
- 5.3 Make sure that all your crew members are duly vaccinated before proceeding on tour.
- 5.4 Ensure that your party members are equipped with field dress and appropriate clothing and bedding. It is desirable that the personal luggage should be light in weight and small in volume. Heavy and superfluous baggage will add to your transport problems.
- 5.5 You shall also ensure that you have collected the maps and photographs of the area to be surveyed from the office. The maps and/or the photographs no longer required should immediately be returned to the Officer-in-charge, Base camp. These are meant for survey work only. **THE PHOTOGRAPHS AND MAPS ARE RESTRICTED AND ON NO ACCOUNT SHOULD THESE BE SHOWN TO ANY ONE NOT CONNECTED WITH THE ORGANISATION OR TO ANY FOREIGNER WHOSOEVER HE MAY BE.** The maps and Photographs should **ALWAYS BE KEPT IN YOUR PERSONAL CUSTODY.** **LOSS OF MAPS OR PHOTOGRAPHS IS AN OFFENCE UNDER THE OFFICIAL SECRET ACT.** Damage or loss of these should immediately be reported to the Zonal Coordinator, North Zone and to the Officer-in-Charge.
- 5.6 You shall collect the data with the help of the crew and record on the prescribed forms **PROPERLY CODED.**
- 5.7 The code numbers should be legibly written in the forms. The digits should invariably be written as under :-  
  
1 2 3 4 5 6 7 8 9 0
- 5.8 Before leaving the plot, make sure -
  - a) that all your instruments are sound and properly packed in the ruck-sack.

- b) Look around the plot to be sure that you are not leaving any thing behind.
- c) that the plot, when you leave, is clean as you found it. Leaving any kind of litter or pack-lunch left overs scattered is not a good habit. You can burry it.

5.9 On return to the camp -

- a) Check up your instruments for their soundness and accuracy.
- b) Write on the Plot Description Form the route to the sample plot from the camp and other information from the field notebook ( do it now, don't leave it for tomorrow).
- c) Re-check all the forms filled during the day and file these properly.

SECTION - III

INSTRUCTIONS FOR FILLING UP VARIOUS FIELD FORMS  
RELATING TO FIELD INVENTORY

PLOT DESCRIPTION FORM

CODING INSTRUCTIONS

NOTE :- STUDY THE INSTRUCTIONS CHART FOR RECORDING DATA CAREFULLY AND FOLLOW THE PROCEDURE FOR FILLING VARIOUS COLUMNS.

Item no.	Col. no.	No. of digits	Code no.	Description
1	2	3	4	5
1	1-3	3	012	Job No. ) Leave it blank. To be filled
2	4-5	2	01	Card Design ) up by D.P.U.
3	6-7	2	09	Report No. )
4	8	1	1	Sub-Report No.)
5	9-10	2	-	<u>Crew Leader</u> :- Write your Code Number as assigned to you.
6	11	1	-	<u>PLOT CLASSIFICATION</u> :- Write the suitable code number depending upon the point classification given as under :-
			1	The Sample Plot falls outside the survey area.
			2	Sample plot not visited, rejected by aerial reconnaissance or by the study of maps or aerial photographs.
			3	Sample plot could not be approached due to inaccessibility.
			4	Sample Plot or its vicinity visited, but tally and measurements not taken.

Note:-

- i) It will include such Sample Plots which are approached, but it is not possible to take tally or measurements because of sudden fall or obstruction.
- ii) It will also include these Sample plots where it is not possible to reach the exact Sample Plot, but the vicinity of the sample plot can be visited. In such cases also it will not be possible to take tally and measurements.

---

1. 2. 3. 4. 5.

---

iii) The term VICINITY for this purpose mean the area near the Sample Plot in the type in which the plot falls. It must be ensured that the data of the type recorded from the place approached is the same (in the P.D.F.) as it would have been had the sample plot been actually approached. This would be possible only when the Crew leader can see the site where the Sample Plot actually lies and he is convinced that the type of forest in which he is standing extends to the sample plot. If the crew leader cannot see the site, he cannot be sure of the type in which the sample plot falls and in this case the sample plot should be classified as 'Inaccessible' (Plot Classification in 3).

5 Sample Point visited and all data collected.

Note :-

- i) The distinction between category 2 and 3 is that in first case the point is rejected out right and in second case an attempt has been made to locate it. The accuracy in precision of the information recorded in both cases is the same.
- ii) The difference between category 4 and 5 is that in case of 4, tally could not be taken. However, the information about the type in the Plot Description Form in both cases is equally precise, accurate and reliable.

7 12-13 2 - STATE :- Write Code 10 of Rajasthan.

8 14 1 - REVENUE DISTRICTS:- Write the Code number of the Revenue Districts in which the Sample Plot lies as given below:-

- 1 Udaipur
- 2 Chittorgarh
- 3 Sirohi
- 4 Dungepur
- 5 Banswara

9 15 1 FOREST DIVISION:- Write the Code number of the Forest Division in which the sample plot lies (as given below)-

- 1 Udaipur
- 2 Chittorgarh
- 3 Sirohi
- 4 Dungepur
- 5 Banswara

---

1	2	3	4	5
---	---	---	---	---

---

10 16 1 CATCHMENT :- Leave it blank

11 17 1 LAND CLASS:- Consider the present land use of the area represented by the Sample Plot and classify it in the appropriate class. Particular 'Land Use' should be given an independent identity only. When its extent is 5 ha. or more.

- 1 Forest land
- 2 Agricultural Crop Land
- 3 Pasture Land
- 4 Waste and Barren Land
- 5 Other lands

The following definitions of the above classes will help you in determining the category of land class to which the plot belongs:

FOREST LAND:- It includes all the lands with forest cover of any density and where land surface is not used primarily for purposes other than forestry. All the lands which are under the control of Forest Department as shown in the Management Map irrespective of the fact that whether there is any vegetative cover or not will be classified as forest land.

AGRICULTURAL CROP LAND:- This includes all areas which are primarily used for growing agricultural crop. It also includes Farm Forests where trees are grown together with agricultural crop. SHIFTING CULTIVATION areas where the cultivation is still being done will also come under this category.

PASTURE LAND:- This includes all areas used primarily for the production of grasses pastures. It will also include areas in forests (more than 5 ha.) having grass growth.

WASTE LAND/BARREN LAND:- This includes part areas devoid of any vegetation growth including grasses as regular pasture although some soil may or may not be present. Such areas are not being presently used for grazing or for any other purpose.

OTHER LANDS:- This includes areas in habitation and industrial sites, river heads, water roads other than forest roads. This also include those lands which cannot be classified in any of the above land classes.

1	2	3	4	5
---	---	---	---	---

12 18 1

LEGAL STATUS :- Classify the 'Forest Land' in which the sample plot lies in one of the following categories. A particular category should be given an independent identity only when its extent is 5 hectare or more.

- 1 Reserved forests.
- 2 Protected forests.
- 3 National Parks and Wood Preserves.
- 4 Un-classed forests
- 5 Other Government forests.
- 6 Undetermined forests.

The following definitions of the above classes will help you in determining the category of legal status of the forest .

RESERVED FORESTS :- Includes areas declared as such under the IFA/SFA. (Indian Forest Act/ State Forest Act.)

PROTECTED FORESTS :- Includes areas declared as such under the IFA/SFA. It also includes unclassified forests/classified forests under Forest Department (It also includes areas notified under section 4 where settlement proceedings are in progress).

NATIONAL PARKS & WOOD PRESERVES :- Include Forest areas where felling are restricted by legislation. It also includes forest tree growth planted or natural, maintained primarily, for purposes other than marketable wood production e.g. Tree preserves, Parks, Municipal wood lands for aesthetic purposes etc. GAME SANCTUARIES WILL NOT COME UNDER THIS CATEGORY. They will fall either in Reserved Forests or Protected Forests depending upon the legal status of the forests.

UNCLASSES FORESTS :- This includes such forests areas which are under the control of Forest Department, but they have not been declared as protected or reserved forests. These forests may or may not be covered by working plans.

OTHER GOVERNMENT FORESTS :- It includes forests under the control of Revenue Department.

UNDETERMINED FORESTS :- It includes all other forests not included in any of the above categories.

1	2	3	4
13	19	1	

VEGETATION :- This column is to be filled up <sup>for</sup> those Sample Plots ONLY which under the land class column classified as 'Forest Land'. Observe the growth in the region and classify it in one of the following classes. (A class should be identified independently if it extends to 5 hectares or more).

- 1 Tree Forest
- 2 Degraded forest
- 3 Scrub
- 4 Others

The following definition of the above classes will help you in determining the category of vegetation class to which the point belongs:

TREE FORESTS:- It includes all areas having tree cover of any density. The following types of areas will also be included in this category.

- a) Temporarily under stocked/or un-stocked areas e.g. recently worked areas.
- b) Young natural stands and forest Plantation at any stage of growth.
- c) Areas of degraded forests where it has been cut back.
- d) Abandoned cultivation having forest cover.
- e) Forest roads, streams, small open areas in the forests and nurseries which form an integral part of the forests.
- f) Public and private forests.
- g) Bamboo bearing areas pure or in admixture with other misc. species.

DEGRADED FORESTS:- It includes areas having open forests patches with trees of low height (generally not more than 3 metres in height) near habitation and cultivation showing signs of heavy biotic pressure. In such areas the trees are badly pollarded or backed. It also includes small patches of young coppice growth (rooted waste) looking like regeneration. Such rooted wastes are the result of repeated cutting back of the coppice shoots. The area may or may not have sprinkling of very few scattered undamaged trees. Areas having badly backed and damaged bamboo clumps are also included in this category.

1	2	3	4	5
---	---	---	---	---

SCRUB:- It includes areas having mostly scrub or bushy growth. The area is generally devoid of trees, although at times scattered trees (2 - 3 per ha.) may be found standing. It will also include abandoned cultivation and plantations having scrub growth.

Note :- Useless species like *Euphorbia royleana* should be grouped as scrub irrespective of the height.

OTHERS:- All other areas not covered by any of the above classes will be classified in this category.

14      20      1

FOREST TYPE :- This column is to be filled up for those Sample Plots ONLY which have been classified as 'Forest' and 'Degraded' forests under the vegetation column.

Observe the area in the vicinity of the Sample Plot and classify the forests in one of the following types. Remember that the areas to be reckoned for this purpose should extent over 5 hectares or more and it should be representative of the type in which the Sample Plot lies.

- 1      Teak
- 2      Dhok
- 3      Salar-Godal
- 4      Misc. Mixed with Teak
- 5      Mixed Misc. without Teak
- 6      Others

Teak Type :- Where teak alone constitutes 50% or more of the crop.

Dhok Type :- Where *anogeissus pendula* alone constitutes 50% or more of the crop.

Salar Godal Type :- Where *Bosewellia serrata* and *Lannea coromandelica* both taken together constitute 50% or more of the crop.

Mixed Misc. with Teak :- Mixed Misc. forests with occurrence of teak more than 10% of the crop but less than 50% of the crop.

Mixed Misc. without teak :- Mixed misc. forests with teak less than 10% or teak completely absent.

Others :- All other forests not falling in any of the above categories.

SPECIES STOCKING IN FORESTS

15	21-23	3	SPECIES CODE
16	24	1	Code for % of spp. stocking
17	25-27	3	Species Code
18	28	1	Code for % of species stocking.
19	29-31	3	Species Code
20	32	1	Code for % of species stocking
21	33-35	3	Species code
22	34	1	Code for % of species stocking.
23	37-39	3	Species Code
24	40	1	Code for % of species stocking
25	41	1	Code of % stocking of species other than 'Important species'.

Observe the forest in atleast 5 ha. areas in the representative type in which the Sample plot lies. Assess the composition of the important species (as listed below) which may be present in the forests. Write the appropriate species-code numbers in the columns provided.

Important species:

- i) Tectona grandis
- ii) Anogeissus pendula
- iii) Anogeissus latifolia
- iv) Lannea coromandelica
- v) Boswellia serrata
- vi) Gyna cordifolia
- vii) Diospyros melanoxylon
- viii) Terminalia bellerica
- ix) Terminalia tomentosa
- x) Acacia catechu
- xi) Wrightea tinctoria
- xii) Millettia tomentosa
- xiii) Others

If there are more than 5 important species, write the code numbers of the ones that are in greater abundance and group the rest as 'OTHERS' for which species column is not provided. If non of the important species is found in the forests, then in column 21-39 write '000' in place of species code. Write '0' in the corresponding percentage column in such cases.

1	2	3	4	5
---	---	---	---	---

(representative area)  
and write the

SPECIES PERCENTAGE:- (Important species)  
Assess the percentage composition of the important species (as listed above) in the forests around the sample plot (in atleast 5 hectares of appropriate code in the corresponding columns. Remember that the percentage of important species only is required to be given in these columns.

Note:- While filling up the species stocking columns always first write that species which is forming the highest percentage spp. with lesser percentage should follow in decending order).

SPECIES PERCENTAGE (OTHER species)

The percentage composition of all species other than the important species (as listed above) grouped together should be given in column No. 41.

SPECIES PERCENTAGE CODE

- 1 Less than 20%
- 2 20% to less than 30%
- 3 30% to less than 40%
- 4 40% to less than 50%
- 5 50% to less than 60%
- 6 60% to less than 70%
- 7 70% to less than 80%
- 8 Equal to or more than 80%

26 42 1

ORIGIN OF STAND: (For Veg. Class 1 & 2 only)

Assess the origin of the stand in the forests extending over an area of 5 hectares or more and classify it in one of the following classes.

- 1 Natural
- 2 Man Made
- 3 Partially Natural and partially Man Made e.g. Natural Forest Supplemented with plantation or natural regeneration supplemented with artificial regeneration.

27 43 1

NUMBER OF STOREY : (For Veg. class 1 & 2 only)

Observe the forests around the sample plot in an area of 5 hectares or more and describe the vertical distribution of height of trees in the stand in one of the following classes.  
DO NOT Consider scrubs as a storey.

1	2	3	4	5
---	---	---	---	---

- 1 Single Storeyed forest
- 2 Two storeyed forest
- 3 Multi-storeyed forest

The following definitions will help you in determining the various categories of storeys.

Single storeyed forests: Where all the trees are more or less of the same height forming one canopy. A small height variation among individual trees may exist even in one storeyed forests.

Two storeyed forests:- The variation in height is such that the tree can be grouped into one upper and one lower canopy.

Multi-storeyed forests:- Where the variation is such that the trees distinctly form more than two canopies.

Note:- (i) In the present survey area the chances of coming across multi-storeyed forests are remote.

(ii) Bamboo clumps are to be considered for classification of storeys.

28

#4-45 2

AVERAGE HEIGHT:- Observe the crop in an area of atleast 5 ha. in the vicinity of the sample plot within the forest type and assess occularly the diameter class which is not prevalent in the area. (For this consider 5 cms. dia. class as in item 29). After you have decided the 'diameter class' (Size class) to which the highest percentage of trees in the area belongs, select five trees belonging to this prevalent diameter class and measure their heights. Calculate the average height to the nearest metre and record it in this column.

Example : 0.5 is to be rounded off to the nearest even number. For instance 08.5 is to be written as 08 and 09.5 to be written as 10.

Note:-(i) Ignore Bamboo clumps for deciding size class and measuring heights for calculating 'average height'.

(ii) Remember that the trees which have been measured for average height will also be used for the determination of the size class.

1	2	3	4	5
---	---	---	---	---

29      46      1

SIZE CLASS: Measure the diameter (dbhob) of the same five trees which have been measured for the average height.

Note :- (i) Ignore Bamboo clumps for deciding the size class.

(ii) In case of DEGRADED FORESTS measure the diameter at the base for deciding the size class. Calculate the average diameter and classify it in one of the following size classes:-

- 1      Less than 5 cms.
- 2      5 cms to less than 10 cms.
- 3      10 cms to less than 15 cms.
- 4      15 cms to less than 20 cms.
- 5      20 cms to less than 25 cms.
- 6      25 cms. to less than 30 cms.
- 7      30 cms. to less than 35 cms.
- 8      35 cms. to less than 40 cms.
- 9      40 cms and over.

30      47      1

SPACING:- Measure the spacing of the trees in the vicinity of the Sample Plot within the forest type in which the Sample Plot lies and calculate the average spacing of trees in the forest atleast TEN measurements should be taken for the purpose.

Note :- (i) Ignore Bamboo clumps while measuring the spacing of the trees.

(ii) In a degraded forest measure the spacing between the stumps.

Calculate the average of the measurements and classify it in one of the following classes.

Spacing in metres

- 1      Less than 2
- 2      2 to less than 4
- 3      4 to less than 6
- 4      6 to less than 8
- 5      8 to less than 10
- 6      10 to less than 12
- 7      12 to less than 14
- 8      14 to less than 16
- 9      Equal to or more than 18.

#1	2	3	4	5
----	---	---	---	---

31 48 1

REGENERATION:- All seedlings less than 5 cms (dbhob) are to be considered as regeneration. Draw a circle of 2 metres radius around the centre and count the number of seedlings of the forest type and classify as under :-

- 1 More than 15 - Profuse
- 2 8 to less than 15 - Adequate
- 3 1 to less than 8 - Scanty
- 4 None - nil

- Note:- (i) Remember that tree/bamboo seedling only are to be taken into account.
- (ii) In 'degraded' forest coppice shoots are not to be considered as regeneration.
- (iii) Regeneration for the purpose of this column is of seed origin only.
- (iv) If vegetation class is 1 or 2 and point classification is 2,3 or 4 this information would not be available, write (-) in this column.

32 49 1

CROWN DENSITY :- In an area of atleast 5 ha. around the Sample Plot and within the representative forest type, assess the crown density of the crop on the basis of the closeness or openness of the crop canopy by crowns and give the appropriate code.

- Note:-
- (i) In a fully stocked forest the crown of the trees are so close that the crop canopy is almost closed and the forest is said to be having the density 1. The density goes on diminishing with the increase in the openness of the canopy. An area having no tree will have zero density.
  - (ii) In case of bamboos, the space of the canopy occupied by bamboo clumps should be considered. If bamboo is found in admixture with tree species, then the space occupied by both the trees as well as the bamboo canopy should be considered for assessing the crown density.

1	2	3	4	5
---	---	---	---	---

(iii) In a degraded forest the assessment of the crown density may not possible because the trees normally do not have a well formed crown. In such a case put a dash(-) in this column.

- 1 Less than 0.2.
- 2 0.2 to less than 0.4
- 3 0.4 to less than 0.6
- 4 0.6 to less than 0.8
- 5 0.8 and above

33 50 1

FOREST POTENTIAL :- This information has to be given only in case of those plots which have been visited by you. All these forests where the crown density is more than 0.4 the area is sufficiently stocked and the potentiality of the area is already under proper utilization. In such cases the code for 'Not applicable' should be used. In all other areas (including those forest areas where the crown density is less than 0.4) make a careful study whether the area could be converted to a more productive forest or not.

While deciding this give due consideration to aspect, soil depth, drainage, crop in the surrounding areas and other biotic and climatic factors. Give the appropriate code for (Potential) or 'Not Potential' as the case may be.

