MDM4

FOREST RESOURCES

OF

KORAPUT DISTRICT

OF

ORISSA STATE

FOREST SURVEY OF INDIA

CENTRAL ZONE

NAGPUR

1989

Contents

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P R E F A C E

Koraput is the largest district of Orissa State with about 45% of its land area under forest. Most of the forests of the district have been brought under scientific management only after the abolition of the Zamindaris in 1952, and not much information was available on the status of forest in the district. The Central Zone of Forest Survey of India undertook inventory of forest resources of the district in 1982-84. The data was collected from 1354 sample plots laid out all over the district.

The study reveals a rather dismal picture of the status of forests in this district. Only 36% of the forest is found to be of density cover over Ø.3. About 32% of the forest land is devoid of any vegetation and are forests in the name only. They include lands under shifting cultivation and under permanent cultivation.

The district has some good bamboo forests but these forests need to be saved from over exploitation and managed under sound silvicultural practice.

This report was compiled by the Central Zone of Forest Survey of India. The work deserves commendation.

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Dehradun.

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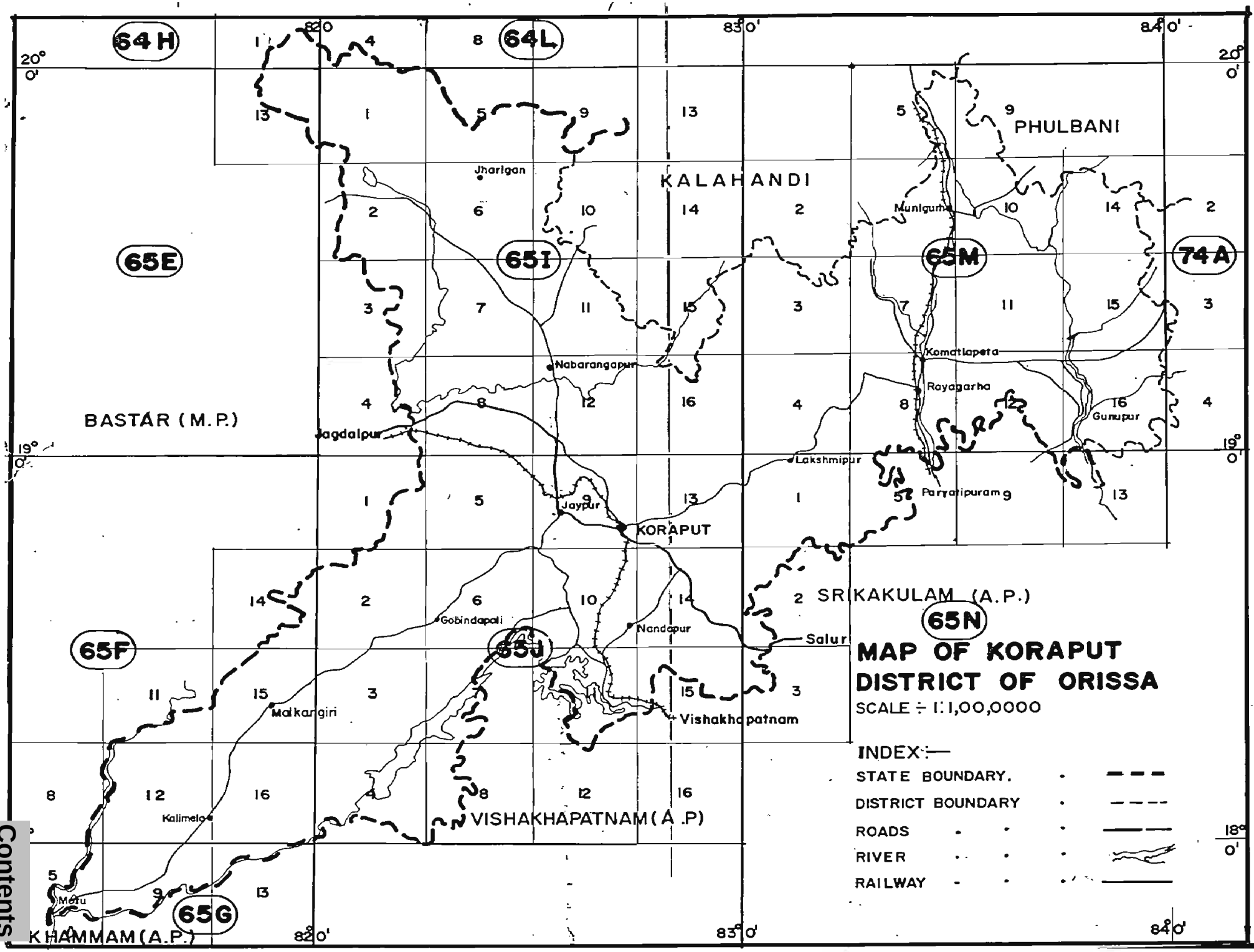
MAP OF INDIA SHOWING SURVEY AREA

AREA COVERED IN THE REPORT :—

Contents


64H
64L
65E
65I
65M
74A
65F
65J
65N
65G
PHULBANI
KALAHANDI
BASTAR (M.P.)
KORAPUT
SRIKAKULAM (A.P.)
VISHAKHAPATNAM (A.P.)
KHAMMAM (A.P.)
Jharigan
Munigumma
Nabarangapur
Komatlapeta
Rayagarha
Gunupur
Jagdalpur
Jaypur
Lakshmipur
Parvatipuram
Gobindapali
Nandapur
Salur
Malkangiri
Vishakhapatnam
Kalimela
Motu
MAP OF KORAPUT
DISTRICT OF ORISSA
SCALE ÷ 1:1,00,000
INDEX:—
STATE BOUNDARY.
DISTRICT BOUNDARY
ROADS
RIVER
RAILWAY
20° 0'
19° 0'
18° 0'
82° 0'
83° 0'
84° 0'

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CHAPTER - I

INTRODUCTION

1.Ø GENERAL:

The district of Koraput derives its name from its Headquarter, the present town of Koraput. The whole of the district of Koraput comprises the ex-zamindaries of Jeypore and Kashipur. In the medieval times Nandapur was the capital city of this tract. The capital was changed to Jeypore in the middle of the 17th century by the King Viravikram Deo. The Britishers chose Koraput as the capital of the district in 187Ø because of its better climate.

This district is full of paradoxes. On one hand it presents a picture of scenic beauty with rolling mountains, roaring rivers, beautiful valleys and pleasant climate and on the other hand it shows abject poverty of its tribal population which has hardly been touched by the modern developments taking place in the country. The bullock-cart civilization of the district is hardly affected by the air crafts civilization of the outer world. This district produces sophisticated air craft engines, paper and other goods required by modern civilization but the local population has hardly any use for it.

Until very recently the development of this region was limited only to the utilisation or more rightly we can say, exploitation of the abundant natural resources available here. The developments have hardly taken into consideration the main resource which is the people of the district. These conditions are now changing very fast. However, the district still presents a picture of one of the most backward districts in the country.

The planning process is mainly based on accurate information about the resources available. These resources must cover all the aspects which touch the people. Such type of multi disciplinary approach can only be helpful in proper planning for development.

The present report on the forest resources of Koraput district attempts to provide data on Forest Resources of the district as a whole in addition to information on various aspects related to the forest like soils, topography, biotic factors etc. The information in this report is collected from hundreds of sample plots and compiled by following appropriate statistical methods based on use of sophisticated computer for data analysis. The information collected is therefore, not only of satisfactory quality but has also uniform standard base applicable to the entire country. This would enable the planners to compare information collected from different parts of the country as district is the primary unit for planning.

The Central Zone of Forest Survey of India undertook the inventory of forest resources of Koraput district of Orissa during November 1982 to May 1983 and November 1983 to January 1984. The present report is essentially based on the data collected during that period.

1.1 LOCATION AND BOUNDARIES:

Koraput is the southern most district of Orissa and is located between 17° 5Ø' & 2Ø ° 3Ø' north latitudes and 81° 27' and 84° 1Ø' east longitudes. On the extreme north it is bounded by Kalahandi district of Orissa and Raipur district of Madhya Pradesh, on the west by Bastar district of Madhya Pradesh, on the south by the districts of East Godavari and Vishakhapatnam of Andhra Pradesh and on the east by the districts of Srikakulam of Andhra Pradesh and Ganjam of Orissa. Koraput district is very much irregular in shape and resembles the letter 'Y' in Roman script.

1.2 AREA AND ADMINISTRATIVE UNITS:

The geographical area of Koraput district is 27Ø2Ø sq.km. It is the largest district in Orissa State and also one of the largest in India. There are six subdivisions in the district namely Koraput, Nowarangpur, Jeypore, Malkangiri, Rayagada and Gunapur.

Out of total 27Ø2Ø sq.km. of the geographical area, 11719.26 sq.km. is the forest area falling under various forest divisions which form 43.37% of the total area. The break up of forest areas of the district by divisions and legal status is given below:-

Area in sq.km.

Name of division	R.F.	Forest demar-cated for reservation	D.P.F.	Unclassed	Total
Nowrangpur	143.73	1571.23	849.19	Ø.11	2564.26
Rayagada	338.68	2827.25	2434.18	Ø.16	56ØØ.27
Jeypore	215.18	1652.1Ø	1687.41	Ø.Ø4	3554.73
Total	697.59	6Ø5Ø.58	497Ø.78	Ø.31	11719.26

Source: Annual Administration Report of Forest Department, Govt. of Orissa, Year 198Ø-81.

1.3 CLIMATE:

Since the major portion of the Koraput district is a mountainous terrain, it has much mild climate compared to the plains of the district. In the hills the summers are cooler, rainfall higher and the winter prolonged than the main Deccan plateau. The low plains of the district are hotter and drier and are quite uncomfortable in the summer

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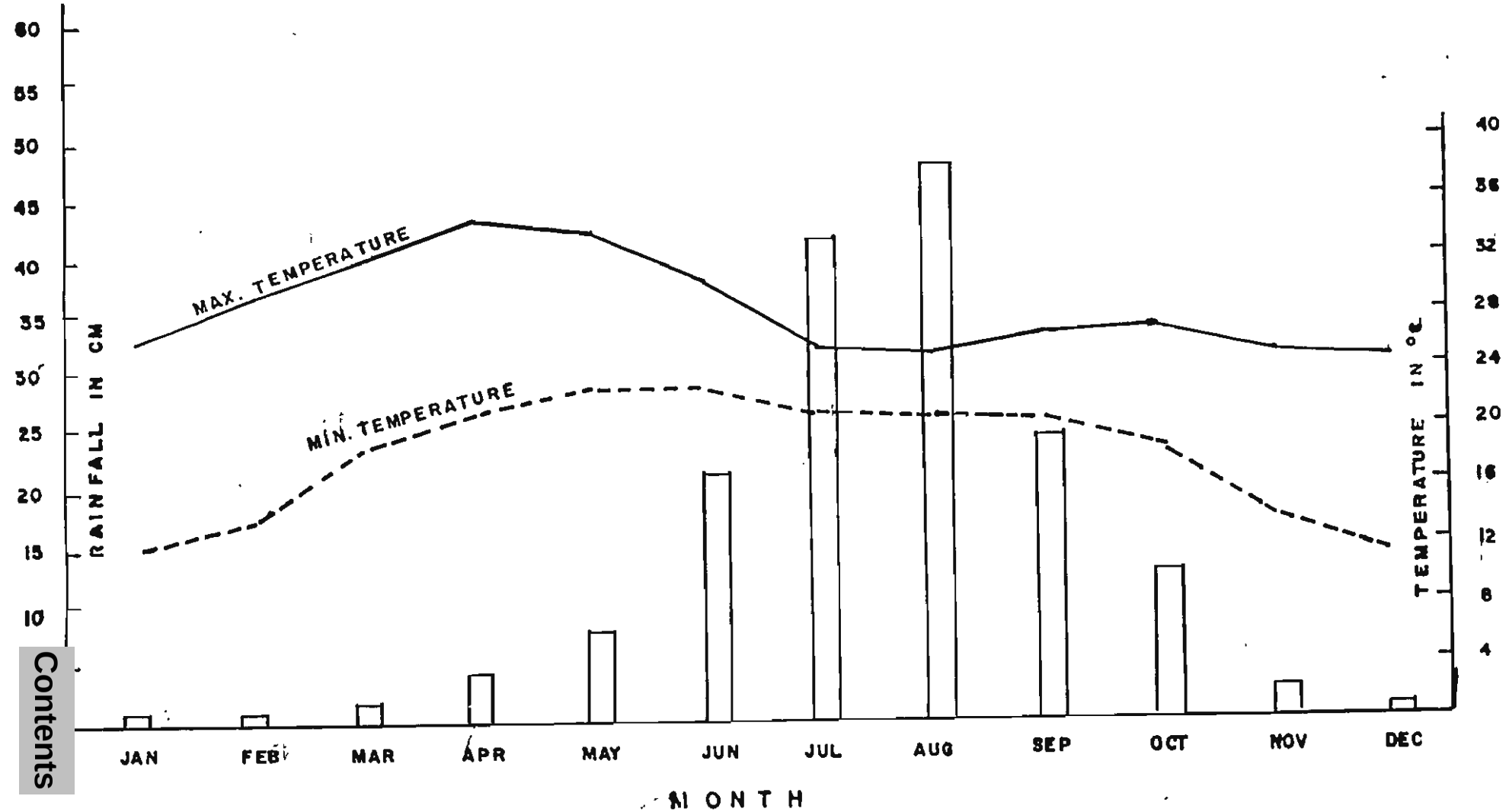
MONTHLY VARIATION OF TEMPERATURE & RAINFALL OF KORAPUT DISTT



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season. The normal rainfall at Koraput which is the headquarters of the district is 1521.8 mm in about 76 rainy days in a year. Nearly 80% of the annual rainfall occurs in monsoon season i.e from June to September. The distribution of rainfall is largely influenced by the Eastern Ghats running south-west to north-east. Areas to the east of the ghats receive less rainfall than those on the ghats and to its west. Mean monthly temperature and rainfall at Koraput are given in Figure 1.

1.4 TOPOGRAPHY:

As already stated, large portion of the district is a mountainous terrain of the Eastern Ghats. There are number of peaks ranging from 1500 m to 1600 m in this district. The Eastern Ghats give rise to range after range of hills ultimately rolling down to the east coast. There are number of plateaus and minor valleys in the district. East Jeypore plateau or Koraput plateau is 900 m high whereas North Jeypore peateau is 600 m high and is clearly distinguished from Koraput plateau. Malkangiri sub-division comprises of low plains. The main rivers of the Koraput district are Machkund, Sabari, Kholab, Sileru, Vansadhara, Muram, Porgar Nadi, Indravati, Tel, Bhaskel etc. Since these rivers flow through hilly terrain having steep slopes, they form water falls at several places on their routes and as such none of them is navigable.

1.5 GEOLOGY AND ROCKS:

Hilly tracts of this district are composed of Archeans which have been completely altered by process of metamorphism. Since their original nature is obliterated they are commonly known as crystalline or metamorphics belonging to Archean Era. These Archeans consist of Charnockites and various gneisses, schists and banded haematite quartzites. Above these Archeans are the Cuddapah formations which comprise of shales, slates, dolomitic lime stones, quartzites etc. There are also Cuddalore sand stones belonging to tertiary age in this district. Large areas are covered by laterites. Alluvium of recent origin is found along the river banks at places.

1.6 SOILS:

Parent rocks and materials influence the soils of this district very much. Ancient crystalline and metamorphic rocks generally give rise to the red soil after weathering of the ferromagnesian minerals. Even the Cuddapah formations contribute to development of red soil in places due to their iron contents. Laterite and lateritic soils are also found in this district at number of places. Black soils with kankar are found in some areas like Chandahandi. Alluvial soils are mostly found along the courses of the rivers and valleys of the Indravati, Tel, Bhaskel etc. These

soils are mostly under cultivation and are hardly of any importance from forestry point of view.

Dandakarnya Project authorities conducted some soil survey and analysed soils in Umerkote area. This survey reveals that most of the soils of the area are of acidic nature. Organic matter content in these soils was found to be normal. Half of them were found to be medium textured and about 1/4th of them were light textured.

1.7 MINERAL WEALTH:

This district is rich in mineral deposits. Iron ore is found near Pittatung and Malkangiri. Extensive deposits of limestones occur in this district. Kaolin deposits fit for manufacture of coarse porcelain also occur in some areas. Placer gold is found in small quantities in some of the tracts. Iron and manganese ores have also been traced in this district.

1.8 LAND USE PATTERN AND SOCIO-ECONOMIC CONDITIONS:

Salient features affecting the socio-economic conditions of the people are:

i) Fairly large percentage of geographical area i.e. 43.74% is under forest. However, large areas are affected by shifting cultivation.

ii) This district has very high percentage (i.e. more than 78%) of Scheduled Castes and Scheduled Tribes population but literacy percentage is very low.

iii) Employment facilities are inadequate resulting in dependence of tribal population on agriculture which is under -developed because of shifting cultivation and low literacy.

iv) There are insufficient communication facilities in the district making transport of agricultural and other produce from one area to another difficult.

The following table gives the idea of various socio-economic features of the district:-

1.	Total cultivable area	1980-81	928000 hectares
2.	Net area sown	"	863000 "
3.	Irrigated	"	33000 "
4.	Unirrigated	"	830000 "
5.	Percentage of net irrigated area sown.	"	3.82%
6.	Total population as per 1981 census		2,484,005
7.	Rural population -do-		2,203,043
8.	Urban population -do-		280,962
9.	Rural population in percentage		88.68%

10 a.	Scheduled Caste population	349,307
b.	------do---------- percentage	14.06
11.a.	Scheduled Tribe population-1981	1,371,550
b.	-------do------ percentage	55.21
12.	Density of population per sq.km.	92
13.	Literacy as percentage of total population	
	a) Persons	15.83%
	b) Males	23.17%
	c) Females	8.44%

Source:- District Statistical Office, Koraput.

1.9 TRANSPORT AND COMMUNICATION FACILITIES:

Transport and communications is one of the most important factors contributing to the development of the economy. This district being hilly, does not have good communication facilities. Railway line from Bailadila to Vishakhapatnam passes through Jeypore and Koraput. There is 154 kms. of National Highway passing through this district. In addition, there are 385.45 kms. of State Highways 404.451 kms. of major district roads, 22.500 kms. of other district roads and 307.100 kms. of other classified village roads. In addition, there are more than 400 kms. of forest roads in the district.

Table No. 1

Length of roads (Km.) by types maintained by different authorities in Koraput district as per report collected from Superintending Engineer (R&B), Jeypore.

Type of Road	Maintained by	Black Top		Metalled	Gravelled	Earthen (Kachha) Road
		Single	Double			
Surfaced Road (Pucca)	National Highway	-	154.000	-	-	-
"	State Highway	384.700	0.700	-	-	-
"	Major Distt. Road	374.651	-	21.800	8.000	-
Surfaced and Unsur-faced Rd	Other Distt. Road	14.000	-	-	2.500	9.000
"	Classified village road	37.800	-	100.000	6.500	162.800
Total		811.151	154.700	121.800	17.000	171.800

1.1Ø FOREST PRODUCE AND FOREST BASED INDUSTRIES:

Important forest produce of the district are timber, fuelwood and bamboos. Other minor forest produce include Tendu leaves, charcoal, Mahua flowers and seeds & various types of grasses used for fodder and broom making. Lac is also obtained from the forest areas. In addition, there are other minor forest produce like medicinal plants, honey, soap nuts etc.

Forest based industries in the district comprise of saw-mills, paper and straw products mill and a plywood factory. Forest Development Corporation also runs a number of sawmills. Among these forest based industries, Sewa paper mills Jeypore, J.K. Paper Mills Rayagada, Plywood factory in Nowrangpur are the major timber industries.

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CHAPTER -II

THE FORESTS

2.0 GENERAL DESCRIPTION:

The forests of Koraput district can broadly be classified into two types i.e. Miscellaneous and Sal forests which occur interspersed throughout the district. Bamboo also occurs overlapping particularly in north-eastern and south-western parts of the district while in remaining areas of the district it occurs sparingly in association with tree species.

