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Forest Resources Survey

Of

Dibang District

(ARUNACHAL PRADESH)

INVENTORY RESULTS

FOREST SURVEY OF INDIA
NORTHERN ZONE
SHIMLA
1997

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SUMMARY

1. The forest inventory survey has been carried out in the Dibang district of Arunachal Pradesh during January 91 to March 91.

2. The objectives of the survey were to assess the forest resources of the district and changes therein so as to focus attention on the critical aspects thereby helping in the development planning.

3. The total geographical area of the district is 13029 Sq. Km. Of this the maps were available only in respect of 9980 Sq. Km. having forest area (green wash) of 7262.79 Sq. Km. (72.92%) excluding the area of "Mahao" Wildlife Reserves/ Sanctuaries, in the reference year 1963.

4. Survey work for forest inventory was taken up over the forest area of 7262.79 Sq. Km. But 5777.59 Sq. Km. the area of unclassed forest could not be surveyed owing to steep slopes having dense undergrowth and having no habitation and footpaths. Every effort was made to tackle the survey area but no solution could be found out.As such, area remained unsurveyed. Therefore only 1485.20 Sq Km. area was surveyed and the present (1991) status of this area is summarized below:-

Status	Area (Sq. Km.)	Percentage
(a) Area permanently diverted to non-forestry purposes. (1963 to 1991)	322.50	21.71
(c) Area under scrub/grass land (degraded forest)	135.50	9.12
(d) Area under current and last year's shifting cultivation.	75.00	5.05
(e) Area under bamboo brakes.	28.20	1.90
(f) Accessible tree forest area.	920.80	62.00
(g) Area under young plantation of forestry species.	3.20	0.22
Total :	1485.20	100.00

The assessment of forest inventory is for the accessible tree forest and area under bamboo brakes only.

5. The overall average canopy density over the

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entire accessible tree forest area of 911.20 Sq. Km.(excluding 9.60 Sq. Km. area which falls under plantation).

6. The soil depth is adequate over most of the accessible forest area and only 38.38% area has been assessed to be suffering from moderate or heavy erosion.

7. Only 50.00 Sq. Km. of the assessed forest area is unplantable.

8. Natural regeneration - of economically important species - is adequate. inadequate or absent over most of the area.

9. Bamboo occurs in pure forms (i.e. as bamboo brakes) over an area of 28.20 Sq. Km. as an under storey with the tree forests over an area of 344.50 Sq. Km. Out of this total bamboo bearing area 372.70 Sq. Km., the bamboo enumeration over an area of 47 .70 Sq. Km. was nil. Therefore figure (47.70 Sq. Km.) does not contribute towards the bamboo inventory of the district. Balance area of 325.00 Sq. Km. is the area contributing to the bamboo inventory of the district. Out of 325.00 Sq. Km. area under clump forming bamboo an area of 25.00 Sq. Km. has been assessed to be of category "Bamboo present but completely hacked".

10. Total non-hacked bamboo area of 300.00 Sq. Km. bears 43.74 million equivalent sound culms.The dry weight of this bamboo stock has been assessed to be 22.062 thousand tonnes.

11. Three forest types have been identified in the survey area. The assessment of average stock (vol./ha.) and stand (no. of stems/ha.) in respect of these forest types is as under:-

S.No. Forest Type	Total area (hectares)	Stems/ha.	Vol./ha. (cum.)
1.Hardwood mixed with conifers	1250	-	-
2.Upland hardwood	7500	169.159	290.000
3.Miscellaneous	83330	79.013	187.609
	92080	86.456	196.064

12. The total growing stock in the accessible tree forest area is assessed at 83.59 million cubic meters corresponding to 180.54 million stems.

83 59 [illegible]

CHAPTER 1

1.1 Introduction

Arunachal Pradesh is a thinly populated hilly tract lying roughly between the latitudes 26° 28′ N and 29° 30′ N and longitudes 91° 30′E and 97°30′ E on the north-east extremity of India comprising roughly 83,743 sq. km. of area. It is bounded on the North, North-East and North-West by China, on the South by Assam and Nagaland, on the South-East by Myanmar (Burma) and on the West by Bhutan. The Pradesh is known to be rich for its flora, fauna, power and mineral potential.

When the 1971 census was taken up in Arunachal Pradesh the area was known as North East Frontier Agency (NEFA) which was constitutionally a part of Assam State. At that time NEFA was directly administered by the President of India through the Governer of Assam as his agent, who was assisted by an advisor.

On 21st January, 1972, NEFA was given the status of Union Territory under the provision of the North-Eastern Area (Reorganisation) Act, 1971 (8 of 1971) and placed under the charge of a Chief Commissioner with head quarters at Shillong.

When NEFA became a Union Territory in January, 1972 it was renamed as Arunachal Pradesh and Itanagar was made as its capital. At present there are eleven districts in the state namely Tawang, West Kameng, East Kameng, Lower Subansiri, Upper Subansiri, West Siang, East Siang, Tirap, Lohit, Changlang and Dibang Valley.

The Dibang Valley district derives its name from the river Dibang which flows through it and finally debouches into the plains where it meets the Lohit river near Sadiya. The district is a wild, mountainous area and presents a remarkable topographical variety.

The area of the district is 13,029 sq. km. with a population of 43,068 according to the 1991 Census. It is the biggest district in area and second smallest in population in Arunachal Pradesh. The district was badly affected by the great earthquake of 1950 when the river Dibang completely changed its course sweeping of the old Sadiya town, supposed to be one of the most beautiful town of the Northern Assam. The district has two sub-divisions Anini and Roing. All together the dis-

trict has nine circles namely Anini, Anelih, Hunli, Etalin, Desali, Dambuk, Mipi, Kronli, and Roing.

Villagers are still having their own customary Administrative System in the form of traditional village council.

The scheduled tribe population of the district accounts for 45.44% of the total population. There are two main tribes namely Idus and Padams (Aids) inhabiting Dibang valley area. The Idu-mishmies to whom the Dibang valley belong are the main dominant tribes of the district.

1.2 Location and boundaries

The survey area i.e. Dibang district lies between 95° 15' to 96° 45' East and 27° 45' to 29° 30' North. The district is bounded on the North by China, on the South partly by Assam and partly by Tezu sub-divisions of Lohit district, on the East by China and Hayuliang sub-division of Lohit district and on the West by East Siang and West Siang district.

1.3 Climate

The varied orography has a profound influence on the climate which varies according to elevation and location. The mountainous regions enjoy what is known as mountain type of climate while the low lying narrow peripheral plains and the valleys experience tropical climate.

Owing to the complexity of relief and drainage, the distribution pattern of precipitation is also complex. Precipitation during the monsoon season is copious and mostly in the form of rain. Significant precipitation also occurs during pre-monsoon period from March to May specially in the northern parts. Narrow peripheral strip of land below the elevation of 1000 metres surrounding the Brahmaputra valley is the area of highest rainfall, receiving more then 250 cms. annually. In this region rainfall increases towards east to 400 cms. Over the remaining part of the territory, rainfall decreases with elevation. Seventy per cent of rainfall is received during the south-west monsoon months of June to September and about 20% during pre-monsoon months. The northern portion receive about 50 to 60% of rainfall during the monsoon period of June to September, while 20% each during pre monsoon and winter

periods in association with western disturbances.

The territory rarely suffers a drought. Floods on the other hand are frequent in the plains. In the case of territory, orography and copious rainfall combine to render the plains liable to frequent floods.

Occasional thunderstorms occur during the later winters in association with western disturbances. Thunderstorm increases considerably and is at its maximum during the pre-monsoon period as a result of interaction between the northern cold air the southerly warm moist air. These summer thunderstorms are often violent similar to the north-western. These are accompanied by hail. This activity continues during the early part of the monsoon. Thunderstorms also occur during October when the monsoon is withdrawing. Fog occurs frequently during the winter months, particularly in the mornings in the valleys. Hills fog is common during the monsoon months.

1.4 Physical features

The entire district is a part of the Eastern Arunachal Pradesh Himalayas having two types of physiography-hill tract and the plains.The district itself is a V shaped valley of Dibang river consisting of five small valleys formed by the tributaries of the Dibang river.The area lies in the eastern most portion of the Himalayas across the Inner ,the Middle Himalayas and the Shiwaliks. In this area,about three fourths of the Shiwalik range has been eroded and changed into plains. These plains are eastward extension of the Bramhputra plain, they are separated from it for political and administrative purposes.The district is a wild, mountainous area and presents a remarkable topographical variety.

1.5 Socioeconomic conditions of the people

Population of the district is 43.068 out of which 24,087 are males and 18.961 are females. The density of population is 3 per Sq. Km. as compared to the state average of 10 persons per Sq. Km. The district has two contrasting features- it is the biggest district in area and smallest district in population. The district is predominantly inhabited by Scheduled Tribe population. The total ST population of the district is 19,572 persons. In percentage, 45.44% of the population are Schedule Tribes population. There are two main tribes namely Idus and Padams(Adis) inhabiting Dibang valley area. The Idu-mishmies to whom the Dibang valley belongs are the main dominant tribe of the district. The literacy rate is found highest in Anini-

Etalin Block with 50.75 percent literates. Roing-Dumbuk Block ranked second with 48.22 percent. The lowest literacy is found in Hunli-Kronli Block with 31.39 percent literates. The same trend is seen in respect of male and females literacy rates. The literacy rate of Roing town is 75.00 percent. The people of Dibang Valley District depend mainly on agriculture. Out of total population of 43,068, about 50% of the people are cultivators. The cultivators of both Lower and Upper Dibang valley grow paddy, maize, millet etc.
The main staple food is paddy and maize.

The District is still underdeveloped.Difficult terrain prevents quick development of the area.Roing and Dambuk circles have developed rapidly and there is scope for further development. Agriculture is under going process of transition from JHUM cultivation to permanent cultivation with the introduction of modern technology. Livestock plays an important role in the socio-economic life and development of the people of Arunachal Pradesh. In rural areas the economic status of a family is assessed by the number of animals especially Mithun that a family posseses. Meat is the favourite food of the people.

The area is very thinly populated and after the devastating earth quake in 1950, almost all the people have shifted from the hills and settled down in the plains. The local people are enjoying their right of the forest. They exercise their right for collection of forest produce for their daily needs as well as for dwelling houses.

The forests are the economic backbone of this division.The local people are induced for timber trade by offering tree permit every year from annual permit quota. Other than timber, minor forest produce like Cane, Bamboo,Thatch,Boulders,Fish are also allowed been to collect on permit and Mohal system for commercial purpose for the upliftment of the local people.

Difficult terrain and backward communication system coupled with lack of entrepreneurship are the buttlenecks to develop trade and commerce in the district.Most of the essential items are carried to remote areas by air only.

1.6 Forests

The classification of the area into forests type has been done on the basis of occurrence of the species. The following forest types have been found in the forest area.

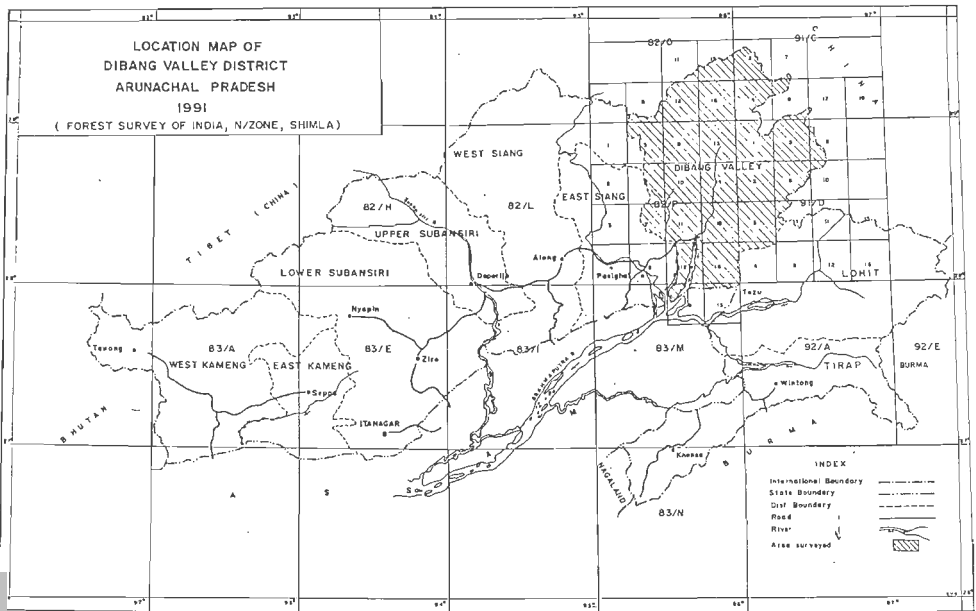
(1) Upland hardwood forest:- Broad leaved species constitute more than 50% of the crop in upper zone i.e.

above 1500 meters altitude.

(2) Bamboo forest:- Forests where the crop is almost pure bamboo.

(3) Hardwoods mixed with conifers or conifers mixed with hardwood forest:- Forests where the conifers and the broad leaved species occur more or less in the same proportion.

(4) Miscellaneous forests:- Tree forests which could not be classified into any of the above types.


LOCATION MAP OF
DIBANG VALLEY DISTRICT
ARUNACHAL PRADESH
1991
(FOREST SURVEY OF INDIA, N/ZONE, SHIMLA)
WEST SIANG
EAST SIANG
DIBANG VALLEY
UPPER SUBANSIRI
LOWER SUBANSIRI
LOHIT
TIRAP
BURMA
TIBET (CHINA)
BHUTAN
ITANAGAR
WEST KAMENG
EAST KAMENG
Along
Daporijo
Roing
Tezu
Hayuliang
Nyapin
Tawang
Ziro
Seppa
Wakro
Wantong
Kheasa
HAGELAUD
82/O
91/C
82/H
82/L
82/P
91/D
83/A
83/E
83/I
83/M
92/A
92/E
83/N
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State Boundary
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CHAPTER 2

2.1 Design and Methodology of the Forest Inventory Survey

The forest areas marked on 1:50,000 Survey of India Toposheats were used as the basis of forest inventory. The year of survey and publication and the maps used in survey are given in Appendix - I.

2.2 Definition of forest area

The following are treated as 'Forest Areas' for carrying out the forest inventory and for the purpose of this report.

(i) All those areas shown in 'green wash' on Survey of India Toposheets on 1:50,000 scale.

(ii) All those areas indicated by dotted lines or broken lines or a pillar line as 'Forest Areas' on Survey of India Toposheets.