- 1 Potential
- 2 Not Potential
- 3 Not applicable

34 51 1

STONINESS:- Observe an area of 5 ha. or more around the plot and consider the extent of rocks/boulders greater than 25 cms. in diameter. Anything less than 25 cms in diameter weights less than about 40 kg. and can easily be moved manually. Hence keeping in view stone/boulders greater than 25 cms. classify the plot in one of the following classes :-

- 1 More than 60% of the land surface is covered with stones/boulders.
- 2 30% to 60% of the land surface is covered with stones/boulders.
- 3 Less than 30% if the land surface is covered with boulders.
- 4 Stones/boulders absent

1	2	3	4	5
35	52	1		<p><u>HUMUS:-</u> Humus is decomposed organic matters (leaves, twigs etc) which has become a part of the upper most soil horizon. This should be clearly distinguished from the undecomposed leaf litter. Remove the undecomposed leaf litter from the soil surface before taking measurements. Dig a small pit 5 cms. deep in the representative area. Now measure the depth of the humus and write the code of the class in which it falls.</p> <ol style="list-style-type: none"><li>1 5 cms or more</li><li>2 2 cms to less than 5 cms</li><li>3 less than 2 cms</li><li>4 Humus absent</li></ol>
36	53	1		<p><u>SOIL TEXTURE :-</u> Examine the texture of the soil in the region by feeling with hand and classify in one of the following categories and record the code number. Apply this test to the soil type predominant in the area.</p> <ol style="list-style-type: none"><li>1 Clay - Soil contains mostly clay particles.</li><li>2 Clay loam - Soil having higher percentage of clay particles but also some sand silt.</li><li>3 Loam - Soil having mostly slit and sand with same clay.</li><li>4 Sandy loam - Soil in which sand particles are predominant but it also contains some slit.</li><li>5 Sand :- Soil having mostly sand particles.</li><li>6 Pebbles - Where is every little soil, but more of pebbles and stones.</li><li>7 No soil</li></ol>
37	54	1		<p><u>SOIL CONSISTENCY:-</u> Consistency describes the agregation of soil particles. Classify the soil around the Sample Plot in one of the following classes and write the code :-</p> <ol style="list-style-type: none"><li>1 <u>Friable :-</u> is one which is loose and which crumbles very easily while pressing with fingers. Sand contents are more in this type of soil.</li><li>2 <u>Slightly compact :-</u> is one which sticks together as a lump when taken in hand. Digging a pit in this type of soil is comparatively easier than in compact soil. Such soil can be scraped easily with the toe of the shoe.</li><li>3 <u>Compact :-</u> is one which makes digging difficult. Caly contents are more in this type and is very hard.</li></ol>

1	2	3	4	5
39	55	1	<p><u>SOIL DEPTH :-</u> Examine the road, nallaha side cuttings etc. and estimate soil depth. Classify the soil depth in one of the following categories and write the code number in appropriate column.</p> <ol style="list-style-type: none"> <li>1 Equal to or greater than 100 cms.</li> <li>2 75 cms. to less than 100 cms.</li> <li>3 50 cms. to less than 75 cms.</li> <li>4 25 cms. to less than 50 cms.</li> <li>5 10 cms. to less than 25 cms.</li> <li>6 Less than 10</li> <li>7 No soil</li> </ol>	
39	56	1	<p><u>SOIL MOISTURE :-</u> Study the vegetation around the plot in 5 hectare area and taking the vegetation as indicator for soil moisture classify the moisture in following classes.</p> <ol style="list-style-type: none"> <li>1 Moist</li> <li>2 Dry</li> <li>3 Very Dry</li> </ol>	
40	57	1	<p><u>GEOLOGY :-</u> In the visit of the Sample Plot, geology of the area be studied. Parent rock compactness/hardness will be studied. It will be possible to carry out the study after examining road side cutting and land slides accuring in the area. After study, classify the parent rock as under :-</p> <ol style="list-style-type: none"> <li>1 <u>Sand stone :-</u> Sand particles cemented by Ferruginous material. It is generally light brown in colour.</li> <li>2 <u>Lime Stone :-</u> Where the calcium carbonate content is high. It is generally grey, brown and blue in colour.</li> <li>3 <u>Conglomerate :-</u> Where different types of pebbles are aggregated to form a solid structure. It has different colour in the same rock.</li> <li>4 <u>Slate :-</u> These are similar to shales but more smooth high mica content. Varies in a colour generally those are black, but frequently green or purple.</li> <li>5 <u>Schists :-</u> These rocks are foliated (coming out in small chips schists have high mica content (shining)).</li> <li>6 <u>Gneiss :-</u> These are banded rocks which are un-like with respect each other.</li> </ol>	

1	2	3	4	5
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7 Quartzite :- Sand stone with greater hardness and are more crystalline. These are harder and heavier than sand stones generally white in colour but more frequently formed in colours like purple and brown.

8 Phyllite :- These are like slate but very shining. They have grassy in appearance (high mica content).  
Un-identified.

41            58

SLOPE :- Measure the slope in uphill and down hill directions over a stretch as long as possible. Take the average of this and classify as under and record in the proper code.

Slope in degrees

- 1 70 and above
- 2 60 to less than 70
- 3 45 to less than 60
- 4 20 to less than 45
- 5 Less than 20.

42            59-61    3  
43            62           1  
44            63           1

ALTITUDE ) Leave it blank. To be filled up  
TERRAIN ) in the camp.  
ASPECT )

The data regarding altitude, terrain and aspect is to be collected from the study of the maps (1 inch or 1:50,000) in the camp and classify as under :-

ALTITUDE:- The altitude of the Sample plot is to be reckoned from the topographic map sheets to the nearest 10 meters and the value is to be recorded in three digits.

TERRAIN:- Examine the general topography over an area of 4 to 5 sq. km. in the type of terrain in which the Sample plot lies on topo map and classify the terrain in one of the following classes :-

- 1 Precipitous
- 2 Very Hilly
- 3 Hilly
- 4 Gently rolling
- 5 Flat

Example :- A hillock 100 to 200 m. high covering an area of about 1 sq.km. surrounded by 4-5 sq.km. of gently undulating area is to be classified as 'Gently Rolling'.

1	2	3	4	5
---	---	---	---	---

ASPECT :- Aspect refer to the direction of the slope general aspect of the area where the sample plot lies is to be studied on the maps and classify as under :-

- 1 North
- 2 North East
- 3 East
- 4 South East
- 5 South
- 6 South West
- 7 West
- 8 North West
- 9 None

45      64      1

BAMBOO QUALITY :- The quality of bamboo will be determined on the basis of the height (total) of the culms. Fill up the appropriate columns as given below :-

- 1 Average height of culms - 5 metres or above
- 2 Average height of culms - less than 5 metres
- 3 No bamboo

The following definition will help you in understanding the terms used for describing bamboos:-

Bamboo clumps :- It is the aggregate of the bamboo stems issuing from the same root, rhizome system or stool.

Bamboo culms :- A single stem of bamboo of B.H. diameter 2 cm. or more and height 1.0 m. or more.

Notes:- This column is to be filled up whatever may be percentage of bamboo in the forest crop.

46      65      1

BAMBOO OCCURRENCE :- The occurrence of bamboo will be estimated with the help of average spacing of bamboo clumps in the representative areas. To get the average spacing of the bamboo clumps at least 10 measurements of spacing between the bamboo clumps from centre to centre should be taken in the representative area.

(Spacing in metres)

1	2	3	4	5
---	---	---	---	---

- 1 0 to less than 5'
- 2 5 to less than 10
- 3 10 to less than 15
- 4 15 to less than 20
- 5 20 to less than 25
- 6 25 to less than 30
- 7 30 to less than 50
- 8 50 and above
- 9 No bamboo.

Note :- This column is to be filled up whatever may be the percentage of bamboo in the forest crop.

(ii) While measuring the spacing trees are to be ignored.

47 66 1

PHOTO-CLASSIFICATION - LAND CLASS

Leave it blank

PHOTO-CLASSIFICATION - FOREST TYPE

48 67 1

Leave it blank.

PHOTO-CLASSIFICATION-DENSITY

49 68 1

Leave it blank.

Note:- Items 47,48 and 49 would be filled up in the office from photo-interpretation data.

50 69 1

BIOTIC INTERFERENCE : Look around the forest and assess the damages to the forest crop because of grazing, fires, loping etc. and fill up the appropriate code as given below depending upon extent of damage to crop due to biotic interference.

- 1 Very heavy
- 2 Heavy
- 3 Moderate
- 4 Light

51 70 1

WEEDS/GRASSES

- 1 Dense bushes
- 2 Open bushes
- 3 Dense Grasses
- 4 Open grasses
- 5 Dense bushes and open grasses.
- 6 Dense bushes and dense grasses.
- 7 Open bushes/dense grasses.
- 8 Open bushes/open grasses.
- 9 Absent

1	2	3	4	5
52	71-74	3 4		Map sheet reference
53	75-78	4		Coordinates of the Plot reference.
54	79-80	2		Inventory Design (Leave it blank. To be filled up by Data Processing Unit.)

SAMPLE TREE FORM (BAF-2)  
(Coding Instructions)

7. ALWAYS REMEMBER THAT THE SAMPLE TREE FORM IS REQUIRED TO BE FILLED IN ONLY WHEN THE VEGETATION CLASS (COL.19) IN THE P.D.F. IS 'FOREST' (CODE 1). FOR ALL OTHER CATEGORIES OF VEGETATION CLASS SAMPLE TREE FORM IS NOT REQUIRED, SINCE TALLY IS NOT REQUIRED TO BE TAKEN.

Note :- The Sample Tree Form will be used for recording the data of only those 'IN' trees which have been tallied with Basal Area Factor - 2.

7.1 The original Sample Tree Form has been amended and new columns has been introduced in it. This new column is :-

1) Col. No. 63 - Forest Type (one digit)

- Each S.T.F. should have B.A.F.-2 written against the name of the form on the left top and corner.

Before you start recording the data check that all the amendments are already incorporated in the form.

7.2 DATA COLLECTION:

Stand at the centre of the Sample Plot (over the peg) and using the Basal Area Factor-2 take a sweep around the area with the Relaskop starting from the North and moving in a clock-wise direction make a full circle. Count all the 'IN' trees in the tally. Ignore DEAD TREE AND TREES HAVING LESS THAN 5 CMS. D.B.H.O.B.

Note :- While taking tally with the relaskop for BAF-2 the following instructions shall be followed for all such MARGINAL TREES about which you cannot decide whether they are 'IN' or 'OUT'.

(i) Measure the diameter of the tree and its horizontal distance (from the centre of the tree) to the Sample point peg and ascertain whether the tree is 'IN' or 'OUT' as per instructions given in appendix - II.

(ii) Wherever such Marginal trees have been measured write a note at the bottom of the Sample Tree Form as under :-

(a) If the trees measured is 'IN' then write :-

"Tree No. \_\_\_\_\_ was measured and its horizontal distance from the Sample plot peg was \_\_\_\_\_ metres.

(b) If the tree measured is 'OUT' then write :-

"The tree standing between tree No. \_\_\_\_\_ and tree No. \_\_\_\_\_ was measured and its diameter was \_\_\_\_\_ cms. and the horizontal distance from the peg was \_\_\_\_\_ metres. The tree was found out.

(iii) If the tally could not be taken due to inaccessibility or obstruction, write '99' in column 67-70. If tally is nil write '00' in column 67-70.

(a) Sometimes the Crew Leaders are in the habit of deciding occularly that the tally would be nil and do not take the tally and record '99' in column 69-70. THIS IS WRONG. In case of point classification, 5, the tally must be taken and if tally is nill record '00' in columns 69-70.

(b) In the P.D.F. if the point classification is 2 or 3 and the vegetation class (Column 19 of the P.D.F.) is 1 (Forest) then record '99' in column 69-70. In case where the point classification is 4 i.e. the tally could not be taken on account of obstruction (e.g. sudden fall etc.) record '99' in column 69-70.

7.2.1 'IN' TREES : Refer appendix-II for the method of counting 'IN' trees with B.A.F.-2.

7.2.2 While you are taking the tally direct one of the Crew members to blaze the tree stem at about 20 cm. below the breast height facing the Sample Plot peg and write the serial number of the tree in two digits (refer para 4.2). Fix a Sample Tree Card on each of the tallied trees. The Assistant Crew Leader will take different measurements on the tree and record it on the Sample Tree Card fixed on it. All the columns in the Sample Tree Cards must be filled in.

7.2.3 After you have completed taking the tally and the P.D.F. is also completely filled start transferring the various information from the Sample Tree Card on to the Sample Tree Form. While you are doing this, you will also be able to check the work of your Assistant Crew Leader.

7.3 The following instructions should be carefully read for filling up the Sample Tree Form.

Item No.	Col. No.	No. of digits	Code	Description
1	2	3	4	5
1	1-3	3	012	JOB NO. )
2	4-5	2	04	CARD DESIGN )
3	6-7	2	09	REPORT NUMBER )
4	8	1	1	SUB REPORT NUMBER )

NIL

SPECIES LOCAL NAME OR BOTANICAL NAME

Write the name of species in this col.  
(Refer appendix -IV)

1	2	3	4	5
---	---	---	---	---

5	9-10	2	-	<u>SERIAL NUMBER</u> :- Write the serial number of trees only.
---	------	---	---	--

6	11-13	3	-	<u>SPECIES CODE</u> :- Refer appendix IV for the species code. Although almost all the common species found in the forests have been listed and coded you might occasionally come across species in the tally which is not listed. In such a case write '113' (Misc.) for that species code and write its local name if botanical name is not available.
---	-------	---	---	--

7	14	1		<u>DOMINANCE</u> : Classify the tree in one of the following classes and write the appropriate code for dominance :-
---	----	---	--	--

- 1 Dominant
- 2 Dominated
- 3 Supressed
- 4 Tree of under storey
- 5 Solitary
- 6 Abnormal and damaged tree.

The following definitions will help you in determining the dominance classes.

DOMINANT :- Tree is one which forms the upper most leaf canopy and whose leading shoot is more or less free.

DOMINATED :- Tree is one which does not form part of the upper most leaf canopy, but the leading shoot of which is not definitely over topped by the neighbouring trees and the crown is not fully free. Its height is usually about 3/4 of the dominant trees.

SUPPRESSED :- Tree is one whose leading shoot is definitely over topped by their neighbours. Height of such trees is usually about 5/8 of the Dominant trees. Such trees usually suffer from slow growth due to supersession.

Note :- A small suppressed tree standing with its leader free in a chance gap should not be classes as Dominant or Dominated.

TREE OF UNDER STOREY:- is one which is a part of the understorey.

SOLITARY :- Tree is one which is standing alone in a blank.

1	2	3	4	5
				<u>ABNORMAL AND DAMAGED TREES:</u> It includes wolf trees, trees of abnormal form and damaged and top broken trees.
8	15-17	3		<u>DIAMETER AT BREAST HEIGHT</u> Diameter 1 in cm. Diameter 2 in cm.
9	18-20	3		Measure with callipers two diameters over bark at breast height ( at a point 1.37 metres above the base of the tree from the uphill side ) to the nearest centimeter.  (a) Dia. 1 : Towards the point centre (b) Dia. 2 : Perpendicular to Dia. 1 round off 5 cm. to the nearest even number and record it in the form. (Example : 08.5 cm. is to be written as 08 and 09.5 is to be written as 10 cm).
				<u>Note :-</u> While measuring the diameter observe the precautions listed under diameter measurement (Tally sheet).
10	21-22	2		<u>TOTAL HEIGHT</u> (in metres) :- Measure the height of the tree from the base on the uphill side of the tree to the top of the leading shoot with Blume Leiss Hypsometer to the nearest metre. 0.5 metre should be rounded off to the nearest even number.
11	23-24	2	-	<u>CLEAR POLE:</u> (In metres) Measure the height alongwith stem of the tree from the base on the uphill side to the beginning of the regular crown with Blue Leiss Hypsometer to the nearest metre. (Round off 0.5 M to the nearest even number) and record the data in two digits in the column headed 'Clear Pole'.  Beginning of regular crown in conifers is the point where the first complete live whorl starts. For broad leaved species this point may be recognised as the place from where the first major live branch takes off or from where the main stem forks, if forking is below b.h. point each stem is counted as an independent tree.
12	25	1	-	<u>DEFECT NATURAL:</u> Examine the stem of the tree and classify as under on the basis of the extent of 'Natural Defects' and write the code in the column headed "Defects Natural".

1	2	3	4	5
			1	Complete stem length free of natural defects.
			2	one third stem length with natural defects.
			3	Two third stem length with natural defects.
			4	Full stem length with natural defects.
				<u>NATURAL DEFECTS</u> : Under this category all those abnormalities are included which are very natural and normal for the tree e.g. knots, cellus formation, twisted or spiral grain ( of Chir) etc.
13	26	1		<u>DEFECTS OTHERS</u> (One digit)
				Examine the stem and classify as under on the basis of the extent of defects caused by 'External Agencies' and write the code in the column headed "Defect others".
			1	Complete stem free of any defect
			2	One third of stem length with defects
			3	Two third of stem length with defects
			4	Full stem length with defects.
				<u>EXTERNAL AGENCIES DEFECTS</u> : Include damage caused to the tree stem by pathological, entomological climatic or biotic factors. Damage by these agencies may result in loss of cellulose material and weakening of the strength properties of the timber. These includes, borer attack, fire damage, hollowness, snow and wind damage etc.
14	27-29	3		<u>CROWN WIDTH TOWARDS POINT CENTRE</u> (In decimeters) Measure the crown width in a direction pointing towards the Sample Plot in decimeter and record in this column.
15	30-31	2		<u>BARK THICKNESS TOWARDS P.C.</u> (In millimeters) Blaze the tree and remove the bark making a neat cut at the breast height point towards the sample plot where the shorter arm of the calliper touches the stem while taking the diameter measurement 'Diameter 1'. Measure the bark thickness with a scale to the nearest mm and record in the columns.
				<u>RADIAL INCREMENT TOWARDS P.C.</u> (in mm)
16	32-33	2		Last 10 years
17	34-35	2		Last 20 years.
				Collect a core with the increment borer at the breast height point from the side towards point centre. Count the number of annual rings from the periphery towards the pith with the help of magnifying glass and measure the increment in millimeters for -

1	2	3	4	5
---	---	---	---	---

- the last 10 years
- the last 20 years

Note :-

- (i) For counting the annual rings apply Fluoroglucose or water on the core before counting. This will make the rings distinct.
- (ii) Use a transparent scale of measuring the increment.
- (iii) Wherever it is not possible to collect core or rings formation is absent write (-) in this column.

18	36-37	2		<u>BARK THICKNESS OPPOSITE TO P.C. (In mm.)</u>  Measure the bark thickness at breast height opposite to the point centre in same way as done above (Item 15, Col. 30-31) and record.
19	38-39	2		<u>RADIAL INCREMENT OPPOSITE TO P.C. (In mm.)</u>  Last 10 years Last 20 years.
20	40-41	2		Measure the increments opposite to the point centre in the same manner as done earlier (Item 16 & 17 above). <u>Straightness</u>
21	42		1 2 3 4	Very straight - bole straight. Slightly bent - axis of bole deviates less than 10° from straight line. One pronounced bent. More than one pronounced bent.
22	43-67			Blank.
23	68	1		<u>Forest Type</u> : Fill up the code for Forest Type as determined by you for Col. 20 of P.D.F.
24	69-70	2		<u>TOTAL NUMBER OF TREES</u> : Fill up the total number of 'IN' trees and record in the Sample Tree Form.
25	71-74	4		Map sheet Reference.
26	75-78	4		Point Reference (Latitude, longitude)
27	79-80	2		Inventory Design (leave it blank. To be filled up by Data Processing Unit).

PLOT ENUMERATION FORM

8. All trees of 5 cms. d.b.h.o.b or above in the plot are to be enumerated and the data recorded by species in the appropriate columns in the prescribed form. Dead trees are not to be enumerated.

8.2 Please note that the enumeration form will be filled only in case where vegetation class (col. 19 of P.D.F.) is 'Forest' (Code 1).

8.3 To decide whether a border line tree is in or 'OUT' the plot the following method will be adopted.

All trees touching or lying on the NW or SW side of the plot shall be considered as 'in the plot' and all trees touching or lying on the NE and SE sides of the plot shall be considered as 'out of plot'. The diagram at Section I will illustrate the point.

8.4 Every tree enumerated shall be marked with a tree marked or chalk facing the plot centre where you should stand. By this you shall be able to check whether a tree has been enumerated or not.

8.5 Record the following information in the appropriate columns as in the Plot Description Form.

Job No.	(Col. 1-3)
Ord Design	(Col. 4-5)
Report Number	(Col. 6-7)
Sub Report Number	(Col. 8 )
Map Sheet Reference	(Col. 71-74)
Point Reference	(Col. 75-78)
Inventory	(Col. 79-80)

On the top write the date on which the data is collected and the name of the Crew Leader in BLOCK LETTERS.

8.6 Use one form for each plot. If number of trees in the plot is more than can be accommodated in one form use another continuation sheet and fill up all the columns (1-8) and (66-80) in that also.

8.7 The enumeration form consists of rectangular blocks. Data for each tree is recorded in each such block. Data is to be recorded in 1st row, then 2nd row, and so on till all the trees in the plot have been accounted for.

8.8 In each block on the top write the local or botanical name of the trees enumerated. In the lower left column write the code number of the species in three digits and in the lower right side columns the diameter at b.h. of the tree in cm.

8.9 Total number of trees in the plot is to be recorded in three digits in column 66-68.

8.10 MEASUREMENT OF DIAMETER:

Measure the D.B.H. over bark (at a point 1.37 metres above the base of the tree from the uphill side.) With Callipers to the nearest centimeter. (.5 centimeter is to be rounded off to the nearest even number ). Take measurements along the diameter.

Pointing towards the plot centre and the other perpendicular to it.

- 8.11 If there is considerable abnormality at the base of the stem, upto or at the breast height then take the measurement above or below such abnormality.
- 8.12 In case of trees forking below the B.H. measure and record diameter at breast height considering each stem as a separate trees.
-

BAMBOO ENUMERATION FORM

This form is to be filled only for plots for which code of occurrence as stated in Column 65 P.D.F. is other than '9'.

Item No.	Col.No.	No. of digits	Code No.	Description
1	2	3	4	5

1	1-3	3		Same as given in Plot Description Form.
---	-----	---	--	---

2	4-5	2		) Same as given in Plot Description Form.
3	6-7	2	Card Design	
4	8	1	Report Number	
5	9-10	2	Sub Report Number	
6	11	1		Crew Leader

OCCURRENCE :- The occurrence of bamboo will be estimated with the help of average spacing of the bamboo clumps in the representative areas. To get the average spacing of bamboo clumps atleast 10 measurements of spacing between the bamboo clumps from centre to centre should be taken in the representative area.