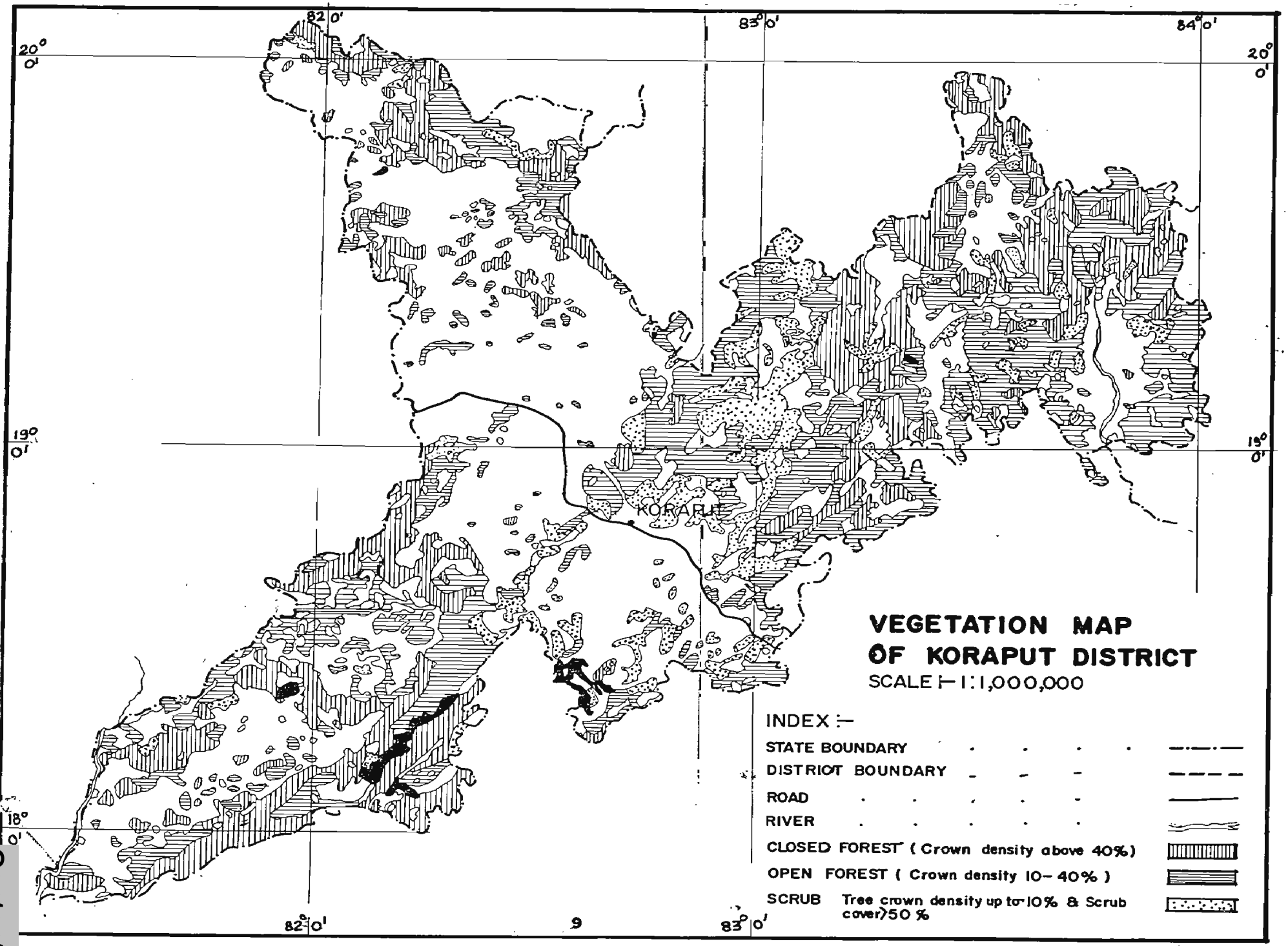
Sal constitutes the most important forest type mainly located on Koraput plateau, Jeypore plateau and low Malkangiri plains. There is no marked difference in the types of Sal forests found in different localities of the district yet they are distinctly of a moist forest type or semi-evergreen type and find optimum conditions for growth and development in this district. The areas are well drained and have lateritic soils with very favourable climatic and rainfall conditions. Sal comes up spontaneously on any land that is spared by axe and fire for a few years but it looses its robustness and loftiness in the areas affected by shifting cultivation. Heavy and irregular exploitation in the past also had its impact on the crop.

Sal i.e. Shorea robusta in this district is by far the most important economic tree species. Other common associates are: Pterocarpus marsupium, Anogeissus latifolia, Adina cordifolia, Tectona grandis, Mitragyna parvifolia, Terminalia belerica, Terminalia chebula, Dalbergia latifolia, Gmelina arborea, Schleichera oleosa, Syzyzium cumini, Diospyros melanoxylon, Boswellia serrata, Albizzia species, Salmalia malabaricum, Terminalia arjuna, Butea monosperma etc. Bamboo is found only sporadically in Sal forest.

Miscellaneous forest occurs throughout the tract. It is mainly an association of Terminalia tomentosa, Pterocarpus marsupium, Xylia xylocarpa, Adina cordifolia, Dalbergia latifolia alongwith other species. Some good forest areas are submerged under various reserviors while others are under shifting cultivation. Bamboo has good stocking in Miscellaneous forest.

Sandal(Santalum album) is found occurring naturally in some areas of the district, particularly in Rayagada forest division. To protect and propogate such valuable species a scheme is under active implementation by the State Forest Department.

Natural teak also occurs at some places in the district. Most of the teak forests have been replaced by a poor crop of mixed deciduous forests due to illicit removal.


82° 0'
83° 0'
84° 0'
20° 0'
19° 0'
18° 0'
KORAPUT
VEGETATION MAP
OF KORAPUT DISTRICT
SCALE :- 1:1,000,000
INDEX :-
STATE BOUNDARY
DISTRICT BOUNDARY
ROAD
RIVER
CLOSED FOREST (Crown density above 40%)
OPEN FOREST (Crown density 10- 40%)
SCRUB Tree crown density up to 10% & Scrub cover>50 %

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The forests are quite open and their remoteness from the centre of consumption, difficulties of communication and long distances from rail head make their extraction problematic. -

A vegetation map of Koraput district prepared by the Forest Survey of India based on M.S.S. data of Landsat satellite for the period 1981-83 has been extracted from the vegetation map of Orissa state on 1:1,ØØØ,ØØØ scale and appended as page no.9.

2.1 FOREST TYPES:

Based on the classification of Champion & Seth the forest of Koraput district can be broadly classified into following major groups namely:-

1. MOIST TROPICAL FORESTS;

Group 3: Tropical Moist Deciduous Forests.

Subgroup 3 C: North Indian Tropical Moist Deciduous Forests.

2c Moist peninsular sal forests.

Subgroup 3B: South Indian Tropical Moist Deciduous Forests.

2S1 Southern moist mixed deciduous forests and dry bamboo brakes.

2. DRY TROPICAL FORESTS:

Group 5: Tropical Dry Decidous Forests

CI Dry Teak Forests
C3 Southern Dry mixed deciduous forests.

Subgroup 5A: Southern Tropical Dry Deciduous forest.

E9 Dry Bamboo brakes.
(All three sub-types intricately mixed)

Subgroup 5B: Northern Tropical dry deciduous forests.

C1 (c) Dry peninsular sal

C2 Northern dry mixed deciduous forest.

E2 Boswellia serrata forests.

In addition to the above major groups, following two subgroups are also found:

Subgroup 8A: Southern sub-tropical wet hill forests

C3 Central Indian sub-tropical hill forests with sal practically non-existent in Koraput district.

Subgroup 2B: Northern semi-evergreen

Edaphic variations:

E1 Cane brakes
E2 Moist bamboo brakes.

2.2 DAMAGE TO THE FORESTS:

The forests of this district have been extensively damaged by the practice of shifting cultivation. This continues to take its toll even now. This practice has reduced once rich forest of this district to open forests and scrub jungles over large areas. Forest fires are also very common because of shifting cultivation. Lot of damage has been done by domestic animals, near human habitations.

2.3 RIGHTS AND CONCESSIONS:

Protected & unreserved forests are heavily burdened with rights and concessions granted to the tribals. Moreover the policy of the Government is to interfere with the tribals to the minimum extent! This has affected the well being of the forests. Privilege holders who are the residents of numerous tribal villages have been granted number of concessions and are allowed to remove timber from inside the protected forests and unreserved lands adjoining the villages. Concessional rates are also allowed for meeting their fire wood requirements from the reserved forests. Grazing is allowed in the forests at very nominal rates to the villagers. As a result of all these concessions, forests in this district in almost all accessible areas, are very much depleted and are now only relics of their glorious past.

2.4 FOREST MANAGEMENT:

Most of the forest areas of Koraput district were untouched by scientific management till almost late fifties. Prior to this period the forest management was in the hands of the local Rulers and tenants had unrestricted rights of removal of timber and use of forest for shifintg cultivation. Some check over collection of timber was imposed by collecting nominal rents from the tenants. After abolition of Zamindari in 1952, management of forests came under the control of Orissa Forest Department. No systematic management could be introduced for quite a few years as the main occupation of the forest officials was demarcation and reservation of forest areas.

Since most of the areas were under sal and miscellaneous forests, the forest management plans for the three forest divisions which cover Koraput district, prescribe management of the forests under various working circles as mentioned below:

1. Sal Selection Working circle.
2. Sal Conversion Working circle.
3. Coppice Working circle.
4. Plantation Working circle.
5. Protection Working circle.
6. Selection Working circle for miscellaneous forests.
7. Minor Forest Produce Working Circle.
8. Bamboo(overlappling) Working Circle.

Sal selection working circle includes good quality sal forests capable of yielding large size commercial timber. Sal conversion working circle was created for conversion of uneven aged forests into more even crops by adopting periodic blocks. The conversion period was fixed as 100 years. Most of the areas requiring clear felling because of the shifting cultivation and other biotic interferences were included in the coppice working circle. Clear felled areas were closed for 6 years and protected from fire. Wherever degraded forests have a chance to recover and where clear felling can not be resorted to due to steep slopes and other silvicultural considerations, those are put under Protection -cum-Rehabilitation Working Circle.

Valuable miscellaneous forests were brought under Selection Working Circle for miscellaneous species.

2.5 WILD LIFE:

Forests of Koraput district are rich in variety of fauna but their number is reduced due to depradation by tribal people. Some of the important wild animals found in these forests are tiger, panther, gaur, nilgai, wild boar, deer, sambar, barking deer, sloth bear, wild buffaloes, mouse-deer and various species of monkeys.

Wild birds commonly seen are peacocks and other common indian birds like mynah, bulbul, parrots etc. Wildlife in this district needs strict protection particularly in tribal areas where it always suffers very badly due to dominant hunting instinct amongst the tribals. Wiith the strict enforcement of protection under the Wildlife Prreservation Act and creation of a few Wildlife Sanctuaries in this district the position of wild life has improved a lot.

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CHAPTER – III

RESOURCES SURVEY METHODOLOGY

3.Ø OBJECTIVES OF THE SURVEY:

The objectives of this resources survey were:

1. To collect information on distribution of forest with reference to general topography, altitude, aspect, slope, depth of soil etc.

2. To collect information on crop data including origin of crop, its composition, height, size, quantum of regeneration, injuries to crop, fire and grazing incidence, presence of weeds and grasses etc.

3. To collect information on bamboo occurrence such as species found, their density, quality, stage of flowering and regneration etc.

4. To estimate the areas falling under various land uses (in'green wash' areas shown on Survey of India maps).

5. To estimate the growing stock of trees and bamboos in areas having forest cover.

6. To determine the plantation potential of the land.

7 To focus attention on critical aspects about the condition of the forest for national planning.

3.1 AREA CONSIDERED FOR SURVEY:

For the purpose of this inventory, the forest areas falling under Koraput district were considered. For the purpose of deciding forest areas the Survey of India maps, preferably more recently published on 1:5Ø,ØØØ scale and in case of their non-availability, those on 1" = 1 mile scale were used for the survey. All those areas which are demarcated by double dotted forest boundaries on these maps having green wash within or outside such boundaries were taken as forest areas for undertaking this inventory.

3.2 INVENTORY DESIGN:

The inventory design adopted for this survey was evolved in consultation with the Central Statistical Organisation (Govt. of India). The design envisaged the survey of two randomly selected plots each of Ø.1 ha area, in each grid of 2½' x 2½' on 1:5Ø,ØØØ toposheets. One grid of 2½'x 2½' in this area roughly covers 2Ø sq.km. The sampling intensity of the inventory, thus, comes to Ø.1ha for 1Ø sq.km. area i.e. Ø.Ø1%. The method of marking the plot centre on the map within the grid is as follows:

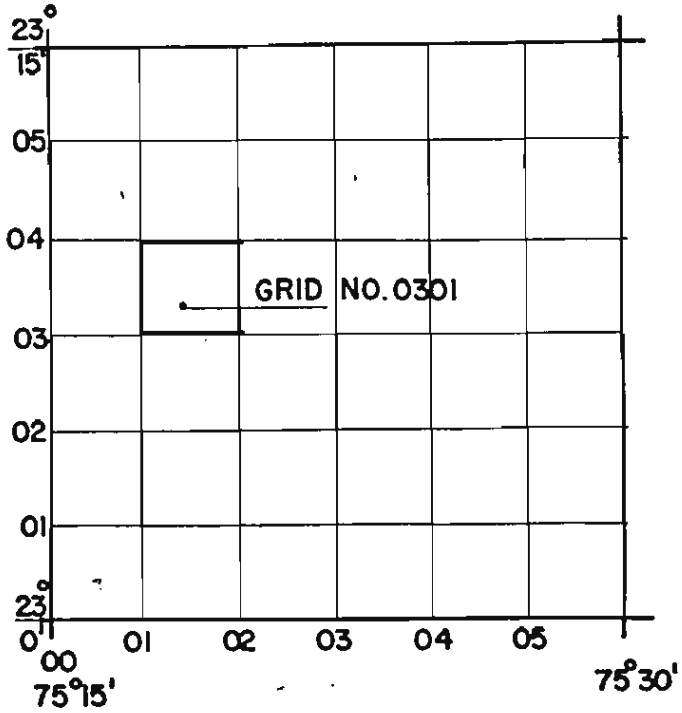
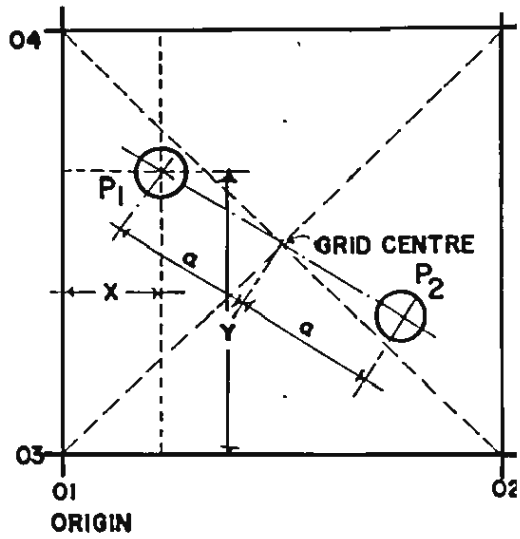


DIAGRAM-1
DIAGRAM SHOWING
IDENTIFICATION OF GRIDS
ON 1:50,000 OR 1:63,360
SCALE TOPOSHEETS

DIAGRAM-2
DIAGRAM SHOWING LAY-OUT
OF PLOT IN 2 1/2' X 2 1/2' GRID

'X' & 'Y' ARE THE DISTANCES ALONG
'X' & 'Y' AXES WITH SW CORNER AS
THE ORIGIN



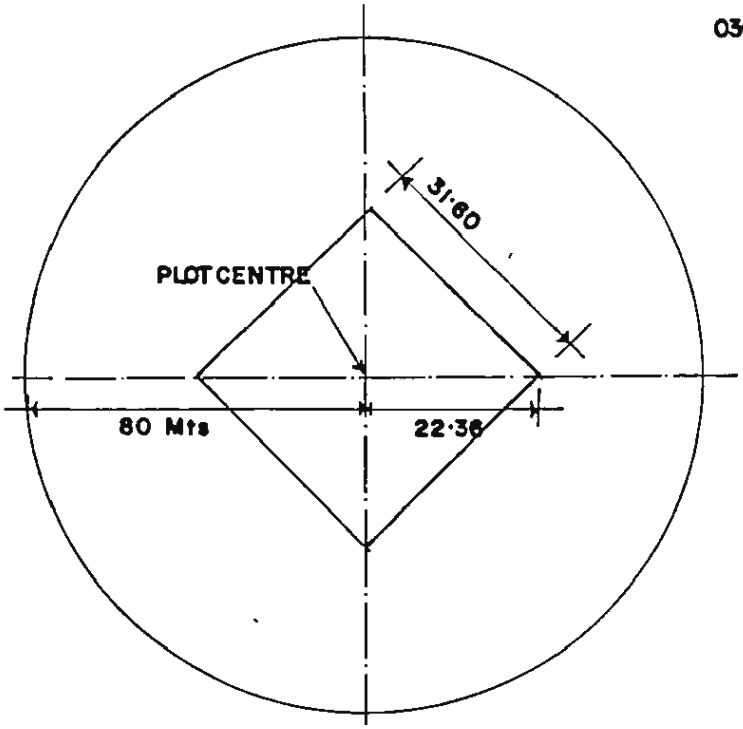


DIAGRAM-3
DIAGRAM SHOWING
LAY-OUT OF PLOT

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Two sides (X-axis & Y-axis) of a 2½' x 2½' grid are measured in millimeters. The length of these sides is divided by Ø.6324 mm (side of Ø.1 ha square plot) in case the map is on 1:5Ø,ØØØ scale or by Ø.499Ø mm in case the map is on 1:63,36Ø scale. The quotient obtained is rounded. Let the numbers for X-axis be X and that for Y -axis be Y. One set of three random numbers are selected from random numbers table. If the random number selected for X-axis is less than x then it is retained and if the random number is more than x then it is divided by x and the remainder is retained. Similar exercise has to be done for Y-axis also. The figures so obtained for X and Y axis are the coordinates of the centre of plot no.1 which has to be reckoned from south-west corner of the grid as the origin. The distance along X-axis is measured towards east and along Y-axis towards north. Thus, the location of plot 1 is marked on the map at the crossing of these two coordinates. Similar exercise has to be done for plot 1 of each grid. For marking the centre of the second plot of each grid, the plot centre of the first plot and the centre of the grid(2½'x2½')are joined and the line extended to the same distance in opposite direction beyond the grid centre. The point so reached is the plot centre of the second plot. The location of second plot is thus, linked with that of the first plot. The layout of 2½'x2½' grid and the plots is shown in the diagrams 1, 2, and 3. The plots so marked are to be visited only when they fall in forest areas i.e. the areas covered by green wash in the Survey of India toposheets on 1:5Ø,ØØØ scale or 1:63,36Ø scale.

3.3 LOCATION OF PLOT ON THE GROUND:

As stated earlier, the survey is confined to the forest areas only as decided on the basis of forest boundaries and green wash on the toposheets. The plot has to be visited only when it has fallen in some forest area. All the forested plots of the survey area, duly marked on the toposheets were allotted to different crews. The crews had to draw up their programme to halt at some convenient place in order to tackle maximum plots from that place. The plot on the toposheet has to be exactly located on the ground with the help of some conspicuous feature near by it. The exact location of the plot was made by calculating the bearing and distance of the plot from the reference point i.e. conspicuous feature identified on the map and exactly located on the ground. Further traversing of distance was made by following the compass bearing and measuring the distance to the plot. While traversing to the plot the magnetic declination found in the area, as indicated on the map, was also taken into account. Similarly while traversing the distance, slope corrections were also made in order to measure correct horizontal distance.

On reaching the plot centre, a square plot was laid out by taking distance of 22.36 meters in all the four directions (i.e.north, south, east and west) from the plot centre. Thus, an exact plot of Ø.1 ha area (having each side of 31.62 meters) was laid out horizontally after making corrections for slope with the help of Blumeliess hypsometer.

3.4 FORMAT FOR DATA COLLECTION:

After laying out the plot in the field, various data were collected in the following field forms in codified manner(except in Plot Approach Form)as described in the field manual in details which was issued to the crews for data collection purposes. This facilitated the transfer of data on punch cards, consistency checking of collected data as per field manual and finally processing of data on electronic computer at a later stage. The field forms used are:

1. Plot Approach Form,
2. Plot Description Form,
3. Plot Enumeration Form,
4. Sample Tree Form,
5. Bamboo Enumeration-cum-Clump Analysis Form,
6. Bamboo Enumeration Form for Non-clump Forming Bamboos.
7. Bamboo Weight Form.
8. Herbs and Shrubs Data Form.
9. Special Study Form for Volume and Utility Classes.