2.3 Sampling design

Available Survey of India Toposheets, on 1:50,000 scale, were divided into grids of 1'*1' of latitudes and longitudes. All the intersection points of these 1'*1' grids, falling within the 'green wash' and/or demarcated forest areas (as shown on S.O.I.Toposheats) were given serial numbers. A total of 3193 intersections were thus marked in the district. As the forest department of Arunachal Pradesh desired a higher intensity of sampling in Reserve Forest than that of "unclassed forest" for achieving a higher accuracy, it was decided to select all the intersection points (1'*1') falling within R.F. as centres of sample plots. In respect of "unclassed forest" only as many sample plot locations were selected randomly so as to make the overall intensity of sampling in the district at par or more than the earlier design of 2 plots per 2.5'*2.5' grid. This modified design was as per the guidance provided by C.S.O.

The forest inventory data was collected from square plots of 0.1 ha. each which were laid out at each of these selected intersections.

2.3.1 Method of Selection of plot Centres

As mentioned in para 2.3 above a total of 3193 grid intersection points (1'*1') were marked in the 'green wash' area of available toposheats. Out of these intersections, 136 intersections were falling in R.F. All these

136 intersections were selected as plot centres. In the 'U.F.', 700 intersections were randomly selected out of the available 3057 intersections. This makes the overall intensity of sampling slightly higher than the regular design which provides for 2 sample plots in each grid of 2.5'*2.5'.

2.4 Field methodology

The field data is collected by a crew, consisting of one Junior Technical Assistant (Crew Leader), a Deputy Ranger, two Fieldmen, a Khalasi and unskilled labourers engaged locally wherever necessary. The Crew Leader is provided with a list of sample plots to be surveyed by his crew during the year along with a set of S.O.I. Toposheets with location of sample plots already marked. A set of measuring instruments viz. Silva compass, Haga/Blumme Liess hypsometer, callipers, measuring tapes and ranging rods etc. are provided.

After deciding the plot and the grid number to be surveyed on a particular day from a camp spot the crew leader reaches a prominant physical feature (also called starting reference point as near to the sample plot as possible) which is depicted on the Survey of India Toposheet and can also be identified on the ground. Usually the following features are selected as reference point:

(i) Bench mark.
(ii) Triangulation points.
(iii) Village trijunction points.
(iv) Bridges and culverts.
(v) Temples, mosques and churches.
(vi) Crossing of rail tract with roads/rivers/streams.
(vii) Junctions of rivers or streams with roads.
(viii) Junctions of streams.
(ix) Junctions of roads.
(x) Prominent bends in roads, rivers and streams.
(xi) Ponds, wells and springs.
(xii) Prominent topographical features in hilly region such as spurs, knolls etc.
(xiii) Kilometer or mile stones.
(xiv) Boundary pillars (international, state, district and forest boundaries).

Having located a prominent physical feature (reference point) both on the ground as well as on the Survey of India Toposheet, the distance and the bearing of the sample plot from this physical feature is measured from the map. The bearing is measured with the help of the

protractor or the Silva's compass. At this reference point the crew leader records the reference feature used, the bearing and distance of the sample plot from the reference feature,the name of the camping spot, the time taken to complete the work etc.,in the 'Plot approach Form'. Information recorded in this form is used in time and cost study for the forest inventory and helping to relocate the sample plot at a future date. Specimen of this form is given in Appendix-III. From the reference point crew leader traverses the distance in the direction as measured on the map to reach the sample plot. A wooden peg is fixed at this location,which is the center sample plot, a square sample plot of 0.1 ha. area with diagonals measuring 44.72 metres in NE-SW & NW-SE directions is laid out on the ground by marking its four corners by pegs at the end of the diagonals. Regeneration data is collected from a subplot measuring 4 m.* 4 m. and herb-shrub data from a sub plot of 2 m.* 2 m. size (see diagram at page ?)

After laying the sample plot the crew leader with the help of other crew members collects the forest inventory data in the following fields forms:

(i) Sample plot description form.
(ii) Sample plot enumeration form.
(iii) Sample tree form.
(iv) Bamboo enumeration form (Clump forming).
(v) Bamboo enumeration form (Non clump forming).
(vi) Bamboo weight form.
(vii) Herbs and Shrub data form.

Samples of the above fields forms may be seen in Appendix - III. They are briefly described below:

(i) Sample plot description Form (PDF)

Qualitative data such as land use, crop composition of tree crop and its density, intensity of erosion in the area, fire and grazing incidence, regeneration status etc. are recorded in this form. The basis of assessment is ocular, by examining a surrounding area of about 2 ha. around the plot center.

(ii) Sample plot enumeration Form (PEF)

In this form the trees and bamboo clumps in the sample plot are survey area enumerated and recorded with their species and diameter at breast height .

Sample tree Forms (STF)

The data in this form is collected from northern quarter of the sample plot. Name of the tree species, its diameter at breast height, twice bark thickness, dominance status, length of the clear bole, and height etc. of each tree is enumerated in the quadrant is recorded. The data from this form helps in developing the local volume equations for the species in the survey area. Under bark volume is also derived from the local volume equations by using the bark thickness data.

(iv) & (v) Bamboo enumeration Forms (Clump & Non-clump forming variety)

These forms are used wherever bamboo clumps, whether of clump or non clump forming variety, are encountered in sample plots. Data such as culms in each clump, there size maturity condition, length etc. are recorded.

(vi) Bamboo Weight Forms (BWF)

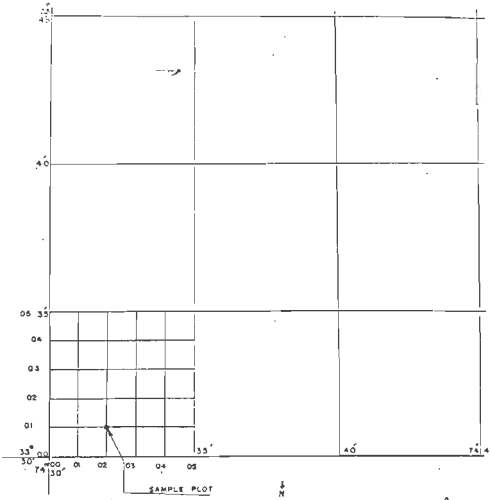
For determining the co-relation between green and dry weight of the utilizable length of bamboo culm, data on weight are recorded in this form.

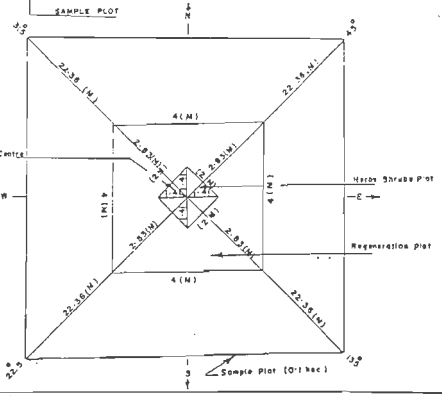
(vii) Herbs and Shrubs data Form

In this form names and other details of all identifiable species of herbs and shrubs are recorded. In case of the species that could not be identified in field, the number of such species only are noted.

The above is a brief description of the design and methodology of forest inventory survey. The details are given in the 'Manual of instructions for field inventory' of Forest Survey of India.

SKETCH SHOWING SAMPLING DESIGN AND LAYOUT OF PLOT





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Chapter 3

DATA PROCESSING

3.0 Processing of the data on computer

After completion of the field work, the field forms of the region surveyed were consolidated and checked for inconsistencies and coding mistakes, if any. The coded data was then sent to the data processing unit of this organisation at Dehradun. The data contained in the field forms were again checked there for inconsistencies and coding mistakes. The processing of the data has been done on the computer system viz. VAX-11/780 acquired by the Forest Survey of India, Dehradun. One of the main advantages of this system is that the data has a direct access to the computer.

The processing of the data on the computer consisted of the following steps:

(i) Loading of the data on floppy disk from field forms.
(ii) Checking of consistency of data on computer.
(iii) Listing of loaded data for visual checking.
(iv) Correction of data for discrepencies, if any.
(v) Preparation of area tables.
(vi) Calculation of tree and plot volume.
(vii) Carrying out regression analysis.
(viii) Preparation of growing stock tables for various strata as per design.
(ix) Bamboo analysis.

3.1 Area Computation

The area of the forest land on the 1:50,000 scale topographical maps of Survey of India was calculated using closely spaced dot grid template where on dot represented one hectare. Further distribution of the forest area under various classes such as land use, accessible tree forest area, forest types, soil erosion status, grazing incidence, fire incidence, canopy density classes etc. was arrived at proportionately using ratio estimator. However it may be noted that area tables are based on limited sample plots and therefore, should be considered as indicative only and used with caution.

3.2 Volume Estimation

Collection of felled tree data, for developing volume equations, has since been discontinued by the zones due to the ban on felling of green trees. General volume equations already derived and used in case of Lohit and Tirap districts of Arunachal Pradesh Forest Inventory Survey of 1981 were used to develop local volume equations for each of the main species or group of species including miscellaneous group of species. The general volume equations referred to were the following:

GROUP	NAME OF SPECIES	EQUATION
1	Dipterocarpus macrocarpus	$V=0.03849+0.00003608\ D^2H$
2	Shorea assamica	$V=0.01199+0.000035\ D^2H$
3	Terminalia myriocarpa Cinnamomum oecidodphne Altingia excelsa Castanopsis spp. Terminalia citrina Duabanga sonneratioides Phoebe cooperiana Artocarpus lakoocha Terminalia belerica	$V=0.0346+0.0000257\ D^2H$
4	Ammoora wallichii Gmelina arborea Chukrasia tabularis Talauma phellocarpa Adina cordifolia Lagerstroemia speciosa Bischofia javanica Toona ciliata Pterospermum acerifolium Kydia calycina Trewia nudiflora Stereospermum chelonioides	$V=0.0778+0.0000286\ D^2H$
5	Canarium resiniferum Ailanthus grandis Mansonia dipke Albizia lucida Kayea floribunda	$V=0.04367+0.000039\ D^2H$
6	Bombax ceiba	$V=0.06076+0.0000294\ D^2H$
7	Dillenia indica	$V=-0.01013+0.0000411\ D^2H$
8	Mesua ferrea	$V=-0.03037+0.000157\ D^2+0.000035\ D^2H$

9 Morus laevigata
Michelia champaca
Schima wallichii
Adina oligocephala
Betula alnoides
Tetrameles nudiflora
Anthocephalus chinensis
Alstonia scholaris
Keyea assamica
Pterospermum lanceafolium
Dalbergia sissoo
Miscellaneous spp.

$$V = -0.1368 + 0.00318\,D^2 + 0.01424\,H + 0.0000176\,D^2 H$$

where

V= Volume under bark (cum.)
D= Diameter (cm.)
H= Height (m.)

General volume equation developed for group 9 should not be applied for trees having height less than 7 metres and such trees were ignored while the local volume equations were developed.

For each of the main species, sample tree volume was calculated by using the respective general volume equation. The estimated sample tree volume and its transferred form is considered as depended variable and the diameter or its transferred form as independent variable for the regression. Thus from the available volume/diameter of sample tree data following set of regression functions were tried for each of the main species or group of species.

1. $V = a + bD^2$
2. $V = a + bD + cD^2$
3. $V = a + bD + cD^2 + dD^3$
4. $V = a + b\sqrt{D} + cD^2$
5. $\sqrt{V} = a + bD$
6. $\sqrt{V} = a + bD + c\sqrt{D}$
7. $V/D^2 = a + b/D$

8. $V/D = a + b/D + c/D^2$

9. $V/D^2 = a + b/D + c/D^2 + dD$

10. Log V = a + b log D

where

V = Volume under bark (cum.) up to 5 cm. top overbark limits.
D = Diameter at breast height (DBH).

One of the best fitted local volume equation from these was selected after carrying out the regression analysis.

The following local volume equations were selected for different species:

	Name of the species	Equations
46	Albizia ~~lucida~~ species	$V = 0.07389 + 4.47501 (D^2)$
50	Alnus ~~Altingia excelsa~~ spp.	$V = 0.01115 - 0.11716\ D + 7.11672\ D^2 - 4.54544\ D^3$
105	Betula Alnoides	
	Amoora ~~wallichii~~	$V = -0.12110 + 1.58826\ D + 1.96643\ D^2$
109	Bombax ceiba	
	Ailanthus grandis	$V = -0.06160 + 6.48800\ D^2$
176	Cinnamomum ~~tamala~~	
	Artocarpus chaplasha	$V = 0.10970 - 0.88666\ D + 6.09700\ D^2 - 1.62672\ D^3$
308	Dipus spp	
	Boschotia javanica	$V = 0.22468 - 2.41386\ D + 9.74543\ D^2$
327	Gmelina Arborea	
	Bombax ceiba	$V = -0.17300 + 3.56208\ D - 12.20271\ D^2 + 25.45583\ D^3$
424	Lyonia Ovalifolia	
	Canarium resiniferum	$V = 0.14560 - 2.10543\ D + 11.81097\ D^2 - 6.56089\ D^3$
425	Macaranga denticulata	
	~~Castanopsis~~ hystrix	$V = -0.10251 + 1.87509\ D - 0.31323\ D^2$
435	Machilus spp	$V/D^2 = 4.84009 - 0.02402/D^2$
	~~Toona~~ ciliata	or $V = -0.02402 + 4.84009\ D^2$
	Pinus Excelsa	$V/D^2 = 3.88801 + 1.00147/D - 0.07019/D^2$
521	~~Streospermum personatum~~	or $V = -0.07019 + 1.00147\ D + 3.88801\ D^2$
574	Quercus spp	
	~~Chukrasia~~ tabularis	or $V = 0.00563 + 5.09470\ (2)\ V/D^2 = 5.09470 + 0.00563/D^2$
601	Rhododendron spp	
	Cinnamomum ~~cecidodaphne~~	$V = -0.08934 + 0.70730\ D + 2.13941\ D^2$
621	~~Dillenia~~ indica	$V = -0.06440 + 0.48094\ D + 4.61818\ D^2$
	Sapium Oligowafolia	

Saurinia nepalensis
~~Dipterocarpus macrocarpus~~ $V = 0.03006 - 0.77786 D + 6.72270 D^2 - 2.37257 D - 4.87608 D^3$
Tsuga dumosa
~~Duabanga grandiflora~~ $\sqrt{V} = -0.09154 + 2.37257 D$

/ Misc. species $V = 0.00978 - 0.21005 D +$
$\rightarrow 5.62160 (D^2)$

3.3 Stand Tables

The elements of tree/plot volume file were utilised to classify the tree by species, diameter, crop composition etc. Estimates of the number of stems per hectare and total stems by species and diameter class were obtained for all the crop compositions - Miscellaneous Forests. In case of Reserved Forest (RF) and Hardwood mixed with conifers, Upland hardwood and Misc. Forests in case of Unclassed Forest (UF) separately. The number of stems per hectare and total stems over all crop compositions were also derived from RF and UF.