(Spacing in metres)

- 1 0 to less than 5
- 2 5 to less than 10
- 3 10 to less than 15
- 4 15 to less than 20
- 5 20 to less than 25
- 6 25 to less than 30
- 7 30 to less than 50
- 8 50 and above.
- 9 No bamboo.

Note:-- (i) This column is to be filled up whatever may be the percentage of bamboo in the forest crop.

(ii) While measuring the spacing trees are to be ignored.

12-13 2

SPECIES:- If more than one species occur in the plot, the most predominant species will be coded in the form.

- 01 Dendrocalamus strictus
- 02 Bambusa arundinacea
- 03 Cephalostachyum pergracile
- 04 Oxytenanthera spp.
- 05 No bamboo.

1	2	3	4	5
8	14	1		<p><u>QUALITY:-</u> Object of the assessing site quality for bamboo is to determine the capacity of site to produce bamboo culms of given size. As is the case with tree species, method of assessing the site quality for producing bamboo is indirect one as it relies on the standing clumps in the stand. In case there are no established clumps in nearby area of 5 hectare the quality cannot be defined. Code number 3 should be filled in such cases. The quality of bamboo will be determined on the basis of the total height of the culms. Fill up the appropriate columns as given below:-</p> <ol style="list-style-type: none"> <li>1 Average height of culms - 5 metre or above.</li> <li>2 Average height of culms - less than 5 metres.</li> <li>3 No bamboo.</li> </ol>
9	15	1		<p><u>REGENERATION:-</u> Bamboo bearing areas where clump formation is not very clear or area under bamboo regeneration contains bamboo seedlings and culms will be classified in one of the following classes:-</p> <ol style="list-style-type: none"> <li>1 Dense Regeneration</li> <li>2 Medium</li> <li>3 Scattered</li> <li>4 Absent</li> </ol>
10	16	1	-	<p><u>FLOWERING:-</u> The condition of flowering will be recorded in one of the following classes:-</p> <ol style="list-style-type: none"> <li>1 Gregarious flowering</li> <li>2 Sporadic flowering</li> <li>3 No flowering</li> </ol>
	17-22	6	-	<p><u>Clump Enumeration Size Class :-</u> The definition of clumps and culm has already been given previously. Accordingly the enumeration of clumps will be carried out all over the plot and the number of clumps will be recorded in the following three size classes to the nearest metre in two digit number. The size of each clump will be determined by averaging the two diameters at base level of the clump at right angles to each other. While determining the size class, care will be taken that all the culms belong to one clump having same rhizome.</p>
11	17-18	2	-	<p><u>SIZE CLASS LESS THAN 1 M.</u></p> <p>All clumps of less than one metre diameter will be recorded in this class.</p>
12	19-20	2	-	<p><u>SIZE CLASS 1-2 M.</u></p> <p>All clumps of diameter between 1 M. and 2 M. will be recorded in this class.</p>

1	2	3	4	5
13	21-22	2	-	<p><u>SIZE CLASS 2 M. +</u></p> <p>Clumps having diameter more than 2 m. will be recorded here.</p> <p>(Information in Col. 25 to 50 will be recorded for all the clumps if there are five or less than five clumps in the plot. If there are more than five clumps in the plots, five clumps should be selected randomly with the help of random table and measurements of 5 stumps so selected will be recorded.)</p>
14	23-24	2	-	<p><u>CLUMP NO.</u></p> <p>The number of the clumps will be recorded serially in two digit code number starting from North in clockwise direction.</p>
15	25	1	-	<p><u>SIZE CLASS:-</u> The diameter at base of the clump will be measured with the help of tape at right angles to each other and the average diameter will be recorded to the nearest metre in one of the following three size classes.</p> <p>1 Less than 1 metre 2 1 to 2 metres 3 More than 2 metres</p>
16	26-27	2	-	<p><u>SPECIES CODE</u></p> <p>The species of bamboo will be recorded according to the code numbers given below:-</p> <p>01 Dendrocalamus strictus 02 Bambusa arundinacea 03 Cephalogtachyum pergracile 04 Oxytenanthera spp.</p> <p>28-33 <u>Number of culms as per age.</u></p> <p>Number of culms in a clump will be recorded in the following three age classes according to the age of the culms.</p>
17	28-29	2	-	<p><u>CURRENT SEASON'S :-</u> Number of culms of current season will be enumerated and recorded in two digit number.</p>
18	30-31	2	-	<p><u>TWO SEASON'S :-</u> Number of culms of two seasons will be recorded here in two digit number.</p>
19	32-33	2	-	<p><u>THREE SEASON'S &amp; MORE :-</u> Number of all mature culms of three seasons and more will be recorded in two digit number.</p>

1	2	3	4	5
20	34-35	2	-	<u>TOTAL NUMBER OF CULMS :-</u> Total number of culms in the clump (i.e. sum of Cols. 28-29, 30-31 & 32-33) will be recorded in two digit number.
	36-41	6	-	<u>Distribution of culms :-</u> The number of damaged or top broken culms or scarred (dry only) or rotten culms which are unutilizable will be recorded in the following categories.
21	36-37	2		<u>Damaged or top broken culms :-</u> Number of damaged or top broken culms in the clump will be counted and recorded in two digit code number.
22	38-39	2		<u>Dry scattered or rotten culms :-</u> Number of culms which are rotten or / (dry) and are un-utilizable will be counted and recorded here in two digit number. If the culm is / but not dry, it will not be counted for the purpose of this column.
	/scattered			
	/scattered			
23	40-41	2		<u>Rest :-</u> The remaining number of culms in the clump which can be obtained by subtracting the sum of cols. 36-37 & 38-39 from Cols. 34-35 will be filled in these columns in two digit number.
	42-47	6		<u>SIZE OF CULMS :-</u> One culm from each clumps representative of the area will be cut and the following data will be recorded against the respective clump number.
24	42-43	2		<u>AVERAGE TOTAL LENGTH :-</u> The length of one felled culm from each clump will be recorded to the nearest metre in two digit number.
25	44-45	2	2	<u>AVERAGE LENGTH UPTO 2 cm. DIAMETER :-</u> The length upto 2 cm. diameter of one felled culm from each clump will be recorded to the nearest metre in two digit number.
26	46-47	2	-	<u>AVERAGE CULM DIAMETER :-</u> Average of diameters at breast height of mature standing culms felled from each clump will be recorded to the nearest cm. in two digit number.
27	48	1	-	<u>HOLLOWNESS :</u> The cut culms will be observed from both ends (cut the culm at 2 cm. diameter also) and the information will be recorded as below :-
			1	Solid
			2	Hollow
28	69-70	2		<u>TOTAL NUMBER OF CLUMPS :</u> Total number of clumps occurring in the entire plot will be recorded here in two digit number.
	71-80	10		Same as in Plot Description Form.

## APPENDIX - I

RAJASTHAN

Map Sheet Point reference of the Plots falling in the Forest  
Area of Range UDALPUR

Sr. No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1	2	3	4
1.	233	08110210	45 H/11
2.	234	08110208	-do-
3.	245	08110610	-do-
4.	255	08110808	-do-
5.	257	08111010	-do-
6.	273	08100202	45 H/10
7.	274	08100200	-do-
8.	276	08100402	-do-
9.	277	08100404	-do-
10.	283	08100606	-do-
11.	284	08100604	-do-
12.	288	08100802	-do-
13.	326	08090806	45 H/9
14.	512	08140002	45 H/14
15.	519	08140206	-do-
16.	534	08140300	-do-
17.	552	08150010	-do-H/15
18.	553	08150210	45 H/15
19.	561	08150104	-do-
20.	569	08150802	-do-
21.	572	08150802	-do-
22.	1235	08090907	45 H/9
23.	1236	08091007	-do-
24.	1237	08100201	45 H/10
25.	1238	08100303	-do-
26.	1239	08100304	-do-
27.	1240	08100305	-do-
28.	1241	08100306	-do-
29.	1242	08100405	-do-
30.	1243	08100403	-do-
31.	1244	08100504	-do-
32.	1245	08100505	-do-
33.	1246	08100607	-do-
34.	1247	08100605	-do-
35.	1248	08100603	-do-
36.	1249	08100601	-do-
37.	1250	08100702	-do-
38.	1252	08100705	-do-
39.	1252	08100905	-do-
40.	1253	08100801	-do-
41.	1254	08100900	-do-
42.	1255	08100903	-do-
43.	1256	08110209	45 H/11
44.	1257	08110211	-do-
45.	1258	08110310	-do-

1	2	3	4
46.	1259	08110308	45 H/11
47.	1260	08110307	-do-
48.	1261	08110611	-do-
49.	1262	08110708	-do-
50.	1263	08110809	-do-
51.	1264	08110910	-do-
52.	1265	08110909	-do-
53.	1266	08110908	-do-
54.	1267	08111009	-do-
55.	1268	08111011	-do-
56.	1269	08111111	-do-
57.	1270	08111110	-do-
58.	1271	08111109	-do-
59.	1272	08160811	45 H/16
60.	1273	08150007	45 H/15
61.	1274	08150009	-do-
62.	1275	08150011	-do-
63.	1276	08150110	-do-
64.	1277	08150108	-do-
65.	1278	08150107	-do-
66.	1279	08150106	-do-
67.	1280	08150207	-do-
68.	1281	08150305	-do-
69.	1282	08150304	-do-
70.	1283	08150503	-do-
71.	1284	08150502	-do-
72.	1285	08150601	-do-
73.	1286	08150603	-do-
74.	1287	08150702	-do-
75.	1288	08150701	-do-
76.	1289	08150801	-do-
77.	1290	08150901	-do-
78.	1291	08150900	-do-
79.	1292	08140107	45 H/14
80.	1293	08140105	-do-
81.	1294	08140104	-do-
82.	1295	08140306	-do-
83.	1296	08140305	-do-
84.	1297	08140301	-do-
85.	1298	08140401	-do-
86.	1299	08140501	-do-
87.	1300	08140500	-do-
88.	1301	08140601	-do-

RANGE PARSAD

Map Sheet Point reference of the Plots falling in the  
Forest Area of Range Parsad.

Sr.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1	2	3	4
1.	209	08120610	45 H/12
2.	210	08120608	-do-
3.	218	08120806	-do-
4.	242	08110406	45 H/11
5.	246	08110608	-do-
6.	247	08110606	-do-
7.	249	08110602	-do-
8.	250	08110600	-do-
9.	258	08111008	-do-
10.	260	08111004	-do-
11.	548	08150002	45 H/15
12.	549	08150004	-do-
13.	550	08150006	-do-
14.	557	08150202	-do-
15.	558	08150200	-do-
16.	595	08160400	45 H/16
17.	606	08160600	-do-
18.	1175	08110509	45 H/11
19.	1175 A	08110407	-do-
20.	1176	08110508	-do-
21.	1177	08110507	-do-
22.	1178	08110506	-do-
23.	1179	08110505	-do-
24.	1180	08110501	-do-
25.	1181	08110500	-do-
26.	1182	08110601	-do-
27.	1183	08110603	-do-
28.	1184	08110607	-do-
29.	1185	08110609	-do-
30.	1186	08110706	-do-
31.	1187	08110702	-do-
32.	1188	08110701	-do-
33.	1189	08110700	-do-
34.	1190	08110904	-do-
35.	1191	08110903	-do-
36.	1192	08110902	-do-
37.	1193	08110901	-do-
38.	1194	08110900	-do-
39.	1195	08111003	-do-
40.	1196	08111005	-do-
41.	1197	08111007	-do-
42.	1198	08111107	-do-
43.	1199	08111104	-do-
44.	1200	08111103	-do-
45.	1201	08111102	-do-
46.	1202	08111101	-do-
47.	1203	08111100	-do-
48.	1204	08120511	45 H/12
49.	1205	08120609	-do-
50.	1206	08120611	-do-

#	2	3	4
51.	1207	08120711	45 H/12
52.	1208	08120710	-do-
53.	1209	08120709	-do-
54.	1210	08120708	45 H/12
55.	1211	08120707	-do-
56.	1212	08120910	-do-
57.	1213	08120909	-do-
58.	1214	08121111	-do-
59.	1215	08121110	-do-
60.	1216	08121109	-do-
61.	1217	08121107	-do-
62.	1218	08121106	-do-
63.	1219	08121101	-do-
64.	1220	21130411	46 E/13
65.	1221	21130511	-do-
66.	1222	08160102	45 H/16
67.	1223	08160300	-do-
68.	1224	08160401	-do-
69.	1225	08160411	-do-
70.	1226	08160502	-do-
71.	1227	08160501	-do-
72.	1228	08150105	45 H/15
73. a	1228 A	08150105	-do-
74.	1229	08150102	-do-
75.	1229 A	08150003	-do-
76.	1230	08150101	-do-
77.	1231	08150100	-do-
78.	1232	08150201	-do-
79.	1233	08150301	-do-
80.	1234	08150300	-do-
81.	1230 A	08150001	-do-

Map Sheet point reference of the plots falling in the  
Forest Area of Range Salubar.

Sr.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1	2	3	4
1.	6154	081 61006	45 H/16
2.	6584	12040208	45 L/4
3.	6642	12040402	45 L/4
4.	666	12040406	-do-
5.	668	12040410	-do-
6.	681	12040610	-do-
7.	689	12040804	-do-
8.	690	12040806	-do-
9.	703	12041010	-do-
10.	704	12041008	-do-
11.	705	12041006	-do-
12.	706	12041004	-do-
13.	707	12041002	-do-
14.	710	12080002	-do-
15.	712	12080006	-do-
16.	1331	081 61104	45 H/16
17.	1332	12040108	45 L/4
18.	1332-A	12040109	-do-
19.	1333	12040309	-do-
20.	1333-A	12040310	-do-
21.	1334	12040306	-do-
22.	1335	12040305	-do-
23.	1336	12040405	-do-
24.	1337	12040409	-do-
25.	1338	12040511	-do-
26.	1339	12040510	-do-
27.	1340	12040509	-do-
28.	1341	12040508	-do-
29.	1342	12040507	-do-
30.	1343	12040506	-do-
31.	1344	12040505	-do-
32.	1345	12040603	-do-
33.	1346	12040605	-do-
34.	1347	12040609	-do-
35.	1348	12040709	-do-
36.	1349	12040708	-do-
37.	1350	12040707	-do-
38.	1351	12040706	-do-
39.	1352	12040705	-do-
40.	1353	12040704	-do-
41.	1354	12040703	-do-
42.	1355	12040805	-do-
43.	1356	12040807	-do-
44.	1357	12040809	-do-
45.	1358	12040910	-do-
46.	1359	12040908	-do-
47.	1360	12040906	-do-

1	2	3	4
48.	1361	12040905	45 L/4
49.	1362	12040904	-do-
50.	1363	12040903	-do-
51.	1364	12041003	-do-
52.	1365	12041005	-do-
53.	1367	12041106	-do-
54.	1368	12041105	-do-
55.	1369	12041104	-do-
56.	1370	12041103	-do-
57.	1371	12041102	-do-
58.	1372	12080007	-do-L/8
59.	683	12040610	45 L/4

Map sheet point reference of the plot falling in Forest Area  
of Range Kurabar.

S.No.	Plot No.	Map sheet reference of the plot	Map sheet No.
1.	564	08150208	45 H/15
2.	565	08150610	-do-
3.	566	08150608	-do-
4.	573	08150808	-do-
5.	677	12030606	-do-
6.	679	12030602	-do-
7.	697	12030808	-do-
8.	1302	08140701	45 H/14
9.	1303	08140700	45 H/15
10.	1304	08150109	-do-
11.	1305	08150307	-do-
12.	1306	08150306	-do-
13.	1307	08150405	-do-
14.	1308	08150467	-do-
15.	1309	08150510	-do-
16.	1310	08150508	-do-
17.	1311	08150507	-do-
18.	1312	08150506	-do-
19.	1313	08150609	-do-
20.	1314	08150611	-do-
21.	1315	08150711	-do-
22.	1316	08150710	-do-
23.	1317	08150709	-do-
24.	1318	08150708	-do-
25.	1319	08150809	-do-
26.	1320	08150811	-do-
27.	1321	08150911	-do-
28.	1322	08151011	-do-
29.	1323	08161111	45 H/16
30.	1324	12030311	45 L/3
31.	1325	12030407	-do-
32.	1326	12030508	-do-
33.	1327	12030603	-do-
34.	1328	12030707	-do-
35.	1329	12030704	-do-
36.	1330	12030703	-do-

Map sheet point reference of the plots falling in the Forest  
Area of Range Kherwara.

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1	2	3	4
1.	147	08080002	45 H/8
2.	148	08080004	-do-
3.	149	08080006	-do-
4.	154	08080206	-do-
5.	155	08080204	-do-
6.	156	08080202	-do-
7.	162	08080606	-do-
8.	167	08080806	-do-
9.	176	21050604	46 E/5
10.	177	21050608	-do-
11.	178	21050810	-do-
12.	179	21050808	-do-
13.	185	21090008	46 E/9
14.	193	08120004	45 H/12
15.	195	08120008	-do-
16.	197	08120210	-do-
17.	199	08120206	-do-
18.	201	08120202	-do-
19.	202	08120200	-do-
20.	208	08120410	-do-
21.	211	08120606	-do-
22.	217	08120804	-do-
23.	238	08110200	45 H/11
24.	239	08110400	-do-
25.	240	08110402	-do-
26.	241	08110404	-do-
27.	248	08110604	-do-
28.	1156	08080906	-do-
29.	1157	08081108	45 H/8
30.	1158	21050708	45 E/5
31.	1159	21050706	46 E/5
32.	1160	21090110	46 E/9
33.	1161	08120110	45 H/12
34.	1162	08120106	-do-
35.	1163	08120102	-do-
36.	1164	08120310	-do-
37.	1165	08120306	-do-
38.	1169	08120510	-do-
39.	1167	08120508	-do-
40.	1163	08120506	-do-
41.	1169	08120504	-do-
42.	1170	08110306	45 H/11
43.	1171	08110304	-do-
44.	1172	08110302	-do-
45.	1173	08110504	-do-
46.	1174	08110502	-do-
47.	1432	08041102	45 H/4
48.	1433	08080106	45 H/8
49.	1434	08080104	-do-
50.	1435	08080102	-do-
51.	1436	08080306	-do-
52.	1437	08080304	-do-

Map sheet point reference of the plots falling in the Forest  
area of Range Gogunda

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	093	08050800	45 H/5
2.	104	08051000	-do-
3.	105	08061010	45 H/6
4.	106	08061008	-do-
5.	107	08061006	-do-
6.	109	08061002	-do-
7.	281	08100610	45 H/10
8.	1078	08060803	45 H/6
9.	1079	08060811	-do-
10.	1030	08060911	-do-
11.	1031	08060910	-do-
12.	1082	08060909	-do-
13.	1083	08060908	-do-
14.	1084	08060907	-do-
15.	1085	08060906	-do-
16.	1086	08060905	-do-
17.	1087	08060904	-do-
18.	1088	08060903	-do-
19.	1089	08061007	-do-
20.	1090	08061009	-do-
21.	1091	08061011	-do-
22.	1092	08061111	-do-
23.	1093	08061110	-do-
24.	1094	08061109	-do-
25.	1005	08061108	-do-
26.	1096	08061104	-do-
27.	1097	08061103	-do-
28.	1098	08100003	45 H/10
29.	1099	08100105	-do-
30.	1100	08100104	-do-
31.	1101	08100205	-do-
32.	1102	08100207	-do-
33.	1103	08100308	-do-
34.	1104	08100411	-do-
35.	1105	08100709	-do-
36.	1106	08100910	-do-
37.	1107	08090104	45 H/9
38.	1077	08050900	45 H/5

Map sheet point reference of the plots falling in the forest  
area of Range Bansi

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	694	12030802	45 L/3
2.	711	12060004	45 L/8
3.	714	12080010	45 L/8
4.	718	12070006	45 L/7
5.	719	12070206	-do-
6.	722	12070200	-do-
7.	723	12080210	-do-
8.	734	12080410	-do-
9.	735	12070400	-do-
10.	736	12070402	-do-
11.	738-A	12070602	-do-
12.	739	12070600	-do-
13.	750-B	12070800	-do-
14.	1393	12030702	45 L/3
15.	1394	12030903	-do-
16.	1395	12030907	-do-
17.	1396	12040711	45 L/4
18.	1397	12040811	-do-
19.	1398	12040911	-do-
20.	1399	12041110	-do-
21.	1400	12041111	-do-
22.	1401	12080111	45 L/8
23.	1402	12080110	-do-
24.	1403	12080211	-do-
25.	1404	12080311	-do-
26.	1405	12080310	-do-
27.	1406	12080409	-do-
28.	1407	12080411	-do-
29.	1408	12080511	-do-
30.	1409	12080510	-do-
31.	1410	12080508	-do-
32.	1411	12080609	-do-
33.	1412	12080611	-do-
34.	1413	12080711	-do-
35.	1414	12080710	-do-
36.	1415	12080811	-do-
37.	1416	12070106	45 L/7
38.	1417	12070105	-do-
39.	1418	12070101	-do-
40.	1419	12070100	-do-
41.	1420	12070201	-do-
42.	1421	12070305	-do-
43.	1422	12070301	-do-
44.	1423	12070300	-do-
45.	1424	12070401	-do-
46.	1425	12070502	-do-
47.	1426	12070501	-do-
48.	1427	12070500	-do-
49.	1428	12070601	-do-
50.	1429	12070701	-do-
51.	1430	12070700	-do-
52.	1431	12070801	-do-

Map sheet point reference of the plots falling in the forest  
area of Range Panarwa.