1. Plot Approach Form.

As the title suggests, this form is a record of approach to the plot centre from the field camp of a crew. It is filled in by the crew leader as he proceeds from his camp to some conspicuous feature existing near by the plot. The distance and bearing from the well defined reference point to the plot centre is also recorded on it. The exact location of plot centre i.e. bearing and distance from two trees to the plot centre is also mentioned together with the time of departure from camp, time taken in various studies and time of arrival in the camp. This form helps the check crew or any other person to relocate the plot easily whenever required. The data on this form is recorded in descriptive manner with a neatly drawn sketch showing the location of reference point, plot centre etc. whenever necessary.

2. Plot Description Form.

This form is designed for recording qualitative description of 2 ha area around the plot centre. The

information regarding administrative units, legal status, land-use, topography, soil, vegetation, bamboo, regeneration, biotic influences, accessibility, plantation potentiality etc. were recorded. The data was recorded in codified manner and was transferred to punch cards for further computer analysis. The stratification of area and classification of growing stock was done on the basis of these descriptions only.

3. Plot Enumeration Form.

In this form, all the trees having dia. 10 cm. over bark and above and all the bamboo clumps occuring in the 0.1 ha. sample plot were recorded by species. This was meant for computing total growing stock existing in all such plots and finally in whole of the survey area which were estimated on the basis of these plots.

4. Sample Tree Form.

Detailed information regarding the species, dia. at breast height (over bark), height, clear bole, bark thickness dominance, defects etc. of all trees occuring in NW quadrant of all the plots were recorded in this form. On the basis of these parameters, (i.e. height, dia. and clear bole), we got volume of the plots which further enabled us to estimate the total growing stock of the area falling under various strata.

5. Bamboo Enumeration-cum-Clump Analysis Form.

In this form, the data of individual culms occurring in the selected clumps bearing S.No. 1, 9, 17, 25, 33 etc. i.e. first and every eighth clump appearing in plot enumeration form was recorded. Thus, information about the age, soundness, size, condition etc. of the culms was obtained and analysed in various columns of this form. This information gave the position of total bamboo stock by clumps occurring under various conditions.

6. Bamboo Enumeration Form for Non-clump Forming Species.

This form was not used in this survey since non-clump forming bamboos were not found in the tract. The same are generally found in the North-eastern region of the country. The Mooli bamboo (Melocanna bambusoides) is the main species of this kind profusely found in Manipur & Tripura etc. of North-eastern region of the country.

7. Bamboo Weight Form.

This form was designed for collecting data to determine the green weight of bamboo of different species and sizes and further for establishing relationship between green and dry weight of a bamboo culm. The data was recorded in respect of two selected culms from each dia.class i.e. 2-5, 5-8 and 8+cm and the green weight of three 50 cm. long sub-samples, each taken from the bottom, the middle and the top portions of the culm. Further, these three samples were dried in air and finally in the oven in order to remove their moisture contents and to get their dry weights. This facilitated to establish relationship between the green and the dry weights to know the total growing stock of bamboo in terms of weight.

8. Herbs and Shrubs Data Form.

Data regarding shrubs & herbs occurring in 4 Sq.m. (2mx2m)area around the plot centre was recorded in this form.

9. Special Study Form for Volume and Utility Classes

In order to calculate cull and utility volumes under various dia. classes ranging from 10 cm. d.b.h. over bark and above for all imporatant species occurring in the tract, a special volume study was conducted and data on various aspects recorded in this form. Unfortunately these data could not be analysed and used in this report on account of dismantling of 332 System of N.F.C.C., F.R.I. Dehradun.

3.5 FIELD WORK:

Field work of Koraput district was completed between Nov. 82 to May 83 and Nov.83 to Jan. 84 (two field seasons) keeping the base camps respectively at Jeypore and Rayagada. Initially, six crews were deployed on this work each consisting of one Jr. Technical Assistant as Crew leader, one Deputy Ranger and two Fieldmen. One vehicle was provided between two parties to undertake the field work. Afterwards, from April 83 four more crews were deployed in this survey after completion of field work in Dhulia district of Maharashtra which was simultaneously undertaken by the Central Zone. In the second field season only eight crews were deployed for the inventory survey.

3.6 FIELD CHECKING:

During the course of field work, the checking of the surveyed plots was done by the Dy.Director incharge of the survey and the Sr.Technical Assistant (check crew). About 10% of the total number of plots tackled by various crews were checked and mistakes, if any, found during the checking were removed from the field forms.

Contents

3.7 MAPS:

The maps covering the survey area used during the inventory work, their scale and year of survey (on the basis of which these maps were prepared by Survey of India) and no. of plots falling in each are given below:-

List of Mapsheets Covering Koraput District.

S.No.	Mapsheet No.	Scale	Year of Survey.	No. of plots
1.	64 H/16	1:50,000	1974-75	7
2.	64 L/4	"	1978-79	2
3.	65 E/13	"	1937-38	14
4.	65 F/8	"	1974-75	2
5.	65 F/11	"	1974-75	9
6.	65 F/12	1=1 mile	1929-30	21
7.	65 F/14	1:50,000	1974-75	7
8.	65 F/15	1=1 mile	1929-30	31
9.	65 F/16	1=1 mile	1929-30	32
10.	65 G/5	"	1930-31	7
11.	65 G/9	"	1928-29	30
12.	65 G/13	1:50,000	1974-75	10
13.	65 I/1	"	1967-68	35
14.	65 I/2	"	1966-67	27
15.	65 I/3	"	1975-76	6
16.	65 I/4	"	1967-68	3
17.	65 I/5	"	1967-68	30
18.	65 I/6	"	1967-68	30
19.	65 I/7	"	1968-69	24
20.	65 I/8	"	1968-69	18
21.	65 I/9	"	1967-68	6
22.	65 I/10	"	1967-68	16
23.	65 I/11	"	1968-69	21
24.	65 I/12	"	1968-69	12
25.	65 I/15	"	1968-69	6
26.	65 I/16	"	1968-69	33
27.	65 J/1	"	1972-73	18
28.	65 J/2	"	1932-33	40
29.	65 J/3	1=1 mile	1930-31	60
30.	65 J/4	1=1 mile	1930-32	59
31.	65 J/5	1=1 mile	1932-33	22
32.	65 J/6	1=1 mile	1932-33	40
33.	65 J/7	1=1 mile	1930-32	23
34.	65 J/8	1:50,000	1978-79	12
35.	65 J/9	1=1 mile	1931-32	24
36.	65 J/10	1"=1 mile	1931-32	10
37.	65 J/11	1"=1 mile	1931-32	10
38.	65 J/12	1"=1 mile	1931-32	-
39.	65 J/13	1"=1 mile	1931-32	4
40.	65 J/14	1"=1 mile	1931-32	13
41.	65 J/15	1"=1 mile	1931-32	7
42.	65 M/2	1"=1 mile	1936-37	5

43.	65 M/3	1"=1 mile	1935-36	58
44.	65 M/4	1"=1 mile	1935-36	45
45.	65 M/5	1"=1 mile	1936-37	13
46.	65 M/6	1"=1 mile	1936-37	35
47.	65 M/7	1"=1 mile	1935-36	40
48.	65 M/8	1"=1 mile	1935-36	47
49.	65 M/9	1"=1 mile	1935-36	9
50.	65 M/10	1"=1 mile	1935-36	39
51.	65 M/11	1"=1 mile	1935-36	41
52.	65 M/12	1"=1 mile	1935-36	29
53.	65 M/14	1"=1 mile	1935-36	43
54.	65 M/15	1"=1 mile	1935-36	54
55.	65 M/16	1"=1 mile	1935-36	29
56.	65 N/1	1"=1 mile	1933-34	55
57.	65 N/2	1"=1 mile	1933-34	14
58.	65 N/3	1"=1 mile	1933-34	6
59.	65 N/5	1:50,000	1976-77	7
60.	74 A/3	1:50,000	1975-76	3
61.	74 A/4	1:50,000	1975-76	1
			Total ;	1354

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CHAPTER - IV

DATA PROCESSING.

4.Ø SAMPLING DESIGN:

Grids were marked at 2½'x 2½' interval in green wash areas of Survey of India mapsheets relating to the area falling in Koraput district. Two sample plots were laid in each grid, one at random and other linked to the first in the opposite quadrant at an equal distance from the grid centre. The plots were square in shape having an area of Ø.1 ha each.

4.1 DATA:

The basic data of inventory was collected in Plot description form, Plot enumeration form, Sample tree form, Bamboo enumeration form and Bamboo weight form. The field forms were precoded so that the data are transferred on to the card directly. There were, in all 4686 field forms which involved punching of the following number of card design.

Card design	No. of cards.
1. Plot description form	1354
2. Plot enumeration form	2844
3. Sample tree form	4627
4. Bamboo enumeration form	623
5. Bamboo weight form	275
Total	19723

4.2 DATA PROCESSING:

The field forms received in the Data Processing Unit were checked with the list supplied by the zone. Entries of the field forms were made in the register regarding the number of field forms relating to each map sheet, grid and plot. The total number of cards to be punched in each card design were also estimated and indicated in the register for future reference. Job number, card design and left hand zeros wherever missing were filled up in the field forms.

Each entry of the field form was checked for consistency in the data. The main checks applied were the range check for codes and logical check for inter-relation between the entries for two and more fields.

Listing taken out of the data loads on tape/disk were checked to ensure complete loading and proper sequence of data.

Sample statistics were calculated and checked with the computer output to see if the calculation on computer are correct. These involved volume of enumerated tree from local volume equation, plot volume and standard error etc. Immediate computer output were checked for consistency and relevance of the results. Tables were also prepared mannually.

II. Processing on Unit Record Machines.

The data of field forms was punched on cards using card punching machine. The punched data were verified to detect punching mistakes with the help of card verifier. The card were then sorted for proper input to the computer.

III. Processing on Electronic Computer,

The punched data on card after verification and sorting were loaded on magnetic tapes/disk and listings of the loaded data taken out to check if complete data have been loaded in proper sequence.

Volume of each enumerated tree was estimated from the local volume equation used for the species. Contribution of the volume of each enumerated tree towards per hectare volume was derived and a tree/plot volume file created for further processing. Using the tree/plot volume file, growing stock tables were prepared and standard error of the estimate of growing stock in each forest type calculated.

The data of this survey was mainly processed on 332 system of N.F.C.C., F.R.I. The computer has the following configuration.

1.	Memory	- 256K bytes
2.	Card Reader	- 1
3.	Tape drives	- 2
4.	Disk drives	- 2
5.	Line printer	- 1

4.3 AREA:

Area figures were not available from interpreted aerial photographs. The map sheets of geographical area and forested area covered in Koraput district were also supplied by the zonal office and were taken as correct and the weightage of each plot was calculated on the basis of total plots falling in the total geographical area.

The total forested area was calculated on the above basis and classified by land use class and given in Table 5.1T.

The area falling in land-use dense tree forest, open forest, young plantation of forestry species and young crop of natural and artificial regeneration was considered

as tree vegetation cover and was classified by crop composition (Forest types) classes on the basis of the number of sample plots in each separate estimate for three crop compositions viz; Teak, Sal and Miscellaneous as given in Table 5.2 T. The area under each crop composition (Forest type) was further classified by Topography (Table 5.3 T), Slope class (Table 5.4T), Soil depth(Table 5.5T), Top height (Table 5.6T), Size class (Table 5.7T), Canopy layer (Table 5.8 T), Govt. forest land utilisation pattern(Table 5.9 T)& Estimated plantable area in Govt. forest land (Table 5.10 T).

However, it may be noted that the area estimates are based on ground observations i.e. on a limited number of sample plots and carry a large sampling error. Therefore, the areas under different categories given in tables described above may be considered as indicative only and used with due caution.

4.4 VOLUME ESTIMATION:

4.4.1 GENERAL VOLUME EQUATIONS;

Under bark volume of each felled tree was computed to develop the general volume equation. After discarding the abnormal tree (if any) regression equations were fitted, taking volume or its transformal form as dependent variable and diameter height or their transformed forms as in independent variable.

The following types of regression functions were tried.

1. $V = a + bD^2H$
2. $V = a + bD + cD^2H$
3. $V = a + bH + cD^2H$
4. $\text{Log } V = a + b\text{Log } D + C\text{log } H.$
5. $V/D^2 H = a + b/D^2H$
6. $V = a + bD^2 + cD^2 H$
7. $V = a + bD^2H + c(D^2H)^2$
8. $V = a + b/D^2H + cD^2H$

After a careful scrutiny of the result, the following equations were selected, considering

(a) the standard error of estimate
(b) the multiple determinant co-efficient,
(c) the applicability of the equation in the entire range of data.

1. Adina cordifolia (39)

$$V = -0.117924 + 1.041595\ D + 0.256368\ D^2H$$

2. Anogeissus latifolia (76)

$$V = -0.009211 + 0.500013\ D^2H - 0.022211(D^2H)^2$$

3. Bombax ceiba (28)

$$V/D^2H = 0.311630 - 0.004022/D^2H$$

or $$V = -0.004022 + 0.311630\ D^2H$$

4. Boswellia serrata (34)

$$V = 0.004783 + 0.301536D^2H + 0.021818(D^2H)^2$$

5. Bridelia retusa (58)

$$\text{Log } V = 0.794669 + 2.315417 \text{ Log } D + 0.534416 \text{ Log } H.$$

6. Cleistanthus collinus(35)

$$\text{Log } V = 0.594183 + 2.267380 \text{ Log } D + 0.562626 \text{ Log } H$$

7. Dalbergia latifolia (39)

$$V = 0.009238 + 0.376711\ D^2H + 0.016492\ (D^2H)^2$$

8. Diospyros melanoxylon (67)

$$V/D^2H = 0.445716 - 0.007106/D^2H - 0.005929D^2H$$

or $$V = -0.007106 + 0.445716D^2H - 0.005929\ (D^2H)^2$$

9. Garuga pinnata (61)

$$\text{Log } V = 0.262489 + 2.277\ 143 \text{ Log } D + 0.686867 \text{ Log } H$$

10. Lagerstroemia parviflora (45)

$$V = 0.009491 + 0.352882D^2H + 0.015283(D^2H)^2$$

11. Lannea coromandelica (65)

$$V = -0.055367 + 0.422394\ D + 0.338742\ D^2H$$

12. Madhuca latifolia (32)

$$V = 0.001526 + 0.391284\ D^2H$$

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13. Mitragyna parvifolia (40)

$$\text{Log } V = -0.097172 + 2.050903 \text{ Log } D + 0.678458 \text{ Log } H$$

14. Ougeinia dalbergioides (39)

$$V = 0.00398 + 0.384313\ D^2H$$

15. Pterocarpus marsupium (69)

$$V = -0.014390 + 1.332840\ D^2 + 0.328477\ D^2H$$

16. Shorea robusta(77)

$$V/D^2H = 0.338574 - 0.001775/D^2H \quad \text{or}$$

$$V = -0.001775 + 0.338574\ D^2H$$

17. Syzygium cumini(41)

$$\text{Log } V = 0.842866 + 2.412125 \text{ Log } D + 0.521065 \text{ Log } H$$

18. Terminalia belerica (31)

$$V = -0.093639 + 7.384277\ D^2 + 0.070648\ D^2H$$

19. Terminalia crenulata (98)

$$V/D^2H = 0.361631 + 0.001254/D^2H - 0.001864D^2H$$

or $$V = 0.001254 + 0.361631\ D^2H - 0.001864\ (D^2H)$$

20. Rest of species (77)

$$V = -0.002909 + 0.376517\ D^2H$$

4.4.2 SAMPLE TREE VOLUME;

Sample tree volumes are obtained by substituting height and diameter of sample trees in the general volume equations of the species presented above and a sample tree volume file was created.

4.5 LOCAL VOLUME EQUATION;

The estimated sample tree volume or its transformed form is considered as dependent variable and the diameter or its transformed form as an independent variable for the regression.

The following types of regression functions were verified for each species.

$$V = a + b\ D^2$$

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

$$V = a + bD = cD^2 + dD^3$$

$$V = a + b\sqrt{D} + cD^2$$

$$\sqrt{V} = a + bD$$

$$\sqrt{V} = a + bD + c\ D$$

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

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

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

One of these equations is selected for each species on the basis of

(a) Standard error of the estimate,

(b) Coefficient of determinator,

(c) Applicability of the equation in the entire range of data.

The following local volume equations were selected on the above criteria for different species as under.

Local Volume Equations:

1. Adina cordifolia (32)

$$V/D^2 = 7.16812 + Ø.19669/D - Ø.Ø85Ø7/D^2$$

or $V = - Ø.Ø85Ø7 + Ø.19669\ D + 7.16812\ D^2$

2. Anogeissus latifolia (357)

$$V = Ø.13928 - 2.87Ø67\ D + 2Ø.224Ø4\ D^2 - 13.8Ø572.D^3$$

3. Bombax ceiba (17)

$$V = Ø.Ø2834 + 4.68381\ D^2$$

4. Boswellia serrata (29)

$$V = Ø.36432 - 1.32768\sqrt{D} + 9.48471\ D^2$$

5. Bridellia retusa (81)

$$\sqrt{V} = Ø.1162Ø + 4.12711\ D - 1.Ø85Ø8\sqrt{D}$$

6. - Cleistantus collinus (350) †

$$\sqrt{V} = 0.12956 + 3.78190\ D - 1.04671\ \sqrt{D}$$

7. Dalbergia latifolia (27)

$$V/D^2 = -2.56050 - 0.00965/D^2 + 0.58546/D + 24.34215\ D$$

or

$$V = -0.00965 + 0.58546\ D - 2.56050\ D^2 + 24.34215\ D^3$$

8. Diospyros melanoxylon (168)

$$\sqrt{V} = 0.06728 + 4.06351\ D - 0.99816\ \sqrt{D}$$

9. Garuga pinnata (77)

$$V/D^2 = -5.53172 - 0.09144/D^2 + 1.48588/D + 24.04851\ D$$

or

$$V = -0.09144 + 1.48588D - 5.53172D^2 + 24.04851\ D^3$$

10. Lagerstroemia parviflora (89)

$$V/D^2 = 9.28416 - 1.25923/D + 0.07199/D^2$$ or

$$V = 0.07199 - 1.25923\ D + 9.28416\ D^2$$

11. Lannea coromandelica (124)

$$V/D^2 = 9.54478 - 0.01071/D^2 - 0.66528/D - 4.58876\ D$$

or

$$V = -0.01071 - 0.66528\ D + 9.54478\ D^2 - 4.58876\ D^3$$

12. Madhuca latifolia (66)

$$V = 0.10423 - 1.38429\ D + 8.39379\ D^2$$

13. Mitragyna parvifolia (28)

$$V = 0.08444 - 1.26801\ D + 8.75274\ D^2$$

14. Ougeinia dalbergioides (69)

$$\sqrt{V} = 0.03456 + 3.81921\ D - 0.80884\ \sqrt{D}$$

15. Pterocarpus marsupium (184)

$$\sqrt{V} = -0.16276 + 2.82002\ D + 0.04034\ \sqrt{D}$$

16. Shorea robusta (599)

$$\sqrt{V} = 0.19994 + 4.57179\ D - 1.56823\sqrt{D}$$

17. Syzygium cumini (85)

$$\sqrt{V} = 0.30706 + 5.12731\ D - 2.09870\ \sqrt{D}$$

18. Terminalia belerica (40)

$$V = -0.14823 + 2.44138\ D - 6.86434\ D^2 + 18.05444\ D^3$$

19. Terminalia crenulata (289)

$$V = 0.05061 - 1.11994\ D + 8.77839\ D^2$$

20. Rest of species (1786)

$$\sqrt{V} = 0.06063 + 3.43666\ D - 0.75571\ \sqrt{D}$$

The figures in the brackets against the species is the number of observations on which the regression equation is based.

4.5.1 ENUMERATED TREE VOLUME;

An estimate of the volume of each enumerated tree in a plot was obtained by substituting the breast height over bark diameter of the tree in the local volume equation selected for the species. The enumerated tree volumes were converted to per hectare volume and stored on a magnetic tape/disk in a tree/plot volume file form together with species code, Tree diameter, parameters of the plot description form, per hectare stems and volume in the plot. This file helped in the tabulation of results by species diameter class for different forest types.