3.4 Stock Tables

Estimates of volume per hectare total volume by species and diameter classes were obtained for each crop composition from the tree/plot volume file.

3.5 Sampling Error

The sample was considered as a systematic cluster sample having two sample plots in each cluster. In order to estimate the sampling error the sample was considered to constitute simple random sample of equal clusters and ratio method of estimate was used as in many grids, only one plot was enumerated.

Let n= total no. of clusters (grids) in the sampe
Y_i= sum of per hectare volume in the grid
X_i= no. of plots in the grid

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i = \text{average no. of plots per grid}$$

$$\hat{R} = \frac{\frac{1}{n}\sum_{i=1}^{n} Y_i}{\frac{1}{n}\sum_{i=1}^{n} X_i} = \text{estimate of average vol./ha. over all grids}$$

Estimate of Variance of $\hat{R}$ is

$$\hat{var}\ (\hat{R}) = \frac{N - n}{N\,n\,\bar{x}^2} \sum_{i=1}^{n} \frac{(Y_i - R\,X_i)^2}{n-1}$$

Ignoring $\frac{N-n}{n}$, the finite population correction factor

$$\hat{var}\ (\hat{R}) = \frac{1}{n\,(n-1)\,\bar{X}^2} \left[\sum_{i=1}^{n} Y_i^2 - 2R \sum_{i=1}^{n} Y_i X_i + R^2 \sum_{i=1}^{n} X_i^2 \right]$$

Estimate of the Standard Error (S.E.) of R is

$$S.E. = \sqrt{\hat{Var}\ (\hat{R})}$$

$$S.E.\% = \frac{S.E.}{\hat{R}} * 100$$

Standard errors have been estimated for the growing stock in each forest type and over the entire area irrespective of the strata.

Chapter 4

4.0 FOREST INVENTRY RESULTS

In this chapter, the results of forest inventory and the critical aspect of forest resources as evident therefrom, in survey area, are presented. This is a low intensity survey (0.01 percent). Its results are, therefore, reliable for the entire district. The standard deviation and the standard error both for "reserve" and the "unclassed" state forest have been calculated and discussed in the previous chapter.

4.1 FOREST AREA

The Survey area is covered by 32 Survey of India topo sheets of 1: 50,000 scale viz.82 O/8,11,12,15 and 16: 91C/3, 4, 7, 8 & 12; 91D/1, 2, 3, 4, 5, 6, 7, 9 & 10; 82P/5, 6, 7, 9, 10, 11, 12, 13, 14, 15 & 16; 83M/9; and 83M/13. Regarding the design adopted in Dibang valley with regard to selection of plots, the area figures obtained from Forest Statistics. 1985 of Arunachal Pradesh. The following figures were worked out in the beginning to serve as the base for starting the survey work.

TABLE 4.1

Distribution of forest area (in the base year 1964) and number of sample plots marked for survey therein.

Forest status	Forest Area (Sq.km.)	Sampling Intesity	Net area to be sampled (Sq.km.)	No. of s.p.'s to be tackled	Weightage per plot in Sq.Km.
Reserved forests	797.40	0.312%	0.249	249	3.20
Unclassed forests	7362.60	0.008%	0.589	589	12.50
Total area	8160.00	0.01%	0.838	838	9.74

Out of 32 S.O.I. toposheets only 20 toposheets were available for survey viz. 82O/16; 91D/1, 2, 3, 4, 6 & 7; 82P/5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 16; 83M/9 and 83M/13. Each of these available sheets, along with the respective year of survey, has been listed vide appendix-I

The year of survey of the Survey of India Toposheets, used for marking the forest areas, are from 1962-1963 to 1964-1965. Major portion of the area is covered by the sheets having year of survey 1963-1964 Therefore, 1963 is taken to be the base year for monitoring changes in the forest area till January 1991 (year of survey).

The total forest area (in the year 1963) as defined in para 2.2 - identified on the available maps for the survey was computed to be 7530.74 Sq.Km.

Out of the total computed forest area (7530.74 Sq.Km.) an area of 267.95 Sq.Km. falling in "MAHAO" Wildlife Reserves/Sanctuaries was, therefore, excluded from the purview of the inventory survey.

The break up of the remaining forest area (7262.79 Sq.Km.) into various categories is given in the following paras of this chapter. A total of 836 sample plots were selected in remaining forest area (7262.79 Sq.Km.). Out of which 136 plots covering 435.20 Sq.Km. forest area were selected in Reserved Forest and 700 plots covering 6827.59 Sq.Km. forest area were selected in Unclassed Forest.

In Dibang district, out of 836 sample plots (7262.79 Sq.Km.) only 220 sample plots (1485.20 Sq.Km.) were surveyed. Out of 220 sample plots(1485.20 Sq.Km.) 136 sample plots were surveyed in Reserved Forest having an area of 435.20 Sq.Km. and only 84 plots(1050 Sq.Km.) could be surveyed in Unclassed Forest. The rest of the area of Unclassed Forest could not be surveyed owing to steep slopes having dense undergrowth and having no habitation and footpaths. Labour for transportation of field equipments and luggage of field crews were also not available. Every effort was made to tackle the survey area, but no solution could be found out. As such, the area remained unsurveyed.

4.1.1 The distribution of the present status of forest area (January 1991 to March 1991) in the district, both for Reserved and Unclassed Forests, is given in table no. 4.1.1.

The following conclusions can be drawn from the results tabulated above in table no. 4.1.1:-

TABLE NO. 4.1.1

Distribution of forest area (tree cover shown in greenwash and of demarcated blank on topo sheets) and number of sample plots inventoried therein by land use.

Dibang district

S.No.	Land use	Reserved Forest		Unclassed Forest		Total	
		No. of sps.	Area (Sq.Km.)	No. of sps.	Area (Sq.Km.	No. of sps.	Area (Sq.Km.)
1.	Tree forest	66	211.20	56	700.00	122	911.20
2.	Plantation	3	9.60	-	-	3	9.60
3.	Bamboo Brakes	1	3.20	2	25.00	3	28.20
4.	Scrub forest	-	-	2	25.00	2	25.00
5.	Govt. grass land	15	48.00	5	62.50	20	110.50
6.	Agricultural land	35	112.00	8	100.00	43	212.00
7.	Water bodies	11	35.20	3	37.50	14	72.70
8.	Habitation	4	12.80	2	25.00	6	37.80
9.	Shifting cultivation	-	-	6	75.00	6	75.00
10.	Young Planation	1	3.20	-	-	1	3.20
	Total	136	435.2	84	1050	220	1485.20
	Results:						
1.	Accessible forest area (1-5, 9 & 10)	86	275.20	71	887.50	157	1162.70
2.	Accessible forest area (excluding shifting cultivation)	86	275.20	65	812.50	151	1087.70
3.	Accessible tree forest (1&2)	69	220.80	56	700.00	125	920.80
4.	Forest area permanently diverted to non-forest (6,7&8)	50	160.00	13	162.50	63	322.50
5.	Forest area degraded to scrub/grassland (4 & 5)	15	48.00	7	87.50	22	135.50

(a) Out of 1485.20 Sq.Km. of forest area (1963) taken up for forest inventory survey, 1162.70 Sq.Km. (78.28%) is under the category "accessible forest area" now (1991). The remaining 322.50 Sq.Km. (21.72%), stands permanently diverted to non forestry uses.

(b) Even out of 1162.70 Sq.Km. of accessible forest area, an area of 75.00 Sq.Km. is under current and last year's shifting cultivation and 25.00 Sq.Km. is under scrub only, 952.20 Sq.Km. is under accessible tree forest and bamboo brakes now (1991).

(c) The accessible tree forest area is 924.00 Sq.Km. and accessible area under bamboo forest/brakes is 28.20 Sq.Km.

(d) The area under shifting cultivation (current and last year's) has been assessed at 75.00 Sq.Km. Assuming an average cycle of 6 years the total area affected by shifting cultivation is assessed at 75.00*3 i.e. 365.00 Sq.Km. in the surveyed area.

Note:-

The accessible forest area includes all those areas which were surveyed and described and also those areas which could not be visited but were identified on the basis of vicinity visited. In such cases as many attributes as possible were recorded on the basis of vicinity visit, and rest of the attributes which could not be assessed were clubbed under category unrecorded.

4.1.2 Distribution of accessible forest area by soil depth

Out of total accessible forest area of 1162.70 Sq.Km., 52.24% (607.40 Sq.Km.) has a soil depth of 90 cm or more and only 11.30% (131.40 Sq.Km.) area has a soil depth less than 30 cms.

The distribution by soil depth classes is given in table no. 4.1.2.

TABLE 4.1.2

--> Accessible forest area : 1162.70 Sq.Km.

Distribution of accessible forest area by soil depth.

Code	Soil Depth	Reserve forest		Unclassed forest		Total	
		Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.
01	No soil	-	-	-	-	-	-
02	<15 cm.	-	-	1	12.50	1	12.50
03	>15 cm. but <30 cm	2	6.40	9	112.50	11	118.90
04	>30 cms. but <90 cm	25	80.00	21	262.50	46	342.50
05	>=90cm	57	182.40	34	425.00	91	607.40
Unrecorded		2	6.40	6	75.00	8	81.40
Total		86	275.20	71	887.50	157	1162.70

* Unrecorded relates to those plots where information could not be collected.

4.1.3 Distribution of accessed forest area by soil texture

A high percentage of 43.61% (507.00 Sq.Km.) of the total accessible forest area has a loam texture followed by 34.29% (398.70 Sq.Km.) having Sandyloam texture. 13.48% (156.70 Sq.Km.)having clayey loam texture, 1.63% (18.90 Sq.Km.) having sandy texture.

The distribution by soil texture classes is given in table no. 4.1.3.

TABLE 4.1.3

Accessible forest area : 1162.70 Sq.Km.

Distribution of accessible forest area by soil texture

S.No	SOIL → TEXTURE	Reserve forest		Unclassed forest		Total	
		Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.
1	Clayey	-	-	-	-	-	-
2	Clayey loam	6	19.20	11	137.50	17	156.70
3	Loam	10	32.00	38	475.00	48	507.00
4	Sandy loam	66	211.20	15	187.50	81	398.70
5	Sandy	2	6.40	1	12.50	3	18.90
6	No soil	-	-	-	-	-	-
7	Unrecorded	2	6.40	6	75.00	8	81.40
	Total	86	275.20	71	887.50	157	1162.70

* unrecorded relates to those plots where information could not be collected

4.1.4 Distribution of assessed forest area by soil erosion

45.94% (534.10 Sq.Km.) of the total accessible forest area has almost no soil erosion or slight erosion (only surface erosion present). 7.58% (88.10 Sq.Km.) area is having moderate erosion i.e. having small gullies and rills on the top surface of the soil. 30.81% (338.20Sq.km) area having heavy erosion ie having deep gullies,ravines and land slips etc.

The distribution by soil erosion status is given in the table no. 4.1.4

TABLE 4.1.4

Accessible forest area : 1162.70 Sq.Km.

Distribution of accessible forest area by soil erosion status.

S.No	Erosion Status	Reserve forest		Unclassed forest		Total	
		Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.
1	Mild erosion	38	121.60	33	412.50	71	534.10
2	Moderate erosion	8	25.60	5	62.50	13	88.10
3	Heavy erosion	26	83.20	22	275.00	48	358.20
4	* Unre-corded	14	44.80	11	137.50	25	182.30
	Total	86	275.20	71	887.50	157	1162.70

* Unrecorded relates to those plots where information could not be collected.

Note:-

Mild erosion means no erosion or slight erosion, where only surface erosion has taken place.

Moderate erosion means where small gullies and rills are formed on the top surface of the soil.

Heavy erosion means area has deep gullies, ravines and land slips etc.

4.1.5 Distribution of accessible forest area by grazing incidence classes

Only 7.60% (88.40 Sq.Km.) of the total accessible forest area is suffering from light grazing followed by 9.83% (114.30 Sq.Km.) area having heavy grazing incidence, 18.98% (220.70 Sq.Km.) having medium grazing incidence and 54.68% (635.80 Sq.Km.) having no grazing incidence.

The distribution by grazing incidence classes is given below in table no. 4.1.5.

TABLE 4.1.5

Accessible forest area : 1162.70 Sq.Km.
Distribution of accessible forest area by grazing incidence classes.

S.No	Grazing incidence	Reserve forest: Nos.of Sample plots	Area Sq.Km.	Unclassed forest: Nos.of Sample plots	Area Sq.Km.	Total: Nos.of Sample plots	Area Sq.Km.
1	Heavy grazing	24	76.80	3	37.50	27	114.30
2	Medium grazing	26	83.20	11	137.50	37	220.70
3	Light grazing	12	38.40	4	50.00	16	88.40
4	No grazing	19	60.80	46	575.00	65	635.80
5	* Unre-recoded	5	16.00	7	87.50	12	103.50
	Total	86	275.20	71	887.50	157	1162.70

* Unrecorded relates to those plots where information could not be collected and includes the sample plots falling in " barren land "for which this attribute was not recorded.

4.1.6 Distribution of assessed forest area by plantation potential

In 51.81% (602.40 Sq.Km.) of the total accessible forest area does not need further stocking by way of plantation. 4.30% (50.00 Sq.km) area has been assessed as unplantable due to poor soil cover or other adverse conditions and 36.89% (428.90 Sq.km)area there is a scope for undertaking afforestation or augmentation of stocking by plantation.

The distribution by plantation potential is given below in table no. 4.1.6.

TABLE 4.1.6

Accessible forest area : 1162.70 Sq.Km.

Distribution of assessed forest area by plantation potential

S.No	Plantation potential	Reserve forest		Unclassed forest		Total	
		Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.	Nos.of Sample plots	Area Sq.Km.
1	Plantable	52	166.40	21	262.50	73	428.90
2	Un-plantable	-	-	4	50.00	4	50.00
3	Not-applicable	32	102.40	40	500.00	72	602.40
4	Unrecorded	2	6.40	6	75.00	8	81.40
	Total	86	275.20	71	887.50	157	1162.70

Explantory note:-

Plantation potential was assessed only at those sample plots having tree crown cover density of less than 30%. Plantable/Unplantable potential was determined by giving due consideration to aspect, soil depth, drainage, crop in surrounding area and other biotic and climatic factors. The maximum permissible slope upto which plantation can be raised was kept 40 degree and minimum soil depth as 20 cms. Sample plots having crown density of 30% or more were categorised as not applicable since plantation potential of such area, from afforestation point of view, is not of any significance.

4.1.7 Distribution of assessed forest area by fire incidence classes

In our sample data only five fire incidences of heavy and frequent fire was observed which is 3.78% (43.90 Sq.km)of total accessible forest area. Even occassional fire was assessed only over 8.10% (94.20 Sq.km) area.Remaining forest area is either having "no fire" or data could not be collected there.