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	002	08040810	45 H/4
2.	003	08040808	-do-
3.	004	08040806	-do-
4.	006	08041006	-do-
5.	007	08041008	-do-
6.	008	08041010	-do-
7.	016	08030802	45 H/3
8.	018	08031000	-do-
9.	019	08031002	-do-
10.	111	08070000	45 H/7
11.	112	08070002	-do-
12.	113	08070004	-do-
13.	118	08070208	-do-
14.	119	08070206	-do-
15.	120	08070204	-do-
16.	121	08070202	-do-
17.	123	08070400	-do-
18.	124	08070402	-do-
19.	125	08070404	-do-
20.	126	08070406	-do-
21.	150	08080008	45 H/8
22.	151	08080010	-do-
23.	152	08080210	-do-
24.	153	08080208	-do-
25.	945	08040410	-do-
26.	1108	08030500	45 H/3
27.	1109	08030900	-do-
28.	1110	08030902	-do-
29.	1114	08031104	-do-
30.	1112	08031100	-do-
31.	1113	08040508	45 H/4
32.	1114	08040708	-do-
33.	1115	08040706	-do-
34.	1116	08040910	-do-
35.	1117	08040908	-do-
36.	1118	08040906	-do-
37.	1119	08041110	-do-
38.	1120	08041108	-do-
39.	1121	08041106	-do-
40.	1122	08080110	45 H/8
41.	1123	08080108	-do-
42.	1124	08080308	-do-
43.	1125	08070104	45 H/7
44.	1126	08070102	-do-
45.	1127	08070100	-do-
46.	1128	08070308	-do-
47.	1129	08070302	-do-
48.	1130	08070300	-do-
49.	1131	08070508	-do-
50.	1132	08070506	-do-
51.	1135	08070706	-do-
52.	1134	08070708	-do-

Map sheet point reference of the plots falling in the forest area of Range Jhadi

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	086	08060600	45 H/6
2.	087	08060800	-do-
3.	088	08060802	-do-
4.	128	08070410	45 H/7
5.	129	08070610	-do-
6.	132	08070604	-do-
7.	135	08070800	-do-
8.	137	08070804	-do-
9.	139	08070808	-do-
10.	140	08070810	-do-
11.	141	08071010	-do-
12.	143	08071006	-do-
13.	144	08071004	-do-
14.	146	08071000	-do-
15.	157	08080406	45 H/8
16.	158	08080408	-do-
17.	159	08080410	-do-
18.	168	08080808	-do-
19.	169	08080810	-do-
20.	229	08110004	45 H/11
21.	1133	08070502	45 H/7
22.	1136-A	08060300	45 H/6
23.	1136	08060702	-do-
24.	1137	08060700	-do-
25.	1138	08060902	-do-
26.	1139	08060900	-do-
27.	1140	08061100	-do-
28.	1141	08070310	45 H/7
29.	1142	08070702	-do-
30.	1143	08070704	-do-
31.	1144	08070710	-do-
32.	1145	08070900	-do-
33.	1146	08070902	-do-
34.	1147	08070904	-do-
35.	1148	08070910	-do-
36.	1149	08071106	-do-
37.	1149-A	08071102	-do-
38.	1150	08080508	45 H/8
39.	1151	08080708	-do-
40.	1152	08110110	45 H/11
41.	1153	08110108	-do-
42.	1154	08110106	-do-
43.	1155	08100100	45 H/10

Map sheet point reference of the plots falling in the forest  
area of Range Kotra

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	011	08030608	45 H/3
2.	012	08030610	-do-
3.	013	08030810	-do-
4.	114	08070006	-do-
5.	115	08070008	-do-
6.	116	08070010	-do-
7.	117	08070210	-do-
8.	027	08020404	45 H/2
9.	028	08020608	-do-
10.	029	08020606	-do-
11.	030	08020604	-do-
12.	034	08020802	-do-
13.	035	08020804	-do-
14.	036	08020806	-do-
15.	037	08020808	-do-
16.	039	08010800	45 H/1
17.	042	08021008	45 H/2
18.	044	08021004	-do-
19.	047	08060000	45 H/6
20.	048	08060002	-do-
21.	049	08060004	-do-
22.	050	08060006	-do-
23.	054	08050002	45 H/5
24.	056	08050204	-do-
25.	059	08060210	45 H/6
26.	060	08060208	-do-
27.	061	08060206	-do-
28.	062	08060204	-do-
29.	063	08060202	-do-
30.	064	08060200	45 H/6
31.	066	08060402	-do-
32.	067	08060404	-do-
33.	068	08060406	-do-
34.	069	08060408	-do-
35.	071	08050400	45 H/5
36.	080	<del>08050800</del>	<del>-do-</del>
37.	081	08060610	45 H/8
38.	090	08060806	-do-
39.	091	08060808	-do-
40.	092	08060810	-do-

Map sheet point Reference of the plots falling in the forest area of Renge Dhariawad

S.No.	Plot No.	Map sheet reference of the plot.	Map sheet No.
1.	635	09050 610	46 I/5
2.	636	09050810	-do-
3.	713	12080008	45 L/8
4.	724	12080208	-do-
5.	725	12080206	-do-
6.	726	12080204	-do-
7.	727	12080202	-do-
8.	728	12080200	-do-
9.	730	12080402	-do-
10.	733	12080408	-do-
11.	741	12080608	-do-
12.	745	12080600	-do-
13.	749	12080806	-do-
14.	750	12080808	-do-
15.	750-A	12080810	-do-
16.	751-A	12081008	-do-
17.	751-B	12081010	-do-
18.	754	12081000	-do-
19.	930	12120000	-do-
20.	931	12120002	-do-
21.	934	12120008	-do-
22.	935	12120206	-do-
23.	936	12120204	-do-
24.	937	12120202	-do-
25.	1366	12041109	45 L/4
26.	1373	25050510	46 I/5
27.	1374	25050708	-do-
28.	1375	12080108	45 L/8
29.	1376	12080106	-do-
30.	1377	12080102	-do-
31.	1378	12080302	-do-
32.	1379	12080300	-do-
33.	1380	12080502	-do-
34.	1381	12080708	-do-
35.	1382	12080910	-do-
36.	1383	12080908	-do-
37.	1384	12080900	-do-
38.	1385	12081110	-do-
39.	1386	12081108	-do-
40.	1387	12081102	-do-
41.	1388	12081100	-do-
42.	1389	12071000	45 L/7
43.	1390	12120102	-do-
44.	1391	12120100	-do-

Map sheet point reference of the Plots falling in the Forest  
Area of Range Kumbalgarh

S.No.	Plot No.	Map sheet reference of the plot	Map sheet No.
1	2	3	4
1.	075	08050610	H/5
2.	076	08050608	-do-
3.	077	08050606	-do-
4.	078	08050604	-do-
5.	304	08090010	H/9
6.	315	08090408	-do-
7.	316	08090410	-do-
8.	337	07120004	G/12
9.	340	07120204	-do-
10.	343	07120400	-do-
11.	344	07120402	-do-
12.	347	07120408	-do-
13.	348	07120610	-do-
14.	349	07120608	-do-
15.	351	07120604	-do-
16.	353	07120600	-do-
17.	356	07120804	-do-
18.	357	07120806	-do-
19.	361	07121008	-do-
20.	366	07030600	G/18
21.	368	07080802	-do-
22.	369	07080804	-do-
23.	570	07081004	-do-
24.	373	07110600	G/11
25.	374	07110602	-do-
26.	375	07110804	-do-
27.	376	07110802	-do-
28.	381	07111006	-do-
29.	408	07150006	G/15
30.	1001	07080500	G/8
31.	1002	07080501	-do-
32.	1003	07080601	-do-
33.	1004	07080701	-do-
34.	1005	07080702	-do-
35.	1006	07080703	-do-
36.	1007	07080803	-do-
37.	1008	07080801	-do-
38.	1009	07080902	-do-
39.	1010	07080903	-do-
40.	1011	07080904	-do-
41.	1012	07081003	-do-
42.	1013	07081104	-do-
43.	1014	08050105	H/5
44.	1015	08050303	-do-
45.	1016	08050304	-do-
46.	1017	08050305	-do-
47.	1018	08050306	-do-
48.	1019	08050407	-do-
49.	1020	08050403	-do-
50.	1021	08050504	-do-
51.	1022	08050508	-do-

1	2	3	4
52.	1023	08050509	H/5
53.	1024	08050510	-do-
54.	1025	08050511	-do-
55.	1026	08050611	-do-
56.	1027	08050809	-do-
57.	1028	08050607	-do-
58.	1029	08050605	-do-
59.	1030	08050711	-do-
60.	1031	08051110	-do-
61.	1032	08051109	-do-
62.	1033	08051108	-do-
63.	1034	08090011	H/9
64.	1035	08090311	-do-
65.	1036	08090307	-do-
66.	1037	08090306	-do-
67.	1038	08090409	-do-
68.	1039	08090511	-do-
69.	1040	08090510	-do-
70.	1041	07120005	G/12
71.	1042	07120106	-do-
72.	1043	07120102	-do-
73.	1044	07120201	-do-
74.	1045	07120205	-do-
75.	1046	07120207	-do-
76.	1047	07120308	-do-
77.	1048	07120307	-do-
78.	1049	07120304	-do-
79.	1050	07120303	-do-
80.	1051	07120301	-do-
81.	1052	07120401	-do-
82.	1053	07120405	-do-
83.	1054	07120407	-do-
84.	1056	07120510	-do-
85.	1057	07120509	-do-
86.	1058	07120504	-do-
87.	1059	07120502	-do-
88.	1060	07120609	-do-
89.	1061	07120611	-do-
90.	1062	07120710	G/12
91.	1063	07120709	-do-
92.	1064	07120702	-do-
93.	1065	07120807	-do-
94.	1066	07120908	-do-
95.	1067	07120907	-do-
96.	1068	07120906	-do-
97.	1069	07110601	-do-
98.	1070	07110703	-do-
99.	1071	07110702	-do-
100.	1072	07110701	-do-
101.	1073	07110700	-do-
102.	1075	07111005	-do-
103.	1076	07111106	-do-

APPENDIX -II

INSTRUCTIONS FOR TAKING THE TALLY OF 'IN' TREES

Remember that --

- i) The record of tally of 'IN' trees is required in respect of those sample points only where the vegetation class (column 19 of the P.D.F.) is Forest (Code 1). For all other categories of vegetation class this record of tally is not required.
- ii) For counting the tally with the relaskop the trees/bamboo clumps will be sighted at the B Breast Height.
- iii) The trees which are dead and seedlings (which are less than 5 cm. in diameter at breast height over bark) are not to be considered for taking the tally.

Note:- Badly burnt or hacked bamboo clump which has only stumps (dead, dried upto 2 metre in height) is not to be considered for tally.

TALLY OF 'IN' TREES.

Stand at the point centre (over the peg) and take a sweep around the area with the relaskop starting from North and moving in a clock-wise direction and making a full circle of the sweep. Look at the breast height point of each tree through the relaskop and compare the diameter of the stem at breast height with that of width of the strip 2 corresponding to B.A.F-2. If the diameter of the tree is definitely bigger than the width of the strip then the tree will be counted as 'IN'. If the diameter of the tree is smaller than the width of the strip, then the tree will be considered as 'OUT'. If you cannot decide by observation whether the tree is bigger or smaller than the angle projected (width of the strip i.e. it is about as wide as the projected strip, it is a 'Marginal Tree'. Marginal trees should be checked by actual measurements and calculations as explained hereinafter. Measure the diameter of the tree (perpendicular to the point centre) and multiply it with .3536 (for B.A.F-2) to calculate the 'plot radius' in metres. Now measure the distance from the centre of the tree to the point centre (peg) in metres. If this distance is less than the calculated plot radius the tree is 'IN' and if the measured distance is more than the 'plot radius' the tree is 'OUT'. REMEMBER THAT EVERY MARGINAL TREE MUST BE VERIFIED BY ACTUAL MEASUREMENT OF DIAMETER AND DISTANCE.

Note:-

- i) Make sure that each tree has been sighted through the relaskop. Observe extra caution where the crop is dense and some trees may be hidden behind the stem of other trees.
- ii) ALWAYS first use B.A.F.-2 to take the tally of 'IN' trees. For this first take the tally of all trees and give a serial number to each of the 'IN' trees. In the sample tree form the trees will be recorded which will be written below the horizontal line drawn across the S.T.F.

iii) On the blaze of each "IN" tree write both the serial number as well as the Basal Area Factor to assist in identifying between two trees counted for different basal area factors. For this write B. A.F. as NUMERATOR and the serial number as DENOMINATOR.

PLOT RADIUS

For ready reference tables showing the D.B.H.O.B. and the corresponding plot radius is given separately for B.A.F-2 and B.A.F-1.

TABLE

PLOT RADIUS FOR VARIOUS DIAMETERS

<u>"FOR BASAL AREA FACTOR-2"</u>		<u>Plot Radius Factor = .3536</u>	
<u>D.B.H.O.B.</u> <u>cm.</u>	<u>Plot Radius</u> <u>M.</u>	<u>D.B.H.O.B.</u> <u>cm.</u>	<u>Plot Radius</u> <u>M.</u>
1	.3536	38	
2	.7072	39	13.4368
3	1.0608	40	13.7904
4	1.4144	41	14.1440
5	1.7680	42	14.4976
6	2.1216	43	14.8512
7	2.4752	44	15.2048
8	2.8288	45	15.5584
9	3.1824	46	15.9120
10	3.5360	47	16.2656
11	3.8896	48	16.6192
12	4.2432	49	16.9728
13	4.5968	50	17.3264
14	4.9504	51	17.6800
15	5.3040	52	18.0336
16	5.6576	53	18.3872
17	6.0112	54	18.7408
18	6.3648	55	19.0944
19	6.7184	56	19.4480
20	7.0720	57	19.8016
21	7.4256	58	20.1552
22	7.7792	59	20.5088
23	8.1328	60	20.8624
24	8.4864	61	21.2160
25	8.8400	62	21.5696
26	9.1936	63	21.9232
27	9.5472	64	22.2768
28	9.9008	65	22.6304
29	10.2544	66	22.9840
30	10.6080	67	23.3376
31	10.9616	68	23.6912
32	11.3152	69	24.0448
33	11.6688	70	24.3984
34	12.0224	71	24.7520
35	12.3760	72	25.1056
36	12.7296	73	25.4592
37	13.0832	74	25.8128
			26.1664

<u>D. S. H. O. B.</u> cm.	<u>Plot Radius</u> M.	<u>D. S. H. O. B.</u> cm.	<u>Plot Radius</u> M.
75	26.2500	98	34.6528
<del>76</del>	<del>26.8736</del>	99	35.0064
77	27.2272	100	35.3600
78	27.5808	101	35.7136
79	27.9344	102	36.0672
80	28.2880	103	36.4208
81	28.6416	104	36.7744
82	28.9952	105	37.1280
83	29.3488	106	37.4816
84	29.7024	107	37.8352
85	30.0560	108	38.1888
86	30.4096	109	38.5424
87	30.7632	110	38.8960
88	31.1168	111	39.2496
<del>89</del>	<del>31.4704</del>	112	39.6032
90	31.8240	113	39.9568
91	32.1776	114	40.3104
92	32.5312	115	40.6640
93	32.8848	116	41.0176
94	33.2384	117	41.3712
95	33.5920	118	41.7248
96	33.9456	119	42.0784
97	34.2992	120	42.4320

INSTRUCTIONS FOR TRAVERSING FROM REFERENCE FEATURE TO A SAMPLE POINT

(A) MEASUREMENT OF BEARING (GRADE) BY SILVA COMPASS

After you have correctly located a reference feature on the ground, the location of sample point will be made by calculating the distance and the direction of the sample point from that reference feature. For this proceed as under :-

Orient the map towards the north. Draw a straight line passing through the centre of the reference feature point and the sample point shown on the map. Adjust the dial of the Silva Compass so that the pointer is on the 400th grade of the dial. Now place the Silva Compass on the map sheet in such a way that the pivot of the needle is placed over the point of the reference feature. In this position the compass needle show N-S. Note the grade at which the straight line (drawn from the reference feature to the sample point) is cutting through. Note it in your field note book. This is the grade on which you have to proceed with the silva compass to reach to the sample point.

Cross check the above by measuring the bearing with the help of graduated protractor. The protractor will give the bearing in degrees. Multiply the degrees by 10/9 to get the grade which should be the same as that measured by the Silva compass. If you find an error in the cross checking repeat the process both by the silva compass as well as the protractor. **AN ERROR IN MEASURING THE CORRECT BEARING (GRADE) MAY RESULT IN COMPLETELY WRONG LOCATION OF THE SAMPLE POINT.**

Adjust the graduated disc. of the Silva Compass so that the scale pointer reads the bearing (grade) as determined by you. From now on the disc will not be moved and its position should remain fixed till the sample point is reached. Note down the Silva Compass grade thus determined in your field note book.

(B) MEASUREMENT OF HORIZONTAL DISTANCE FROM THE MAP

How to calculate the ground distance of the sample point measure the distance between the reference feature and the sample point on the map in centimeters. Multiply this with the 50,000 if 1:50,000 sheet is used and by 63360 if 1" sheet is used and divide the product by 100 to get the ground distance in meters. (R.F. is given at the bottom of each map sheet). The figure thus obtained will be the distance of the sample point from the reference feature on the ground in meters. Note down the distance thus calculated in your note book.

(C) MEASUREMENT OF HORIZONTAL DISTANCE ON THE GROUND

For reaching the sample point from a known reference feature you would be required to measure the actual ground distance as determined by you earlier on the map.

The ground distance thus measured should always be horizontal. In a flat uniform terrain the measurement of horizontal distances will pose no problem but when the terrain is hilly direct measurements on the ground will not give the horizontal distances. In such cases the sloping distance should be converted into horizontal distances as per instructions given here.

With this method you can measure long stretches in a uniform sloping terrain by converting the known horizontal distance (from the map sheet) into sloping distance or by measuring the sloping distance, for a uniform slope, the horizontal distance can be calculated. Remember that for varying slopes separate measurements should be taken and then each should be converted to horizontal distance.