4.5.2 PLOT VOLUME;

The estimated volume of each enumerated tree when added up over the whole plot volume. These were also stored in tree/plot volume file. The plot volumes in the form of per hectare helped to estimate per hectare volume in different classes in table computer output.

Average volumes per hectare were calculated in different classes of topography, slope, soil depth, canopy layer, top height, and size class under each crop composition. These are given in computer output tables. The plot volumes were also used to estimate the sampling error of the growing stock for each forest type.

4.5.3 STAND TABLES;

The elements of the tree/plot volume were utilized to classify the trees. Estimate of number of stems per hectare and total stems by species and diameter classes were obtained from tree/plot volume file for each forest type and are given as tables 6.1T(A) & (B) to 6.3T (A) & (B).

The stems per hectare and total stems over all forest type were also derived; these are given as table 6.4T.

4.5.4 STOCK TABLES;

Estimates of volume per hectare and total volume by species and diameter classes were obtained from tree/plot volume file for each forest type and are given as tables 6.5T (A) & (B) to 6.7T (A) & (B).

Estimates of volume per hectare and total volume by species and diameter over all forest types were also calculated from tree/plot volume file. This is given as table 6.8T.

4.6 SAMPLING ERROR:

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

Let = n = Total number of cluster (grids) in the sample.

Yi = The total of per hectare volume in the ith cluster.

Xi = Number of plots in ith cluster

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

= Average number of plots per cluster.

$$\hat{R} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1} x_i}$$

= Estimate of average volume per hectare over all clusters.

Estimate of variance of $\hat{R}$

$$\hat{V}\hat{R} = \frac{N-n}{N \times n \times X^{-2}} \sum_{i=1}^{n} \frac{(Yi-\hat{R}\,Xi)^2}{n-1}$$

or

$$= \frac{1}{n(n-1)\,X^{-2}} \sum_{i=1}^{n} \left(y_i - \hat{R}\,x_i\right)^2$$

(Ignoring the finite population correction factor).

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

Estimate of the standard error of R

$$SE = \sqrt{\hat{V}\ \hat{R}}$$

$$SE\% = \frac{SE}{R} \times 100$$

Standard errors has been estimated for the growing stock and area in each forest type. This is given in table 6.9T.

4.7 BAMBOO:

4.7.1 BAMBOO AREA;

The occurrence of bamboo species was examined in an area of about 2 ha around the plot centre and its density and quality recorded in the Plot description form. The area under bamboo was estimated from this information by giving proper weightage to the plot. Area under each quality of bamboo was also estimated from the number of plots falling in each quality. It is given in para 5.15. Dendrocalamus strictus mainly occurs in the area.

4.7.2 BAMBOO CLUMPS PER HECTARE;

The bamboo clumps occurring in each sample plot were enumerated by species and diameter in plot enumeration form. This information was utilized to estimate the number of clumps per hectare by species and clump size classes (diameter). Since quality is recorded in Plot description form only, this information was merged with the Plot enumeration form to estimate the number of clumps per hectare in each quality and clump size class. It is given in table 7.1T & 7.2T.

4.7.3 CULMS PER CLUMP;

Bamboo enumeration form contains the information of number of culms by age (current year, one to two years and over two years) and soundness (green sound, green damaged, dry sound, dry damaged and decayed). The culms were further classified by culm diameter class (2 - 5 cm, 5 - 8 cm and 8 cm and above). This information was used to estimate the number of culms per clump in different classes. It is given in table 7.3T.

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4.7.4 CULMS PER HECTARE;

From the estimate of the number of clumps per hectare and the number of culms per clump, the estimate of number of culms per hectare was obtained under different classes of each species. It is given table in 7.4T.

4.7.5 TOTAL NUMBER OF CULMS;

The estimates of the number of culms per hectare and the area provided an estimate of the total number of bamboo culms under different classes. It is given in table 7.5T.

4.7.6 BAMBOO WEIGHT;

Weight of freshly felled culms of diameter 2-5 cm, 5-8 cm and 8 cm and above are given in Bamboo weight form together with diameter, total height, utilisable height up to 1 cm and upto 2 cm top diameter. This information was used to estimate the green weight of bamboo culms by culm size class (cm). These weights when applied to the number of culms per hectare provided per hectare green tonnage of bamboo. This is given in tables 7.6T to 7.10T.

The following factors were used to obtain green equivalent weight of different categories of culms.

Dry Sound - 1.0

Dry damage - 1.0

Green Sound - 1.0

Green damaged -0.5

Decayed - 0.0

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CHAPTER - V

INVENTORY RESULTS - AREA

5.Ø AREA:

The forest resources of Koraput district have been estimated on the basis of data collected from 1354 randomly selected sample plots falling in all kinds of forest lands as determined from green wash and forest boundaries etc. on Survey of India toposheets. Various parameters have been calculated based on the number of plots falling in each category and the data collected from such sample plots during the course of field work. Area in each category was calculated by finding out the number of plots falling in that category out of the total number of plots distributed over the entire forest area of Koraput district and by giving due weightage in terms of area to each plot. Weightage for each sample plot works out to be approximately 1Ø sq.km.

5.1 FOREST AREA AND LAND USES:

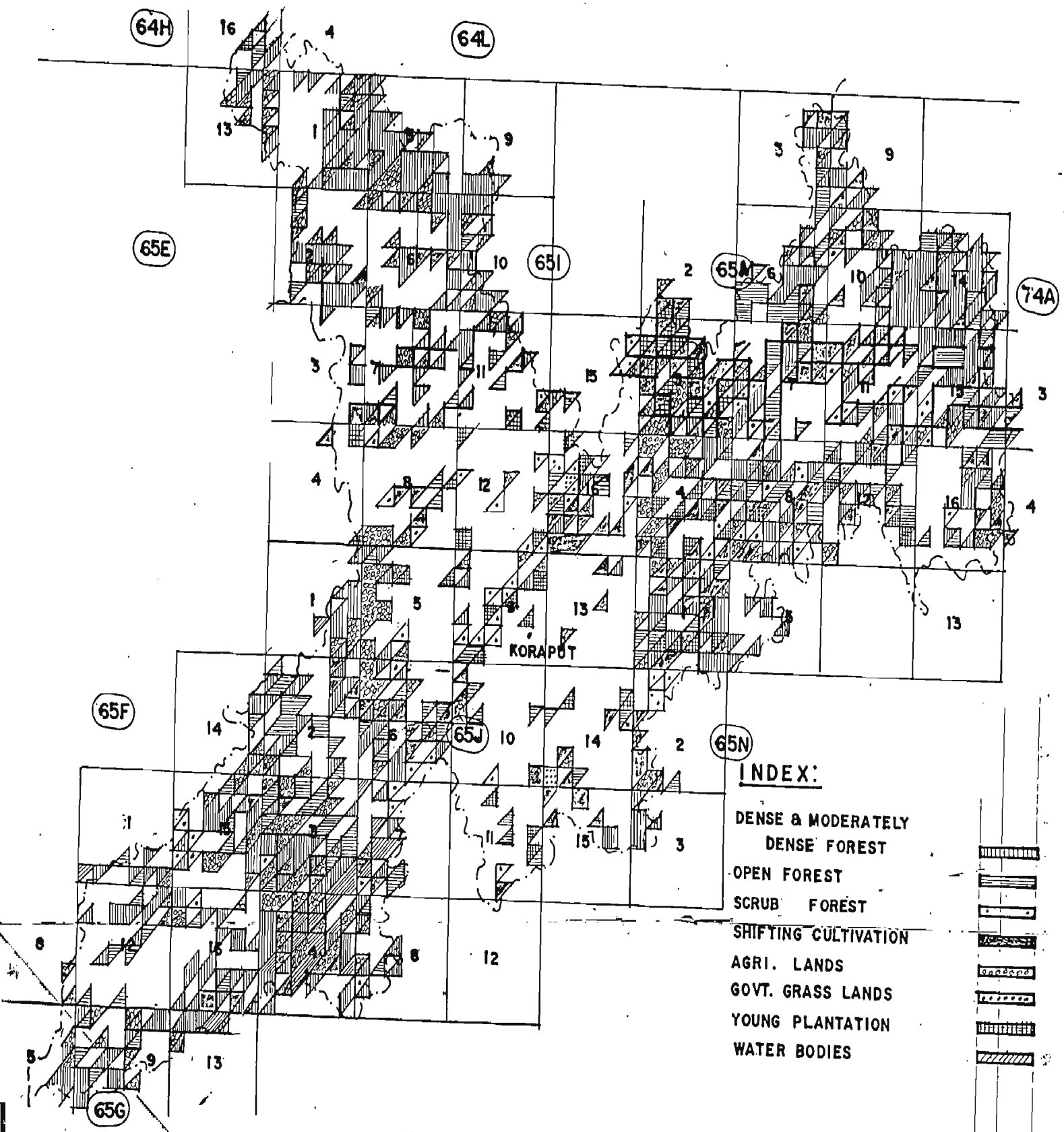
On the basis of random lay out of plots on toposheets, 1354 forested sample plots were selected and visited. These plots fell in Govt. forest land as well as in private forest lands which could be confirmed from field visits only. Table no. 5.1 T gives the picture of how the forest land of Koraput district (including private forest land) is being used. It indicates that about 5Ø.66% of forest land is under tree vegetation out of which 36% is under dense and moderately dense forest having canopy density above 3Ø% and 15% is under open forest having canopy density 5to3Ø%. In all 92ØØ sq.km. (68%) of forest land is under some vegetation including tree forest, young plantations, bamboo brakes, scrubs(with density below 5%),young crop of natural or artificial regeneration etc. The inaccessible terrain is also included here as it has been observed that such terrain does have some kind of vegetation. The scrub forests which occupy 5% of the forest land consist of inferiortree growth mainly of small stunted trees with canopy density less than 5% associated with bushy growth. Remaining 434Ø sq.km. (32%) of forest land is devoid of any vegetation. Such lands are occupied by shifting cultivation (1Ø.41%), grass lands,barren lands, agricultural lands with or without trees in surround, habitation, water bodies etc. These lands are being used for non-forestry purposes. The areas under shifting cultivation go on changing their position every year. The local people, particularly tribals, clear fell and burn the forest, raise agricultural crops for one or two seasons and then leave the locality. They subsequently select new area for this operation. Shifting cultivation (podu) is a major problem faced by the forest department in this district due to which forest wealth is depleting at a very fast rate. Encroachment of forest land for permanent

Contents

NO -5.1M

LANDUSE MAP OF KORAPUT DISTRICT

SCALE : 1.100,0000



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cultivation and habitation was also noticed over 18.61% of forest area. Some of these forest lands have been allotted to the encroachers as per the policy of State Govt.'s but some are still occupied by the encroachers illegally. The areas falling outside the forest boundary or the green wash in the Survey of India toposheets were not taken into account for the purpose of this survey.

Table No. 5.1 T

Distribution of total forest by land use classes

S.No.	Land use	No. of sample plots.	Area in sq.km.	Percentage
1.	Tree forest	686	6860.0	50.66
2.	Young plantation	4	40.0	0.30
3.	Bamboo brakes	3	30.0	0.22
4.	Scrub forest	69	690.0	5.10
5.	Shifting cultivation	141	1410.0	10.41
6.	Grass lands	1	10.0	0.07
7.	Barren lands	4	40.0	0.30
8.	Agri. land with & without trees and non-forestry plantations	252	2520.0	18.61
9.	Habitation	13	130.0	0.96
10.	Water bodies	21	210.0	1.55
11.	Young crop of natural or artificial regeneration	95	950.0	7.02
12.	Other lands	2	20.0	0.15
13.	Inaccessible	63	630.0	4.65
		1354	13540.0	100%

A map no. 5.1 M, representing the distribution of plots falling under various categories of land uses has been prepared and appended as page no. 36. The map shows that the dense and moderately dense forest areas are confined to northern and north-eastern parts of the district. The south-eastern part of the district also has some patches of dense forest. The central part mainly has agricultural land with open and poor forest vegetation.

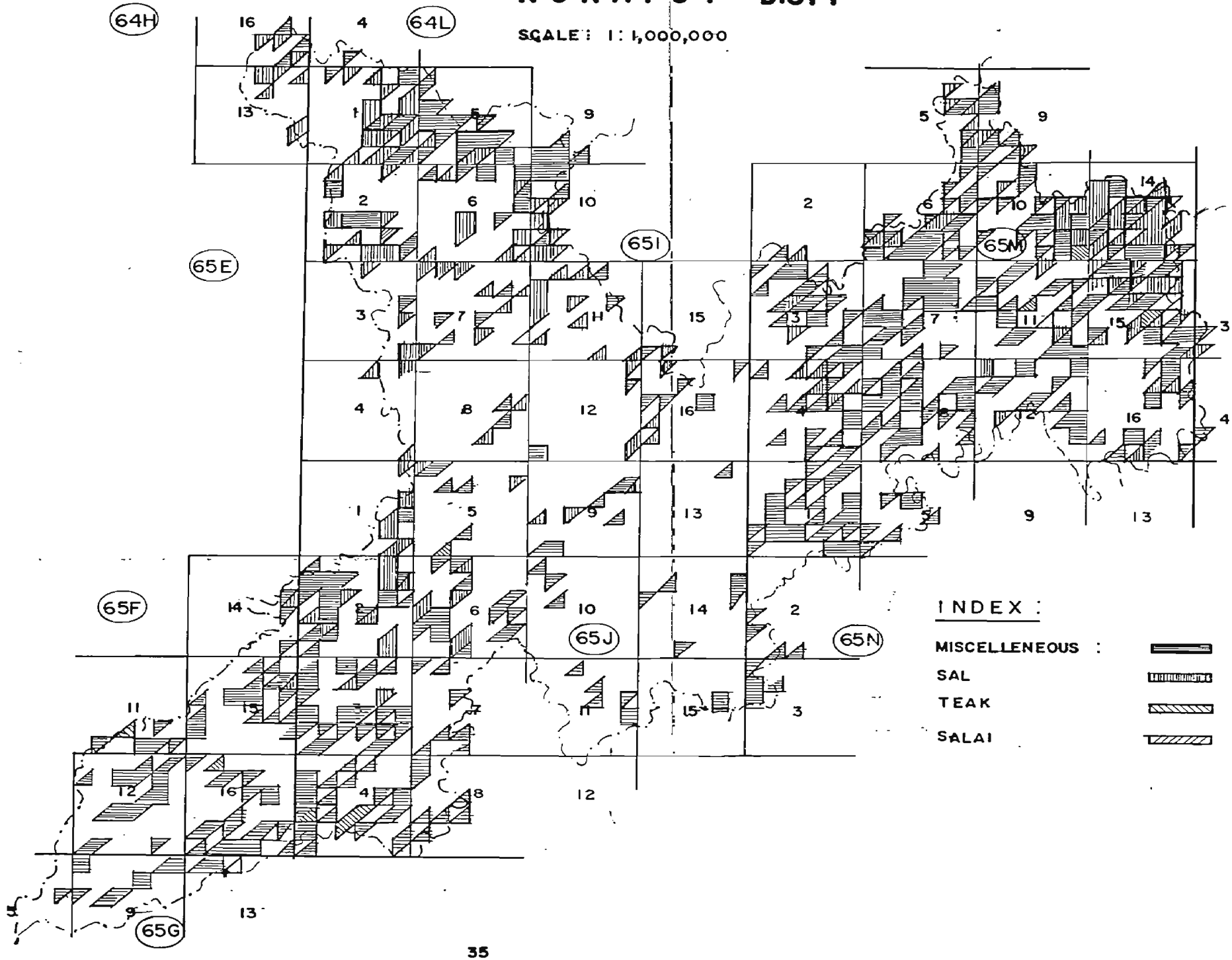
5.2 AREA BY CROP COMPOSITIONS:

Table no. 5.2. T gives picture of tree forest under various crops/forest types. Out of 9200 sq.km. of vegetated area of the total forest land (13540 sq.km.), the tree forests i.e. dense forest, moderately dense forest, open forest, young plantation and young crop of natural or artificial regeneration together constitute 58% of the area

Contents

CROP COMPOSITION MAP OF KORAPUT DISTT

SCALE : 1 : 1,000,000



or 785Ø sq.km. These forests were classified under different crop compositions i.e. Teak forest, Sal forest and Miscellaneous forest. The table reveals that that major part of tree forest (72.23%) is under miscellaneous species having no dominance of a particular species to form its own forest type except sal which constitutes 26.62% of the forest. Teak has very little contribution i.e. just 1.15% of the total tree forest which is quite insignificant.

Table No. 5.2 T

Break up of the vegetated tree forest area by crop compositions

S.No.	Crop composition	No. of plots	Area in sq.km.	Percentage
1.	Teak	9	9Ø.Ø	1.15
2.	Sal	2Ø9	2Ø9Ø.Ø	26.62
3.	Miscellaneous	567	567Ø.Ø	72.23
		785	785Ø.Ø	1ØØ%

A map no. 5.2M was prepared on the basis of sample plots falling in various forest types during the course of field work. The map indicates that the north-eastern and western parts of the district bordering Ganjam district of Orissa and Bastar district of Madhya Pradesh respectively have sal forests. These two bordering districts have sal over fairly large areas. Rest of the forest areas have no dominance of a particular species to form its own forest type.

5.3 AREA BY TOPOGRAPHY AND CROP COMPOSITIONS:

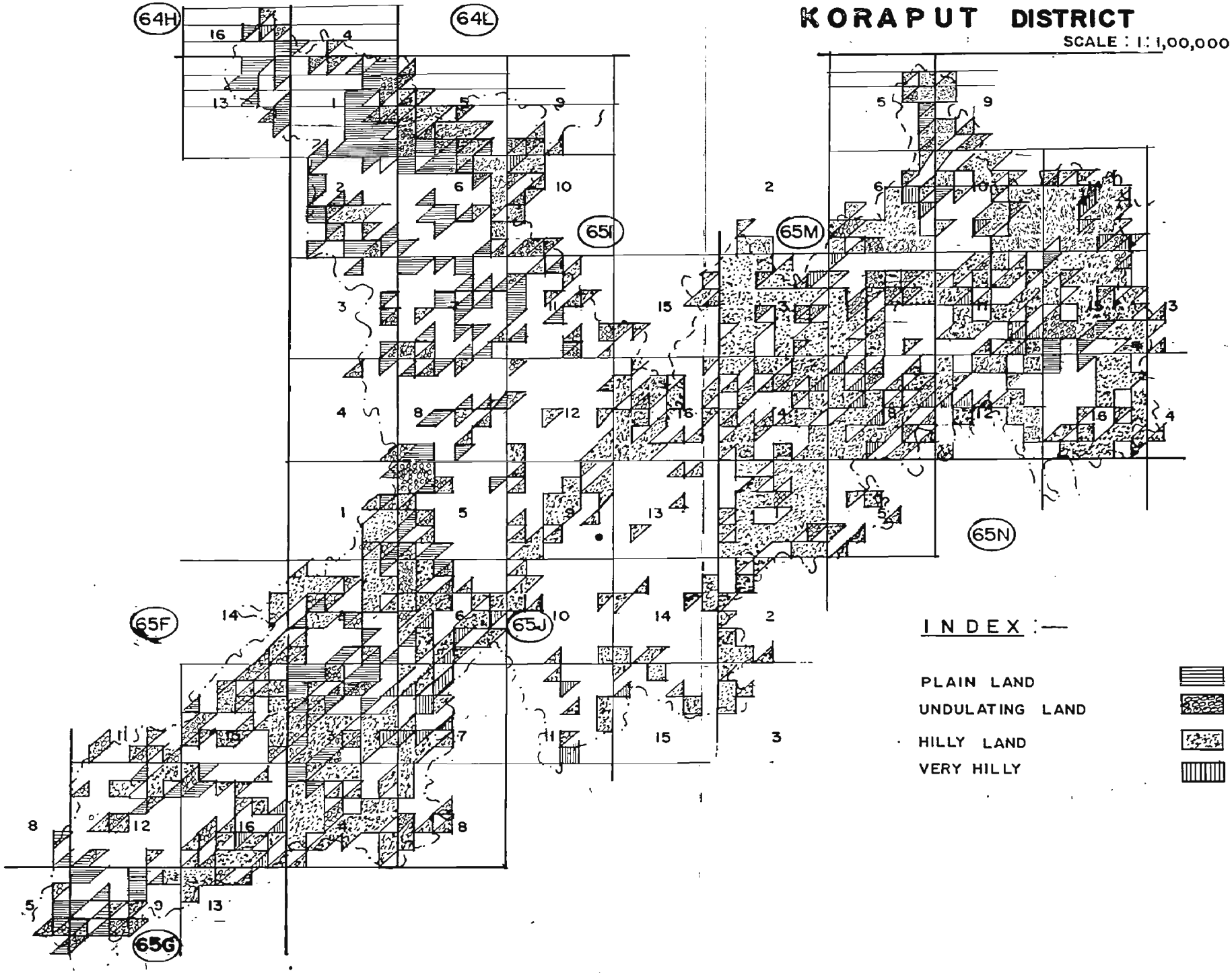
Table no.5.3T shows distribution of vegetated forest areas under different forest types by topographic classes. It indicates that major part of the vegetation mainly exists on hilly terrain. However, forests are sparingly present on undulating lands also. The flat lands have very little vegetation due to the pressure of habitation subjecting the forests to excessive felling and biotic interference. Such forest areas lands are being converted to agricultural lands day by day.