TABLE 4.1.7

Accessible forest area : 1162.70 Sq.Km.

Distribution of assessed forest area by fire incidence classes.

S.No	Fire incidence	Reserve forest Nos.of Sample plots	Reserve forest Area Sq.Km.	Unclassed forest Nos.of Sample plots	Unclassed forest Area Sq.Km.	Total Nos.of Sample plots	Total Area Sq.Km.
1	Heavy	1	3.20	1	12.50	2	15.70
2	Frequent	1	3.20	2	25.00	3	28.20
3	Occasional	6	19.20	6	75.00	12	94.20
4	No fire	75	240.00	55	687.50	130	927.50
5	* Unre-corded	3	9.60	7	87.50	10	97.10
	Total	86	275.20	71	887.50	157	1162.70

* Unrecorded relates to those plots where information could not be collected.

4.1.8 Distribution of assessed tree forest area by size classes

Total accessible tree forest area is 920.80 Sq.Km. out of which 0.70% (6.40 Sq.Km.)is under "regeneration", 13.33% (122.70 Sq.Km.) is under "pole crop ", 22.80% (209.90 Sq.Km.)is under "mixed size class", 31.58% (290.80 Sq.Km.) is under "small timber," and 31.60% (291.00 Sq.Km) is under" big timber."

The distribution by crop size class is given below in the table no. 4.1.8.

TABLE 4.1.8

Accesseible tree forest area : 920.80 Sq.Km.

Distribution of accessible tree forest area by size classes.

S.No	Size Class	Reserve forest: Nos. of Sample plots	Area Sq.Km.	Unclassed forest: Nos. of Sample plots	Area Sq.Km.	Total: Nos. of Sample plots	Area Sq.Km.
1	Regeneration	2	6.40	-	-	2	6.40
2	Pole crop	11	35.20	7	87.50	18	122.70
3	Small timber	44	140.80	12	150.00	56	290.80
4	Big timber	5	16.00	22	275.00	27	291.00
5	Mixed size classes *	7	22.40	15	187.50	22	209.90
6	Unrecorded	-	-	-	-	-	-
	Total	69	220.80	56	700.00	125	920.80

Explanatory note :-
Regeneration is forest crop where below 10 cm. diameter predominates.
Pole crop is the forest crop between 10 t0 20 cm. diameter predominates.
Small timber where crop between 20 to 30 cm. diameter predominates.
Big timber where trees with 30 cm. and over diameter predominates.
Mixed size is the tree crop with no marked domination of any diameter class.

4.1.9 Distribution of accessible tree forest area by regeneration status

Only 7.52% (69.20 Sq.Km.) of accessible tree forest area is having "adequate regeneration", 39.50% (363.70 Sq.Km.) area having "adequate" regeration and in only 2.96% (27.24 Sq.Km.) area the regeneration (of economically important tree spps.) is "absent".

The distribution by regeneration status is given below in table no. 4.1.9.

TABLE 4.1.9

Accessible tree forest area : 920.80 Sq.Km.
Distribution of accessible tree forest area by regeneration status.

S.No	Regeneration Status	Reserve forest Nos.of Sample plots	Reserve forest Area Sq.Km.	Unclassed forest Nos.of Sample plots	Unclassed forest Area Sq.Km.	Total Nos.of Sample plots	Total Area Sq.Km.
1	Profuse	-	-	-	-	-	-
2	Adequate	6	19.20	4	50.00	10	69.20
3	Inadequate	47	150.40	16	200.00	63	350.40
4	Absent	16	51.20	25	312.50	41	363.70
5	* Unrecorded	-	-	11	137.50	11	137.50
	Total	69	220.80	56	700.00	125	920.80

* Unrecorded relates to those plots where information could not be collected.

Explanatory note:-

Adequate regeneration : Means where 8 or more than 8 seedlings (having diameter >2 cms. but < 10 cms.) of economically important species. were found in a regeneration plot of 16 Sqm. area.

Inadequate regeneration : Means where less than 8 seedlings (having diameter >2 cms. but <10 cms. of economically important species were found in regeneration plot of 16 Sqm. area.

4.1.10 Distribution of accessible tree forest area by type of injury to crop

26.68% (245.70 Sq.Km.) of accessible tree forest area is affected by un-natural/man-made injuries and 32.05% (295.10 Sq.Km.) by natural injuries. Injury to crop is absent in 41.27% (380.00 Sq.Km.) area.

The distribution by type of injury to forest crop is given below in table no. 4.1.10.

TABLE 4.1.10

Accessible tree forest area : 920.80 Sq.Km.

Distribution of accessible tree forest area by type of injury to crop

S.No	Type of injuries to the crop.	Reserve forest: Nos.of Sample plots	Area Sq.Km.	Unclassed forest: Nos.of Sample plots	Area Sq.Km.	Total: Nos.of Sample plots	Area Sq.Km.
1	Natural	18	57.60	19	237.50	37	295.10
2	Un-natural	26	83.20	13	162.50	39	245.70
3	Absent	25	80.00	24	300.00	49	380.00
4	* Unre-corded	-	-	-	-	-	-
	Total	69	220.80	56	700.00	125	920.80

* Unrecorded relates to those plots where information could not be collected.

Explanatory note:-

Injury to the crop was jugded by occular estimation in two hectare area around the center of the plot, provided the effected trss formed at least 10% of the crop.

Natural injury to the crop means injuries by wind or snow or flood, climber lighetning, wildlife, borer attack, leaf defoliator or other pests.

Manmade/Unnatural means injury to the crop by girdling, illicit felling, scarring by fire, lopping.

4.1.11 Distribution of accessible tree forest area by forest types

The accessible tree forest area of 920.80 Sq.Km. has been classified into three forest types, on the basis

predominant tree spps. (refer para 1.6). 90.50% (833.30 Sq.Km.) area bears "Miscellaneous forest type". 8.14% (75.00 Sq.Km.) area is under "Upland-hardwood forest type,"and only 1.36% (12.50 Sq.Km.) area is under "Hardwood mixed with conifers."

The distribution of forest types is given in the following table no. 4.1.11.

TABLE-4.1.11

Accessible tree forest area : 920.80 Sq.Km.

Distribution of accessible tree forest area by Forest Types

S.No. Forest Type	Reserved forest		Unclassed forest		Total		% age
	No. of SPs.	Area (Sq.Km.)	No. of SPs.	Area (Sq.Km.)	No. of SPs.	Area (Sq.Km.)	
1. Hardwoods mixed with conifers	-	-	1	12.50	1	12.50	1.36
2. Upland hardwood	-	-	6	75.00	6	75.00	8.14
3. Misc. forests	69	220.80	49	612.50	118	833.30	90.50
Total	69	220.80	56	700.00	125	920.80	100.00

4.1.12 Distribution of accessible tree forest area by forest types and canopy-density classes.

Out of the total accessible tree forest area of 920.80 Sq.Km.an area of 9.60 Sq.km falls under the land use "plantation." Since the canopy is not formed in these plantations the area under these has been excluded while analysing the distribution by canopy density classes and forest types. The distribution by forest types and canopy density classes is given in the table no. 4.1.12.

The overall average canopy density is assessed at 39.65 %.Out of total area of 911.20 sq.km, an area of 476.80 Sq.km (52.33%) is under moderate dense tree forest with canopy density of 30 to 69% followed by 72.10 Sq.km (7.91%) under dense tree forest with canopy density of 70% and above. 362.30 Sq.km (39.76%) bears open tree forest with canopy density of 5 to 29%.

The average canopy density for Reserved Forest has been assessed at 32.09% and for unclassed Forest it has been assessed at 41.92 %.Amongst the forest types "Hardwood mixed with conifers" has been assessed to be bearing only moderate dense tree forest (canopy density 30 to 69%).

Note:-

Appendix- III incorporates the list of location of centres of sample plots. This list also incorporates the important data like landuse classification. forest type. number of trees enumerated and volume per hectare assessed at each sample plot. This information can be used for growing stock assessment with different area stratification or for assessment of change over a time period.

TABLE NO. 4.1.12

Distribution of accessible tree forest area by forest types and canopy density.

AREA : 911.20 Sq. Km.

S.NO.	Category	Canopy density class	Forest Types				
			Hardwood mixed with conifers	Upland hardwood	Misc.	Total	Density %
1.	Reserved Forest	70% & above	-	-	9.60	9.60	
		30 to 69%	-	-	76.80	76.80	32.09
		5 to 29%	-	-	124.80	124.80	
2.	Unclassed Forest	70% & above	-	12.50	190.70	62.50	
		30 to 69%	12.50	37.50	350.00	400.00	41.93
		5 to 29%	-	25.00	212.50	237.50	
3.	Total	70% & above	-	12.50	59.60	72.10	
		30 to 69%	0.00	37.50	426.80	476.80	39.65
		5 to 29%	-	25.00	337.30	362.30	
	Grand total		0.00	75.00	823.70	911.20	
	Density %		50.00	44.83	39.02	39.65	

Note: 9.60 sq.km. of tree cover falls under the land use'Plantation' canopy in such areas is not formed i.e. canopy density in such areas has been omitted from this analysis

4.2 Stand and stock tables

Distribution of total stems and stems per hectare as well as total volume and volume per hectare have been estimated separately for R.F. and U.F., in respect of the accessible tree forest area i.e. 908.30 Sq. km. These have been included as table nos. IV.2.1 to IV.2.17.

The accessible tree forest area has been explained in table no.4.1.1 and is 920.80 Sq. Km.but for the purpose of growing stock the area is 908.30 Sq. Km. which has been taken into consideration as one plot representing forest type Hard Wood mixed with conifers comes under vicinity visit.

For the accessible tree forest area, the distribution of total stems forest type wise is given in table nos. IV.2.1 for R.F. and in table nos. IV.2.7 and IV.2.8 for U.F. The distribution of total volume is given in table nos. IV.2.6 for R.F. and in table nos. IV.2.11 and IV.2.12 for U.F.

The overall position of all the forest types combined, for the district is given in the table nos. IV.2. and IV.2.

The abstract of forest type wise stand and stock tables is given below:

Accessible tree forest area: 90830 Hectare.

S.No.	Forest type	Forest area (hect.)	Stems/ha.	Vol./ha. (Cum./ha.)
1	Upland hardwood	7500	169.159	290.000
2	Miscellaneous	83330	79.013	187.609
	Total	90830	86.456	196.064

The overall average figure is 196.064 stems per hectare corresponding to 86.456 cum. per hectare.

4.2.1. Growing stock in Forest Types and its critical aspects.

(i) Upland hardwood forest type

Out of the total accessible tree forest area of 908.30 Sq. km., this forest type occures over an area of 75.00 Sq. km. The average growing stock is 169.159 cum. per hectare (290.00 stems per hectare). Quercus spp. account for 7.34% of the total growing stock (volume), corresponding to 11.21% of total stems. in this forest type. The overall canopy density has been estimated as ".

(ii) Miscellaneous forest type

This forest type occupies the largest proportion i.e. 91.74% (833.30 Sq.km.) of the total accessible tree forest area. Average canopy density has been estimated as 39.01 %. Average growing stock has been estimated as 86.456 cum. per hectare (196.064 stems per hectare).

For all the forest types combined i.e. over the entire accessible tree forest area, Miscellaneous spp. account for an estimated 133.06 million stems having volume of 58.39 million cum. Followed by Macaranga peltata spp. with 11.19 million stems having volume of 1.86 million cum. and Bombax ceiba with 5.25 million stems having an volume of 2.61 million cum.

Note: The appendix-III incorporates the list of location of centres of sample plots. This list also incorporates the important data like land use classification, forest type, number of trees enumerated and volume per hectare assessed at each sample plot. This information can be used for growing stock assessment with different area stratification or for assessment of change over a time period.

4.3 Bamboo area and Inventory

In the district under survey, the total area under bamboo has been assessed, in the form of bamboo brakes and also as under storey, to be 372.70 Sq. km. As per our sample survey whole of this area bears clump forming bamboo.

4.3.1 The distribution of bamboo bearing as bamboo brakes or overlapping the tree forest is given below in table 4.3.1.

Table No. 4.3.1

District	Bamboo brakes		Overlapping Bamboo		Total	
	No. of S. Plots	Area (Sq. km.)	No. of S. Plots	Area (Sq. km.)	No. of S. Plots	Area (Sq. km.)
Dibang	3	28.20	35	344.50	38	372.70

Out of total bamboo area of 372.70 Sq. Km., the bamboo enumeration over an area of 47.70 Sq. Km. was nil. Therefore figure (47.70 Sq. Km.) does not contribute towards the bamboo inventory of the district. The balance area of 325.00 Sq.km. is the area contributing to the bamboo (clump forming) inventory of the district.

4.3.2 In respect of 325.00 Sq. km. area bearing clump forming bamboo the distribution of bamboo area by bamboo site quality classes is given in table no. 4.3.2.

Table No. 2

Table No. 4.3.2

District	I		II		III			Total
	Plot	Area	Plot	Area	Plot	Area	Plot	Area
Dibang	22	275	3	37.5	1	12.5	26	325

Bamboo quality classes

Quality	Description
I	Average culm height 6 metres or more for Dendrocalamus strictus and 14 metres or more for Bambusa arundinacea.
II	Average culm height 4 metres or more but less than 6 metres for Dendrocalamus strictus and 10 metres or more but less than 14 metres for Bambusa arundinacea.
III	Average culm height of 2 metres or more but less than 4 metres for Dendrocalamus strictus and 2 metres or more but less than 10 metres for Bambusa arundinacea
IV	Regeneration crop.

4.3.3 Out of 325.00 sq. km. area under clump forming bamboo. an area of 25.00 sq. km. has been assessed to be completely hacked category (i.e. bamboo present but completely hacked) and therefore does not contribute towards the bamboo inventory of the district under report. The balance area of 300.00 sq. km. is the area solely contributing to the bamboo(clump forming) inventory of the district.

The distribution of the bamboo area into "Hacked" and "Non-hacked" categories is given in table no. 4.3.3.

Table No. 4.3.3

Distribution of bamboo area into "Hacked" and "Non-hacked" categories.

District	Hacked		Non-hacked		Total	
	No. of S. plots	Area (Sq. km.)	No. of S. plots	Area (Sq. km.)	No. of S. plots	Area (Sq. km.)
Dibang	2	25.00	24	300.00	26	325.00

4.3.4 Mean number of clumps per hectare

The clump size-classwise distribution of number of

clumps per hectare for "Non-hacked" bamboo area is given in table no. 4.3.4.

Table No. 4.3.4

The size classwise distribution of number of clumps per hectare for non-hacked bamboo area.