While measuring on a sloping ground determine the angle of slope and convert the sloping distance into horizontal distance with the help of the formula explained as under :-

Q. If L is the horizontal distance; L' is the sloping distance and A is the angle of slope, then the sloping distance can be converted to horizontal distance (or vice versa) by the formula.

$$\frac{L}{L'} = \cos A$$

$$L = L' \cos A$$

$$\text{or } L' = \frac{L}{\cos A} = L \cdot \sec A$$

Q.1. Thus if the value of COS A and any of the distance (L or L') is known then the other distance can be calculated. A table showing the value of COS A for different values is given below :-

A°	COS A	A°	COS A	A°	COS A
1	0.9998477	31	0.8571673	61	0.4848096
2	0.9993208	32	0.8480481	62	0.4694716
3	0.9986295	33	0.8386706	63	0.4539905
4	0.9975641	34	0.8290376	64	0.4383711
5	0.9961917	35	0.8191502	65	0.4226183
6	0.9945219	36	0.8090170	66	0.4067366
7	0.9925462	37	0.7986355	67	0.3907311
8	0.9902681	38	0.7880108	68	0.3746066
9	0.9876983	39	0.7771460	69	0.3583679
10	0.9848078	40	0.7660444	70	0.2429201
11	0.9816272	41	0.7547096	71	0.3255682
12	0.9781476	42	0.7431443	72	0.3090170
13	0.9743701	43	0.7313537	73	0.2923717
14	0.9702957	44	0.7193398	74	0.2756374
15	0.9659258	45	0.7071068	75	0.2588190
16	0.9612617	46	0.6946584	76	0.2419219
17	0.9563048	47	0.6819984	77	0.2248511
18	0.9510565	48	0.6691306	78	0.2079117
19	0.9455186	49	0.6560590	79	0.1908090
20	0.9396926	50	0.6427876	80	0.1736482
21	0.9335804	51	0.6293204	81	0.1564345
22	0.9271839	52	0.6156615	82	0.1391731
23	0.9205049	53	0.6018150	83	0.1218693
24	0.9135455	54	0.5877853	84	0.1045285
25	0.9063078	55	0.5735764	85	0.0871557
26	0.8987940	56	0.5591929	86	0.0697565
27	0.8910065	57	0.5446390	87	0.0523360
28	0.8829476	58	0.5299193	88	0.0348995
29	0.8746197	59	0.5150381	89	0.0174524
30	0.8660284	60	0.5000000	90	0.0000000

C-2

<u>A°</u>	<u>Sec A</u>	<u>A°</u>	<u>Sec A</u>
0	1.000000	45	1.41421
1	0.00015	46	1.43956
2	1.00061	47	1.46628
3	1.00137	48	1.49448
4	1.00244	49	1.52425
5	1.00382	50	1.55572
6	1.00551	51	1.58902
7	1.00751	52	1.62427
8	1.00983	53	1.66164
9	1.01247	54	1.70130
10	1.01543	55	1.74345
11	1.01872	56	1.78829
12	1.02234	57	1.83608
13	1.02630	58	1.88708
14	1.03061	59	1.94160
15	1.03528	60	2.00000
16	1.04030	61	2.06267
17	1.04569	62	2.13005
18	1.05146	63	2.20269
19	1.05762	64	2.28117
20	1.06438	65	2.36620
21	1.07114	66	2.45759
22	1.07853	67	2.55930
23	1.08636	68	2.66947
24	1.09464	69	2.79043
25	1.10338	70	2.92380
26	1.11260	71	3.07155
27	1.12233	72	3.23607
28	1.13257	73	3.42080
29	1.14335	74	3.62796
30	1.15470	75	3.86370
31	1.16663	76	4.13357
32	1.17918	77	4.44541
33	1.19236	78	4.80973
34	1.02622	79	5.24084
35	1.22077	80	5.75877
36	1.23607	81	6.39245
37	1.25214	82	7.18530
38	1.26902	83	8.20551
39	1.28676	84	9.56677
40	1.30541	85	11.474
41	1.32501	86	14.358
42	1.34563	87	19.107
43	1.36733	88	28.654
44	1.39016	89	57.299

(D) PRECAUTIONS

While using the Silva Compass the following PRECAUTIONS must be observed :-

- i) When sighting through the Silva Compass keep the centre of the instrument above the station. For this, stand at such a distance from the station that the centre of your stretched palm is just over the station.
- ii) At every station check that the bearing adjusted at the starting point is in the same position.
- iii) Hold the instrument horizontal on your palm.
- iv) When aligning the next station take care that the centre of the needle, the hair line and the notch at the top of the mirror are all in a straight line.
- v) Hold the instrument in the right palm if you are closing the left eye. But if you are in the habit of closing your right eye then hold the instrument in the left hand. Whichever practice is adopted at the standing point, it should be continued till you reach the sample point.
- vi) Do not keep any object made of iron near the instruments while in use.
- vii) Always lock the needle of the instrument when you are not using the instrument.

(E) CREW DEVELOPMENT FOR TRAVERSING

For traversing from the reference feature to the sample point the method given here should be followed.

From the reference feature point direct one fieldman to stand at a convenient distance approximately in the direction in which the sample point lies. This fieldman shall carry with him an aligning rod for giving alignment to the crew leader and a sharp instrument (Khukri or axe) for clearing the bushes and branches etc. which might obstruct the visibility of laying down of the nylon rope line. After the first fieldman has taken the forward position, align him with Silva compass in the correct line of the direction of the sample point. Once the alignment of the first station is done the first fieldman shall move a further convenient distance to the next station along the same direction. You shall then move to the station over which the first fieldman was standing in the beginning. (The first fieldman would have left an identification mark at the station). Besides the SILVA compass you shall be keeping one end of the nylon rope line tied firmly to one end of a two metre wooden rod held in your hand. When you walk to the next station for further alignment you shall walk in a straight line so that the nylon rope line (one end of which is with you) tied to a rod trails on the ground in a straight line. You will find the rod useful particularly in areas where walking in a straight line is difficult because of the presence of dense bushes. Wherever you come across such bushes obstructions, push the wooden rod (with the rope end through the bush to the other side of it. You can circumvent the obstruction and reach to the other side of the bush. Pick up the rod and the rope end and continue further alignment.

While you are moving from one station to the other station in the process of alignment you shall find that the rope (one end of which is with you) is trailing on the ground behind you along the line of alignment. Direct your other two crew members (Deputy Ranger and Fieldman) to go on measuring and recording the horizontal ground distance along the nylon rope line trailing on the ground. The measurement shall be done along the trailing nylon rope line with the help of a tape or a rope having fixed lengths marked on it in advance. The movement of the crew leader and the ground measurement by the followers shall be so synchronised that at no stage the work is held up. For ground measurement the one of the two crew members (Fieldman No.2) shall hold the forward end of the tape or the measured rope and shall also keep a ranging rod and 10 steel arrows with him. The rear end of the measuring tape/rope shall be held by the Deputy Ranger who shall also be responsible for recording the measurements. After a measurement is completed the fieldman shall fix an arrow on each point at which the measurement has been taken. He shall move forward along the line of alignment to a distance till his follower (Deputy Ranger) reaches to the point where the first arrow is fixed on the ground. The arrow shall be removed by the Deputy Ranger from the ground and shall be kept with him for record. Each arrow will represent the fixed measured length of the tape rope. A second measurement shall be taken and an arrow shall be fixed on the ground in the same way as done in the case of first measurement. This way the measurement shall proceed till all the 10 arrows have been picked up by the Deputy Ranger. At this point, he shall record the total distance measured in his note book and hand over all the arrows to the fieldman for continuing the process again. This process shall continue till the sample point is reached.

This method of traversing will help in quick measurements of ground distances since the processes of alignment of direction and measurement of ground distance shall go on simultaneously.

LIST OF TREE/BAMBOO SPECIES AND THEIR CODE NUMBERS

<u>Botanical Name</u>	<u>Local Name</u>	<u>Code</u>
Morinda tinctoria	Aal	001
Mangifera indica	Aam, Amba	002
Buchanania lanzan	Achar, Chiranji	003
Alangium salvifolium	Akol	004
Millingtonia hortensis	Akash nim	005
Cassia fistula	Aaltas, Karamalia	006
Hardwickia binata	Anjen	007
Emblia officinalis	Anla	008
Ricinus communis	Aranda	009
Ailanthus excelsa	Ardu	010
Sapindus emarginate	Arithi	011
Polyalthia longifolia	Ashapala, Ashik	012
Acacia nilotica var	Babul, Bawal	013
Tomentosa cupressiforma var		
Ficus bengalensis	Bad	014
Melia azedarach	Bakain	015
Terminalia belerica	Bahara Beda	016
Crataeva religiosa	Barna	017
Pterocarpus marsupium	Bija, Biya	018
Aegle marmelose	Billi, Bel	019
Diospyros cordifolia	Bistendu Kara-tendu	020
Zizyphus mauratina, Lamk varior		021
Perkinsonia aculeata	Buldhan	022
Santalum album	Chandan	023
Bauhinia purpurea	Chapeli	024
Holoptelia integrifolia	Chural	025*
*Grewia tiliaefolia	Dhaman	027
Anogeissus latifolia	Dhaura	028
Anogeissus pendula	Dhokra, Kentya, Kaldhi	029
Dalbergia peniculata	Dhobin	030
Holarrhena antidysenterica	Dudhi, Karontya, Karu, Akdiya	031
Tamarix articulata	Farash	032
Erythrina suberosa	Gadapalash	033
Kydia calycina	Gadi hagro	034
Zizyphus xylopyra	Ghat bor	035
Ochlospermum religiosum	Garnal, Girnar	036
Lannea coromandelica	Godal	037
Dichrostachya cineria	Goya, Khair, Kolai	038
Ficus racemosa I. Var	Gulam Umar	039
Dalmeix regia (Boj) Raf.	Gulmohar	040
Cordia rothii	Gundi (Bar), Lasora	041
Cordia dichotoma	Gundi (Bar) Lasora, Ludi	042
Adina cordifolia	Haldu	043
Balanites aegyptiaca (Linn)	Hingotia	044
Tamarindus indica	Imli, Jamli	045
Salvadora oleoides	Jal (khara) (Pilu)	046
Salvadora persica	Jal (Khara)	047
Syzygium jambos, (Linn)	Jammi, Jal/Jamun	048
Syzygium cumini, (Linn), Ots. (Eugenia Jambolaha)	Jamun, Jambua	049
Inga dulcis, Willd	Jengal Jalebi	050
* Butea monosperma (Lamk) Taub	Dhak, Khankra	026*

<u>Botanical Name</u>	<u>Local Name</u>	<u>Code</u>
Bauhinia ralemosa	Jhinjha	051
Bauhinia arighata	Kachanar	052
Feronia limonia (Linn)	Kainth, Kabeeta	053
Flacourtia indica (burm.f)	Kaken, Kanak, Champa	054
Pongamia pinnata (Linn)	Karanja, Kangari	055
Mitragyna parvifolia (Roxb)	Korth Kalam, Kenda	056
Bridelia rotusa	Kaljaaria (Lemph asna)	057
Sterculia urens	Karaya, Kara	058
Capparis decidua	Kair	059
Musa sapientum	Kela	060
Pandanus fascicularia	Kevra	061
Acacia catechu	Khair	062
Phoenix sylvestris	Khajur	063
Wrightia tinctoria	Khirmi, Dudhi	064
Mamilkara Haxandra (Rox) Dub (Mimusops Haxandra)	Khirmi/Rain	065
Prosopis cineria	Khejri	066
Acacia senegal	Kumta	067
Terminalia arjuna	Kohra	068
Scheichera trijuga	Kusum	069
Hymenodictyon excelsum	Lunia	070
Bridelia retusa	Lakhamana, Kaljbaria	071
Madhura indica	Mahua, Mahura	072
Dalichandrona falcata seem	Mandal/Medla	073
Schrebera swietenoides	Mokha	074
Mimosupa elengi	Melsiri	075
Acadirachta indica	Neem, Limra	076
Citrus medica	Nimboo	077
Stereopermum suaveolena	Padal	078
Gardebia turgid	Paderi Karariya	079
Dalbergia lanceolaria	Pai	080
Ficus cordifolia Roxb.	Paras Pipal	081
Acogcissus acuminate	Passi	082
Ficus lacor	Pakhar	083
Salvadora olccida	Pilu	084
Ficus religiosa	Pipal	085
Claisena pentaphylla	Ratanjot	086
Manilkara hixandra (Rox.)	Dub Raen (Khirmi)	087
Limonia acidissima Linn	Rambell	088
Acacia leucofloea	Ranjus, Khejra	089
Soyimida febrifuga	Rohan, Royan	090
Mallotus phillippinensis	Rhani, Rilli, Bendi	091
Tecomella undulata	Rhera	092
Terminallia tomentosa	Sadar	093
Tectona grandis	Sag, Sagwen	094
Boswellia serrata	Salar, Halar	095
Delonix elata	Sandeshra	096
Moringa concanensis	Sargora/Sainjna	097
Salmalia malabarica (Bombax ceiba)	Semal, Hamlia	098
Moringa cleifera	Genjna, Surjna	099
Gmelina arborea	Sawan, Haven	100
Dalbergia sissoo	Shisham	101
Dalbergia latifolia	Shisham (Kala)	102
Morusalba	Shahtoot	103
Albezzia lebbak	Siris Kala	104
Albezzia procera	Siris (Safed)	105

<u>Botanical Name</u>	<u>Local Name</u>	<u>Code</u>
<i>Anona squamosa</i>	Sitaphal	106
<i>Ehretia levis</i>	Tambolia	107
<i>Diospyros melanoxylon</i>	Timru	108
<i>Ougenia dalbergiodes</i>	Tanaj	109
<i>Milusa tomentosa</i>	Umbia	110
<i>Garuga pinnata</i>	Vanakrya	111
<i>Prosopis juliflora</i>	Wilayati Khejra	112
Misc.		113
Unidentified		120

APPENDIX - V

Definition of Technical terms used in the manual

BARK	Tissue of stem and root of a tree outside the cambium layer, in older trees usually divisible into inner (living) and outer (dead) bark.
BREAST HEIGHT	Almost universally adopted as the standard height for measuring girth, diameter and basal area of standing trees. It is taken as 4 feet 6 inches (1.37m) above ground level. On slopes breast height is taken on the uphill side.
CALIPPER	An instrument for measuring tree or log diameters by taking their rectilinear projections on a graduated scale.
CALLUS	Tissue that develops after a plant is wounded and tends to cover the wound.
CAMBIUM	The actively dividing layer of cells, which lies between and gives rise to xylem and phloem, i.e. wood and inner bark.
CANOPY	The cover of branches and foliage formed by the crowns of trees in a wood.
CROWN	The upper branchy part of a tree above the bole.
CROWN WIDTH	The maximum spread of the crown expressed at its widest diameter.
HEIGHT (TREE)	The straight line distance between the ground level and extreme top of a tree usually measured on slopes on the uphill side of the tree.
KNOT	Portion of branch embedded in the wood by the natural growth of the tree. The Knot is "Loose" or "Tight" depending on whether the branch was dead or living at the time it was embedded.
LITTER	The upper most layer of organic debris (dead vegetable matter) on a forest floor, freshly fallen or only slightly decomposed, and consisting chiefly of leaves but also including bark fragments, twigs, etc.
RINGS ANNUAL	A layer of wood produced by the growth of one year.
RING FALSE	The layer of wood less than a full year's growth and seldom extending round the stem; formed when diameter growth is interrupted and resumed during the same growing season.
LOAM	A soil composed of sand, silt and clay in such proportions that the proportion of the soil are not dominated by any one of them.
SHELTERBELT	A belt of trees and/or shrubs maintained for the purpose of shelter from wind, sun, snow-drift, etc.

- SHRUB** A woody perennial plant differing from a perennial herb in its persistent and woody stem and less definitely from a tree in its low stature and its habit of branching from the base.
- STOREY** A horizontal stratum or layer of canopy in a plant community. Forests often have two or more canopy layers each a storey.
- THREE SAMPLE** A tree chosen as representative of a given population for detailed study of one or more of its characteristics.
- TREE WOLF** A vigorous tree, usually of bad form, occupying more space than its future value warrants and threatening potentially better neighbours; usually a broad crowned dominant.
- UNDER STOREY** The lower storey of a forest crop, e.g. a young crop under seed bearers, coppice under standards, or the lower storey in a multistoreyed high forest.
- WIND BREAK** A narrow shelterbelt or other obstacle maintained against the wind.
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SECTION - IV

SAMPLE COPIES OF FIELD FORMS RELATING TO FIELD INVENTORY.

**PRELIMINARY SURVEY OF FOREST RESOURCES  
NORTHERN ZONE  
( RAJASTHAN )**

**DESCRIPTION FORM**

Card No.	Survey No.	Sub H. No.
12	15	10
13	16	11

Map Sheet No.	Point Reference	Inventory Design
71-74	75-78	79-80

Name of C.I. \_\_\_\_\_

To be filled in all cases  
Where the point has been visited

State	Revenue District	Forest Division	Attachment	Land Class	Legal Status	Vegetation	Forest Type	FOR FOREST ONLY										Bar-Photo Class	Occurrence	Land Class	Forest Type																																			
								Species stocking in Forest														Soil Data			Terrain Data																															
								%	Spp.	%	Spp.	%	Spp.	%	Spp.	%	Spp.	%	Spp.	Origin	Number of storeys	Average Height	Size Class	Spacing	Regeneration	Crown Density	Forest Potential	Stemness	Humus	Soil Texture	Soil consistency	Soil Depth	Soil Moisture	Geology	Slope	Altitude	Terrain	Aspect	Quality																	
12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
13	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	

PLANT INVESTMENT SURVEY OF FOREST RESOURCES  
NORTHERN ZONE  
(RAJASTHAN)

PLOT ENUMERATION FORM

Total No. of trees	Total No. of B. columns	Total No. of Mapsheet Reference	Plot Reference	Inventory Design
66-69	59-70	71-74	75-78	79-80

Job Card Design Number	Report Sub Report Number
1-3: 4-5 6-7	8

Name of U.I. \_\_\_\_\_

Date \_\_\_\_\_

Code	Species		Code	Species		Code	Species		Code	Species							
	Diam.I	Diam.II		Diam.I	Diam.II		Diam.I	Diam.II		Diam.I	Diam.II						
2-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35	36-38	39-41	42-44	45-47	48-50	51-53	54-56	57-59	60-62

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SECTION - V

FORM. FACTOR AND CULL FACTOR STUDY

INSTRUCTIONS FOR SELECTION OF SAMPLE POINTS AND SAMPLE TREES

The sample points where felling is to be done have been selected ~~randomly from the sample points where inventory work has been done. List of the sample points so selected is attached herewith.~~ At each point the fixed plots will be laid out and enumeration will be done as explained in the Inventory Manual. Out of the enumerated trees, ten trees will be selected at random for Volume study. In case there are less than 10 trees in the plot, all the trees will be felled and studied.

1. Introduction

The Volume and Cull study is carried out on sample points which were taken for the inventory. The Crew Leaders have been informed about sample points which they have to visit in this connection. The detailed coding instructions for filling up the forms are given below. The sample point allotted to each crew are also the checking points for the inventory work. ~~Therefore, a complete inventory of these points will also be carried out afresh by the Crew Leader.~~ The instructions for the check crew are given in the inventory manual. Instruction regarding the selection of sample trees will be given separately.

2. Detailed Field Procedure :

- 2.1 The Crew Leader should copy out the approaches of all the sample points where the felling is to be done. This work should be completed at the headquarters itself where the approach description for all the visited sample points is available.
- 2.2 Collect all the tools required for the work before proceeding to the field. The crew leader should have a list of tools required in the forest and before leaving the camp he should personally check that all the tools are being taken to the field.
- 2.3 Locate the sample point with the help of approach description, photographs and the map sheet of the area. In case the peg is not available this can be located with the help of reference trees.
- 2.4 In case the old sample point cannot be located inspite of thorough search all around the area upto a radius of 200 metres then locate the sample point afresh, as it is done by the inventory crew, and fix the point. Record this fact that the sample point done by inventory crew could not be located.
- 2.5 Mark the B.H. point with J.K. writer in a ring on all the selected sample trees and also the side facing the P.C. The direction mark will be required while measuring the diameter, towards the point centre and perpendicular to P.C.
- 2.6 Fell the tree as near to ground level as possible. The tree should be felled in the up-hill direction using all precautions for felling. As far as possible use power chain saws for felling. Only where it is not possible to use power chain saw due to bigger diameter of the tree in such cases hand saw may be used for felling.

3. Numbering of tree portion:

3.1 The following sequence will be used for denoting the main stem and the branches of a tree which is named as tree portion. The main stem from the base upto the leading shoot which be called tree portion 01. The branches having diameter of 5 cms. d.o.b. and above at the origin are also to be considered separately. The main stem will be tree portion 01 and the branches will be called as tree portion 02,03,04 and so on depending upon the number of branches of 5 cms. d.o.b. and above. Branches less than 5 cms. d.o.b. will be ignored. The figures below depicts how the various tree portions are numbered.

4. Stem wood measurements.

4.1 Measurement of stem length :- Measure the length of the stem from the breast height point up to the tip of the leading shoot placing the tape reading 1.37 metres at B.H. point. The tape reading would directly give the total length of the tree. Let this length be 'L' metres.

2 Marking and numbering the sections:- After felling the tree mark the sections in such a way that maximum portion of the tree is utilizable in one or more of the utility classes. Cut the tree at these sections and record the measurements of each section in appropriate columns. The logs should be cut so that the end faces are perpendicular to the log axis. Thus the number of sections will be varying from tree to tree and the length of logs will also vary depending upon the utility.

4.3 In case of Teak and other species where stem analysis have to be done the section will first be marked keeping in view the utility classes and then sections will also be marked at 1/10, 2L/10, 3L/10 ....10L/10 along the main stem.

The tree will be cut at all these sections and the measurements at utility class sections will be recorded in appropriate columns of the Tree Volume Study Forms and the measurements at 1/10, 2L/10, 3L/10 .....10L/10 sections will be recorded in appropriate columns of the Growth Study Form. This means that the total number of sections will generally be more than 10 and will be variable from tree to tree.

4.4 Number the sections serially from the base of the tree.

4.5 Measurement on the sections :- The following measurements are to be made and recorded for each section on the Tree Volume Study Form (for felled trees).

4.5.1 Height of the sections from the ground level:- In case of 10L/10 section which theoretically will be at the ground level, the section at stump level will be studied as it is not possible to cut the tree exactly at the ground level. To find the height of any section from the ground level measurement is taken from breast height point which forms the reference point even for the sections below the B.H. Point. For the purpose of the measurement of height of any section, place 1.37 metre point of the tape at B.H. and take the reading. The height will be measured correct to a centimeter.