Contents

No.5·3 M

TOPOGRAPHY CLASSES MAP OF KORAPUT DISTRICT

SCALE : 1: 1,00,000



Contents

Table No. 5.3 T

Break up of vegetated forest area under different crop compositions by topographic classes (area in sq.km.)

	Flat	Gently rolling	Hilly	Very hilly	Total
Teak	20.0 (2)	10.0 (1)	60.0 (6)	-	90.0 (9)
Sal	670.0 (67)	380.0 (38)	1010.0 (101)	30.0 (3)	2090.0 (209)
Misc.	540.0 (54)	610.0 (61)	4350.0 (435)	170.0 (17)	5670.0 (567)

A map no. 5.3M based on table no.5.3T shows the distribution of vegetated plots by topographic classes in whole of the district. It shows that forest vegetation is mainly present in eastern part of the district which is hilly. The central and western parts are plain lands with some undulation which have very little forest vegetation.

5.4 AREA BY CROP COMPOSITIONS AND SLOPE PERCENTAGE:

Table no. 5.4T indicates the distribution of vegetated areas by different forest types and slope classes. It indicates that the vegetation mainly (91%) exists on moderate slopes i.e. slopes less than 60%. Teak and Sal forests mostly grow on lower slopes (upto 60%) whereas Miscellaneous forests are found over higher slopes (above 60%) also. The forest areas of Koraput district have mainly moderate slopes where most of the vegetation exists. Map no. 5.4M indicates the localities of various slope classes in the forest areas of Koraput district.

Table No. 5.4 T

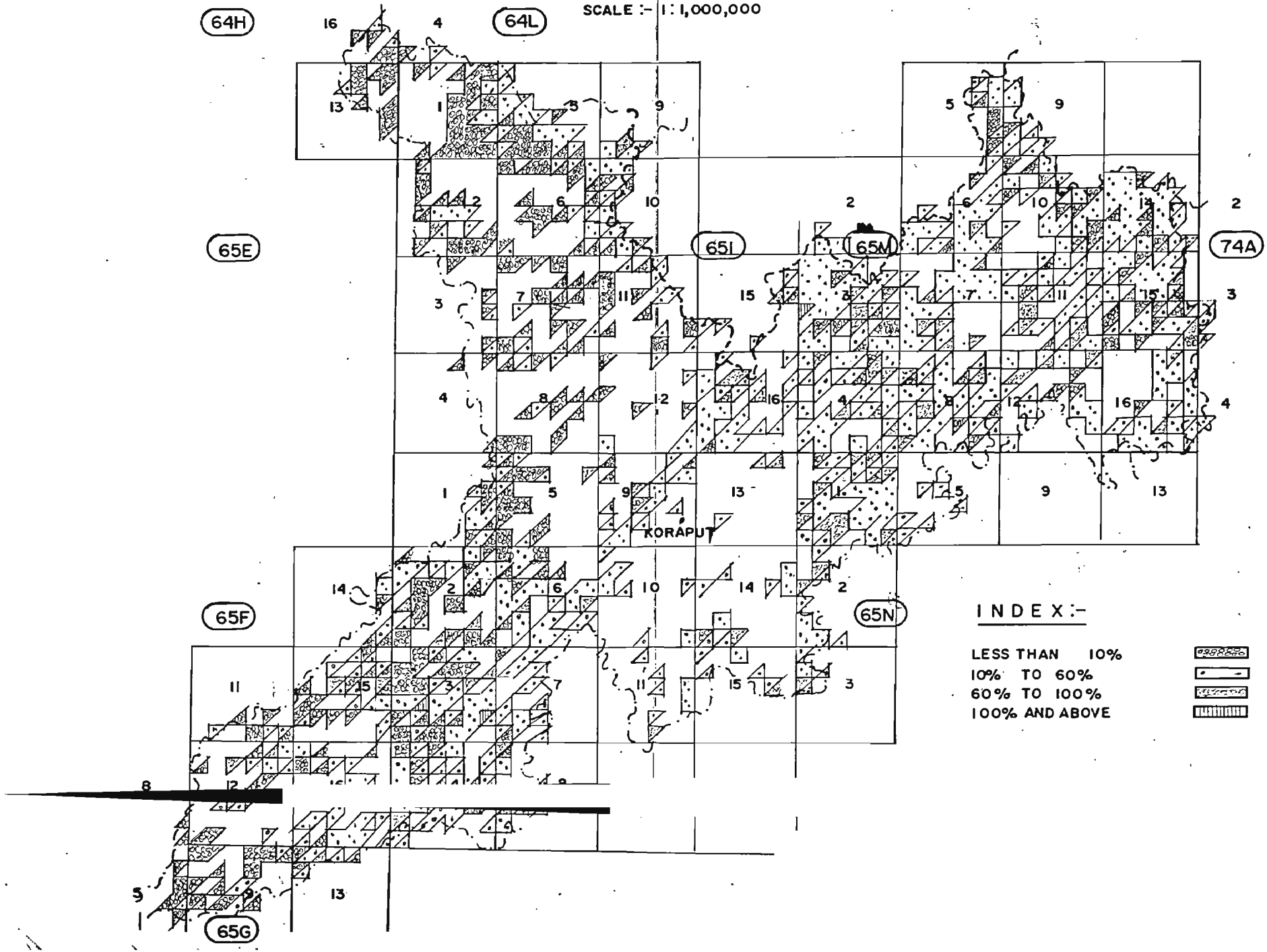
Break up of the vegetated forest area under different crop compositions by slope classes (area in sq.km.)

	Below 10%	10-60%	60-100%	Above 100%	Not record-ed.	Total
Teak	30.0 (3)	60.0 (6)	-	-	-	90.0 (9)
Sal	1040.0 (104)	1020.0 (102)	30.0 (3)	-	-	2090.0 (209)
Misc.	1140.0 (114)	3880.0 (388)	620.0 (62)	-	30.0 (3)	5670.0 (567)

SLOPE CLASSES MAP OF KORAPUT DISTRICT

NO:- 5.4M

SCALE :- 1 : 1,000,000

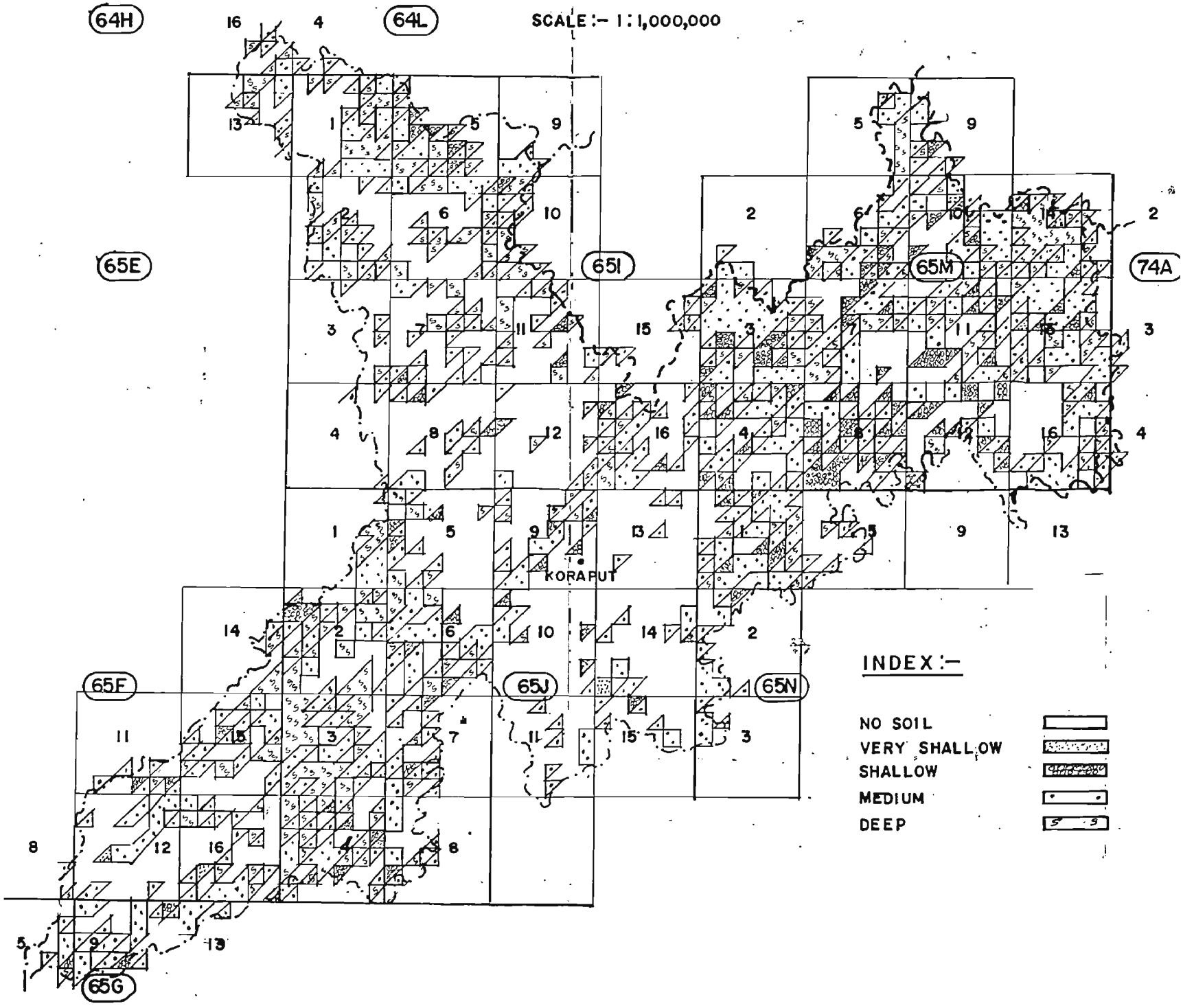


Contents

SOIL DEPTH MAP OF KORAPUT DISTRICT

NO:- 5.5M

SCALE :- 1 : 1,000,000



Contents

Map no.5.4M, appended as page no.39, shows the distribution of various slope classes in Koraput district.

5.5 AREA BY CROP COMPOSITIONS AND SOIL DEPTH CLASSES:

Table no. 5.5T indicates the distribution of vegetation by forest types supported by various soil depths. It indicates that the soils which have depth above 30 cm, support maximum vegetation. However, the Miscellaneous forest was found to be supported even in the soils which have depths below 30 cm. Teak and Sal require deep soil but Miscellaneous forests are found to be growing even on soils having shallow depth. However, almost all the vegetated areas have soil depth more than 15 cm.

Table No. 5.5 T

Break up of the vegetated forest area under different crop composition by soil depth classes(area in sq.km.)

	No soil	Very shallow	Shallow	Medium	Deep	Not record-ed.	Total
Teak	-	-	-	80.0 (8)	10.0 (1)	-	90.0 (9)
Sal	-	10.0 (1)	60.0 (6)	1000.0 (100)	1020.0 (102)	-	2090.0 (209)
Misc.	10.0 (1)	40.0 (4)	690.0 (69)	3780.0 (378)	1130.0 (113)	200.0 (20)	5670.0 (567)

Map no. 5.5M shows the forest areas with different soil depths. It indicates that most of the forest lands (62%) have medium soil depth. About 27% have deep soil.

5.6 AREA UNDER DIFFERENT CROP COMPOSITIONS BY TOP HEIGHT CLASSES:

Table no. 5.6T gives distribution of vegetated area by crop compositions and top height classes. It indicates that the Miscellaneous forest type which accounts for major part of vegetative cover has top height between 10-20 m. The representation of trees in higher height classes is less in Miscellaneous forest whereas in Sal forest type the representation of trees in higher height classes is more. This means that the Miscellaneous forest is of moderate height, mostly between 10-20 m. whereas sal has height between 10-30 m. and forms upper canopy of the forest. Teak forest has hardly any significance as it contribute very little to the vegetation of Koraput district.

TOP HEIGHT CLASS MAP OF KORAPUT DISTRICT

NQ:- 5.6M

SCALE:- 1:1,000,000

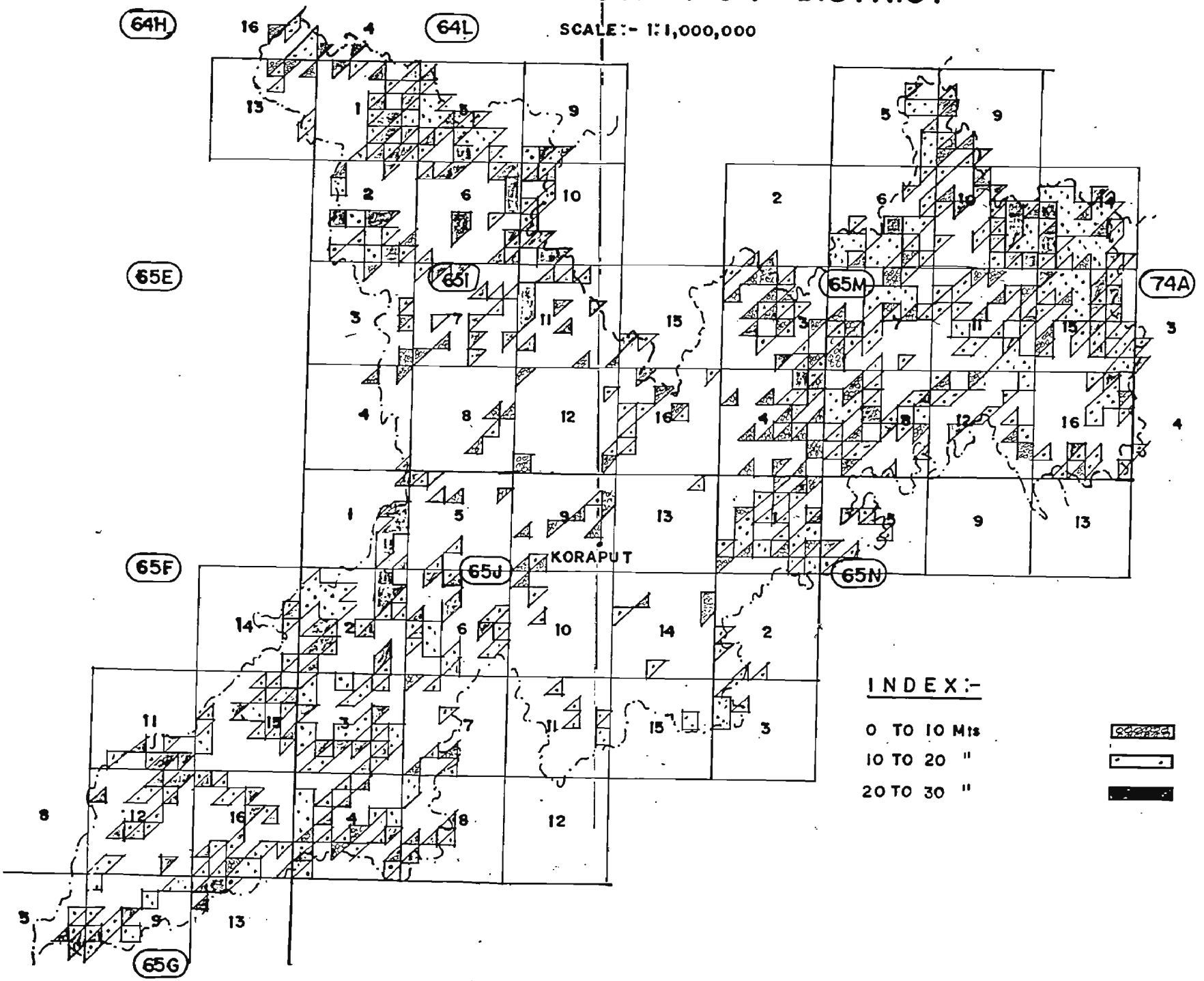


Table No. 5.6 T

Break up of the vegetated tree forest area under different crop compositions by top height classes(area in sq.km.)

	1-5m	6-10m	11-15m	16-20m	21-25m	26-30m	31m +	Not recorded	Total
Teak	20.0 (2)	20.0 (2)	10.0 (1)	30.0 (3)	10.0 (1)	-	-	-	90.0 (9)
Sal	160.0 (16)	230.0 (23)	350.0 (35)	680.0 (68)	400.0 (40)	260.0 (26)	10.0 (1)	-	2090.0 (209)
Misc.	460.0 (46)	640.0 (64)	1560.0 (156)	2290.0 (229)	580.0 (58)	120.0 (12)	-	20.0 (2)	5670.0 (567)

Map no. 5.6M indicates that major forest vegetation is having top height between 10-20 m. which is evenly distributed all over the forest area. The vegetation of small height is mainly concentrated in plain areas near habitations. About 18% vegetation has top height above 20 m which is evenly distributed over the forest areas but mainly in Sal forest type.

5.7 AREA BY CROP COMPOSITIONS AND SIZE CLASSES:

Table no. 5.7 T gives the distribution of vegetation by crop composition and size classes namely regeneration crop (between 0-10 cm d.b.h.), pole crop (10-20 cm d.b.h.), small timber (20-30 cm d.b.h.), big timber (30 cm d.b.h and over) and mixed sized crop (having no marked dominance of any particular size class). The table indicates that about 13% crop is at regeneration stage, 28% at pole stage, 19% small timber, 8% big timber and 32% has mixed sizes having no marked dominance of any particular size class.

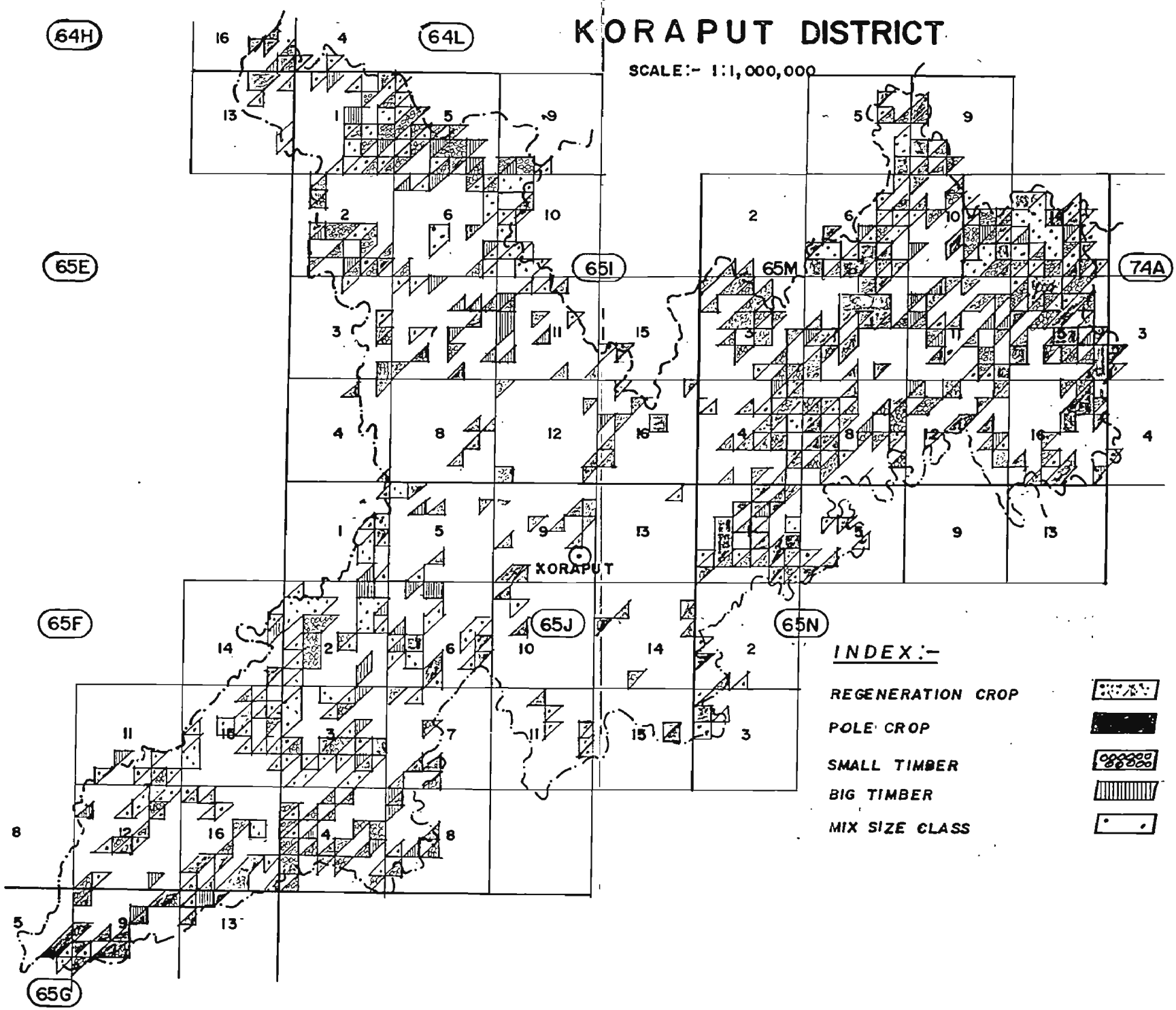
In case of Sal there is a progressive reduction of area as we go from regeneration crop to the big sized timber class whereas in case of Miscellaneous forest there is a sudden fall in area under big size timber class. It indicates that the Miscellaneous forest is mostly found under small diameter classes or has mixed size crop.