District: Dibang

Quality class	Clump size classes			Total clumps per hectare
	1	2	3	
I	100.95	18.1	35.24	154.29
II	10.00	-	20	30
Total	89.58	15.84	33.34	138.75

The overall average figures for the number of clumps per hectare over the non-hacked bamboo area of Dibange district in quality I is 154.29 and in quality II is 30 respectively and over the entire district for non hacked bamboo area of 300 Sq.Km. is 138.75.

Clump size class	Description
1	Small : Clumps with average diameter less than 1 metre.
2	Medium: Clumps with average diameter 1m to less than 2m.
3	Large : Clumps with average diameter 2m and above.

4.3.5 Total number of clumps by clump size classes

The distribution of total number of clumps in the non-hacked bamboo area by clump size classes is given in table no. 4.3.5.

Table No. 4.3.5

Quality	Clump size class			Total clumps
	1	2	3	
I	2649938	475125	925050	4050113
II	37500	-	75000	112500
Total	2687438	475125	1000050	4162613

Thus over the entire non-hacked bamboo area of 300 Sq. km. the total number of clumps have been assessed to be 4.16 million.

4.3.6 Clump size- classwise distribution of total number of culms(in 000) by age and culm size classes is given in table no. 4.3.6 in this table all the culms except decaved culms have been converted into equivalent sound culms. For arriving at the equivalent sound culms the factors used as under:

Green sound	1
Green damage	0.5
Dry sound	2
Dry damage	1

Table No. 4.3.6

District	Culm size class	Equivalent Sound Culms				Decayed culms	Total culms
		Current year's	2 to <5 cms.	5 to <8 cms.	8 cms. & above		
Dibang	1	6208	5564	378	189	151	12492
	2	237	237	1484	1009	712	3682
	3	12488	8695	12426	13752	5611	52974
	Total for Distt	18934	14497	14289	14951	6476	69149

4.3.7 Culm size classwise distribution of total number of culms (in '000) - excluding current year's culms and decayed culms - by soundness and also the equivalent sound culms has been given in table no. 4.3.7.

Table No. 4.3.7

Distribution of total number of culms (in '000) by soundness (excluding current year's culms and decayed culms).

Culm size class	Green sound	Green damaged	Dry sound	Dry damaged	Total culms	Total equivalent sound culms
2 to <5 cms.	10557	2369	1247	260	14435	14497
5 to <8 cms.	10371	2277	-	2780	15428	14289
8 cms. & above	10954	2519	75	2585	16135	14951
Total	31882	7165	1322	5625	45998	43737

4.3.8 Average green weight and dry weight of culms and dry weight of the bamboo stock are given in table no. 4.3.8.

Table No. 4.3.8

Culm size class	Average Green wt. per culm	Green Bamboo Stocking tonnes	Average Dry wt. per culm	Number of equivalent sound culms	Dry wt. of Bamboo stock (in Tonnes)
2 to <5 cms.	0.460 Kg	6669	0.235	14497	3407
5 to <8 cms.	1.120 Kg	16004	0.638	14289	9116
8 cms. & above	N.A	16745	N.A	14951	9538
Total		39148		43737	22061

4.3.9 Total bamboo stock in tonnes

In the non-hacked bamboo area of 300.00 Sq. km. the total number of culms have been assessed at 45.00 million (equivalent sound culms =43.74 million) having a gross dry weight 22062.858 tonnes.

4.4 Sampling error

As has been explained above random samples were selected separately in the Reserve Forest and Unclassed Forest. For each of these categories stanard error of the estimates have been calculates for volume per hectare.

The standard error percent of the estimated growing stock is as under:-

Category	Stratum	Total Volume	S.E.%
R.F.	Misc. Forest	1767.968('000) Cum.	12.41
U.F.	Upland H.W.Forest	1268.696('000) Cum.	29.92
	Misc.Forest	4816.159('000) Cum.	18.86

TABLE NO. IV.2.1

Distribution of total number of stems by species and diameter classes (in '000) for Forest Type : Miscellaneous (R.F)

Area : 22080 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia species	48.000	22.400	9.600	3.200	3.200	3.200	0.000	0.000	89.600	2.19
2	Alstonia scholaris	16.000	6.400	0.000	0.000	0.000	0.000	0.000	0.000	22.400	0.54
3	Bombax ceiba	156.800	182.400	60.800	16.000	12.800	9.600	3.200	3.200	444.800	10.82
4	Cinnamomum tamala	16.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.000	0.39
5	Ficus spp.	44.800	3.200	0.000	0.000	0.000	0.000	0.000	3.200	51.200	1.25
6	Gmelina arborea	102.400	6.400	3.200	0.000	0.000	0.000	0.000	0.000	112.000	2.73
7	Macaranga peltata	668.800	176.000	32.000	0.000	0.000	0.000	0.000	0.000	876.800	21.34
8	Machilus spp.	9.600	9.600	0.000	0.000	0.000	0.000	0.000	0.000	19.200	0.47
9	Shorea assamica	6.400	0.000	0.000	6.400	0.000	0.000	0.000	0.000	12.800	0.31
10	Misc. spp.	1385.600	531.200	275.200	118.400	44.800	32.000	22.400	54.400	2464.000	59.97
	Total	2454.400	937.600	380.800	144.000	60.800	44.800	25.600	60.800	4108.800	100.00

Table IV.2.2

Distribution of steas per hectare by species and diameter classes
Forest Type : Miscellaneous (R.F.)

Area : 22680 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia species	2.174	1.014	0.435	0.145	0.145	0.145	0.000	0.000	4.058	2.18
2	Alstonia scholaris	0.725	0.290	0.000	0.000	0.000	0.000	0.000	0.000	1.015	0.54
3	Bombax ceiba	7.101	8.261	2.754	0.725	0.580	0.435	0.145	0.145	20.146	10.82
4	Cinnamomum tamala	0.725	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.725	0.39
5	Ficus spp.	2.029	0.145	0.000	0.000	0.000	0.000	0.000	0.145	2.319	1.25
6	Gmelina arborea	4.638	0.290	0.145	0.000	0.000	0.000	0.000	0.000	5.073	2.73
7	Macaranga peltata	30.290	7.971	1.449	0.000	0.000	0.000	0.000	0.000	39.710	21.34
8	Machilus spp.	0.435	0.435	0.000	0.000	0.000	0.000	0.000	0.000	0.870	0.47
9	Shorea assamica	0.290	0.000	0.000	0.290	0.000	0.000	0.000	0.000	0.580	0.31
10	Misc. spp.	62.754	24.058	12.464	5.362	2.029	1.449	1.014	2.464	111.594	59.97
	Total	111.181	42.464	17.247	6.522	2.754	2.029	1.159	2.754	186.390	100.00

Table IV.2.3

Distribution of total number of stems by species and diameter classes (in '000) and stems per hectare by dia-classes (R. F.)

All Forest Types combined — Area : 22080 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia species	48.000	22.400	9.600	3.200	3.200	3.200	0.000	0.000	89.600	2.18
2	Alstonia scholaris	16.000	6.400	0.000	0.000	0.000	0.000	0.000	0.000	22.400	0.54
3	Bombax ceiba	156.800	182.400	60.800	16.000	12.800	9.600	3.200	3.200	444.800	10.82
4	Cinnamomus tamala	16.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.000	0.39
5	Ficus spp.	44.800	3.200	0.000	0.000	0.000	0.000	0.000	3.200	51.200	1.25
6	Gmelina arborea	102.400	6.400	3.200	0.000	0.000	0.000	0.000	0.000	112.000	2.73
7	Macaranga peltata	668.800	176.000	32.000	0.000	0.000	0.000	0.000	0.000	876.800	21.34
8	Machilus spp.	9.600	9.600	0.000	0.000	0.000	0.000	0.000	0.000	19.200	0.47
9	Shorea assamica	6.400	0.000	0.000	6.400	0.000	0.000	0.000	0.000	12.800	0.31
10	Misc. spp.	1385.600	531.200	275.200	118.400	44.800	32.000	22.400	54.400	2464.000	59.97
	Total	2454.400	937.600	380.800	144.000	60.800	44.800	25.600	60.800	4108.800	100.00
	Stems/ha	111.161	42.464	17.247	6.522	2.754	2.029	1.159	2.754	186.090	

Table IV.2.4

Distribution of total volume by species and diameter classes(in '000 cum.)

Forest Type : Miscellaneous (R.F.)

Area : 22080 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	X age
1	Albizia species	9.169	8.722	5.032	2.763	3.961	6.287	0.000	0.000	36.434	2.06
2	Alstonia scholaris	2.364	2.067	0.000	0.000	0.000	0.000	0.000	0.000	4.431	0.25
3	Bombax ceiba	15.243	67.957	44.897	18.611	23.754	24.937	11.795	32.243	239.437	13.54
4	Cinnamomus tamala	1.661	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.661	0.09
5	Ficus spp.	3.751	0.472	0.000	0.000	0.000	0.000	0.000	39.091	43.314	2.45
6	Gmelia arborea	16.907	2.195	2.035	0.000	0.000	0.000	0.000	0.000	21.137	1.20
7	Macaranga peltata	85.496	49.985	14.101	0.000	0.000	0.000	0.000	0.000	149.582	8.46
8	Machilus spp.	0.409	3.260	0.000	0.000	0.000	0.000	0.000	0.000	3.669	0.21
9	Shorea assamica	0.990	0.000	0.000	6.943	0.000	0.000	0.000	0.000	7.933	0.45
10	Misc. spp.	143.584	167.621	178.804	123.346	68.369	77.343	68.117	433.186	1260.370	71.29
	Total	279.574	301.779	245.869	151.663	96.084	108.567	79.912	504.520	1767.968	100.00

Table IV.2.5

Distribution of volume per hectare by species and diameter classes

Forest Type : Miscellaneous (R.F.)

Area : 22080 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia species	0.415	0.372	0.273	0.125	0.179	0.285	0.000	0.000	1.649	2.06
2	Alstonia scholaris	0.107	0.094	0.000	0.000	0.000	0.000	0.000	0.000	0.201	0.25
3	Bombax ceiba	0.690	3.078	2.033	0.843	1.076	1.129	0.534	1.460	10.843	13.54
4	Cinnamomum tamala	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.09
5	Ficus spp	0.170	0.021	0.000	0.000	0.000	0.000	0.000	1.770	1.961	2.45
6	Gmelina arborea	0.766	0.099	0.092	0.000	0.000	0.000	0.000	0.000	0.957	1.20
7	Macaranga peltata	3.872	2.264	0.639	0.000	0.000	0.000	0.000	0.000	6.775	8.46
8	Machilus spp.	0.019	0.148	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.21
9	Shorea assamica	0.045	0.000	0.000	0.314	0.000	0.000	0.000	0.000	0.359	0.45
10	Misc. spp.	6.503	7.592	8.098	5.586	3.096	3.503	3.085	19.620	57.083	71.29
	Total	12.662	13.668	11.135	6.868	4.351	4.917	3.619	22.850	80.070	100.00

Table IV.2.6

Distribution of total volume by species and dia-classes (in'000 cum. and volume per hectare by dia-classes (R.F.)

All Forest Types combined — Area : 22080 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia species	9.169	8.222	6.032	2.763	3.961	6.287	0.000	0.000	36.434	2.06
2	Alstonia scholaris	2.364	2.067	0.000	0.000	0.000	0.000	0.000	0.000	4.431	0.25
3	Bombax ceiba	15.243	67.957	44.897	18.611	23.754	24.937	11.795	32.243	239.437	13.54
4	Cinnamomum tamala	1.661	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.661	0.09
5	Ficus spp.	3.751	0.472	0.000	0.000	0.000	0.000	0.000	39.091	43.314	2.45
6	Gmelina arborea	16.907	2.195	2.035	0.000	0.000	0.000	0.000	0.000	21.137	1.20
7	Macaranga peltata	85.496	49.985	14.101	0.000	0.000	0.000	0.000	0.000	149.582	8.46
8	Machilus spp	0.409	3.260	0.000	0.000	0.000	0.000	0.000	0.000	3.669	0.21
9	Shorea assamica	0.990	0.000	0.000	6.943	0.000	0.000	0.000	0.000	7.933	0.45
10	Misc spp	143.584	167.621	178.804	123.346	68.369	77.343	68.117	433.186	1260.370	71.29
	Total	279.574	301.779	245.869	151.663	96.084	108.567	79.912	504.52	1767.968	100.00
	Vol/ha	12.662	13.668	11.135	6.868	4.351	4.917	3.619	22.850	80.070	4.53

Table IV.2.7

Distribution of total number of stems by species and dia-classes (in '000)

Forest Types: Upland Hardwood (U.F.)

Area : 7500 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Cinnamomum tamala	56.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	56.250	2.59
2	Lyonia ovalifolia	75.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75.000	3.45
3	Quercus spp.	112.500	56.250	56.250	18.750	0.000	0.000	0.000	0.000	243.750	11.20
4	Misc. spp.	918.750	300.000	206.250	131.250	75.000	18.750	56.250	93.750	1800.000	82.76
	Total	1162.500	356.250	262.500	150.000	75.000	18.750	56.250	93.750	2175.000	100.00

Table IV.2.8

Distribution of total number of stems by species and diameter classes

Forest Type : Miscellaneous spp.(U.F.)

Area : 61250 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia spp.	209.539	32.237	16.118	0.000	32.237	0.000	0.000	0.000	290.131	2.52
2	Alnus spp.	16.118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.118	0.14
3	Alstonia scholaris	16.118	0.000	0.000	16.118	0.000	0.000	0.000	16.118	48.354	0.42
4	Betula alnoides	177.303	80.592	80.592	48.355	32.237	0.000	0.000	0.000	419.079	3.63
5	Bombax ceiba	48.355	16.118	16.118	0.000	0.000	0.000	0.000	0.000	80.591	0.70
6	Cinnamomum cecidodaphne	0.000	0.000	0.000	0.000	16.118	0.000	0.000	0.000	16.118	0.14
7	Cinnamomus tamala	225.658	16.118	0.000	0.000	0.000	0.000	0.000	0.000	241.776	2.10
8	Ficus spp.	145.066	112.829	48.355	0.000	48.355	0.000	0.000	32.236	386.841	3.36
9	Gmelina arborea	48.355	0.000	0.000	0.000	0.000	0.000	0.000	16.118	64.473	0.56
10	Lyonia ovalifolia	386.842	32.237	0.000	0.000	0.000	0.000	0.000	0.000	419.079	3.63
11	Macaranga peltata	193.421	48.355	0.000	0.000	0.000	0.000	0.000	0.000	241.776	2.10
12	Quercus spp.	161.184	16.118	32.237	16.118	0.000	0.000	0.000	0.000	225.657	1.96
13	Shorea assamica	32.237	0.000	0.000	0.000	0.000	0.000	0.000	0.000	32.237	0.28
14	Misc.spp.	6092.763	1579.605	580.263	241.776	209.539	145.066	32.237	161.183	9042.432	78.46
	Total	7752.959	1934.209	773.683	322.367	338.486	145.066	32.237	225.655	11524.662	100.00

Table IV.2.9

Distribution of number of stems/ha. by species and diameter classes

Forest type : Upland hardwood (U.F.1

Area : 7500 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1.	Cinnamomum tamala	7.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.500	2.59
2.	Lyonia ovalifolia	10.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.000	3.45
3.	Quercus spp.	15.000	7.500	7.500	2.500	0.000	0.000	0.000	0.000	32.500	11.20
4.	Misc. spp	122.500	40.000	27.500	17.500	10.000	2.500	7.500	12.500	240.000	82.76
	Total	155.000	47.500	35.000	20.000	10.000	2.500	7.500	12.500	290.000	100.00

Table IV.2.10

Distribution of number of stems/ha.by species and diameter classes

Forest Type : Miscellaneous spp.(U.F.)