4.5.2 Diameter measurement :- On each section the diameter over bark and diameter under bark in radial direction to the sample point and another diameter perpendicular to first will be measured. The diameter will be measured with the help of meter scale correct to a millimeter. If the face of the section, where measurement is to be done, is not perpendicular to the axis of the logs the scale will be held perpendicular to the axis of the log and correct diameter will be recorded.

4.5.3 Measurement of defects :- The section is to be examined to see if there are any defects on it. There may be rot, knot, hollowness, insect damage etc. on the face of the section. If there is any defects then enclose the defect in a rectangle by drawing pencil lines and measure the sides of the rectangle and write in the appropriate column. This will give the area of the defective portion. Sometimes the defects may be present in more than one patch. Then it has to be examined whether it is possible to take out a sound piece in between the defective portions. Generally, if the defective portions are within 10 cms. then it is not possible to take out any sound piece in between. In such case the different defective portions will be combined and one rectangle covering the entire defective area will be drawn and its measurements will be recorded. When the defective portions are 10 cms. or more apart their measurements are to be recorded separately by enclosing each within a rectangle.

#### 5. Branch Wood Measurement :

The branches having d.o.b. 5 cms. and above are to be considered as separate tree portions. Just as in case of tree portion O1, the 1st section is at the base of the tree, similarly, in case of branches the first section will be at the base of the branch i.e. from the junction of the stem and the branch or the junction of branch and sub-branch, as the case may be. Here sub-branch means the branch which is not originating from the main stem but which is coming out of another branch. The further sections of the branch will be done at an interval 2 metres till the point where d.o.b. 5 cms is reached. The portion of branch less than 5 cms. d.o.b. will be ignored. If the length of the last section where 5 cms. d.o.b. has been reached, is 1 metre or less than 1 metre in length, it should be included with the previous section, but if the length of the last section is more than 1 metre it will be treated as separate section. It means the length of the last section can vary from more than 1 metre to 3 metres. In place of the height of the section above the C.L. here it will be the length of section from the junctions. Therefore, the length of the first sections will be 0000 and the length of the subsequent sections will be the distance from the junction to the point where the sections have been cut.

5.1 Anything below 5 cm. d.o.b. including the foliage present will be classified as Brushwood. The brushwood will be collected into small bundles of less than 50 kg. and weighted by a spring balance. The total weight of brushwood of each tree will be recorded in kgs. in the right hand blank margin of the Tree Volume Study Form.

SECTION - VI  
INSTRUCTIONS FOR FILLING UP OF VARIOUS FIELD FORMS  
RELATING TO FORM FACTOR  
AND  
GULL STUDY

1. TREE VOLUME STUDY FORM

Fill up the various columns as explained below :-

<u>Col. No.</u>		
1-3	Job No.	Leave it blank
4-5	Card Design	Leave it blank
6-7	Tree No.	Here give the serial No. of the tree that was given to the tree after taking tally.
8-10	Species	Give the species code for the tree.
11	Dominance	Refer Sample Tree Form instructions in inventory manual.
12	Defect Natural	-do-
13	Defect Others	-do-
14-15	Length of Clear Bole	-do-
16	Straightness of Bole	-do-
17-18	Code of Crew Leader	Fill up code no. of the crew in this column.
19-20	Tree Portion	Write the code for the tree portion for which data is being recorded in the subsequent columns. For main stem the code will be 01 and the branches will be separately numbered as 02, 03, 04 etc. depending upon their numbers.
21-22	Sl.NO. OF Section	How the section will be numbered has already been explained. Here write the section no. for which the data is being collected.
23-26	Height of section above base/branch	The height of the section above the base of the tree in case of 01 portion and above the junction of the branch and stem or junction of two branches in case of tree portion 02 or more to be given in this column. It has been already explained that B.H. will be taken as a reference point for the determination of the height of the section for portion No. 01. The height is to be recorded correct to the nearest centimeter.
27-29	D.O.B. towards P.C.	Measure the diameter over bark towards point centre upto the nearest millimeter.
30-32	D.O.B. 1 to P.C.	Measure the diameter over bark in a direction perpendicular to the point centre upto the nearest millimeter.

- 33-35 D.U.B. towards P.C. Measure the under bark diameter towards point centre upto the nearest millimeter.
- 36-38 D.U.B. 1 to P.C. Measure the under bark diameter in a direction perpendicular to point centre to the nearest millimeter.
- 39-41 Utility Classes Examine the log between the two consecutive sections and classify in one of the following utility classes and fill up the appropriate code :-

<u>Code</u>	<u>Utility class</u>	<u>Specification</u> <u>Girth at the thicker</u> <u>and O.B. IN cm.</u>	<u>Approx.</u> <u>length</u>
01	Lath	76 cm.	Over 3.6 M
02	Pat	61- 76 Cm.	Over 3.6 M
03	Belwan	46- 61 cm.	over 3.6 M
04	Ballies-I	38-46 cm.	3.6 to 5.4 M
05	Ballies-II	38- 46 cm.	2.1 to 3.6 M
06	Ballies-III	30-38 cm.	3.6 to 5.4 M
07	Ballies-IV	30-38 cm.	2.1 to 3.6 M
08	Poles-I	23-30 cm.	3.0 to 4.5 M
09	Poles-II	23-30 cm.	2.1 to 3.6 M
10	Poles-III	15-23 cm.	2.1 to 3.0 M
11	Galtay Sagwan-I	23-30 cm.	0.9 to 2.1 M
12	-do- -II	30-38 cm.	0.9 to 2.1 M
13	-do- -III	38-46 cm.	0.6 to 2.1 M
14	-do- -IV	46-61 Cm.	0.6 to 3.6 M
15	-do- -V	61-76 cm.	0.6 to 4.5 M
16	-do- -VI	over 76 cm.	0.3 to 3.6 M
17	Packing cases, D.O.B. at thin end.	10 cm. + over	0.9 M + above
18	Match splint D.O.B. at thin end (only in Boswellia and Semal).	10 cm. + over	1 M + above
19	Plywood (Garjan/Codal and Teak) D.O.B. At thin end.	20 cm. + above	1 M & above
20	Fuelwood	Any thing above 5 cm. D.O.B. Utilizable as firewood.	
21	Brushwood	Branches, twigs less than 5 cm. D.O.B. utilizable for any purpose.	
22	No utility		

- 42 Gull presence Examine whether there are defects on the section or not and fill the appropriate code as given below :-

Defect absent - 1                      Defect present - 2

43-44 Type of defect

This column will be filled only when in col. 42 the presence of defect has been shown. If the defect is absent write '00' in col. 43-44. In case the defect is present it will be classified in the following classes : and the code of defect present will be filled in col. 43-44.

<u>Type of Defect</u>	<u>Code</u>
Fibrous rot	01
Pocket rot	02
Spongy rot	03
Loose knot	04
Tight knot	05
Radial shake	06
Star shake	07
Cup shake	08
Superficial cracks	09
Fire damage	10
Hollowness	11
Unclassified	12

45-47 )  
48-50 ) Size of  
51-52 ) rectangle  
53-55 )  
56-58 )

Enclose the defect in a rectangle and write the measurement of the sides in m.

When the number of defects is more than one these columns are to be used similar to columns 43-50. Whenever there is no defect put '00' as the size of the rectangle.

59 Straightness

Each section has to be examined in respect to its straightness. It will be classified into the following classes and the appropriate code will be used:-

Straight	1
Slightly bent (less than 10°)	2
Pronounced bend (one bend more than 10°)	3
Crooked (More than 1 bend)	4

60 Shape of sec.

Classify the end face of the section in the following classes and write the appropriate code.

Circular	1
Elliptical (one diameter longer than the other by more than 20%)	2
Fluted (Where the periphery of the section is wavy).	3



71-74	Map sheet Ref.	Refer to instructions in inventory manual.
75-78	Plot Reference	-do-
79-80	Inventory Design	Leave it blank.

(a) Stem Analysis Measurements:

A thin disc ( about 5 cms. thick) may be cut at the B.H. point and 1/10, 21/10 etc. points. The end face should be plane and perpendicular to the axis of the log. Mark the end face. On the section mark a diameter in pencil along the plot radius. This will be in the same direction in which one diameter measurement is taken.

Count the number of rings from the pith onward on the B.H. section and fix a pin at every decade or 10th ring. The first decade shall be the outermost complete decade. Record THE RADIAL DISTANCE OF THE OUTERMOST pin from the pith in the columns 32-34 for the 1st decade. Make similar measurement for the next decade till you reach the last decade or pin nearest to pith. Count the number of rings in the last incomplete decade and measure the width of the incomplete decade. If for example, a section has 66 rings, there will be 6 complete decades measure the radial length from the pith and for incomplete decade write only the radial distance from the last complete decade to the circumference of the section.

On the next section, first mark the diameter in the radial direction in pencil. Then counting from the circumference inwards, mark out the same number of rings as in the last incomplete decade on the B.H. section and fix a pin. Then continue to count inwards and fix pins at every 10th ring till you reach the pith. It is possible that the inner decade i.e. nearest to pith may have less than 10 rings. But consider it as a decade for measurement purposes on this section. Measure also the width of the outer incomplete decade i.e. width of the number of rings left at the periphery.

(b) Seedling Height:

At each place where stem analysis work is done above 5 free growing seedlings and samplings 1-4 metres in height and of the same species as the tree should be selected and cut at the ground level and B.H. point with a sharp Khukri. The diameter should be measured at the base and B.H. point. The rings should be counted at base and B.H. point and recorded in the form.

(2) SEEDLING HEIGHT FORM

The columnwise instruction for filling the Seedling Height Form is given below :-

Col. No.

1-3	Job No.	Leave it blank
4-5	Card Design	-do-
6-7	Crew Leader	Write your Code Number
8-9	Seedling No.	Give the number of the seedling. The first seedling taken for felling and measurement will have 01 Nos., the second seedling taken will be 02 and so on.
10-12	Species	Write the Code Number of the species.
13-16	Diameter at Collar	Measure the over bark diameter at collar with the help of metric scale, after cutting at the base point, in millimetres and record.
17-20	Diameter at B.H.	Measure the over bark diameter at the B.H. point with the help of metric scale, after cutting at the B.H. point, in millimeters and record.
21-23	Height in cms.	Write the total height of the seedling correct to cms. For this measure the length of the seedling from the base to the tip of the seedling.
24-26	No. of rings of collar	Count the total number of rings at the collar section and record. For this, the cut should be clear and made with sharp edged instrument.
27-29	No. of rings at B.H.	Count the total number of rings at the B.H. section and record.
71-74	Map sheet reference	Refer to instructions in Inventory Manual.
75-78	Sample Point reference	-do-
79-80	Inventory Design	Leave it blank.

(3) GROWTH STUDY FORM

The detailed columnwise instruction of filling the Growth Study Form is given below :-

Col No.

1-3	Job No.	Leave it blank.
4-5	Core Design	-do-
6-7	Crew Leader	Write your Code.
10-12	Species	Write the Code number of the species as given in the Inventory Manual.
13-14	Section No.	Write the number of the section on which the measurement is being done.
15-18	Height above the base.	Measure the length of the section taking B.H. Point as reference and subtract or add the value to 1.37 M. depending upon whether the section is below B.H. or above B.H. respectively.
19-21	No. of rings on the section	Count the total number of rings on the section and write the total count.
22-25	D.O.B.mm.	Write the average diameter over bark which is calculated from the girth measurement.
26-29	D.U.B.mm.	Write the average diameter under bark calculated by subtracting double the bark thickness, from the average diameter over bark.
30	Radius No.	In each section two average radii will be drawn. Number them as 1 and 2. The measurements on each section have to be done on radius 1 and radius 2 separately.
31	Century code	When the total number of rings are within 100 then put century code 1. When the number of rings are 101 to 200 for this put century code 2. Similarly when the rings are 201-300 put century code 3 and so on, that means if there are 325 rings on a section then for the 1st ten decades write 1 under century code, for 11th to 20th decade write 2 under century code, for 21st to 30th decade write 3 under century code and for the remaining decades write 4 under century code.

32-34		Under 31-33, write the width of the 1st decade in col. 34-36 write the width of the second decade and so on till col. 58-60 where the width of the 10th decade will come. If the total number of rings are more than 100. Then for the century code 2 write the decade under 34-36 and so on so that 20th decade will come under col. 58-60. Similarly for century code 3 the width of the 21st decade will come under col. 31-33 and so on.
35-37		
38-40		
41-43		
44-46		
47-49		
50-52		
53-55		
56-61		
62-64	Width of incomplete decade.	Write the width of those rings which are in the incomplete decade i.e. width of those rings which are between the last pin and the periphery of the section.
65-66	Total No. of section.	Write the total number of section on which the measurements have been done.
71-74	Map sheet reference	Write the map sheet reference of the map.
75-78	Sample Point reference	Refer to instructions in Inventory Manual.
79-80	Inventory Design	Leave it blank.

LIST OF FELLED TREES

S.No.	Sample Point	Grid Reference	No. of trees felled
01	011	08030608	08
02	211	08120606	06
03	012	08030610	10
04	013	08030810	10
05	016	08030802	10
06	029	00020606	10
07	030	08020604	10
08	050	08060006	10
09	076	08050608	10
10	125	08070404	10
11	132	08070604	10
12	154	08080206	10
13	158	08080408	10
14	159	08080410	10
15	234	08110208	10
16	357	07120806	5
17	370	07081004	11
18	733	12080408	27
19	741	12080608	14
20	750	12080808	10
21	751A	12081008	22
22	1009	07080902	10
23	1010	07080903	10
24	1013	07081104	10
25	1054	07120407	6
26	1067	07120907	10
27	1068	07120906	3
28	1083	08060908	11
29	1090	08061009	10
30	1093	08061110	10
31	1096	08061104	10
32	1097	08061103	10
33	1098	08100003	10
34	1099	08100105	10
35	1109	08030900	10
36	1121	08041106	10
37	1118	08040906	10
38	1132	08070506	10
39	1135	08070706	5
40	1150	08080508	10
41	1165	01120306	10
42	1168	08120506	3
42A	1121	08120707	9
43	1236	08091007	10
44	1256	08110209	10
45	1259	08110308	10
46	1260	08110307	10
47	1381	12080708	15
48	1382	12080910	20
49	1383	12080908	11
50	1385	12081110	14

S.No.	Sample point	Grid reference	No. of trees felled
51	1386	12081108	9
52	1389	12071000	13
53	1404	12080311	9
54	1406	12080409	13
55	1415	12080811	31
56	1416	12070106	10
57	1426	12070501	20
58	1427	12070500	10
59	1431	12070801	
Total			668

SECTION - VII

SAMPLE COPIES OF FIELD FORMS RELATING TO  
FORM FACTOR AND CULL STUDY







P A R T - II

DEMAND AND MARKET STUDY

INSTRUCTIONS FOR COLLECTION OF DATA- MARKET & DEMAND STUDY

As a Crew Leader, you are overall incharge of data collection for this study. You have been provided with an Assistant to help you in your work of data collection but at no instance you will leave this work entirely on your Assistant. The collection of data for this study will require the application of all your intelligence, resourcefulness and tactfulness alongwith your capacity to tackle the various problems as and when they crop up. During the course of this data collection you might have to contact Government officials at various levels as well as the traders and the common man and as such you should be very clear in your mind about your objectives and the points that you may have to put before them.

SURVEY ZONE

The survey zone for the study consists of the Udaipur District except Bhim tehsil.

OBJECTS

The objects of the Demand and Market study are briefly as under:-

- (a) Analysis of the present pattern of production of wood and bamboos having regard to the important locations of output and the quantum of production at each location.
- (b) Analysis of the present consumption pattern, with particular reference to species, sizes and grades of timber and bamboo in demand.
- (c) Assessment of the future pattern of consumption in the zone.

DATA COLLECTION

The data for this study shall be collected under the following broad categories:-

- a) Production of wood and bamboos
- b) Consumption of wood and bamboos
- (c) Import of wood/bamboos
- d) Export of wood/bamboos.

The term "Wood" includes timber, firewood, charcoal and Katha. Except, wherever stated otherwise, this term will always mean all the four types given above. (Bamboos is not included in it). In some Kuar lesses the contractor may be manufacturing 'Katha' from the Kuar trees within the lease area and may be extracting it as Katha only.

In such cases along with the quantity of Katha you should also ascertain and record the quantity of Khair wood used for converting it into Katha. Similarly for charcoal quantity also, you should ascertain and record the wood round equivalent.

#### RECORDED PRODUCTION OF WOOD AND BAMBOOS

The information about the production of wood, bamboos and katha will relate to the actual recorded removal of these from any of the sources given below. The total removal of wood, bamboos and katha will be recorded from the official records only. The various sources of production of wood, bamboo and katha are:-

- i) Production from Government Forests,
- ii) Production from Revenue lands,
- iii) Production from Private Lands.

#### PRODUCTION FROM GOVERNMENT FORESTS

The term "Government Forests" will mean all such forests (Reserved or Protected) which are under the direct management control of the forest department. The removal of wood and bamboos from those forests is generally carried out by the agencies of:-

- a) Lessees (contractors)
- b) Departmental agency
- c) Right Holders and Concessionists.

#### a) Removal of Wood: Bamboos and Katha by lessees - (Proforma 1 & 1(a))

This is the main agency for removal of wood and bamboos from the Government Forests. All the records of removal of wood; bamboos and katha by this agency are maintained in the divisional forest office. The total quantity of wood; bamboos and katha extracted by this agency will be collected by you in proforma 1 and 1(a) from the records of the Forest Division Office. This information may be available in the following records:-

- i) Annual administration Reports
- ii) Statistical Returns
- iii) Lease (contract) files
- iv) Extraction records of the range officers of the division ( The Range Officers send the reports to the D.F.O. of the completion of the contract work in which they give the total quantity of wood/bamboo removed by the lessee from a particular contract area within their range jurisdiction. If you have to resort

to collection of information from the Range Officers records, this should be done for all coupes worked in those Ranges. (The total of all these will give the production figures for the whole Division).

NOTE: Normally the consolidated production figures will be available to you in the Division Offices from any of the records given above. But before you start recording the information in the proforma, make sure that the information is complete in all respect. You should ensure it by cross checking the information available in one records from other relevant records also. If there is any doubt about the correctness of any information, clarify it from the Divisional Forest Officer or any other officer who is competent to do so. If, however, you feel or in case you are advised by the D.F.O. that the complete information can only be obtained from the Range Offices, then you should visit all the Range Offices for compiling the information.

b) Removal of wood and bamboos by Departmental agency -  
(Proforma 2 and 2(a)):

In some areas the removal of wood/bamboos and/ or Katha may be carried out by the Department itself. Generally, the removals by the departmental working will include:-

- i) Removal of wood/bamboo/katha by a regular departmental working division.
- ii) Removal of wood/bamboo/katha for silvicultural reasons such as thinning and cut back operations etc.
- iii) Removal of wood/bamboo for specific purposes such as road building; departmental building constructions; building repairs; fencing for nurseries; plantations and soil conservation areas etc;
- iv) Removal of wood/bamboo for supply to their institutions or departments.
- v) Removal of wood/bamboos for sale in 'NISTAR' depots (In many places such depots are established for supply of wood/bamboo to the villagers at concessional rates. These depots are run by the department at selected places in the forest divisions).
- vi) Removal of wood/bamboo done by plantation Division; soil conservation division or Utilization Division of the Department.

NOTE: i) Removal by Department through a sub-contract (where the contractor works as the agent of the department and is given a commission for the work) where the contractor delivers all the extracted material to the government at recognised depots will be included in Departmental extraction.

ii) Leased out areas where the lessee is obliged wood/ bamboo to any government depot shall be considered under "Extraction by Lessees" i.e. Proforma 1 and 1(a). The information about extraction of wood/charcoal may be available from the following sources:-

- (1) Annual Administration Reports
- (2) Statistical Returns
- (3) Timber Account Register.

NOTE: Generally the quantity of wood/bamboos removed from Government forests by other sister departments like Departmental Working Division and Plantation Division; Soil Conservation Division and Utilization Division will be available in the records of the territorial D.F.O. but if it is not so then the information about the removals by these agencies shall be collected from the records of the respective officers.

c) Removal of wood/bamboos by Right Holders and Concessionists (Proforma 3 and 3(a))

As a policy matter the government generally allows the villagers to remove wood and bamboos at concessional rates from the government forests for their requirements of building construction, building repairs and agricultural implements etc. Under the same policy the villagers are also allowed to collect a headload of dried and fallen firewood free of charge from the forests for their daily domestic consumption. Whereas the removals of firewood by the Right Holders and Concessionists may not be available on official records, the removal of timber and bamboo will positively be available in these records. Sometimes, because of the fallen natural calamity such as floods, fire etc. the government supplies wood/bamboos to the villagers FREE of charge. This is known as FREE GRANTS. Certain religious and charitable institutions do also get such Free Grants from the Government. The wood/bamboo supplied to the villagers/ institutions as Free Grants shall be considered with the Removals by the Right Holders and Concessionists.