Contents

NO: 5.7M

SIZE CLASS MAP OF KORAPUT DISTRICT

SCALE:- 1:1,000,000



Contents

Table No. 5.7 T

Break up of the vegetated forest area under different crop compositions by size classes(area in sq.km.)

	Regeneration	Pole crop	Small Timber	Big Timber	Mixed size class.	Not recorded.	Total
Teak	30.0 (3)	30.0 (3)	-	10.0 (1)	20.0 (2)	-	90.0 (9)
Sal	260.0 (26)	450.0 (45)	350.0 (35)	260.0 (26)	770.0 (77)	-	2090.0 (209)
Misc.	720.0 (72)	1690.0 (169)	1180.0 (118)	360.0 (36)	1710.0 (171)	10.0 (1)	5670.0 (567)

Map no.5.7 M gives clear picture about the location of various forest crops in Koraput district under different size classes. The distribution reveals that most of the vegetation is in small size class. The big sized timber class occupies only 8% forest area.

5.8 AREA BY CROP COMPOSITIONS AND CANOPY LAYERS:

On the basis of 785 sample plots inventoried during the survey, it is concluded that 12% vegetated area is at regeneration stage because it does not form any canopy. 46% vegetated area is having one storeyed forest and 47% vegetated area has two storeyed forest.

Table No. 5.8T

Break up of the vegetated forest area under different crop compositions by canopy layers (area in sq.km.)

	No storey	One storeyed forest	Two storeyed forest	Three or more storeyed forest	Total
Teak	30.0 (3)	40.0 (4)	20.0 (2)	-	90.0 (9)
Sal	220.0 (22)	1010.0 (101)	860.0 (86)	-	2090.0 (209)
Misc.	660.0 (66)	2590.0 (259)	2420.0 (242)	-	5670.0 (567)

7850

5.9 UTILISATION PATTERN OF GOVT. FOREST LAND:

Out of 1354 sample plots visited in the entire forest area based on'green wash' in Koraput district only 1245 plots were found to be located in govt. forest land covering about 12450 sq.km. area as calculated on the basis of the sample plots falling in such forest lands. The remaining 109 plots representing about 1090 sq.km. area were initially considered as forested on the basis of green wash on the Survey of India toposheets but on visit they were found to be located on private lands which are presently being used mainly for cultivation. Out of the Govt. forest land, 39% is covered by dense and moderately dense forest having density above 30% and 17% land by open forest having density of 5-30%. In all 9200 sq.km. of govt. forest land (74%) is under some vegetation. 25% govt. forest land is being used for cultivation and the remaining 1% govt. forest land is blank and lying waste. The break up of govt. forest land by utilisation pattern has been indicated in Table 5.9T.

Table No. 5.9 T

Govt. Forest Land Utilisation Pattern of Koraput (area in Sq.km)

Utility	Dense tree forest 70% & above	Moderate -ly dense tree forest 32-69%	Open tree forest 5%-29%	Scrub forest < 5%	Agri. tree land+ Agri. crop land +shifting cultivation.	Non fore- stry plan- tation	Barren area + others
	540.0 (54)	4270.0 (427)	2090.0 (209)	620.0 (62)	3070.0 (307)	20.0 (2)	60.0 (6)

Table 5.9 T (contd.)

Young crop of natural or arti- ficial regene- ration.	Bamboo brakes	Young planta- tion of forestry species.	Govt. grass lands	Water bodies + habi- tation.	Inaccessi ble.	Total
910.0 (91)	30.0 (3)	40.0 (4)	10.0 (1)	250.0 (25)	540.0 (54)	12450.0 (1245)

5.10 PLANTABLE AREA IN GOVT. FOREST:

For the purpose of calculating plantable area in Govt . forest land of Koraput district, all those areas which have forest having density less than 30% and the areas which are devoid of any forest cover were taken into account. Table no.5.10 T gives an account of such areas. The table indicates that out of 12450 Sq.km of Govt. foret area, about 5870 sq.km. (47%) is plantable by one or the other species. Out of this, 4050 sq.km. area is available from the poor forest, 176 sq.km. from agricultural crop land or tree land which are under private occupation irregularly and the rest 60 sq.km. from barren lands. Such areas can be easily planted with some suitable species depending upon various locality factors and brought under vegetal cover.

Table No. 5.10.T
Estimated plantable area in the Govt. forest land
(area in sq.km.)

Present land use.	Vegetated forest land	Agri. crop land + Agri. tree land.	Barren area+ others.	Total
	4050.0 (405)	1760.0 (176)	60.0 (6)	5870.0 (587)
Plantable area =	4440.0 (444)			

5.11 REGENERATION STATUS:

An assessment of state of regeneration of commercially important species was made during the inventory work. It was done by counting the number of seedlings of commercial species found in 16 sq.m. area around the centre of the plot. Commercially important species taken into consideration for this purpose were, Acacia catechu, Adina cordifolia, Ailanthus excelsa, Albizzia spp., Anogeissus latifoia, Bombax malabaricum, Boswellia serrata, Dalbergia latifolia, Dalbergia sissoo, Diospyros melanoxylon, Eucalyptus spp., Garuga pinnata, Gmelina arborea, Lagerstroemia parviflora, Lannea coromandelica, Mitragyna parvifolia, Ougeinia dalbergioides, Pterocarpus marsupium, Shorea robusta, Syzigium cumini, Schleichera oleosa, Terminalia tomentosa, Terminalia belerica, Terminalia chebula, Terminalia arjuna and Tectona grandis.

The assessment made during the inventory survey reveals that only 2% of the forest area has adequate regenertion of commercially important species. 32% forest area has inadequate number of commercially important species and the rest 66% forest area lacks regeneration of commercially important species. However, regenertion of

other unimportant species was found in some areas but these species have hardly any contribution towards the timber. They are utilizable only for fuel purpose. Such inadequate regeneration of commercial species is because of the heavy felling, grazing and burning of forest for collection of minor forest produce and for converting forest land to agricultural land. Map no. 5.11 M shows the regeneration status of forests of Koraput district.

5.12 SOIL EROSION:

From the data relating to soil erosion collected during the field work of Koraput district, it is observed that about 89% of forest area is subjected to mild erosion, 9% to moderate erosion and about 2% to heavy erosion which is especially noticed in south-eastern parts of the dstrict. Moderate soil erosion has been noticed in eastern part of the district. Mild erosion is noticed in hilly tracts where fairly good vegetal cover exists. This erosion can be checked effectively by undertaking afforestation with suitable species. Map no. 5.12. M shows the areas subjected to soil erosion.

5.13 FIRE INCIDENCE:

Fire incidence of varying intensity was noticed during the inventory survey of Koraput district. It was observed that 1% area is subjected to heavy annual fire, 7.6% to frequent fire and 61% to occassional fire. About 30% area is not affected by annual fire. Main reason for annual fire is the grazing and seed collection by local people. For clearing weeds and grasses the local people set the forest to fire during summer which adversely affects the regeneration and the standing vegetation. A map depicting fire incidence is annexed as no. 5.13 M.

5.14 GRAZING INCIDENCE:

The extent of grazing incidence has been depicted on Map no. 5.14 M based on the data collected from the sample plots spread over the district. The survey reveals that about 20% forest land is subjected to heavy grazing, 29% to medium grazing, and 34% to light grazing. Only 17% forest land is unaffected by grazing. Such ungrazed forests are found to be quite away from habitation e.g. in hilly and remote areas. Grazing has adverse effect on the establishment of regeneration in the forest. Goats and sheep are the biggest enemy of regeneration. They do not spare even the small herbs in the forest. Due to heavy grazing incidence, the forests of plain areas or those near habitations are deteriorating very rapidly day by day.

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5.15 BAMBOO OCCURRENCE:

Data on the occurrence and quality of bamboos was also collected during the survey work. These results are presented in the table no. 5.19T. 318 plots representing about 3180 sq.km. area in Koraput district were found to have bamboo growth. Out of these, 76% plots had first quality, 9% had second quality and 2% had third quality bamboos. Remaining 13% area was under bamboo regeneration wherein the clump formation had not yet taken place. The bamboo species available in Koraput distirct is mainly Dendrocalamus strictus. Out of these bamboo areas, 7% area has pure bamboos (having 200 or more clumps/ha), 8% area has very dense bamboos(having 150-200 clumps/ha), 12% dense bamboos(having 100-150 clumps/ ha), 14% moderately dense (having 50-100 clumps/ ha), 23% scattered (having 20-50 clumps/ha), 19% sparse (having 0-20 clumps/ha) and 7% area has some bamboos which have been hacked by the local people. The rest of the bamboo area is under regeneration crop where clump formation is absent. These results have been depicted on Map no. 5.15 M which shows the localities where bamboos are present. In all 25% area of the Govt. forest land has bamboo vegetation, out of which only 50 sq.km. area was estimated to have pure bamboos and the remaining 3130 sq.km. forest area has tree vegetation associated with bamboos. The occurrence of bamboo is mainly confined to north-eastern and south-western parts of the district.

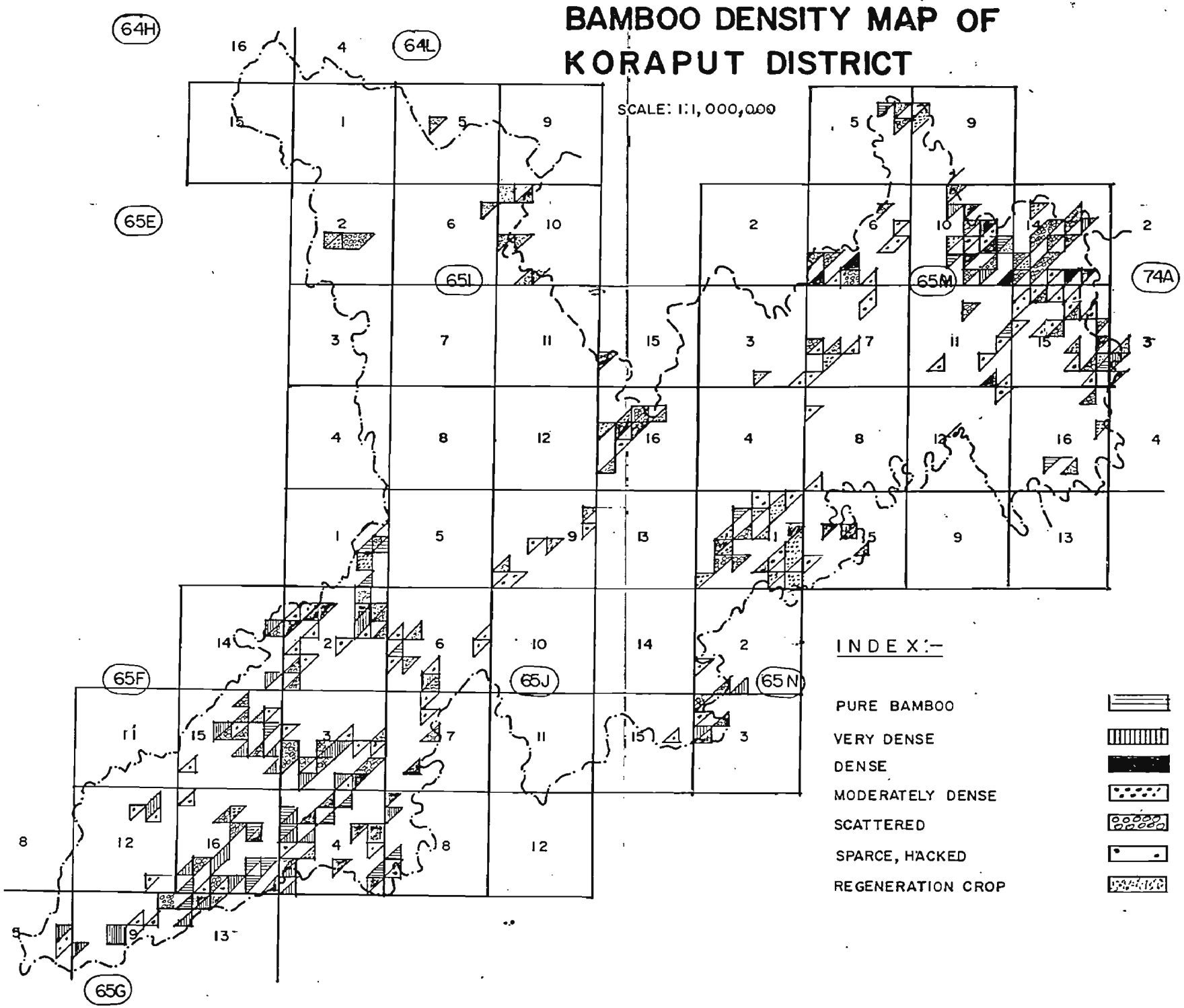
Table No. 5.15 T

Break up of area(ha) by bamboo density and quality

Density/Quality	1	2	3	4	Total
1.	21000 (21)	1000 (1)	-	-	22000 (22)
2.	26000 (26)	1000 (1)	-	-	27000 (27)
3.	38000 (38)	1000 (1)	-	-	39000 (39)
4.	42000 (42)	4000 (4)	-	-	46000 (46)
5.	65000 (65)	7000 (7)	-	-	72000 (72)
6.	47000 (47)	11000 (11)	1000 (1)	-	59000 (59)
7.	1000 (1)	3000 (3)	6000 (6)	13000 (13)	23000 (23)
8.	-	-	-	-	-
9.	-	-	1000 (1)	29000 (29)	30000 (30)
Total	240000 (240)	28000 (28)	8000 (8)	42000 (42)	318000 (318)

BAMBOO DENSITY MAP OF KORAPUT DISTRICT

SCALE: 1:1,000,000



C H A P T E R - VI

INVENTORY RESULTS - GROWING STOCK (TREES)

6.Ø GENERAL:

The forests of Koraput district have been assigned three strata namely Teak (9Ø sq.km.). Sal (2Ø9Ø sq.km.) and Miscellaneous (567Ø sq.km.) based on dominance of each of these species observed in any particular area during field visits as already indicated in Table no. 5.2 T in the preceeding chapter. The distribution of growing stock (trees), total number of stems, no. of stems/ha, total volume and volume/ha falling in each stratum have been calculated for various species with regard to their occurrence in each diameter class which are described below in details.

6.1 TOTAL NO. OF STEMS AND STEMS/HA; STRATUM :TEAK

Though stratum Teak was separately identified on the basis of occurrence of teak trees in the vicinity of 9 sample plots, yet there were no teak trees available for enumeration in such plots and as such no volume of teak was found. The reason for this is that teak vegetation was found mostly at regeneration/pole stage. However, a few teak trees were found to occur in the 2 ha area around the plot. In this stratum, the miscellaneous species occurring in the plots were enumerated. In the whole of this stratum (9Ø sq.km. area), about 26ØØØØ trees of various species and sizes were found to be present. Anogeissus latifolia, Salmalia malabaricum Bridelia retusa, Diospyros melanoxylon, Pterocarpus marsupium, Shorea robusta and Syzygium cumini, have almost equal share in the growing stock in this stratum,

Table no. 6.1 T (A) and 6.1 T (B) indicate distribution of total stems and stems/ha as found in this stratum. It further indicates that on an average 28.889 stems of various species in different diameter classes occur per hectare in this stratum. Even though referred as Teak stratum, the vegetation does not show any dominance of teak in the growing stock as teak is disappearing at a faster rate and may ultimately vanish if the present situation is allowed to continue.

6.2 TOTAL NO. OF STEMS AND STEMS/HA; STRATUM: SAL

Table no. 6.2 T(A) and 6.2 T (B) show the distribution of total number of stems and stems/ha in each diameter class for individual species occurring in Sal stratum which covers 2Ø9Ø sq.km. vegetated area. The distribution reveals that in this stratum Sal is predominant with 199Ø5234 stems of different sizes constituting 38% of the growing stock present. Other dominant speices in this stratum are Terminalia crenulata, Anogeissus latifolia,

Cleistanthus collinus, Pterocarpus marsupium, Syzygium cumini and Diospyros melanoxylon. Their distribution with regard to diameter classes is almost uniform. Number of stems are gradually reduced in higher diameter classes. Some of the species are totally absent in higher diameter classes. In this stratum, 248.221 stems of various species and sizes were found per hectare. As compared to Teak, Sal stratum has much better stocking.

6.3 TOTAL NO. OF STEMS AND STEMS/HA; STRATUM:MISC.

Table no. 6.3 T(A) and 6.3 T(B) show the distribution of various species by their diameter classes found in Miscellaneous stratum which covers 567Ø sq.km. of vegetated area in Koraput district. In this stratum, 127469125 stems of various species and sizes were found. There is no marked dominance of any species and that is why this area was classified as Miscellaneous forest. However, the species like Cleistanthus collinus (12831.543 stems), Anogeissus latifolia (1163187 stems), Terminalia crenulata(7658727 stems), Pterocarpus marsupium, Lannea coromandelica and Diospyros melanoxylon etc. were found prominently. Scattered Sal(3416809 stems)also exists in this stratum. Occurrence of all these species in this stratum was mainly in lower classes i.e. between 1Ø-15 cm. The species like Adina cordifolia, Diospyros melanoxylon, Madhuca latifolia, Pterocarpus marsupium, Shorea robusta and Terminalia crenulata were found to be existing in higher diameter classes also. In all 224.813 trees of different species and of various diameter classes were found per hectare in this stratum. This stratum has better stocking than that of Teak stratum but less than that of Sal stratum.

6.4 TOTAL NO. OF STEMS AND STEMS/HA;(ALL FOREST TYPES COMBINED):

Table no. 6.4 T gives distribution of stems and stems/ha for all the species by their diameter classes irrespective of the stratum over 785Ø sq.km. In the whole of this area,about 179Ø7312 stems of different species under various diameter classes were found. This gives the average of 228.799 stems/ha for the entire forest area. There is a progressive reduction in no. of stems as we go from lower diameter classes to higher diameter classes. Some of the species like Bridelia retusa, Cleistanthus collinus, Lagerstroemia parviflora, Ougeinia dalbergioides etc. do not have representation in diameter classes above 4Ø-5Ø cms.

6.5 TOTAL VOLUME AND VOLUME/HA; STRATUM: TEAK

Table no. 6.5 T(A) and 6.5 T(B) show the distribution of total volume and volume/ha for all the species by their diameter classes found in Teak stratum. The table shows that in all 25Ø,ØØØ cu.m. volume of various species is found in this stratum. As stated earlier

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in para 6.1, though it is classified as Teak stratum, it does not have any volume of teak as teak trees are mostly at regeneration or pole stage and as such they were not enumerated. This clearly shows that teak is disappearing from the areas where it occurred prominently in the past. Even other miscellaneous species occur sporadically in this stratum. These forest areas are subjected to much biotic interferences resulting in poor condition of the forest. Per hectare volume in this stratum was estimated to be 27.802 cu.m.