Area : 61250 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia spp.	3.421	0.526	0.263	0.000	0.526	0.000	0.000	0.000	4.736	2.52
2	Alnus spp.	0.263	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.263	0.14
3	Alstonia scholaris	0.263	0.000	0.000	0.263	0.000	0.000	0.000	0.263	0.789	0.42
4	Betula alnoides	2.895	1.316	1.316	0.789	0.526	0.000	0.000	0.000	6.842	3.63
5	Bombax ceiba	0.789	0.263	0.263	0.000	0.000	0.000	0.000	0.000	1.315	0.70
6	Cinnamomum ceciodaphne	0.000	0.000	0.000	0.000	0.263	0.000	0.000	0.000	0.263	0.14
7	Cinnamomum tamala	3.684	0.263	0.000	0.000	0.000	0.000	0.000	0.000	3.947	2.10
8	Ficus spp.	2.368	1.842	0.789	0.000	0.789	0.000	0.000	0.526	6.314	3.36
9	Gmelia arborea	0.789	0.000	0.000	0.000	0.000	0.000	0.000	0.263	1.052	0.56
10	Lyonia ovalifolia	6.316	0.526	0.000	0.000	0.000	0.000	0.000	0.000	6.842	3.63
11	Macaranga peltata	3.158	0.789	0.000	0.000	0.000	0.000	0.000	0.000	3.947	2.10
12	Quercus spp.	2.632	0.263	0.526	0.263	0.000	0.000	0.000	0.000	3.684	1.96
13	Shorea assamica	0.526	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.526	0.28
14	Misc. spp.	99.474	25.789	9.474	3.947	3.421	2.368	0.526	2.631	147.630	78.46
	Total	126.578	31.577	12.631	5.262	5.525	2.368	0.526	3.683	188.150	100.00

Table IV.2.11

Distribution of total stems by species and diameter classes (*000) and stems/ha by dia-classes

All Forest Types Combined (U.F.) Area : 68750 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizzia spp.	209.539	32.237	16.118	0.000	32.237	0.000	0.000	0.000	290.131	2.12
2	Alnus spp.	16.118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.118	0.12
3	Alstonia scholaris	16.118	0.000	0.000	16.118	0.000	0.000	0.000	16.118	48.354	0.35
4	Betula alnoides	177.303	80.592	80.592	48.355	32.237	0.000	0.000	0.000	419.079	3.06
5	Bombax ceiba	48.355	16.118	16.118	0.000	0.000	0.000	0.000	0.000	80.591	0.59
6	Cinnamomum ceciodaphne	0.000	0.000	0.000	0.000	16.118	0.000	0.000	0.000	16.118	0.12
7	Cinnamomum tamala	281.908	16.118	0.000	0.000	0.000	0.000	0.000	0.000	298.026	2.17
8	Ficus spp.	145.066	112.829	48.355	0.000	48.355	0.000	0.000	32.236	386.841	2.82
9	Gmelina arborea	48.355	0.000	0.000	0.000	0.000	0.000	0.000	16.118	64.473	0.47
10	Lyonia ovalifolia	461.842	32.237	0.000	0.000	0.000	0.000	0.000	0.000	494.079	3.61
11	Macaranga peltata	193.421	48.355	0.000	0.000	0.000	0.000	0.000	0.000	241.776	1.76
12	Quercus spp.	273.684	72.368	80.487	34.868	0.000	0.000	0.000	0.000	469.407	3.43
13	Shorea assamica	32.237	0.000	0.000	0.000	0.000	0.000	0.000	0.000	32.237	0.24
14	Misc. spp.	7011.513	1879.605	786.513	373.026	284.539	163.816	88.487	254.933	10842.432	79.14
	Total	8915.459	2290.459	1036.183	472.367	413.486	163.816	88.487	319.405	13699.662	100.00
	Stems/ha	129.679	33.316	15.072	6.871	6.014	2.383	1.287	4.646	199.268	

Table IV.2.12

Distribution of total volume by species and diameter classes in ('000 cum.)
Forest Type : Upland Hardwood (U.F.)

Area : 7500 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Cinnamomum tamala	6.775	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.775	0.53
2	Lyonia ovalifolia	4.927	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.927	0.39
3	Quercus spp.	14.494	18.476	43.189	16.956	0.000	0.000	0.000	0.000	93.115	7.34
4	Misc. spp.	99.905	95.763	126.103	122.557	119.592	39.537	166.720	393.702	1163.879	91.74
	Total	126.101	114.239	169.292	139.513	119.592	39.537	166.720	393.702	1268.696	100.00

Table IV.2.13

Distribution of total volume by species and diameter classes (in'000 cum.)
Forest Type : Miscellaneous (U.F.)

Area : 61250 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia spp.	33.443	8.744	12.732	0.000	40.647	0.000	0.000	0.000	95.566	1.83
2	Alnus spp.	1.963	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.963	0.04
3	Alsionia scholaris	1.249	0.000	0.000	15.456	0.000	0.000	0.000	62.746	79.451	1.53
4	Betula alnoides	33.005	28.937	56.404	48.580	41.634	0.000	0.000	0.000	208.560	4.00
5	Bombax ceiba	3.861	8.419	9.057	0.000	0.000	0.000	0.000	0.000	21.337	0.41
6	Cinnamomum cecicodephne	0.000	0.000	0.000	0.000	29.702	0.000	0.000	0.000	29.702	0.57
7	Cinnamomum tamala	23.294	3.101	0.000	0.000	0.000	0.000	0.000	0.000	26.395	0.51
8	Ficus spp.	14.312	25.946	23.884	0.000	86.634	0.000	0.000	212.476	363.252	6.97
9	Gamlina arborea	6.523	0.000	0.000	0.000	0.000	0.000	0.000	424.331	430.854	8.27
10	Lvonia ovalifolia	27.848	5.962	0.000	0.000	0.000	0.000	0.000	0.000	33.810	0.65
11	Macaranga peltata	21.992	14.581	0.000	0.000	0.000	0.000	0.000	0.000	36.573	0.70
12	Quercus spp.	20.821	5.223	21.483	20.620	0.000	0.000	0.000	0.000	68.147	1.31
13	Shorea assamica	5.389	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.389	0.11
14	Misc. spp.	571.780	473.487	349.434	267.192	326.913	346.573	98.618	1373.376	3807.373	73.10
	Total	765.680	574.400	472.994	351.848	525.530	346.573	98.618	2072.929	5208.572	100.00

Table IV.2.14

Distribution of volume/ha. by species and dia-classes

Forest Type : Upland Hardwood [U.F.]

Area : 7500 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Cinnamomum tamala	0.903	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.903	0.53
2	Lyonia ovalifolia	0.657	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.657	0.39
3	Quercus spp.	1.933	2.463	5.758	2.261	0.000	0.000	0.000	0.000	12.415	7.34
4	Misc. spp.	13.321	12.768	16.814	16.341	15.946	5.272	22.229	52.494	155.185	91.74
	Total	16.814	15.231	22.572	18.602	15.946	5.272	22.229	52.494	169.160	100.00

Table IV.2.15

Distribution of volume/ha. by species and diameter classes

Forest Type : Miscellaneous (U.F.)

Area : 61250 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia spp.	0.546	0.143	0.208	0.000	0.664	0.000	0.000	0.000	1.561	1.83
2	Alnus spp.	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.04
3	Alstonia scholaris	0.020	0.000	0.000	0.252	0.000	0.000	0.000	1.024	1.296	1.53
4	Betula alnoides	0.539	0.472	0.921	0.793	0.680	0.000	0.000	0.000	3.405	4.00
5	Bombax ceiba	0.063	0.137	0.148	0.000	0.000	0.000	0.000	0.000	0.348	0.41
6	Cinnamomum cecicodaphne	0.000	0.000	0.000	0.000	0.485	0.000	0.000	0.000	0.485	0.57
7	Cinnamomum tamala	0.380	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.431	0.51
8	Ficus spp.	0.234	0.424	0.390	0.000	1.414	0.000	0.000	3.469	5.931	6.97
9	Gmelina arborea	0.106	0.000	0.000	0.000	0.000	0.000	0.000	6.928	7.034	8.27
10	Lvonia ovalifolia	0.455	0.097	0.000	0.000	0.000	0.000	0.000	0.000	0.552	0.65
11	Macaranga peltata	0.359	0.238	0.000	0.000	0.000	0.000	0.000	0.000	0.597	0.70
12	Quercus spp	0.340	0.085	0.351	0.337	0.000	0.000	0.000	0.000	1.113	1.31
13	Shorea assamica	0.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.091	0.11
14	Misc. spp.	9.335	7.730	5.705	4.362	5.337	5.658	1.610	22.423	62.160	73.10
	Total	12.500	9.377	7.723	5.744	8.580	5.658	1.610	33.844	85.036	100.00

Table IV.2.16

Distribution of total volume by species and diameter classes (in '000 cum.) and vol/ha by dia classes
(All Forest Type Combined) [U.F.] Area : 68750 Hectares

S.No.	Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
1	Albizia spp	33.443	8.744	12.732	0.000	40.647	0.000	0.000	0.000	95.566	1.47
2	Alnus spp.	1.963	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.963	0.03
3	Alstonia scholaris	1.249	0.000	0.000	15.456	0.000	0.000	0.000	62.746	79.451	1.23
4	Betula alnoides	33.005	28.937	56.404	48.580	41.634	0.000	0.000	0.000	208.560	3.22
5	Bombax ceiba	3.861	8.419	9.057	0.000	0.000	0.000	0.000	0.000	21.337	0.33
6	Cinnamomum cecicodaphne	0.000	0.000	0.000	0.000	29.702	0.000	0.000	0.000	29.702	0.46
7	Cinnamomum tamala	30.069	3.101	0.000	0.000	0.000	0.000	0.000	0.000	33.170	0.51
8	Ficus spp.	14.312	25.946	23.884	0.000	86.634	0.000	0.000	212.476	363.252	5.61
9	Gmelina arborea	6.523	0.000	0.000	0.000	0.000	0.000	0.000	424.331	430.854	6.65
10	Lyonia ovalifolia	32.775	5.962	0.000	0.000	0.000	0.000	0.000	0.000	38.737	0.60
11	Macaranga peltata	21.992	14.581	0.000	0.000	0.000	0.000	0.000	0.000	36.573	0.56
12	Quercus spp.	33.315	23.699	64.672	37.576	0.000	0.000	0.000	0.000	161.262	2.49
13	Shorea assamica	5.589	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.589	0.09
14	Misc. spp.	671.685	569.250	475.537	389.749	446.505	386.110	265.338	1767.078	4971.252	76.75
	Total	891.781	688.639	642.286	491.361	645.122	386.110	265.338	2466.631	6477.268	100.00
	Vol/ha	12.971	10.017	9.342	7.147	9.384	5.616	3.860	35.878	94.215	

Table IV.2.17

Distribution of total stems by species and diameter classes ('000) and stems/ha by dia-classes in Dibang Distt.
(All Forest Types Combined) Area : 92080 Hectares

Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
Albizzia spp.	261.083	55.389	26.072	3.244	35.925	3.244	0.000	0.000	384.957	2.13
Alnus spp.	16.340	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.340	0.09
Alstonia scholaris	32.560	6.488	0.000	16.340	0.000	0.000	0.000	16.340	71.728	0.40
Betula alnoides	179.743	81.701	81.701	49.020	32.681	0.000	0.000	0.000	424.846	2.35
Bombax ceiba	207.978	201.250	77.977	16.220	12.976	9.732	3.244	3.244	532.621	2.95
Cinnamomum ceciodaphne	0.000	0.000	0.000	0.000	16.340	0.000	0.000	0.000	16.340	0.09
Cinnamomum tamala	302.008	16.340	0.000	0.000	0.000	0.000	0.000	0.000	318.348	1.77
Ficus spp.	192.479	117.626	49.020	0.000	49.020	0.000	0.000	35.924	444.069	2.46
Gmelina arborea	152.830	6.488	3.244	0.000	0.000	0.000	0.000	16.340	178.902	0.99
Lyonia ovalifolia	468.198	32.681	0.000	0.000	0.000	0.000	0.000	0.000	500.879	2.77
Macaranga peltata	874.087	227.443	32.440	0.000	0.000	0.000	0.000	0.000	1133.970	6.28
Machilus spp.	9.732	9.732	0.000	0.000	0.000	0.000	0.000	0.000	19.464	0.11
Quercus spp.	277.450	73.364	89.705	35.348	0.000	0.000	0.000	0.000	475.867	2.64
Shorea assamica	39.169	0.000	0.000	6.488	0.000	0.000	0.000	0.000	45.657	0.25
Misc. spp.	8512.674	2443.982	1076.324	498.189	333.871	198.511	112.413	313.590	13489.554	74.72
Total	11526.331	3272.484	1436.483	624.849	480.813	211.487	115.657	385.438	18053.542	100.00
Stems/ha	125.177	35.540	15.600	6.786	5.222	2.297	1.256	4.186	196.064	

Contents

Table IV.2.18

Distribution of total volume by species and diameter classes ('000) and Vol./ha by dia-classes in Dibang Distt.
(All Forest Types Combined) Area : 92080 Hectares