The recorded removals of wood/bamboos by Right Holders and Concessionists may be available in the following records of the Divisional Office:-

- i) Annual Administration Reports,
- ii) Statistical Returns,
- iii) Specially maintained registers for Right Holders and Concessionists,
- iv) Register for Free Grants.

NOTE: The wood/bamboos given as Free Grants should also be noted down in your note book separately.

RECORDED PRODUCTION FROM REVENUE LANDS (Proforma 4 and 4(a))

Removal of wood/bamboo from government lands outside the control of the forest department will fall in this category. Removals from road side and canal side plantations will also be included under this category. The information about such removals will be available in the records of the revenue authorities (Collectorate or Tehsil office). If a consolidated information is not available in the district office, it shall have to be collected from all the Tehsil offices within a district.

NOTE: Sometimes in the revenue records the removals are shown in terms of number of trees. In such cases the diameter/girth of the trees should also be collected for their subsequent conversion to their cubical contents. For the transit of the felled material the D.F.O.s then issue a transit pass. As such this information may also be available in the D.F.O.'s office also.

RECORDED PRODUCTION FROM PRIVATE LANDS (Proforma 5 and 5(a))

Such removals are made from personal holdings of a individual or a cooperative. In either case the fellings are permitted, by rule, only after the written permission of the revenue authorities on the recommendations of the forest department. The information about such removals may be available from:-

- i) the forest divisional office records, and
- ii) the revenue district or tehsil office records.

NOTE: (i) The consolidated information may be generally available in the Divisional office records but if it is not so this will have to be collected from the District or Tehsil offices as the case may be.

ii) In this case also if the information available is by number of trees, then the diameter/girth of the tree should also be collected.

### CONSUMPTION OF WOOD AND BAMBOOS

The information about the consumption of wood and charcoal will be collected separately for each category of consumers. Different categories of consumers should be identified by you from the available sources (such as Divisional Forest Office; Industries Office etc.) Some of the categories of consumers are listed under three broad heads as under for your guidance:-

- i) Consumption by Government departments;
- ii) Consumption by industries; and
- iii) Consumption by General public for domestic purposes.

#### i) Consumption by Government departments ( Proforma 6 & 6(a) )

Some of the Government departments which consume appreciable quantity of wood/bamboos are as under:-

- a) Railways;
- b) D.G.S. & D (Director General Supplies and Disposals)
- c) Defence Services;
- d) Mining;
- e) Posts and Telegraph;
- f) P.W.D.
- g) C.P.W.D.
- h) Schools and Colleges;
- i) Irrigation;
- j) Religious institutions;
- k) Forest Department.

These departments generally obtain their entire requirement directly from the forest department but sometimes they get their supplies from the private timber traders also. Normally, the information about supply of wood/bamboo to various government departments will be available from the divisional office records. But in some cases, such as Mining, P.W.D. and Irrigation departments, which procure their requirements from private sources also, this information should be collected, as far as possible from their official records.

NOTE: Separate proforma should be used for consumption by each department.

#### ii) Consumption by Industries ( Proforma 7 )

Note: For collection of data about the Saw Milling Industry a different proforma is prescribed ( proforma 11 )

(A) MAINLY TIMBER BAMBOO CONSUMING

1. Paper and pulp Factory
2. Plywood Factory
3. Veneer Mills
4. Fibre boards factory
5. Hard board factory
6. Saw mills
7. Joinery Mills
8. Half wrought Factory ( For rifle butts etc.)
9. Match Factory
10. Packing Case Industry
11. Furniture and Carpentry Industry
12. Sports Goods Industry
13. Wood Carving and other similar cottage Industry
14. Basket making Industry
15. Katha Factory
16. Wood seasoning and treatment Plants
17. Mining

(B) MAINLY FIREWOOD OR CHARCOAL CONSUMING

1. Brick kilns
2. Oil mills
3. Jaggery mills
4. Lime kilns
5. Potteries and Utensil making

The information about the industrial consumption of wood/ bamboo shall be collected from the individual units directly. For this purpose you will be required to visit all such establishments wherever they are located within the area allotted to you. The industrial establishments may not be willing to allow you to see their official records. In such cases the information will have to be extracted tactfully from verbal enquiries. You will have to deal with them intelligently taking them into confidence before you are able to extract a reliable information from them. You should be able to convince them that the information being collected by you is for academic interest only.

There might be some instances, particularly with petty consumers, when you might be given any arbitrary figures of annual consumption. Your efforts in such cases should be to put such questions to them which would drive them to come out with reliable figures (For example in case of a small saw milling unit, if either the owner is finding it difficult to give you authentic figures or you feel that the quantity being told is under estimated or over estimated then your questions should also relate to the total capacity of the machine; average daily in-take of wood, number of persons engaged daily; number of days the mill runs

in a year; number of hours the mill works every day etc. After you have discussed such details it will be easy for you as well as the owner to reach to reliable annual consumption figure for that unit).

NOTE: Besides collecting the figures of consumption of wood/bamboo in the proforma you shall also collect all such supplementary information from each unit, which may be relevant for this study. All such information should be recorded in a separate sheet of paper and appended to the prescribed proforma. Some of such supplementary informations, for example, are:-

i) Total installed capacity. (ii) actual intake  
iii) No. of days the unit works in a year, (iv) Important species and quantity consumed, (v) Sources from which the material (spc-wise) is obtained - government forests or other sources (give approximate percentages for each), (vi) annual production of the finished material (note down the nature of finished product), (vii) Destination to which the finished product is sent, (viii) Planned production expansion if any.

iii) Consumption by general public for domestic purposes

The consumption for wood/bamboo for domestic purposes shall be studied separately for urban and rural areas in respect of following categories. The rural areas will be divided into two categories i.e. within 5 km of forest and beyond 5 kms.

(a) Domestic Timber/Bamboo consumption

- i) For new house construction;
- ii) For house repairs;
- iii) For agricultural implements (Rural areas)
- iv) For bullock carts (Rural areas).

(B) Domestic Firewood/charcoal consumption

- i) In urban area;
- ii) In rural area.

CONSUMPTION OF TIMBER/BAMBOO FOR HOUSE CONSTRUCTION AND REPAIRS  
(Proforma 8)

There are 3056 villages in the survey area. These villages have been divided into two categories depending upon their distance from the nearest forests. Out of these 3056 villages, 1305 are within 5 Kms. from the nearest forests and 1751 beyond 5 Kms. From these two categories 14 and 16 villages respectively have been selected randomly for sampling. 10% of the total households from each of these randomly selected villages will be selected finally by the crew leader for collection of detailed information. The selection of households should be done with a subjective bias so as to incorporate different types and sizes of houses. In urban areas, 10% of the new house constructed during 1976 in three of the six towns selected randomly will be visited for collection of information of domestic consumption. The various terms used above are defined below for your guidance.

RURAL AREAS: Where the population is less than 5000 persons.

URBAN AREAS: Where the population is over 5000 persons.

HOUSEHOLD is a group of persons who commonly live together and take their meals from a common kitchen unless exigencies of work prevent them from doing so.

The data of consumption of timber/bamboo for new construction of houses shall be collected by actual measurements wherever possible and also by direct enquiries from villagers. Wherever, measurements are taken, an estimate of total consumption of timber/bamboo alongwith a rough sketch of the plan of the building should be prepared.

Generally, the villagers whom you have to deal with may be illiterate and as such they may not be able to answer to your direct questions. You will have to deal with them skillfully to extract reliable figures of consumption, wherever possible you should take the help of the local sarpanch, school teacher of Gram sewak also for this study. The information should cover the following subjects in particulars:

- a) Year of construction of the house
- b) Longevity of the construction
- c) Quantity of timber consumed round and sawn quantities to be separately collected (spp.wise) if possible.
- d) Quantity of bamboos consumed (spp. also if possible).
- e) Source from where the construction material is obtained (Separately for round and sawn)
- f) No. of persons in the household.
- g) Periodicity of repairs needed.
- h) Timber/bamboo required for repairs
- i) Quantity of timber/bamboo consumed in subsidiary structures attached to the house such as cattle shed, barns, fencing etc. (spp. used for these should also be collected if possible).
- j) No. of households (approximate) in the sample village/town.

CONSUMPTION OF TIMBER FOR AGRICULTURAL IMPLEMENT -  
(Proforma 8a):

In the same sample village where you will be collecting data of consumption of timber/bamboos for house construction/repairs, you shall also collect information about the consumption of timber for agricultural implements. The information should cover the following in particulars:-

- a) Kind of implements (various components with their sizes that go to form the implement should be given).
- b) Quantity of timber consumed for each implement.
- c) Species used for construction (mention all spp. that are used).
- d) Source from which the timber is obtained.
- e) Longevity of the implement
- f) No. of agricultural implements in each household
- g) No. of persons in the household
- h) No. of households in the village/town.

CONSUMPTION OF TIMBER BAMBOO FOR MAKING BULLOCK CARTS ETC  
(Proforma 8A)

The data shall be collected in the same sample villages/town visited by you for other studies. The information in particular should cover the following:

1. No. of carts per household.
- 2) No. of carts in the village/town (approximate)
- 3) No. of households in the village/town (-do-)
4. Size of the cart (give common size)
5. Quantity of timber/bamboos consumed (component-wise)
6. Sp. used.
7. Source from where timber/bamboo is obtained (both for round and sawn)
8. Longevity of the cart.
9. Periodicity of repairs and quantity used (in round and sawn separately).

DOMESTIC FIREWOOD/CHARCOAL CONSUMPTION (Proforma 8B):

This information shall be collected in the same sample villages/  
town where other studies have been carried out. THE information in  
particular cover the following subjects :-

- a) No. of persons in the household.
- b) Quantity of firewood/charcoal consumed every day.
- c) Species preference as firewood and charcoal.
- d) Source from which this is obtained.
- e) In urban areas what are other kinds of energy used as  
fuel, besides firewood and charcoal, .

NOTE:- If the information supplied to you is in terms of head load  
and/or bags its corresponding weight in kilograms should be ascertained.  
Similarly in case of charcoal bags its metric weight should be noted.

(C) IMPORT OF WOOD AND BAMBOOS (Proforma 9)

The term 'Import' here would mean the quantity of wood/bamboos  
which comes into the survey area for local consumption from all other  
areas not included in the survey area.

The information about imports may be available from the following sources:-

- i) Divisional office record
- ii) Range office records
- iii) Check post registers
- iv) Railways goods booking records.

Normally the consolidated information shall be available from the Divisional offices. If it is not available you shall have to scrutinize the returns submitted to the D.F.O. by different check post officials. The other alternative may be sort out this information from the registers of various border check posts located within the area allotted to you. While collecting this information you shall also write the source and destination of wood/bamboo (Source - place from which the material is coming.)

A consolidated records of quantity of wood/ bamboo which has been transported by Railways, will also be normally available in the Divisional office. According to procedures for the railway wagon bookings, the owner is required to apply to the Railway authorities through the D.F.O. stating in his application the quantity of material to be transported and the number of railway wagons required for it. The record of transit of material thus sanctioned by the D.F.O. is maintained in his office.

If, for any reason the information is not available with the D.F.O. it shall have to be sorted out from the records of the Railway Booking office.

- NOTE:
- i) The quantity of material should be recorded species-wise.
  - ii) Wherever the quantity is available in terms of number of trucks, wagon etc. the corresponding volumes ( cu.m)/or weight contained in each should also be ascertained.
  - iii) Round and sawn quantities should be recorded separately.

(D) EXPORT OF WOOD AND BAMBOOS ( Proforma 10)

The term 'Export' would mean the quantity of wood/bamboos sent from the study to any place outside the survey area.

The information about export may be available from the following sources:-

- i) Divisional office records
- ii) Range office records
- iii) Check posts
- iv) Railway goods booking records.

Normally a consolidated information should be available in the Divisional offices. Whenever, any forest produce is transported it is required to be covered by a 'Transit Pass' issued by the D.F.O. In case the wood/bamboo has been exported by train and the information is not available with the D.F.O. then the figures of export should be collected from the Railways booking records. The check post registers will be helpful to you in sorting out the information if the material has been transported by road and complete figures are not available with the D.F.O. or Range Officer.

- NOTE:
- i) The source (place from which the material is being exported), and the destination of material should invariably be recorded.
  - ii) Wherever the quantity is available in number of trucks or wagons its corresponding volume in cubic metres should also be recorded.
  - iii) Round and sawn quantities should be recorded separately.
  - iv) The quantity of material should be recorded species-wise.

#### INSTRUCTIONS FOR FILLING OF PROFORMA

The proformas shall be filled in the manner described below. You should carefully read the instructions for collection of data wherein the details of informations to be collected and the source from where these informations are available are dealt with. All other such supplementary informations which may be relevant to this study but has not been covered up in the instructions should be noted on a separate sheet of paper and appended to the forms.

The following proformas are prescribed for the collection of data for this study.

1. Proforma 1 & 1(a): These proformas are meant for collecting the information about the recorded production of wood, bamboos and katha from the government forests "through the agency of lessees"

Proforma 1 is meant for recording the species-wise quantity of production of timber, bamboo and katha from the government forests in different years starting from 1972-73 to 1975-76. The proforma has space for 5 timber species (A, B, C, D, E) only. If you find it insufficient a fresh proforma may be prepared making provision for requisite number of species. The quantity of sawn and round timber shall be shown separately. Proforma 1(a) is meant for recording the total sawn and round quantity of wood/bamboo and katha extracted from the Government forests in different years. The quantity of timber and bamboo in this proforma for a particular year will be the total sawn and round quantity of all spp. shown in proforma 1. The recorded production of firewood, charcoal and katha shall be given in proforma 1(a) only. The quantity of wood/bamboo/katha should be shown in the same unit in which it is available in the records. If the unit used (in records) is other than cu.m/cft. the factor in vogue for its conversion to cu.m/cft. volume should always be recorded on the back of the form.

NOTE:

Whenever any quantity of katha is shown as extracted should ascertain and record on the back of the form the volume of khair timber used for preparing the katha. (Katha is made out of the heart-wood portion of khair trees. In lease areas it is a common practice to manufacture katha from khair trees. In such cases either the entire material is extracted as katha or partly as katha and partly as wood).

2. Proforma 2 and 2(a): These proformas are meant for collecting the information about the recorded production of wood/bamboo/katha from the Government forests "through the Department agency."

The proformas shall be filled in the same way as explained under item No. 1

3. Proformas 3 and 3(a): These proformas are meant for collecting the information about the recorded production of wood/bamboo from the government forests "through the agency of Right Holders and Concessionists".

The proformas shall be filled in the same way as explained under item No. 1.

4. Proformas 4 and 4(a): These proformas are meant for collecting the information about the recorded production of wood/bamboo from the "Revenue Lands through any agency." Removals from road side and canal side plantations shall also be included under this category.

The proformas shall be filled in the same way as explained under item No. 1

5. Proformas 5 and 5(a): These proformas are meant for collecting the information about the recorded production of wood/bamboo from "Private Forests through any agency".

The proformas shall be filled in the same way as explained under item No. 1

6. Proformas 6 & 6(a): These proformas are meant for recording the quantities of wood/bamboos consumed by various Government departments. One set of proformas should be used for one department only. The name of the department should be written on each form in the space provided for it.

The proformas shall be filled in the same way as explained under item No. 1

7. Proforma 7: This proforma is meant for recording the present consumption of wood/bamboos by various industries (Other than saw-mills) located in the study zone. Each proforma has space for covering 3 industrial units. More number of industries in the survey area allotted to you. Collect other relevant supplementary information also on a separate sheet of paper and append it with the form.

8. Proforma 8: This proforma is meant for recording consumption of Timber bamboo in rural and urban areas for house construction and repairs. In such form enough space has been provided to collect information for 5 sample households each in the rural and urban sectors. One form should be used for one Tehsil (sub-division) only.

9. Proforma 8A: This proforma is meant for recording the consumption of timber and bamboos in rural and urban areas for Agricultural implements and bullock carts. In each form enough space has been provided to collect information from 5 sample households each in the rural and urban sectors. One form should be used for one Tehsil (Sub-division) only.

10. Proforma 8B: This proforma is meant for recording the consumption of firewood and charcoal in rural and urban areas for domestic purposes. In each form enough space has been provided to collect information from 5 sample households each in the rural and urban sectors. One form should be used for one Tehsil (Sub-division) only.

11. Proforma 9:- This proforma is meant for collecting information about recorded quantity of wood/bamboo imported into the study zone from areas not included in the zone. The transit of material from one Forest Division to another Forest Division within the same zone for subsequent consumption shall NOT be considered as imports. It is, therefore, essential that the source (place) from which the material has come should be ascertained before, it is accepted as import.

12. Proforma 10:- This proforma is meant for collecting information about the recorded quantity of wood/bamboos exported out of the study zone. The transit of material from one Forest Division to another Forest Division within the zone for subsequent consumption shall NOT be considered as exports. It is, therefore, essential that the destination to which the material has been transported should be ascertained before it is accepted as exports.

13. Proforma 11:- This proforma is meant for recording the present consumption of timber by saw milling industries.

As an investigator you should be very clear in your mind as to what information are required to be collected for various items in the proforma. The informations that are sought to be collected in this proforma are as under:-

Item No. 1 State the name of the district/division in which the saw mill is located.

Item No. 2 State the name of the saw mill. Also write the proprietors name.

Item No. 3: This relates to the postal address of the saw mill.

Item No. 4: State the number of band saw in operation. This could be 1,2,3,4 or even more depending upon the volume of work being undertaken.

Item No 5: State the horsepower of the engine.

Item No. 6: Here you should collect the information by different categories of persons employed (e.g. operator, machine, helper, etc.)

Item No. 7: Generally, you shall find two kinds of saw mills:-

- a) Full time saw mills:- Which are independent units and are run full time as a saw mill. In such units normally there is a continuous supply of timber for sawing.
- b) Part time saw mills:- Some petty traders own small saw mills which they use as and when they get some orders for sawing. The supply of timber for sawing is not regular in case of such units. In some other cases there may be an integrated unit comprising of a saw mill, flour mill, oil mill or rice mill. In such cases the owner may be using any one unit at a time depending upon the orders received by him. If it is a part time saw mill state the reason for its running part time only. Also write as to how many hours the saw mill is run when operational.

Item No. 8: State the quantity of timber(round) which can be sawn in the saw mill if it is worked with its full capacity ( per day).

Item No. 9: State the average quantity of timber(round) which is actually sawn in the saw mill every day. Spp.-wise break up of the quantity of round timber sawn per day should be given. If species wise reliable break-up is not available write miscellaneous but give approximate % of round volume of important spp. which is sawn per day.

Item No.10: State the actual number of days in a year when the mill works. Barring the closure of the mill on sundays and on few other religious holidays. If the mill remains closed on account of some other reasons, it should be stated. The closure of the saw mill because of any of the following reasons:-

- i) Break down of machinery
- ii) Non-availability of power supply
- iii) Non-availability of raw material
- iv) Any other reasons.

Item No.11: State the volume of sawn timber extracted from the total quantity of round timber shown against item No. 9 The sawn timber here means the commercial sizes only. Off-cuts and other waste sawn material shall not be included in this. Give percentage of sawn cut turn to actual intake in round.

Item No. 12: The sawing of round timber is done for different purposes. The sizes in which the timber is sawn will vary depending on the purpose for which the sawn timber is required. Whereas some bigger saw mills turn out sawn timber in certain specific size only, (i.e. for Railway Sleepers, beams, shooks for packing cases, furniture etc.) there are others which saw miscellaneous sizes depending upon the orders received from their customers. Mention the important sizes sawn and give the purpose for which those sizes are required.

Item No. 13: Generally bigger forests lessees maintain their own mills for conversion of the round material coming out of their lease areas. Such saw mills generally do not undertake the work of sawing for others. In such cases 'tick' the class 'own' and write 100%. Strike off the other two classes.

In the second case, if the saw mill does not saw its own timber but saws the timber brought by customers only, the 'tick' the class 'others' and write 100%. Strike off the other two classes. In the third case the saw mill may be sawing its own timber as well as that brought by customers then 'tick' the class 'BOTH' and write the percentage of timber quantity sawn for each class. Strike off the other two classes.

Item No. 14: Whether the timber sawn is 'own' or those of customers (Others) or 'both', the source from which the timber was obtained would be from any of the following sources:

- i) Govt. Forests
- ii) Revenue Lands
- iii) Private Forests

The source should be ascertained and stated here with the percentage. Strike off the class not applicable (if the timber was purchased locally from timber depots then in that case also the source (as listed above)).

Item No. 15 Give the sale price of different sawn sizes (sp. wise). The information under this item shall be in reference to sizes shown under item No. 12

Item No. 16: During the conversion of round timber to sawn timber, some quantity of 'waste' is obtained which is either entirely used by the mill owner himself or is sold out in the open market. State the method of its disposal along with the price at which it is sold.