6.6 TOTAL VOLUME AND VOLUME/HA; STRATUM: SAL

Table no. 6.6 T(A) and 6.6 T(B) show the distribution of total volume and volume per ha for all species by their diameter classes in Sal stratum. The table indicates that 15,325,148 cu.m. of volume exists in Sal stratum out of which contribution of sal alone is 8,600,715 cu.m. i.e. 56% of the total volume. Other prominent species which contribute significantly towards total volume of this stratum are Terminalia crenulata, Anogeissus latifolia, Pterocarpus marsupium, Syzygium cumini, Madhuca latifolia, and Diospyros melanoxylon. Most of the species have volumetric representation upto 50 cm. diameter. Beyond that very few species are found. Total volume of all the species in this stratum increases upto diameter class of 40-50 cm. but the volume goes on decreasing in higher diameter classes. Most of the commercial species except Shorea robusta, Adina cordifolia and Terminalia crenulata have no representation in higher diameter classes. Per hectare volume is 73.326 cu.m. in this stratum as compared to 27.802 cu.m. in Teak stratum.

6.7 TOTAL VOLUME AND VOLUME PER HA; STRATUM:MISC.

Table no. 6.7 T(A) and 6.7T(B) show the distribution of total volume and volume per hectare for all the species by their diameter classes found in Miscellaneous stratum covering about 5670 sq.km. of forest land. The table reveals that there is total growing stock of 32319926 cu.m. in this stratum. Volume per hectare in this stratum is about 57.002 cu.m. which is less than that in Sal stratum but more than in Teak stratum. There is gradual increase in volume from lower diameter classes to higher diameter classes upto 50 cm. diamter and afterwards there is rapid decrease in volume. The predominant species contributing to the volume are Anogeissus latifolia, Terminalia crenulata, Cleistanthus collinus, Diospyros melanoxylon, Shorea robusta, Ptercarpus marsupium and Madhuca latifolia.

6.8 TOTAL VOLUME AND VOL/HA;(ALL FOREST TYPES COMBINED):

Table no.6.8T gives distribution of total volume & volume per hectare of different species by diameter classes for all the three strata i.e. Teak, Sal and Miscellaneous combined. In all 47895296 cu.m. volume was estimated to

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be existing in these forests. It comes to 61.Ø13 cu.m. volume per hectare for all the forest types combined.

The map no. 6.8 M appended at the end of this Chapter, gives distribution of growing stock throughout the district. This maps shows that except for the Central part of the district rest of the forest areas are better stocked.

6.9 ESTIMATION OF STANDARD ERROR FOR AREA AND GROWING STOCK:

Table no. 6.9T gives percentage standard error for various strata i.e. (Teak, Sal and Miscellaneous) found in Koraput district. From the table it is seen that percentage of standard error is very high for both the parameters i.e. for area (33.216%) and for growing stock (47.999%) for Teak stratum. For Sal the figures is 6.898% and 6.188% and for Miscellaneous the figures is 3.242% and 4.411% respectively. The reason for abnormally high percentage of standard error in case of Teak is paucity of plots in this stratum i.e. just 9 only which is not adequate to get the results within permissible limits. On the other hand, the number of sample plots falling under Sal and Miscellanuous strata are quite large and therefore the S.E.% for them was found to be well within precision limits. Volume and area figures for Teak staratum should therefore be taken as indicative only as these figures lack required precision on account of paucity of plots falling in this stratum.

Table No. 6.9T

Growing stock of forest types with standard error

Crop composition.	Area (ha)	SE%	Vol./ha	SE%
Teak	9ØØØ	33.22	27.8Ø2	48.ØØ
Sal	2Ø9ØØØ	6.9Ø	73.326	6.19
Misc.	567ØØ	3.24	57.ØØ2	4.41

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KORAPUT INVENTORY SURVEY

TABLE FOR STRATUM _ TEAK

Table No. 6.1.T(A)

STEMS (000)

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
XANOGEISSUS LATIOFLIA	-	-	-	10.000	-	-	-	-	-	-	-	10.000
BOMBAX CEIBA	-	-	-	-	-	-	-	-	10.000	-	-	10.000
BRIDELIA RETUSA	-	-	10.000	-	-	-	-	-	-	-	-	10.000
DIOSPYROS MELANOXYLON	-	-	10.000	-	-	-	-	-	-	-	-	10.000
LAGERSTROEMIA PARVIFLORA	10.000	-	-	-	-	-	-	-	-	-	-	10.000
PTEROCARPUS MARSUPIUM	-	-	-	-	-	-	10.000	-	-	-	-	10.000
SHOREA ROBUSTA	-	-	-	-	-	-	10.000	-	-	-	-	10.000
SYZYGIUM CUMINI	-	10.000	-	-	-	-	-	-	-	-	-	10.000
MISC. SPECIES	70.000	30.000	10.000	10.000	-	10.000	20.000	10.000	10.000	-	10.000	180.000
ALL SPECIES TOTAL	80.000	40.000	30.000	20.000	-	10.000	40.000	10.000	20.000	-	10.000	260.000

KORAPUT INVENTORY SURVEY

TABLE No.6.1 T.(B

TABLE FOR STRATUM TEAK

STEM/HA.

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
NOGEISSUS LATIFOLIA	-	-	-	1.111	-	-	-	-	-	-	-	1.111
OMBAX CEIBA	-	-	-	-	-	-	-	-	1.111	-	-	1.111
RIDELIA RETUSA	-	-	1.111	-	-	-	-	-	-	-	-	1.111
IOSPYROS MELANOXYLON	-	-	1.111	-	-	-	-	-	-	-	-	1.111
AGERSTROEMIA PARVIFLORA	1.111	-	-	-	-	-	-	-	-	-	-	1.111
TEROCARPUS MARSUPIUM	-	-	-	-	-	-	1.111	-	-	-	-	1.111
HOREA ROBUSTA	-	-	-	-	-	-	1.111	-	-	-	-	1.111
ZYGIUMCUMINI	-	1.111	-	-	-	-	-	-	-	-	-	1.111
ISC. SPECIES	7.778	3.333	1.111	1.111	-	1.111	2.222	1.111	1.111	-	1.111	20.000
L SPECIES TOTAL	8.889	4.444	3.333	2.222	-	1.111	4.444	1.111	2.222	-	1.111	28.889

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KORAPUT INVENTORY SURVEY

TABLE NO. 6.2 T (A)

TABLE FOR STRATUM -SAL

STEM(000)

ECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
INA CORDIFOLIA	110.529	80.385	50.240	40.192	40.192	-	30.144	-	10.048	20.096	10.048	391.875
)GEISSUS LATIFOLIA	924.423	542.596	311.490	211.010	150.721	50.240	20.096	10.048	-	-	-	2220.625
BAX CEIBA	10.048	30.144	-	-	10.048	-	-	-	-	-	-	50.240
SWELLIA SERRATA	10.048	-	30.144	-	10.048	-	-	-	-	-	-	50.240
IDELIA RETUSA	311.490	100.481	60.288	50.240	20.096	-	-	-	-	-	-	542.596
EISTANTHUS COLLINUS	1376.586	361.730	110.529	0.192	-	-	-	-	-	-	-	1889.038
.BERGIA LATIFOLIA	10.048	10.048	20.096	-	10.048	-	-	-	-	-	-	50.240
)SPYROS MELANOXYLON	944.519	311.490	150.721	120.577	90.433	20.096	40.192	20.096	10.048	-	-	1708.173
RUGA PINNATA	200.961	110.529	120.577	110.529	50.240	30.144	10.048	10.048	-	-	-	643.077
GERSTROEMIA PARVIFLORA	321.538	100.481	30.144	10.048	-	-	-	-	-	-	-	462.211
NEA COROMANDELICA	522.500	90.433	80.385	20.096	--	-	10.048	-	-	-	-	723.461
)HUCA LATIFOLIA	211.010	180.865	90.433	150.721	80.385	50.240	110.529	50.240	-	-	-	924.423
TRAGYNA PARVIFLORA	120.577	100.481	50.240	10.048	20.096	10.048	-	-	-	-	-	311.490
GEINIA DALBERGIOIDES	472.259	221.058	150.721	90.433	40.192	30.144	10.048	-	-	-	-	1014.855
EROCARPUS MARSUPIUM	793.798	311.490	180.865	180.865	130.625	140.673	50.240	20.096	30.144	10.048	-	1848.846
)REA ROBUSTA	6903.023	3245.528	2733.076	1929.230	1758.413	1366.538	1396.682	341.635	100.481	90.433	40.192	19905.234
ZYGIUM CUMINI	713.413	391.875	271.298	170.817	90.433	110.529	70.337	-	10.048	-	10.048	1838.797
RMINALIA BELERICA	180.865	10.048	20.096	10.048	-	-	10.048	-	-	-	-	231.106
RMINALIA CRENULATA	1446.923	753.605	653.125	200.961	130.625	120.577	80.385	20.096	-	-	-	3406.297
S PECIES	8100.187	3074.711	1165.577	522.500	170.817	140.673	90.433	40.192	10.048	20.096	30.144	13665.379
L CIES TOTAL	23934.746	10027.977	6280.047	3868.509	2803.413	2069.903	1929.230	512.452	170.817	140.673	90.433	51878.207

KORAPUT INVENTORY SURVEY

TABLE NO 6.2 T (B)

TABLE FOR STRATUM -SAL

STEM/HA.

SPECIES DESCRIPTION	DIAMETER CLASSES (IN CM.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	0.529	0.385	0.240	0.192	0.192	-	0.144	-	0.048	0.096	0.048	1.875
ANOGEISSUS LATIFOLIA	4.423	2.596	1.490	1.010	0.721	0.240	0.096	0.048	-	-	-	10.625
BOMBAX CEIBA	0.048	0.144	-	-	0.048	-	-	-	-	-	-	0.240
BOSWELLIA SERRATA	0.048	-	0.144	-	0.048	-	-	-	-	-	-	0.240
CLEISTANTHUS COLLINUS	6.587	1.731	0.529	0.192	-	-	-	-	-	-	-	9.038
BRIDELIA RETUSA	1.490	0.481	0.288	0.240	0.096	-	-	-	-	-	-	2.596
DALBERGIA LATIFOLIA	0.048	0.048	0.096	-	0.048	-	-	-	-	-	-	0.240
DIOSPYROS MELANOXYLON	4.519	1.490	illegible	illegible	illegible	illegible	0.192	0.096	0.048	-	-	8.173
GARUGA PINNATA	illegible	illegible	0.721	0.577	0.433	0.096						
LAGERSTROEMIA PARVIFLORA	0.962	0.529	0.577	0.529	0.240	0.144	0.048	0.048	-	-	-	3.077
LANNEA COROMANDELICA	1.538	0.481	0.144	0.048	-	-	-	-	-	-	-	2.212
MADHUCA LATIFOLIA	2.500	0.433	0.385	0.096	-	-	0.048	-	-	-	-	3.462
MITRAGYNA PARVIFLORA	1.010	0.865	0.433	0.721	0.385	0.240	0.529	0.240	-	-	-	4.423
OUGFINIA DALBERGIODES	0.577	0.481	0.240	0.048	0.096	0.048	-	-	-	-	-	1.490
PTEROCARPUS MARSUPIUM	2.260	1.058	0.721	0.433	0.192	0.144	0.048	-	-	-	-	4.856
SHOREA ROBUSTA	3.798	1.490	0.865	0.865	0.625	0.673	0.240	0.096	0.144	0.048	-	8.846
SYZYGIUM CUMINI	33.029	15.529	13.077	9.231	8.413	6.538	6.683	1.635	0.481	0.433	0.192	95.240
TERMINALIA BELERICA	3.413	1.875	1.298	0.817	0.433	0.529	0.337	-	0.048	-	0.048	8,798
TERMINALIA CRENULATA	0.865	0.048	0.096	0.048	-	-	0.048	-	-	-	-	1.106
C. SPECIES	6.923	3.606	3.125	0.962	0.625	0.577	0.385	0.096	-	-	-	16.298
SPECIES TOTAL	40=192	14.712	5.577	2.500	0.817	0.673	0.433	0.192	0.048	0.096	0.144	65.385
	114.760	47.981	30.048	18.510	13.413	9.904	9.231	2.452	0.817	0.673	0.433	248.221

KORAPUT INVENTORY SURVEY

TABLE NO. 6.3T(A)

TABLE FOR STRATUM -MISCE. FOREST

STEM(000)

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	211.567	105.784	95.205	105.784	74.048	74.048	52.892	31.735	31.735	21.157	10.578	814.534
ANOGEISSUS LATIFOLIA	5077.609	2708.059	1618.488	941.474	602.966	359.664	264.459	42.313	21.157	-	-	11636.187
BOMBAX CEIBA	126.940	52.892	52.892	42.313	10.578	21.157	52.892	10.578	-	-	-	370.242
BOSWELLIA SERRATA	137.519	137.519	243.302	243.302	116.362	84.627	95.205	21.157	10.578	-	-	1089.571
BRIDELIA RETUSA	1428.078	624.123	264.459	137.519	52.892	31.735	10.578	-	-	-	-	2549.324
CLEISTANTHUS COLLINUS	7108.652	3184.085	1555.018	571.231	243.302	126.940	42.313	-	-	-	-	12831.543
DALBERGIA LATIFOLIA	550.074	179.832	52.892	52.892	42.313	31.735	21.157	10.578	-	-	-	941.474
DIOSPYROS MELANOXYLON	2136.828	729.906	454.869	433.712	380.821	116.362	190.410	42.313	31.735	-	10.578	4527.535
GARUGA PINNATA	1163.619	433.712	285.615	306.772	200.989	63.470	74.048	31.735	10.578	-	-	2570.540
LAGERSTROEMIA PARVIFLORA	1491.548	719.328	380.821	222.145	179.832	95.205	52.892	-	-	-	-	3141.772
LANNEA COROMANDELICA	2083.936	994.355	507.761	296.194	285.615	200.989	126.940	10.578	42.313	-	-	4548.691
MADHUCA LATIFOLIA	423.134	349.086	232.724	190.410	169.254	158.675	126.940	137.519	63.470	42.313	10.578	1904.104
MITRAGYNA PARVIFLORA	412.556	264.459	63.470	63.470	52.892	42.313	31.735	10.578	10.578	10.578	-	962.631
OUGEINIA DALBERGIODES	1184.776	571.231	338253.881	158.675	116.362	21.157	31.735	-	-	-	-	2337.816
PTEROCARPUS MARSUPIUM	2570.540	1153.041	486.604	423.134	200.989	137.519	148.097	52.892	31.735	52.892	-	5257.437
SHOREA ROBUSTA	1290.559	698.171	338.507	296.194	285.615	211.567	169.254	63.470	10.578	31.735	21.157	3416.809
SYZYGIU ..MINI	751.063	285.615	169254	63.470	84.627	63.470	74.048	52.892	21.157	21.157	52.892	1639.646
TERMINALIA BELERICA	539.496	243.302	95.205	42.313	42.313	21.157	74.048	21.157	-	-	-	1078.993
TERMINALIA CRENULATA	2718.637	1417.500	1078.992	835.690	592.388	359.664	349.086	200.989	42.313	31.735	31.735	7653.727
MISC. SPECIES	32835.215	12323.781	5849.828	2813.843	1565.596	962.630	994.365	317.351	211.567	84.627	232.724	58191.527
..SPECIES TOTAL	64242,344	27175.793	14079.789	8240.539	5299.754	3184.085	2983.097	1857.836	539.496	296.191	370.242	127469.125

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KORAPUT INVENTORY SURVEY

TABLE NO 6.3T(B)

TABLE FOR STRATUM - MISC. FOREST

STEM/HA.

SPECIES DESCRIPTION	DIAMETER CLASSES(IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	0.373	0.187	0.168	0.187	0.131	0.131	0.093	0.056	0.056	0.037	0.019	1.437
ANOGEISSUS LATIFOLIA	8.955	4.776	2.854	1.660	1.063	0.634	0.466	0.075	0.037	-	-	20.522
~~BOISYI (C3Y~~ y												
BOMBAX CEIBA	0.224	0.093	0.093	0.075	0.019	0.037	0.093	0.019	-	-	-	0.653
BRIDELIA RETUSA	2.519	1.101	0.466	0.243	0.093	0.056	0.019	-	-	-	-	4.496
BOSWELLIA SERRATA	0.243	0.243	0.429	0.429	0.205	0.149	0.168	0.037	0.019	-	-	1.922
CLEISTANTHUS COLLINUS	12.537	5.616	2.743	1.007	0.429	0.224	0.075	-	-	-	-	22.631
DALBERGIA LATIFOLIA	0.970	0.317	0.093	0.093	0.075	0.056	0.037	0.019	-	-	-	1.660
DIOSPYROS MELANOXYLON	3.769	1.287	0.802	0.765	0.672	0.205	0.336	0.075	0.056	-	0.019	7.985
GARUGA PINNATA	2.052	0.765	0.504	0.541	0.354	0.112	0.131	0.056	0.019	-	-	4.534
LAGERSTROEMIA PARVIFLORA	2.631	1.269	0.672	0.392	0.317	0.168	0.093	-	-	-		5.541
LANNEA CORONANDELICA	3.675	1.754	0.896	0.522	0.504	0.354	0.224	0.019	0.075	-	-	8.022
MADHUCA LATIFOLIA	0.746	0.616	0.410	0.336	0.299	0.280	0.224	0.243	0.112	0.075	0.019	3.358
MITRAGYNA PARVIFLORA	0.728	0.466	0.112	0.112	0.093	0.075	0.056	0.019	0.019	0.019	-	1.698
OUGEINIA DALBERGIODES	2.090	1.007	0.448	0.280	0.205	0.037	0.056	-	-	-	-	4.123
PTEROCARPUS MARSUPIUM	4.534	2.034	0.858	0.746	0.354	0.243	0.261	0.093	0.056	0.093	-	9.272
SHOREA ROBUSTA	2.276	1.231	0.597	0.522	0.504	0.373	0.299	0.112	0.019	0.056	0.037	6.026
SYZYGIUM CUMINI	1.325	0.504	0.299	0.112	0.149	0.112	0.131	0.093	0.037	0.037	0.093	2.892
TERMINALIA BELERICA	0.951	0.429	0.168	0.075	0.075	0.037	0.131	0.037	-	-	-	1.903
TERMINALIA CRENULATA	4.795	2.500	1.903	1.474	1.045	0.634	0.616	0.354	0.075	0.056	0.056	13.507
MISC. SPECIES	57.910	21.735	10.317	4.963	2.761	1.698	1.754	0.560	0.373	0.149	0.410	102.631
ALL SPECIES TOTAL	113.302	47.929	24.832	14.534	9.347	5.616	5.261	1.866	0.951	0.522	0.653	224.813

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KORAPUT INVENTORY SURVEY

TABLE NO. 6.4 T

TABLE FOR TOTAL STEMS, STEMS/HA. CHARACTER -STEM ALL FOREST TYPES COMBINED

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA												
TOTAL	322095	186168	145445	145975	114240	74048	83036	31735	41783	41252	20626	1206409
PER HA	0.410	0.237	0.185	0.186	0.146	0.094	0.106	0.040	0.053	0.053	0.026	1.537
ANOGEISSUS LATIFOLIA												
TOTAL	6002031	3250655	1929979	1162483	753687	409904	284555	52361	21156	-	-	13866812
PER HA.	7.646	4.141	2.459	1.481	0.960	0.522	0.362	0.067	0.027	-	-	17.665
BOMBAX CEIBA												
TOTAL	136988	83036	52891	42313	20626	21156	52891	10578	10000	-	-	430482
PER HA.	0.175	0.106	0.067	0.054	0.026	0.027	0.067	0.013	0.013	-	-	0.548
BOSWELLIA SERRATA												
TOTAL	147566	137518	273446	243302	126410	84626	95205	21156	10578	-	-	1139812
PER HA.	0.188	0.175	0.348	0.310	0.161	0.108	0.121	0.027	0.013	-	-	1.452
BRIDELIA RETUSA												
TOTAL	1739568	724603	334747	187759	72987	31735	10578	-	-	-	-	3101979
PER HA.	2.216	0.923	0.426	0.239	0.093	0.040	0.013	-	-	-	-	3.952
CLEISTANTHUS COLLINUS												
TOTAL	8485238	3545815	1665547	611423	243302	126940	42313	-	-	-	-	14720582
PER HA.	10.809	4.517	2.122	0.779	0.310	0.162	0.054	-	-	-	-	18.752
DALBERGIA LATIFOLIA												
TOTAL	560122	189880	72987	52891	52361?	31735	21156	10578	-	-	-	991714
PER HA.	0.714	0.242	0.093	0.067	0.067	0.040	0.027	0.013	-	-	?	1.263
DIOSPYROS MELANOXYLON												
TOTAL	3081346	1041396	615590	554289	471253	136458	230602	62409	41783	-	10578	624.5707 ~~991714~~
PER HA.	3.925	1.327	0.784	0.706	0.600	0.174	0.294	0.080	0.053	-	0.013	~~1.263~~ 7.956
G[illegible] PINNATA												
TOTAL	1384580	544241	406192	417301	251229	93614	84096	41783	10578	-	-	3213617
PER HA.	1.738	0.693	0.517	0.532	0.320	0.119	0.107					