Name of species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80+	Total	% age
Albizzia spp.	43.198	17.199	19.022	2.801	45.222	6.374	0.000	0.000	133.816	1.60
Alnus spp.	1.990	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.990	0.02
Alstonia scholaris	3.663	2.095	0.000	15.669	0.000	0.000	0.000	63.610	85.037	1.02
Betula alnoides	33.459	29.335	57.180	49.249	42.207	0.000	0.000	0.000	211.430	2.53
Bombax ceiba	19.367	77.427	54.697	18.867	24.081	25.280	11.957	32.687	264.363	3.16
Cinnamomum cecicdaphne	0.000	0.000	0.000	0.000	30.111	0.000	0.000	0.000	30.111	0.36
Cinnamomum tamala	32.167	3.144	0.000	0.000	0.000	0.000	0.000	0.000	35.311	0.42
Ficus spp.	18.312	26.782	24.213	0.000	87.826	0.000	0.000	255.029	412.162	4.93
Gmelina arborea	23.752	2.225	2.063	0.000	0.000	0.000	0.000	430.171	459.211	5.48
Lyonia ovalifolia	33.226	6.044	0.000	0.000	0.000	0.000	0.000	0.000	39.270	0.47
Macaranga peltata	108.967	65.455	14.295	0.000	0.000	0.000	0.000	0.000	188.717	2.26
Machilus spp.	0.415	3.305	0.000	0.000	0.000	0.000	0.000	0.000	3.720	0.05
Quercus spp.	35.801	24.025	65.582	38.093	0.000	0.000	0.000	0.000	163.481	1.96
Shorea assamica	6.670	0.000	0.000	7.039	0.000	0.000	0.000	0.000	13.709	0.16
Misc. spp.	826.489	747.012	663.346	520.156	521.960	469.831	338.044	2230.544	6317.382	75.58
Total	1187.476	1004.048	900.378	651.874	751.407	501.485	350.001	3012.041	8358.710	100.00
Vol./ha	12.896	10.904	9.778	7.079	8.160	5.446	3.801	32.711	90.777	

APPENDIX-I

YEAR OF SURVEY AND PUBLICATION OF SURVEY OF INDIA TOPO MAPS
USED FOR FOREST INVENTORY IN DIBANG DISTRICT

S.NO	TOPO SHEET NO.	YEAR OF SURVEY	YEAR OF PUBLICATION
1	82 D/16	1962-64	1977
2	82 P/5	1963-64	1967
3	82 P/6	1963-64	1967
4	82 P/7	1963-64	1967
5	82 P/9	1963-64	1967
6	82 P/10	1963-64	1967
7	82 P/11	1963-64	1967
8	82 P/12	1963-64	1967
9	82 P/13	1962-64	1977
10	82 P/14	1962-63	1966
11	82 P/15	1963	1967
12	82 P/16	1963-64	1983
13	83 M/9	1963-65	1967
14	82 M/13	1963	1963
15	91 D/1	1962-64	1966
16	91 D/2	1963-64	1977
17	91 D/3	1963-64	1966
18	91 D/4	1963	1966
19	91 D/6	1963-64	1966
20	91 D/7	-	-

Note:

The topo sheet No. 82 D/8,11,12 and 15,91 C/3,4,7,8 and 12
91 D/5,9 and 10 were not made available due to security reasons.
Hence their year of survey and publication are not mentioned.

APPENDIX- II

LOCATION OF CENTRE OF SAMPLE PLOTS FOR
FOREST INVENTORY (RESERVED FOREST)

DISTRICT: DIBANG

Map Sheet Coverage: 82 P/12,16, 83 M/9,13

Longitude E / Latitude N of plot centre	Forest Division Code	Land Use Code	Forest Type code	No. of trees enumerated in sample plot of: 0.1 ha.	Volume (m³) in sample plot of 0.1 ha.
	Map Sheet No. 82 P/12				
95° 34′ / 28° 00′	03	02	20	23	6.380
95° 35′ / 28° 00′	03	02	20	33	46.110
95° 36′ / 28° 00′	03	02	20	25	24.029
95° 37′ / 28° 00′	03	02	20	20	6.069
95° 38′ / 28° 00′	03	02	20	24	11.910
95° 40′ / 28° 00′	03	16	-	-	-
95° 41′ / 28° 00′	03	16	-	-	-
95° 43′ / 28° 00′	03	03	20	03	22.521
95° 44′ / 28° 00′	03	12	-	-	-
95° 34′ / 28° 01′	03	03	20	28	26.912
95° 35′ / 28° 01′	03	03	20	21	26.470
95° 36′ / 28° 01′	03	02	-	-	-
95° 37′ / 28° 01′	03	15	-	-	-
95° 38′ / 28° 01′	03	03	20	31	6.118

95°	41′										
28°	01′	03		16		-		-		-	
95°	42′										
28°	01′	03		10		-		-		-	
95°	43′										
28°	01′	03		13		-		-		-	
95°	44′										
28°	01′	03		13		-		-		-	
95°	34′										
28°	02′	03		16		-		-		-	
95°	35′										
28°	02′	03		12		-		-		-	
95°	36′										
28°	02′	03		02		20		20		12.415	
95°	37′										
28°	02′	03		03		20		09		8.609	
95°	41′										
28°	02′	03		18		20		02		3.806	
95°	42′										
28°	02′	03		16		-		-		-	
95°	43′										
28°	02′	03		03		20		19		1.455	
95°	44′										
28°	02′	03		13		-		-		-	
95°	35′										
28°	03′	03		02		20		22		5.595	
95°	36′										
28°	03′	03		02		20		78		11.131	
95°	37′										
28°	03′	03		03		20		08		0.877	
95°	38′										
28°	03′	03		10		-		-		-	
95°	39′										
28°	03′	03		10		-		-		-	
95°	41′										
28°	03′	03		03		20		08		6.881	
95°	42′										
28°	03′	03		16		-		-		-	
95°	43′										
28°	03′	03		15		-		-		-	

95°	44′										
28°	03′	03		13		-		-		-	
95°	35′										
28°	04′	03		02		20		20		18.305	
95°	36′										
28°	04′	03		10		-		-		-	
95°	37′										
28°	04′	03		10		-		-		-	
95°	38′										
28°	04′	03		03		20		32		6.181	
95°	39′										
28°	04′	03		10		-		-		-	
95°	41′										
28°	04′	03		02		20		28		7.592	
95°	42′										
28°	04′	03		16		-		-		-	
95°	43′										
28°	04′	03		07		20		03		10.185	
95°	44′										
28°	04′	03		13		-		-		-	
95°	35′										
28°	05′	03		02		20		20		3.114	
95°	36′										
28°	05′	03		02		20		15		2.517	
95°	37′										
28°	05′	03		16		-		-		-	
95°	38′										
28°	05′	03		03		20		08		1.371	
95°	39′										
28°	05′	03		03		20		15		5.690	
95°	42′										
28°	05′	03		16		-		-		-	
95°	43′										
28°	05′	03		07		20		01		0.480	
95°	44′										
28°	05′	03		10		-		-		-	
95°	35′										
28°	06′	03		02		20		14		10.266	

95°	36′										
28°	06′	03		03		20		20		3.748	
95°	37′										
28°	06′	03		02		20		30		8.892	
95°	38′										
28°	06′	03		02		20		27		6.354	
95°	39′										
28°	06′	03		03		20		15		4.058	
95°	41′										
28°	06′	03		10		–		–		–	
95°	42′										
28°	06′	03		02		20		34		8.474	
95°	43′										
28°	06′	03		16		–		–		–	
95°	44′										
28°	06′	03		12		–		–		–	
95°	35′										
28°	07′	03		02		20		26		14.589	
95°	36′										
28°	07′	03		02		20		31		25.476	
95°	37′										
28°	07′	03		03		20		08		1.941	
95°	38′										
28°	07′	03		03		20		20		7.552	
95°	39′										
28°	07′	03		03		20		05		5.729	
95°	42′										
28°	07′	03		03		20		05		2.123	
95°	43′										
28°	07′	03		16		–		–		–	
95°	44′										
28°	07′	03		07		20		07		1.816	
95°	44′										
28°	08′	03		02		20		40		9.556	
95°	44′										
28°	09′	03		03		20		06		3.510	

Mao Sheet No. 82 P/16

95°	46′										
28°	00′	03		03		20		01		0.663	

95°	46′										
28°	01′	03		03		20		10		1.309	
95°	45′										
28°	02′	03		03		20		03		1.213	
95°	46′										
28°	02′	03		03		20		09		1.551	
95°	47′										
28°	02′	03		13		–		–		–	
95°	45′										
28°	03′	03		13		–		–		–	
95°	46′										
28°	03′	03		15		–		–		–	
95°	47′										
28°	03′	03		03		20		17		7.349	
95°	46′										
28°	04′	03		13		–		–		–	
95°	47′										
28°	04′	03		13		–		–		–	
95°	45′										
28°	05′	03		13		–		–		–	
95°	46′										
28°	05′	03		13		–		–		–	
95°	47′										
28°	05′	03		13				–		–	
95°	45′										
28°	06′	03		13		–		–		–	
95°	46′										
28°	06′	03		13		–		–		–	
95°	47′										
28°	06′	03		13		–		–		–	
95°	45′										
28°	07′	03		13		–		–		–	
95°	46′										
28°	07′	03		13		–		–		–	
95°	47′										
28°	07′	03		13		–		–		–	
95°	45′										
28°	08′	03		13		–		–		–	
95°	46′										
28°	08′	03		13		–		–		–	

95°	47′									
28°	08′	03		13		-		-		-
95°	45′									
28°	09′	03		05		12		04		1.740
95°	46′									
28°	09′	03		10		-		-		-

Map Sheet No. 83 M/9

95°	32′									
28°	54′	03		12		-		-		-
95°	32′									
28°	55′	03		10		-		-		-
95°	33′									
28°	55′	03		10		-		-		-
95°	31′									
28°	56′	03		03		20		09		1.235
95°	33′									
28°	56′	03		10		-		-		-
95°	34′									
28°	56′	03		10		-		-		-
95°	31′									
28°	57′	03		03		20		15		1.486
95°	32′									
28°	57′	03		03		20		31		7.917
95°	33′									
28°	57′	03		13		-		-		-
95°	34′									
28°	57′	03		03		20		07		3.413
95°	36′									
28°	57′	03		10		-		-		-
95°	31′									
28°	58′	03		03		20		12		3.753
95°	32′									
28°	58′	03		02		20		32		6.664
95°	33′									
28°	58′	03		03		20		20		6.662
95°	34′									
28°	58′	03		13		-		-		-
95°	35′									
28°	58′	03		03		20		07		1.788

95°	36′												
28°	58′	03		03		20		09		2.749			
95°	37′												
28°	58′	03		10		-		-		-			
95°	40′												
28°	58′	03		01		20		36		10.891			
95°	41′												
28°	59′	03		03		20		20		4.515			
95°	42′												
28°	58′	03		01		20		31		2.539			
95°	43′												
28°	58′	03		12		-		-		-			
95°	44′												
28°	58′	03		01		20		26		16.803			
95°	32′												
28°	59′	03		03		20		12		0.753			
95°	33′												
28°	59′	03		03		20		17		3.881			
95°	34′												
28°	59′	03		03		20		15		3.301			
95°	35′												
28°	59′	03		13		-		-		-			
95°	36′												
28°	59′	03		02		20		34		9.145			
95°	37′												
28°	59′	03		03		20		22		3.420			
95°	39′												
28°	59′	03		03		20		14		5.569			
95°	40′												
28°	59′	03		02		20		11		1.997			
95°	41′												
28°	59′	03		02		20		30		11.827			
95°	42′												
28°	59′	03		03		20		07		3.533			
95°	43′												
28°	59′	03		02		20		25		11.934			
95°	44′	03		12		-		-		-			
28°	59′												

Map Sheet No. 83 M/13												
95°	45′											
27°	58′	03		12		-		-		-		
95°	46′											
27°	58′	03		15		-		-		-		
95°	45′											
27°	59′	03		12		-		-		-		
95°	46′											
27°	59′	03		13		-		-		-		
95°	47′											
27°	59′	03		12		-		-		-		
95°	48′											
27°	59′	03		12		-		-		-		

APPENDIX- II

LOCATION OF CENTRE OF SAMPLE PLOTS FOR
FOREST INVENTORY (UNCLASSED FOREST)

DISTRICT: DIBANG

Map Sheet Coverage: 82 P/10,11,12,13,14,16, 83 M/13

Longitude E / Latitude N of plot centre	Forest Division Code	Land Use Code	Forest Type code	No. of trees enumerated in sample plot of: 0.1 ha.	Volume (m³) in sample plot of 0.1 ha.
		Map Sheet No. 82 P/10			
95° 38' / 28° 32'	03	02	20	38	12.194
95° 39' / 28° 32'	03	02	20	-	-
95° 40' / 28° 32'	03	06	-	-	-
95° 38' / 28° 33'	03	02	20	82	14.929
95° 41' / 28° 33'	03	06	-	-	-
95° 43' / 28° 33'	03	06	-	-	-
95° 44' / 28° 33'	03	03	20	-	-
95° 36' / 28° 34'	03	02	20	44	11.033
95° 37' / 28° 34'	03	02	20	21	9.911
		Map Sheet No. 82 P/11			
95° 38' / 28° 16'	03	05	12	13	5.241
95° 34' / 28° 17'	03	02	20	30	6.872
95° 35' / 28° 17'	03	01	20	30	10.263
95° 40' / 28° 17'	03	02	20	27	9.487

95° 43′						
28° 17′	03	01	20	-	-	
95° 36′						
28° 19′	03	01	20	16	3.189	
95° 37′						
28° 19′	03	02	20	08	1.151	
95° 39′						
28° 19′	03	02	20	13	2.354	
95° 42′						
28° 20′	03	04	-	-	-	
95° 41′						
28° 18′	03	16	-	-	-	

Map Sheet No. 82 P/12

95° 36′						
28° 09′	03	03	20	04	1.140	
95° 37′						
28° 09′	03	02	20	14	3.973	
95° 38′						
28° 09′	03	16	-	-	-	
95° 40′						
28° 10′	03	02	20	41	4.217	
95° 43′						
28° 10′	03	10	-	-	-	
95° 36′						
28° 11′	03	02	20	33	3.727	
95° 43′						
28° 12′	03	03	20	07	8.519	
95° 37′						
28° 13′	03	04	-	-	-	
95° 38′						
28° 13′	03	02	20	14	0.740	
95° 35′						
28° 14′	03	13	-	-	-	
95° 36′						
28° 14′	03	02	20	20	12.081	
95° 38′						
28° 14′	03	03	20	04	0.419	

					Map Sheet No. 82 P/13							
95°	53′											
28°	45′	03		06		-		-		-		
95°	51′											
28°	47′	03		06		-		-		-		
95°	57′											
28°	47′	03		02		08		-		-		
95°	52′											
28°	48′	03		03		20		-		-		
95°	53′											
28°	48′	03		10		-		-		-		
95°	53′											
28°	49′	03		02		09		24		19.233		
95°	54′											
28°	49′	03		03		09		07		13.724		
95°	54′											
28°	50′	03		02		09		-		-		
95°	55′											
28°	50′	03		01		09		75		29.424		
95°	56′											
28°	50′	03		13		09		10		5.284		
95°	51′											
28°	51′	03		10		-		-		-		
95°	52′											
28°	51′	03		15		-		-		-		
95°	54′											
28°	51′	03		02		09		-		-		
					Map Sheet No. 82 P/14							
95°	51′											
28°	39′	03		01		20		-		-		
95°	52′											
28°	42′	03		02		20		-		-		
95°	53′											
28°	43′	03		06		-		-		-		
					Map Sheet No. 82 P/16							
95°	49′											
28°	00′	03		12		-		-		-		