Item No. 17 There could be three possibilities for the disposal of the sawn timber:-

- i) Locally sold on retail basis
- ii) Returned to the customers (if owned by individual customers)
- iii) Transported to a destination where the mill owner is under contract for the supply.

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Production of wood: Bamboos and Katha (Total)  
 From: Govt. Forest - through Lessess  
 Name of District/Forest Division

Proforma: 1(c)  
 Unit:- cu.m./cft/Nos/quintals

Year	T i m b e r		Katha	Firewood	Charcoal
	Round	Saws			
1972-73					
1973-74					
1974-75					
1975-76					

NOTE:- i) Record the information in the same unit in which they are available the records, mention such units.  
 ii) Record the quantities in round and sawn separately. For example, cu.m/cft(r) or cu.m./cft(s)  
 iii) Wherever the unit used in other than cu.m. or cft, its conversion factor in vegue should be recorded on the back of the form.  
 iv) Columns should not be left blank, if no information is required to be filled in, 'NIL' should be written.  
 v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Production of Timber and Bamboos( spp.-wise)  
From:- Govt. Forests - through Departmental agency  
Name of District/Forest Division.  
Proforma:- 2  
Source:-  
Unit:- cu.m./cft/Nos/Quintals

Y E A R	S P E C I E S O F T I M B E R		B A M B O O		S P E C I E S O T H E R S	
	A	B	C	D	E	F
1972-73					Dendrocalamus	Bamboos
1973-74						
1974-75						
1975-76						

NOTE:- i) Record the information in the same unit in which they are available in the records, mention such units.  
ii) Record the quantities in round and saw separately. For example, cu.m./cft(r) or cu.m./cft(s).  
iii) Wherever the unit used is other than cu.m. or cft, its conversion factor in vogue should be recorded in the back of the form.  
iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.  
v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Production of wood: Bamboos and Katha (Total)

Source:-

From:- Govt. Forests -through Departmental agency.

Unit:- cu.m./cft/Nos/Quintals

Name of District/Forest Division

Y E A R	Timber	Bamboo	Katha	Firewood	Charcoal
1972-73					
1973-74					
1974-75					
1975-76					

- NOTE:- i) Record the information in the same unit in which they are available in the records, mention such units.
- ii) Record the quantities in round and sawn separately. For example, cu.m./cft.(r) or cu.m./cft(s)
- iii) Wherever the unit used in other than cu.m. or cft. its conversion factor in vegue should be recorded on the back of the form.
- iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.
- v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Production of Timber and Bamboos (sp. - wise)

Proforma - 3

From: - Govt. Forests - Through Right holders and Concessionists

Source: -

Name of District/Forest Division: -

Unit: - cu.m/cft/Nos/Quintals

Y E A R	SPECIES OF TIMBER				BAMBOO SPECIES	OTHERS
	A	B	C	D	E	Dendrocalamus Bamboos
1972-73						
1973-74						
1974-75						
1975-76						

- NOTE: -
- i) Record the information in the same unit in which they are available in the records, mention such units.
  - ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m./cft(s)
  - iii) Wherever the unit used is other than cu.m. or cft, its conversion factor in vogue should be recorded on the back of the form.
  - iv) Columns should not be left blank. If no, information is required to be filled in 'NIL' should be written.
  - v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Production of Wood: bamboos and Katha (Total)

Proforma: X (a)

Source: -

From: Govt. Forests - through Right Holders and concessionists  
Name of District/Forest Division.

Unit: -Cu.m./cft/Mcs/quintals

Y E A R	TIMBER	Bamboo	Katha	Firewood	Charcoal
1972-73	Round	Sawn			
1973-74					
1974-75					
1975-76					

- NOTE: -
- i) Record the information in the same unit in which they are available in records, mention such units.
  - ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m./cft(s)
  - iii) Wherever the unit used in other than cu.m. or cft. its conversion factor in vegue should be recorded on the back of the form.
  - iv) Columns should not be left blank, if no information is required to be filled in, 'NIL' should be written.
  - v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Production of Timber and Baobos (sp-wise)

From:- Revenue Lands

Proforma:- 4

Sources:-

Name of District/Forest Division

Unit:- cu.m./cft.Nos/Quintals

Y E A R	SPECIES OF TIMBER				BAMBOO SPECIES	OTHERS
	A	B	C	D		
1972-73					Dendrocalamus	Baobos
1973-74						
1974-75						
1975-76						

- NOTE:-
- i) Record the information in the same unit in which they are available in the records, mention such units.
  - ii) Record the quantities in round and sawn separately. For example, cu.m/cft(r) or cu.m./cft(s)
  - iii) Wherever the unit used is other than cu.m. or cft. its conversion factor in vegue should be recorded on the back of the form.
  - iv) Columns should not be left blank. If no information is required to be filled in 'NIL' should be written.
  - v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Proforma: 4(a)

Production of wood: bamboos and Katha (total)

Sources:-

Unit:- cu.m./cft/Nos/Quintals

From:- Revenue Lands

Name of District/Forest Division

Y E A R	T I M B E R	Bamboos	Katha	Firewood	Charcoal
1972-73					
1973-74					
1974-75					
1975-76					

- NOTE:-
- i) Record the information in the same unit in which they are available in the records, mention such units.
  - ii) Record the quantities in round and saw separately. For example, cu.m./cft(r) or cu.m./cft(s)
  - iii) Wherever the unit used in other than cu.m. or cft, its conversion factor in vegue should be recorded on the back of the forms.
  - iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.
  - v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder

Production of Timber and Bamboos (spp-wise)

From:- Private Forests

Name-of-District/Forest Division

Proforma: 5

Sources:-

Unit:- cu.m./cft/Mos/quintals

Y E A R	SPECIES OF TIMBER				BAMBOO SPECIES	OTHERS
	A	B	C	D		
1972-73					Dendrocalamus	Bambosa
1973-74						
1974-75						
1975-76						

NOTES:-

- i) Record the information in the same unit in which they are available in the records, mention such units.
- ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m./cft(s)
- iii) Wherever the unit used is other than cu.m. or cft its conversion factor in vogue should be recorded on the back of the form.
- iv) Columns should not be left blank. If no, information is required to be filled in, 'NIL' should be written.
- v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder

Production of woods:- bamboos and katha (total)

Proforma: 5(a)

From:- Private Forests

Sources:-

Name of District/Forest Division

Unit:- cu.m./cft/Nos/quintals

Y E A R	T I M B E R			C a r c o a l
	Round	Bamboos	Katha	
1972-73				
1973-74				
1974-75				
1975-76				

NOTE:

- i) Record the information in the same unit in which they are available in the records, mention such units.
- ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.n./cft(s)
- iii) Wherever the unit used in other than cu.m. cft, its conversion factor in vegue should be recorded on the back of the form.
- iv) Columns should not be left blank, if no information is required to be filled in, 'NIL' should be written.
- v) Wherever spp. are not available separately write Miscellaneous.

Name of the Recorder.

Consumption of wood/bamboos (sp. wise)

PROFORMA -6

By (Name of the Department):

Source:-

Name of the District/Forest Division

Unit:- cu.m./cft/lus.

Y E A R	S P E C I E S O F T I M B E R			O T H E R S	S O U R C E S F R O M WHICH SUPPLY MADE
	A B C	D E	B A M B O O S P E C I E S		
1972-73			Deandrocalanus Bamboo		
1973-74					
1974-75					
1975-76					

- Note:- i) Record the information in the same unit <sup>in</sup> which they are available in the records, mention such units.
- ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m.(s)
- iii) Wherever the unit used is other than cu.m./cft. its conversion factor in vegue should be recorded on the back of the form.
- iv) Columns should not be left blank. If no information is required to be filled in 'NIL' should be written.
- v) Wherever spp. are not available, write Miscellaneous.

Name of the Recorder.

Consumption of wood/bamboos (Total)

Proforma: 6(u)

By (Name of the Department):

Sources:-

Name of the District/Forest Division

Unit:- cu.m./cft/nos.

Y E A R	TIMBER	Bamboos	Firewood	Charcoal	Source from which the supply was made
1972-73	Round	Sawn			
1973-74					
1974-75					
1975-76					

- NOTE:-
- i) Record the information in the same unit in which they are available in the records, mention such units.
  - ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m./cft(s)
  - iii) Wherever the unit used is other than cu.m. or cft, its conversion factor in vogue should be recorded on the back of the form.
  - iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.
  - v) Wherever spp. are not available separately write miscellaneous.

Name of the Recorder



Consumption of Timber/Bamboos for Agriculture Implements/Bullock carts

Proforma: 8A

1. Name of the District.
2. Name of the Tehsil (Sub Division)

Name of the village/town.	Agricultural Implements		Bullock Carts		Source from which the material is obtained	Source from which the material is obtained.
	No. of ploughs in the house hold.	Quantity of timber used : spp. spp. spp.	No. of carts in the house hold	Quantity of timber/bamboo used Timber with species Round Sawn		
R U R A L						
U R B A N						

- NOTE- 1. Columns should not be left blank. If no information is required to be filled in, write 'NIL' in it.  
 2. Sheet is to be used for the same village/town surveyed for house construction activity.  
 3. One sheet is to be used for sample villages/towns in one Tehsil. For different Tehsils use separate form.  
 4. Wherever spp. not available, write Miscellaneous.  
 5. Write whether quantity used is in round or sawn.

Name of the Recorder.

Domestic consumption of firewood/charcoal

1. Name of the District.
2. Name of the Tehsil (Sub Division)

Name of the village/town	No. of person in the house hold	Daily consumption of firewood	Daily consumption of charcoal	Daily consumption of coal	Sources from the material is obtained	Total annual consumption
		Round	Sawn	coal	Round Sawn fire wood	Charcoal
					fire wood	Charcoal

R  
U  
R  
A  
L  
  
U  
R  
B  
A  
N

NOTE:- 1. If bamboos are also used as fuel, record the quantity separately on the back of the form.  
2. Columns should not be left blank. If no information is required to be filled in, write 'NIL' in it.  
3. This sheet is to be used for the same village/towns surveyed for house construction activity.  
4. One sheet is to be used for sample village/towns in one tehsil for different tehsils, use separate forms.

Name of the Recorder.

Proforma: 9

IMPORT OF WOOD/BAMBOO IN THE ZONE

Name of the District/Forest Division

Source:

Y E A R	Imports of timber			Total quantity of fuel		Total quantity of bamboos imports	Source from which the material is imported.
	spp	spp	spp	timber imports	Firewood Charcoal		
				Bound	Sawn		

1972-73

1973-74

1974-75

1975-76

- Note:- i) Record the information in the same unit in which they are available in the records, mention such units.
- ii) Record the quantities in round and sawn separately. For example, cu.m./cft(r) or cu.m/cft(s)
- iii) Wherever the unit used is other than cu.m. or cft. its conversion factor in vegue should be recorded on the back of the form.
- iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.
- v) Wherever spp. are not available separately write miscellaneous.

Name of the Recorder

EXPORT OF WOOD/BAMBOOS FROM THE ZONE

Proforma: 10

Name of the District/Forest Division

Source:-

Unit:- Cu.m./cft/Mos.

Y E A R	Spp.wise exports of timber spp spp spp spp	Total quantity of timber exports Round Sawn	Total quantity of Fuel exports Firewood Charcoal exports	Destination to which the export made.

1972-73

1973-74

1974-75

1975-76

- NOTE:-
- i) Record the information in the same unit in which they are available in the records, mention such unit.
  - ii) Record the quantities in round and sawn separately. For example, cu.m/cft.(r) or cu.m/cft.(s)
  - iii) Wherever the unit used is other than cu.m. or cft, the conversion factor in veguo should be recorded.
  - iv) Columns should not be left blank. If no information is required to be filled in, 'NIL' should be written.
  - v) Wherever spp. are not available separate write miscellaneous.

Name of the Recorder.

CONSUMPTION OF TIMBER BY SAW MILLS

Proforma: 11

1. Name of the District/Division
2. Name of the Saw Mill
3. Location of the Saw Mill
4. No. of hand saws in operation
5. Horse Power of the Engine.
6. No. of persons employed
7. Sawing-full time or Part time
8. Installed capacity cu.m/cft(r)  
(cu.m./cft of round timber per day)
9. Actual intake Cum.m./cft(r)  
(cu.m./cft of round timber per day)
10. No. of actual working days/year  
(Give reasons if it remains closed for over 3 months/ years)
11. Out-turn of sawn timber per day  
(Give % of sawn out-turn to actual intake in round). Cu.m./cft(s)....%
12. Important sizes sawn  
(Give purpose for which a particular size is sawn)
  - i)
  - ii)
  - iii)
  - iv)
  - v)
13. Does the saw mill saw its own timber or the timber brought by others(Give percentage; e) Own/others/ both
14. What are the sources from where the Govt. Revenue Lands Pvt. timber is obtained(Give percentage) Forests  
Yes/No.....%Yes/No.....% Yes/No.....%
15. Prices of the sawn sizes ( spp.wise)  
(Use supplementary sheet if the given space is not sufficient.
16. Method of disposal  
(If sold, give prices)
  - a) Off-cuts
  - b) Saw-dust
17. Destination to which the sawn timber goes;

Signature of the Redorder.

PART - III

DATA      PROCESSING

DATA PROCESSING

Tree Volume Study:

Felled tree volume:

Overbark and underbark measurements at the two ends of a section were available, therefore the overbark and underbark volume of each section was calculated by the 'Smalian Formula'.

$$V = \frac{\pi L}{8} (D_1^2 + D_2^2)$$

Where V is the Volume, D<sub>1</sub> and D<sub>2</sub> the average diameter at the two ends of a section, and L is the Length of the Section.

D<sub>1</sub> and D<sub>2</sub> represent overbark measurements for overbark volume and underbark measurements for underbark volume. In case of the stump volume and volume of the first section of each of the other tree portions, the average diameter at the top of the stump or at the top of the first section was considered to represent average diameter of the section, and volume was calculated as

$$V = \frac{\pi}{4} D^2 \times L$$

Where D is the average diameter at the top of the stump or at the top of the first section.

Volume of all the sections of the tree were added to obtain overbark and underbark volume of the tree.

Utility Volume:

Each section of the felled tree was assigned to one of the 22 utility classes and given a code number. Underbark and overbark volumes were available for each section. Underbark volumes of all the sections under each utility, other than Boswellia serrata and Lannea coromandelica, were combined together. These volumes were expressed as a percentage of total underbark volume of all the section of the felled trees. Utility volumes of utility classes 20, 21 and 22 were overbark volumes while other utility volumes were underbark. Percentage utility volumes for Boswellia serrata and Lannea coromandelica were derived separately. Volume per piece by utility were also obtained.

Cull

Percentage of hollow trees by species and diameter class were obtained from all the felled trees.

Bark Volume:

Total overbark volume of all the trees felled in a diameter class was expressed as a percentage of total underbark volume of that class.

Increment study:

Age-diameter and age-height relation of Teak:

The number of rings were recorded at breast height of each felled tree of teak. The diameter and height were plotted against age and smooth curves were drawn. Since due to absence of regeneration, teak seedling were not available for applying age correction. Hence an arbitrary age correction of 2 years was done. From these curves, age-diameter and age-height tables were prepared.

Height-diameter relation:

Height-diameter curves were drawn from sample tree data for the species Alseodaphne latifolia, Boswellia serrate, Lannea coromandelica, Tectona grandis and 'rest of the species'. From these curves height-diameter tables are prepared.

Volume Study:

General Volume Equations:

The following equations were tried to obtain suitable general volume equations for different species:

- 1)  $V = a + bD^2H$
- 2)  $V/D^2H = a + b/D^2H$
- 3)  $\text{Log } V = \text{Log } a + b \text{ Log } D + c \text{ Log } H$
- 4)  $V = a + bD + cD^2H$
- 5)  $V = a + bD + cH + dD^2H$
- 6)  $V = a + bH + cD^2H$

Where V - Underbark tree volume ( $m^3$ ) upto a limit of 5 cm overbark.

D - Overbark diameter (m) at breast height

H - Height (m)

a, b, c and d are regression constants.

Only trees of d.b.h. 10 cm and above were used for the derivation of general volume equation as it was noticed that inclusion of trees less than 10 cm d.b.h. had a different trend.

The following regression equation were selected on the basis of maximum coefficient of determination, least standard error of estimate and the applicability of the equation in the entire range of data.

1) ✓ Anogeissus latifolia (77).

$$V = 0.016909 + 0.252906 D + 0.359305 D^2 H$$

2) ✓ Larnea coromandelica (87)

$$V = -0.004511 + 0.377131 D^2 H$$

3) ✓ Tectona grandia (94)

$$V = 0.0086690 + 0.323051 D^2 H$$

4) ✓ Boswellia serrata (77)

$$V = 0.382544 \leftarrow 0.000751 / D^2 H$$

5) ✓ Rest of species (190)

$$V = 0.012804 + 0.327792 D^2 H$$

The figures in the brackets, indicate the number of observations of which the regression equations are based.

Local Volume Equation:

The diameter and height of each sample tree was substituted in the respective general volume equation to estimate the volume of the sample tree.

The following equations were tried to arrive at suitable local volume equations for the species:-

1)  $V = a + bD^2$

2)  $V = a + bD + cD^2$

3)  $V = a + bD$

4)  $V/D^2 = a + b/D^2$

5)  $\text{Log}_e V = \text{Log}_e a + b \text{Log}_e D$

6)  $V = a + bD + cD^2 + d/D$

7)  $V/D^2 = a + b/D^2 + c/D^2$

The following equations were selected keeping in view the coefficient of determination, standard error of estimate and the applicability of the equation in the entire range of the data.

1) ✓ Anogeissus latifolia (136)

$$V = -0.004378 + 4.575823 D^2$$

2) ✓ Larnea coromandelica (306)

$$V = 0.046731 - 0.962906 D + 7.301883 D^2$$

3) ✓ Tectona grandis (101)

$$V = 0.062108 - 0.927983 D + 6.613031 D^2$$

4) Boswellia serrata ( 506)

$$\bar{V} = - 0.155316 + 2.714875 D$$

5) Rest of species ( 601)

$$V = 0.081467 - 1.063661 D + 6.452918 D^2$$

These equations are valid for overbark diameter 10 cms. and above only. The volumes of trees less than 10 cm overbark diameter were derived from the average volumes of felled trees in this class. The following averages were used for this purpose. Figures in bracket are No. of trees used for deriving average volume.

<u>Species</u>	<u>Average volume (underbark) M<sup>3</sup></u>
1. <u>Anogeissus latifolia</u> (30)	0.0172
2. <u>Lannea coromandelica</u> (10)	0.0088
3) <u>Tectona grandis</u> (26)	0.0130
4) <u>Boswellia serrata</u> (9)	0.0131
5) <u>Rest of species</u> ( 52)	0.0125

Tree Volume:

The volume (underbark) upto 5 cm. overbark limit) of each enumerated tree was obtained by substituting the overbark diameter in the respective selected local volume equation.

Plot Volume:

The tree volumes of all the trees enumerated in a plot were added upto obtain plot volume.

Sampling error:

Standard error of estimate of volume per hectare were derived for each range and the division as a whole. Estimate of standard error were also obtained for five important species of the division.

Tree Density Study:

Stand and stock tables:

Stems per hectare:

The trees enumerated in each plot were classified by diameter and species.

The stems per hectare in each diameter class were obtained for 12 important species separately and for rest of the species together for each range separately and for the division as whole.

Volume per hectare:

The volume of enumerated trees was classified by species and diameter. The volume per hectare in each diameter class was obtained for four important species separately and for rest of the species together in each range and for the whole division.

Total growing stock:

Area under forest in each range was provided by the zone. These areas were used to estimate the total growing stock in each range as well as in the whole division by species and diameter.

Bamboo:

Area under bamboo:

All plots in a range were classified into bamboo bearing and non-bamboo bearing plot. The area under bamboo in each range was calculated on the basis of the proportion of bamboo bearing plots in the range.

Bamboo clumps per hectare:

The total number of clumps in each plot were classified by quality and size class. Bamboo clumps per hectare were estimated by quality and size class from all the bamboo bearing plots in each range. The number of bamboo clumps per hectare were also estimated by quality and size class for the whole division.

Total bamboo clumps:

The total number of bamboo clumps by quality and size class were obtained from the estimates of area and number of clumps per hectare for each range and for the division as a whole.

Number of culms per clump:

The culms of each enumerated clumps were classified by age and soundness. From this data the number of culms per clump were estimated by age and soundness for each quality and size class.

Total Bamboo culms:

Total bamboo culms in different age and soundness classes were estimated from the total bamboo clumps and number of culms per clump.

Average diameter and height:

Average diameter and average height of a culm was determined separately for bamboo clumps of each quality and size class from the enumerated culms.