95°	50′											
28°	00′	03		13		-		-		-		
95°	55′											
28°	00′	03		03		20		04		21.079		
95°	58′											
28°	00′	03		10		-		-		-		
95°	58′											
28°	00′	03		10		-		-		-		
95°	59′											
28°	00′	03		02		20		32		5.915		
95°	49′											
28°	01′	03		13		-		-		-		
95°	50′											
28°	01′	03		13		-		02		11.419		
95°	53′											
28°	01′	03		03		20		02		3.784		
95°	54′											
28°	01′	03		03		20		03		0.265		
95°	57′											
28°	01′	03		03		20		05		15.414		
95°	55′											
28°	02′	03		02		20		01		4.677		
95°	57′											
28°	02′	03		02		20		26		16.393		
95°	49′											
28°	03′	03		13		-		-		-		
95°	56′											
28°	03′	03		02		20		10		1.184		
95°	49′											
28°	04′	03		13		-		-		-		
95°	53′											
28°	04′	03		03		20		02		4.641		
95°	55′											
28°	04′	03		13		-		-		-		
95°	56′											
28°	05′	03		02		20		-		-		
95°	58′											
28°	05′	03		02		20		-		-		
95°	53′											
28°	06′	03		02		20		32		39.630		

95°	54′									
28°	06′	03		16		-		-	-	
95°	55′									
28°	06′	03		02		20		17	5.439	
95°	58′									
28°	06′	03		03		20		-	-	
95°	49′									
28°	07′	03		03		20		08	36.646	
95°	50′									
28°	09′	03		03		20		11	2.474	
95°	51′									
28°	09′	03		15		-		-	-	
95°	52′									
28°	10′	03		03		20		04	0.291	
95°	50′									
28°	11′	03		05		12		-	-	
95°	50′									
28°	12′	03		02		20		-	-	
95°	52′									
28°	12′	03		02		20		-	-	
95°	47′									
28°	13′	03		02		20		81	34.168	
95°	45′									
28°	14′	03		03		20		08	1.096	

Map Sheet No. 83 M/13

95°	56′									
28°	58′	03		03		20		01	7.203	
95°	57′									
28°	58′	03		02		20		03	0.690	
95°	58′									
28°	58′	03		02		20		16	5.765	
95°	57′									
28°	59′	03		03		20		03	0.190	

Description of Codes for Land use i.e. col. 3 of Appendix-II

Code	Item	Description
01	Dense tree forests	All lands with a forest cover of trees with canopy density 70% and above.
02	Moderately dense tree forests	All lands with a forest cover of trees with canopy density 30% to 69%.
03	Open tree forests	All lands with a forest cover of trees with canopy density 5% to 29%.
04	Scrub forests	Inferior tree growth chiefly of small or stunted trees with a canopy density less than 5%.
05	Bamboo brakes	Areas completely covered with bamboo growth.
06	Shifting cultivation (Kumri)	Areas under current as well as last year's shifting cultivation. The agriculture crop may be standing or may have been harvested.
07	Young plantations of forestry species	This will include young plantations of forestry species in which average stems are above 10 cms. diameter at B.Ht. and the extent of such plantation is more than 0.5 Ha. This will include Farm Forests, Social Forestry Plantations, parts of conversion to uniform areas, plantations raised by Forest Development Corporations etc.
08	Trees in line	This will include trees planted along canal banks/road sides/railway lines, wind brakes and shelter belts planted under various Social Forestry Schemes.
09	Forest roads etc.	This will include areas under forest roads, depots, colonies, nurseries and such other forest land used in connection with the forest administration.
10	Govt. grass lands	This will include areas under natural or planted grass lands, pastures etc. which are owned by the Government.

11	Barren lands	This will include areas with exposed surfaces like rock sheets, sand dunes, swamps and areas without any vegetation.
12	Agricultural land without trees in surround	All lands under cultivation including fallow lands will come under this category. Such lands will not have any tree growth along bunds or in their vicinity of 2 Ha.
13	Agricultural land with trees in surround	This includes all lands under cultivation including fallow lands which are covered with trees along bunds and in their surround within 2 Ha.
14	Non-forestry plantations	Lands with tree growth planted primarily for purpose other than forestry such as cashew, coffee, gardens, parks zoos, private grass lands etc.
15	Habitation	This will include village, city sites, industrial areas, grave yards, houses, colonies etc.
16	Water bodies	Land under lakes, water courses etc.
17	Other lands	Lands which cannot be classed under any of the above categories.

Note:-

Canopy density is defined as the relative completeness of canopy expressed as percentage taking closed canopy as 100. Standing in a plot or in area around it observe the tree growth and assess the percentage of the space covered.

Description of Code for Forest type - col. 4 of Appendix-II

Code	Crop composition (Forest type)	Description
01	Fir	Where Fir constitutes more than 50%
02	Spruce	Where Spruce constitutes more than 50%.
03	Fir-Spruce	Where Fir and Spruce both taken together constitute more than 50%.
04	Blue-pine (kail)	Where Blue-pine constitutes more than 50%.
05	Deodar	Where Deodar constitutes more than 50%.
06	Chir-pine	Where Chir-pine constitutes more than 50%.
07	Mixed conifers	Where all conifers taken together constitutes more than 50%.
08	Hardwoods mixed with conifers	Where the conifers and broad leaved species occur more or less in same proportions.
09	Up-land hardwoods	Broad leaved species constitute more than 50% of crop in Upper Chir zone above 1500 metre altitude.
10	Teak	Where Teak constitutes more than 20%.
11	Sal	Where Sal constitutes more than 20% (if Sal and Teak are both more than 20%, then preference is to be given to Teak).
12	Bamboo forests	Where crop is of almost pure bamboo
13	Mangrove	Mangrove forests.
14	Dipterocarpus (Gurjan)	Where Gurjan constitutes more than 50% in the top canopy.

15	Hollong Mekai	Where Hollong and Mekai individually or both taken together constitute more than 50%.
16	Khasi pine	Where Khasi pine constitutes more than 50%.
17	Khair forests	Where Khair trees constitutes more than 50%.
18	Salai forests	Where Salai constitutes more than 50%.
19	Alpine pastures	Alpine pastures.
20	Miscellaneous forests	Forests which cannot be classified in any of the above forest types.

Note:-

Hollong means Dipterocarpus retusus and Mekai means Shorea assamica

PLOT APPROACH FORM

1) Plot Approach Form must be field in while the journey is in progress.
2) While recording date, it is essential to record month and year also.
3) If a plot is visited on more than one day, a separate form for each visit shall be filled up.

1. State and Code
2. Division and Code
3. District and Code
4. Map-sheet and Code
5. Gride Code
5. (a) Plot No.
6. Crew Leader (name)
7. Name of Camp.
8. Time (hrs.) at which Left the camp
9. Distance covered by vehicle (km.)
10. Time taken in jurney by vehicle — Hours — Minutes
11. Name of the place up to which journey was performed by vehicle. (describe in brief)
12. Conspicuous features observed during the journey by vehicle (describe in brief)
13. Time at which started on foot
14. Direction and distance covered on foot up to the reference point (km.)
15. Conspicuous features observed during the journey on foot (describe in brief)
16. Time (hrs.) at which arrived at the reference point
17. Description of the reference point (Describe in details)
18. Compass bearing from reference point to the plot approached for commencing survey (please give the Plot No.) also if any
19. Distance of the plot Centre from reference point (Mtr.)

20.	Date and Time at which arrived at the Plot	Plot 1	Plot 2
21.	Time (hrs.) of Leaving the Plot	Plot 1	Plot 2
22.	Time (hrs.) at which returned to the Camp.		
23.	Compassing done by		
24.	Distance measured by		
25.	Plots laid out by		
26.	Thros Enumeration done by		
27.	Height measurements taken by		
28.	B. T. and other measurements taken by		
29.	Bamboo enumeration done by		
30.	Bamboo Weight taken by		
31.	References in the field written by		
32.	Remarks		

Dated :

Signature of the Crew Leader

Diagrams etc.

A B

PLOT DESCRIPTION FORM

Field Form 2

Job No	Card Design	Zone	State	Distrit	Forest Division	Map Sheet No.	Grid No.	Plot No.	Legal Status	Land Use
1—3	4—5		7 8	9—10	11—12	13—18	19—22	23	24	25—26

Terrain Data

General Topography	Slope	Position on Slope	Altitude	Aspect	Rockiness
27	28-30	31	32 53	36	37

Soil Data

Humus	Soil Colour	Soil Consistency	Soil Textur	Coarse Fragments	Soil Depth	Soil Erosion
38	39	40	41	42	43	45

Crop Data

Origin of Stand	Corp Composition	Canopy Layer or Storey	Top Height	Size Class	Intensity of regeneration	Important Species under regeneration	Injuries to Crop	Fire Incidence	Grazing Incidence	Persence of weeds	Pesence of Grass
46	46-47	48-49	50 51	52	53	54-56	57	58	59	60	61

Bamboo Data

Bamboo density	Bamboo quality	Bamboo Flowering	Bamboo regeneration
62	63	64	65

Plantation Potential	Distance to road	Distance to Mule Path	Distance to River/Stream	Kacha road Distance	Pucca road Distance	River distance to market outlet	Obstacles	Plot Status	Status of Forest
66	67	68	69	70 71	72 74	75 76	77	78	79

Dated.........................

Signature of Crew Leader.........................

Name of Crew Leader. ....

Contents

PLOT ENUMERATION FORM

Field Form No..3

Job No.	Card design	Map Sheet No.	Grid No.	Plot No.
1—3	4 5	6—11	12—15	16

Total No. of bamboo clump	Total No. of trees
71—73	74—76

Species		Species		Species		Species		Species		Species		Species		Species		Species	
Code	Dia	Code	Dia	Code	Dia	Code	Dia	Code	Dia	Code	Dia	Code	Dia	Code	Dia	Code	Dia
17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41-43	44-46	47-49	50-52	53-55	56-58	59-61	62 64	65-67	68-70

Date ... ...

Signature of Crew Leader..... ... .

Name of Crew Leader ....

Field Form No. 4

SAMPLE TREE FORM

Job No.	Card design	Map Sheet No.	Grid No.	Plot No.
1—3	4—5	6—11	12—16	18

Total No. of trees
55—58

SPECIES	Tree Serial No.	Species Code	Dominance	DBH OB (cm)	DBT (mm)	Tree Height (m)	Clear Bole (m)	Condition	Form: Longitudinal	Form: Sectional
	17—18	19—21	22	23—26	26—2	28—30	31—32	33	34	35

SPECIES	Tree Serial No.	Species Code	Dominance	DBH OB (cm)	DBT (mm)	Tree Height (m)	Clear Bole (m)	Condition	Form: Longitudinal	Form: Sectional
	36 - 37	38—40	41	42—44	45—47	48—49	50—51	52	53	54

Date .....

Signature of Crew Leader .....

Name of Crew Leader .....

BAMBOO ENUMERATION AND CLUMP ANALYSIS FORM

Field Form 5

Job No.	Card Design	Map Sheet No.	Grid No.	Plot No.
1–3	4–8	9–11	12–15	16

Average culm height (in dcm)		Bamboo quality
Up to 1cm. top dia 72–74	Over 2cm top dia 75–77	78

Species	Species Code	Clump Serial No.	Clump diameter (in cms.)	Clump size class	Green sound culms						Green damaged culms						Dry sound culms			Dry damaged culms			Deceived culms	Total No. of culms
					Current year's	One to two seasons old			Over two seasons old			Current year's	One to two seasons old			Over two seasons old									
						2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms		2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms	2< Cms	3<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms		
	17–19	20–22	23–25	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	69–71

Date.....

Signature of Crew Leader.....

Name of Crew Leader.....

BAMBOO ENUMERATION FORM (NON CLUMP FORMING)

Field Form 6

Job No.	Card Design	Map Sheet No.	Grid No.	Plot No.
1—3	4—5	6—11	12—15	16

Species Code	Green sound culms							Green damaged culms							Dry sound culms			Dry damaged culms			Decayed culms	Average Culm Ht. (in decimeters)	Total No. of culms
	Current year's	One to two years old			Over two years old			Current year's	One to two years old			Over two years old											
		2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms		2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms	2<5 Cms	5<8 Cms	8+ Cms			
17—18	20—22	23-25	26-28	29-31	31-33	34-36	37-38	39-41	42-44	45-47	1X-49	50-52	53-55	56-57	58-60	61-62	63-64	65-67	68-69	70-71	72-73	74-76	77-80

Signature of Crew Leader .....

Date .....

Name of the Crew Leader.....

Field Form No. 7

BAMBOO WEIGHT FORM

Job Number	Card Design
1–3	4–5

Map sheet Number	Grid No.	Plot Number
6–11	12–15	16

Species	Sample No	Green Weight of culm — DIAMETER CLASS — 3 to under 5 cm: Diameter in cm	Total length in dmt	Utilizable length in dmt: Upto 1cm top dia	Upto 2cm top dia	Weight in Grams	5 to under 8 cm: Diameter in cm	Total length in dmt	Utilizable length in dmt: Upto 1cm top dia	Upto 3cm top dia	Weight in Grams	8 cm and over: Diameter in cm	Total length in dmt.	Utilizable length in dmt: Upto 1cm top dia	Upto 5cm top dia	Weight in Grams	Green weight of sub-sample for co-relation with dry weight: Sub-sample culm 2cm & under 5cm diam	Sub sample culm 5cm & under 8cm diam	Sub-sample culm 8cm and over
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 70 71 72	73 74 75 76	77 78 79 80

Date ....

Signature of Crew Leader ....

Name of Crew Leader ....

Contents

HERBS AND SHRUBS DATA FORM

Field Form No. 8

Map Sheet No.....

Grid No. .....

Plot No. .....

HERBS								SHRUBS										
Name of Species	Total No.	Characteristics			Occurrence		Colour of flower if observed	Name of Spp.	Total No.	Avr. Ht.	Pattern of Branching			Occurrence		Information on flowers & Fruits	
		Erect	Prostrate	Creeping	Gregarious	Sporadic					Opposite	Alternate	Whorling	Gregarious	Sporadic	Colour of Flowers	Size of fruit (Small med big)

Date.....

Signature of the Crew Leader .....

Name of the Crew Leader .....