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SPECIES DESCRIPTION	DIAMETER CLASSES											
	10-15	15-20	20-25	25- 30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
LAGERSTROEMIA PARVIFLORA												
TOTAL	1823086	819808	410965	232193	179832	95205	52891	-	-	-	-	3613983
PER HA.	2.322	1.044	0.524	0.296	0.229	0.121	0.067	-	-	-	-	4.604
LANNEA COROMANDELICA TOTAL/HA.	2606436	1084798	588145	316290	285615	200988	136988	10578	42313	-	-	5272152
PER HA.	3.320	1.382	0.749	0.403	0.364	0.256	0.175	0.013	0.054	-	-	6.716
MITRAGYNA PARVIFLORA												
TOTAL	533132	364939	113710	73518	72987	52361	31735	10578	10578	10578	-	1274121
PER HA	0.679	0.465	0.145	0.094	0.093	0.067	0.040	0.013	0.013	0.013	-	1.623
MADHUCA LATIFOLIA TOTAL/HA.	634143	529950	323156	341131	249638	208915	237469	187759	63470	42313	10578	2828527
PER/HA.	0.808	0.675	0.412	0.435	0.318	0.266	0.303	0.239	0.081	0.054	0.013	3,603
OUGEINIA DALBERGIODES												
TOTAL	1657035	792288	404601	249108	156554	51300	41783	-	-	-	-	3352672
PER HA.	2.111	1.009	0.515	0.317	0.199	0.065	0.053	-	-	-	-	4.271
PTEROCARPUS MARSUPIUM												
TOTAL	3364338	1464531	667469	603999	331613	278191	208337	72987	61879	62939	-	7116285
PER HA.	4.286	1.866	0.850	0.769	0.422	0.354	0.265	0.093	0.079	0.080	-	9 065
SHOREA ROBUSTA												
TOTAL	8193582	3943699	3071583	2225424	2044028	1578105	1575936	405104	111059	122167	61348	23332048
PER HA.	10.438	5.024	3.913	2.835	2.604	2.010	2.008	0.516	0.141	0.156	0.078	29.722
SYZYGIUM CUMINI												
TOTAL	1464476	687490	440551	234287	175059	173998	144385	52891	31204	21156	62939	3488443
PER HA.	1.866	0.876	0.561	0.298	0.223	0.222	0.184	0.067	0.040	0.027	0.080	4.444
TERMINALIAAX BELERICA												
TOTAL	720361	253350	115301	52361	21156 84096		84096	21156	-	-	-	1310098
					42313	21156						
PER HAx	0.918	0.323	0.147	0.067	0.054	0.027	0.107	0.027	-	-	-	1.669
TERMINALIA CRENULATA/TOMENTOSA												
TOTAL	4165558	2171105	1732117	1036651	723012	480240	429470	221084	42313	31735	31735	11065023
PER HA	5.306	2.766	2.207	1.321	0.921	0.612	0.547	0.282	0.054	0.040	0.040	14.096
M LLANEOUS SPECIES												
TOTAL	41305408	15428492	7025406	3346342	1736414	1113303	1104798	367542	231615	104723	272867	72036928
PER HA.	52.618	19.654	8.950	4.263	2.212	1.418	1.407	0.468	0.295	0.133	0.348	91.767
A PECIES TOTAL TOTAL	88307056	37243776	20389840	12129046	8103167	5263988	4952328	1580288	730313	436866	470675	179607312
PER HA.	112.493	47.444	25.974	15.451	10.323	6.706	6.309	2.013	0.930	0.557	0.600	228.799

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KORAPUT INVENTORY SURVEY

TABLE NO. 6.5 T.(A)

TABLE FOR STRATUM _ TEAK

VOL.(000) M^3

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
Anogeissus latifolia	-	-	-	6.180	-	-	-	-	-	-	-	6.180
Bombax ceiba	-	-	-	p	-	-	-	-	17.721	-	-	17.721
Bridelia retusa	-	-	2.359	-	-	-	-	-	-	-	-	2.359
Diospyros melanoxylon	-	-	2.431	-	-	-	-	-	-	-	-	2.431
Lagerstroemia parviflora	0.458	-	- -	-	-	-	-	-	-	-	-	0.458
Pterocarpus marsupium	-	-	- -	-	-	-	12.206	-	- -	-	-	12.206
Shorea robusta	-	-	-	-	-	-	14.526	-	-	-	-	14.526
Syzygium cumini	-	0.829	-	-	-	-	-	-	-	-	-	0.829
Miscellaneous species	2.593	4.107	1.901	3.881	-	7.613	29.572	20.995	33.636	-	89.214	193.512
Total	3.051	4.936	6.691	10.061	-	7.613	56.304	20.995	51.357	-	89.214	250.222

KORAPUT INVENTORY SURVEY

TABLE NO. 6.5 T (B)

TABLE FOR STRATUM TEAK

VOL./HA. M^3

SPECIES DESCRIPTION	DIAMETER CLASSES IN CM											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ANOGEISSUS LATIFOLIA	-	-	-	0.687	-	-	-	-	-	-	-	0.687
BOMBAX CEIBA	-	-	-	-	-	-	-	-	1.969	-	-	1.969
BRIDELIA RETUSA	-	-	0.262	-	-	-	-	-	-	-	-	0.262
DIOSPYROS MELANOXYLON	-	-	0.270	-	-	-	-	-	-	-	-	0.270
LAGERSTROEMIA PARVIFLORA	0.051	-	-	-	-	-	-	-	-	-	-	0.051
PTEROCARPUS MARSUPIUM	-	-	-	-	-	-	1.356	-	-	-	-	1.356
SHOREA ROBUSTA	-	-	-	-	-	-	1.614	-	-	-	-	1.614
SYZYGIUM CUMINI	-	0.092	-	-	-	-	-	-	-	-	-	0.092
MISCELLANEOUS SPECIES	0.288	0.456	0.211	0.431	-	0.846	3.286	2.333	3.737	-	9.913	21.501
ALL SPECIES TOTAL	0.339	0.548	0.743	1.118	-	0.846	6.256	2.333	5.706	-	9.913	27.802

KORAPUT INVENTORY SURVEY

TABLE FOR STRATUM SAL

TABLE NO. 6.6 T(A)

VOL. (000) M^3

SPECIES DESCRIPTION	DIAMETER CLASSES (IN C.M.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	6.187	12.860	19.601	19.761	30.119	-	39.320	-	33.794	75.827	115.984	353.453
ANOGEISSUS LATIFOLIA	66.842	111.250	111.982	127.590	129.602	56.329	29.026	25.292	-	-	-	657.919
BOMBAX CEIBA	0.186	3.749	-	-	5.156	-	-	-	-	-	-	9.090
BOSWELLIA SERRATA	0.412	-	5.516	-	5.392	-	-	-	-	-	-	11.320
BRIDELIA RETUSA	16.611	14.975	16.362	23.800	15.824	-	-	-	-	-	-	87.572
CLEISTANTHUS COLLINUS	72.585	45.141	24.060	14.852	-	-	-	-	-	-	-	156.638
DALBERGIA LATIFOLIA	0.894	1.187	6.144	-	7.166	-	-	-	-	-	-	15.391
DIOSPYROS MELANOXYLON	41.347	43.090	41.239	52.111	64.738	17.428	58.117	46.048	41.897	-	-	406.013
GARUGA PINNATA	9.909	14.957	29.843	46.345	35.742	26.998	17.708	27.356	-	-	-	208.858
LAGERSTROEMIA PARVIFLORA	17.190	15.926	8.556	4.494	-	-	-	-	-	-	-	46.167
LANNEA COROMANDELICA	24.453	13.409	23.682	8.699	-	-	10.096	-	-	-	-	80.338
MADHUCA LATIFOLIA	13.421	20.454	20.923	57.821	45.186	41.268	120.649	94.025	-	-	-	413.748
MITRAGYNA PARVIFLORA	8.260	12.365	11.563	4.550	11.572	9,824	-	-	-	-	-	58.134
OUGEINIA DALBERGIODES	25.356	34.209	39.337	41.929	27.876	30.107	11.775	-	-	-	-	210.588
PTEROCARPUS MARSUPIUM	31.507	37.982	45.076	75.160	81.038	121.288	64.196	40.434	85.617	41.982	-	624.279
SHOREA ROBUSTA 312.833	~~31.507~~	~~37.982~~ 419.355	696.546	794.475	1150.000	1290.797	1960.871	804.040	362.718	472.335	336.844	8600.715
SYZYGIUM CUMINI	31.462	45.002	63.242	67.713	56.040	98.701	105,797	-	35.193	-	109.087	612.236
TERMINALIA BELERICA	15.041	1.926	4.804	4.560	-	-	10.087	-	-	-	-	36.416
TERMINALICA CRENULATA	67.177	107.001	167.912	79.407	79.149	105.062	100.307	37.864	-	-	-	743.881
MISC. SPECIES	388.500	384.336	278.821	203.046	95.364	115.322	113.419	78.650	32.707	80.668	221.566	1992.400
SPECIES TOTAL	~~15325~~ 1150.172	1339.074	1615.206	1626.319	1839.963	1913.125	2641.368	1153.708	591.925	870.812	783.480	15325.148

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KORAPUT INVENTORY SURVEY

TABLE NO 6.6 T (B)

TABLE FOR STRATUM SAL

VOL./HA. M^3

SPECIES DESCRIPTION	DIAMETER CLASSES IN CM											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	0.030	0.062	0.094	0.095	0.144	-	0.188	-	0.162	0.363	0.555	1.691
ANOGEISSUS LATIFOLIA	0.320	0.532	0.536	0.611	0.620	0.270	0.139	0.121	-	-	-	3.148
BOMBAX CEIBA	0.001	0.018	-	-	0.025	-	-	-	-	-	-	0.043
BOSWELLIA SERRATA	k0.002	-	0.026	-	0.026	-	-	-	-	-	-	0.054
BRIDELIA RETUSA	0.079	0.072	0.078	0.114	0.076	-	-	-	-	-	-	0.419
CLEISTANTHUS COLLINUS	0.347	0.216	0.115	0.071	-	-	-	-	-	-	-	0.749
DALBERGIA LATIFOLIA	0.004	0.006	0.029	-	0.034	-	-	-	-	-	-	0.074
DIOSPYROS MELANOXYLON	0.198	0.206	0.197	0.249	0.310	0.083	0.278	0.220	0.200	-	-	1.943
GARUGA PINNATA	0.047	0.072	0.143	0.222	0.171	0.129	0.035	0.131	-	-	-	0.999
LAGERSTROEMIA PARVIFLORA	0.082	0.076	0.041	0.022	-	-	-	-	-	-	-	0.221
LANNEA COROMANDELICA	0.064	0.098	0.100	0.277	0.216	0.197	0.048	-	-	-	-	0.384
MADHUCA LATIFOLIA	0.117 0.064	0.064 0.098	0.113 0.100	0.042 0.277	- 0.216	- 0.197	0.577	0.450	-	-	-	1.980
*MITRAGYNA PARVIFLORA	0.040	0.059	0.055	0.022	0.055	0.047	-	-	-	-	-	0.278
OUGEINIA DALBERGIODES	0.121	0.164	0.188	0.201	0.133	0.144	0.056	-	-	-	-	1.008
PTEROCARPUS MARSUPIUM	0.151	0.182	0.216	0.360	0.388	0.580	0.307	0.193	0.410	0.201	-	2,987
SHOREA ROBUSTA	1.497	2.006	3.333	3.801	5.502	6.176	9.382	3.847	1.735	2.260	1.612	41.152
SYZYGIUM CUMINI	0.151	0.215	0.303	0.324	0.268	0.472	0.506	-	0.168	-	0.522	2.929
TERMINALIA BELERICA	0.072	0.009	0.023	0.022	-	-	0.048	-	-	-	-	0.174
TERMINALIA CRENULATA	0.321	0.512	0.803	0.380	0.379	0.503	0.480	0.181	-	-	-	3.559
. SPECIES	1.859	1.839	1.334	0.972	0.456	0.552	0.543	0.376	0.156	0.386	1.060	9.533
SPECIES TOTAL	5.503	6.407	7.728	7.781	8.804	9.154	12.638	5.520	2.832	3.210	3.749	73.326

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KORAPUT INVENTORY SURVEY

TABLE NO. 6.7 T (A)

TABLE FOR STRATUM MISCELLANEOUS

VOL.(000) M^3

SPECIES DESCRIPTION	DIAMETER CLASSES (IN CM.)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	10.280	19.180	30.243	56.865	55.902	73.569	74.961	72.179	101.601	87.974	50.535	633.288
ANOGEISSUS LATIFOLIA	356.726	521.347	618.825	583,523	528.571	425.601	427.543	93.439	62.753	-	-	3618.327
BOMBAX CEIBA	6.213	6.394	12.315	12.996	4.462	14.483	48.766	14.688	-	-	-	120.316
BOSWELLIA SERRATA	6.766	12.973	56.238	92.564	69.755	73.755	131.065	57.086	31.363	-	-	531.565
BRIDELIA RETUSA	83.901	102.156	74.337	65.418	40.460	32.148	15.548	-	-	-	-	413.968
CLEISTANTHUS COLLINUS	381.158	407.875	379.354	219.603	147.832	103.450	54.940	-	-	-	-	1694.263
DALBERGIA LATIFOLIA	37.070	26.007	14.873	24.004	35.318	38.408	40.105	37.952	-	-	-	253.737
DIOSPYROS MELANOXYLON	101.176	98.859	127.328	202.692	268.173	114.932	279.913	95.744	105.542	-	64.036	1458.594
GARUGA PINNATA	60.984	60.462	69.874	125.008	128.243	68.213	121.532	92.473	62.653	-	-	789.441
LAGERSTROEMIA PARVIFLORA	83.964	105.672	103.798	94.813	117.221	92.205	73.609	-	-	-	-	671.281
LANNEA CORDMANDELICA	87.276	143.018	142.915	134.162	179.421	175.082	148.460	17.885	99.200	-	-	1127.418
MADHUCA LATIFOLIA	26.384	44.162	52.174	72.404	93.836	122.043	136.970	259.786	175.145	166.448	48.799	1203.151
MITRAGYNA PARVIFLORA	27.934	34.434	15.218	26.041	31.383	38.456	45.255	23.330	28.168	49.420	-	319.639
OUGEINIA DALBERGIODES	56.785	80.861	63.642	76.832	78.224	19.972	41.709	-	-	-	-	418.026
PTEROCARPUS MARSUPIUM	102.788	144.989	121.872	179.476	127.564	120.235	186.150	114.568	95.336	197.218	-	1390.196
SHOREA ROBUSTA	62.948	83.203	85.558	125.771	182.727	201.047	244.996	151.537	37.043	179.993	216.415	15711239 15 7123
SYZYGIUM CUMINI	33.563	30.232	40.155	25.494	50.826	56.803	90.591	130.301	80.301	121.686	509.052	1169.005
TERMINALIA BELERICA	37.536	42.891	24.920	16.669	24.910	16.018	99.257	43.693	-	-	-	310.894
TERMINALIA CRENULATA	129.342	189.650	277.195	351.169	370.645	320.449	451.242	394.743	132.107	119.224	187.701	2923.468
MISCELLANEOUS SPECIES	1543.002	1536.043	1372.160	1078.330	898.933	780.993	1189.022	596.254	593.191	335.161	1779.014	11702.105
ALL SPECIES TOTAL	3235.794	3690.407	3682.995	3564.032	3439.455	2887.859	3901.637	2200.660	1604.403	1257.125	2855.533	32319.926

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KORAPUT INVENTORY SURVEY

TABLE NO. 6.7 T (B)

TABLE FOR STRATUM _ MISCELLANEOUS.

VOL./HA.(M^3)

SPECIES DESCRIPTION	DIAMETER CLASSES(IN CM)											
	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA	0.018	0.034	0.053	0.100	0.099	0.130	0.132	0.127	0.179	0.155	0.089	1.117
ANOGEISSUS LATIFOLIA	0.629	0.919	1.091	1.029	0.932	0.751	0.754	0.165	0.111	-	-	6.382
BOMBAX CEIBA	0.011	0.011	0.022	0.023	0.008	0.026	0.086	0.026	-	-	-	0.212
BOSWELLIA SERRATA	0.012	0.023	0.099	0.163	0.123	0.130	0.231	0.101	0.055	-	-	0.938
BRIDELIA RETUSA	0.148	0.180	0.131	0.115	0.071	0.057	0.027	-	-	-	-	0.730
CLEISTANTHUS COLLINUS	0.672	0.719	0.669	0.387	0.261	0.182	0.097	-	-	-	-	2.988
DALBERGIA LATIFOLIA	0.065	0.046	0.026	0.042	0.062	0.068	0.071	0.067	-	-	-	0.448
DIOSPYROS MEALNOXYLON	0.178	0.174	0.225	0.358	0.473	0.203	0.494	0.169	0.186	-	0.113	2.572
GARUGA PINNATA	0.108	0.107	0.123	0.220	0226	0.120	0.214	0.163	0.110	-	-	1.392
LAGERSTROEMIA PARVIFLORA	0.148	0.186	0.183	0.167	0.207	0.163	0.130	-	-	-	-	1.184
LANNEA COROMANDELICA	0.154	0.252	0.252	0.237	0.316	0.309	0.262	0.032	0.175	-	-	1.988
MADHUCA LATIFOLIA	0.047	0.078	0.092	0.128	0.174	0.215	0.242	0.458	0.309	0.294	0.086	2.122
MITRAGYNA PARVIFLORA	0.049	0.061	0.027	0.046	0.055	0.068	0.080	0.041	0.050	0.087	-	0.564
OUGEINIA DALBERGIODES	0.100	0.143	0.112	0.136	0.138	0.035	0.074	-	-	-	-	0.737
PTEROCARPUS MARSUPIUM	0.181	0.256	0.215	0.317	0.225	0.212	0.328	0.202	0.168	0.348	-	2.452
SHOREA ROBUSTA	0.111	0.147	0.151	0.222	0.322	0.355	0.432	0.267	0.065	0.317	0.382	2.771
SYZYGIUM CUMINI	0.059	0.053	0.071	0.045	0.090	0.100	0.160	0.230	0.142	0.215	0.898	2.062
TERMINALIA BELERICA	0.066	0.076	0.044	0.029	0.044	0.028	0.175	0.086	-	-	-	0.548
TERMINALIA CRENULATA	0.228	0.334	0.489	0.619	0.654	0.565	0.796	0.696	0.233	0.210	0.331	5.156
MISC. SPECIES	2.721	2.709	2.420	1.902	1.585	1.377	2.097	1.052	1.046	0.591	3.138	20.639
ALL SPECIES TOTAL	5.707	6.509	6.496	6.286	6.066	5.093	6.881	3.881	2.830	2.217	5.036	57.002

KALAHANDI INVENTORY SURVEY

TABLE NO. 6.8 T

TABLE FOR STAND AND STOCK DISTRIBUTION (COMBINED) CHARACTER VOLUME (M^3)

	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
ADINA CORDIFOLIA												
TOTAL	16466	32039	49843	76625	86021	73568	114281	72179	135394	163801	166519	986741
PER HA	0.021	0.041	0.063	0.098	0.110	0.094	0.146	0.092	0.172	0.209	0.212	1.257
ANOGEISSUS LATIFOLIA												
TOTAL	423567	632596	730807	717297	658172	481930	456569	118730	62753	-	-	4282425
PER HA	.54055	0.806	0.931	0.914	0.838	0.614	0.582	0.151	0.080	-	-	5.455
BOMBAX CEIBA												
TOTAL	6398	10142	12314	12996	9617	14482	48766	14688	17721	-	-	147127
PER HA	0.008	0.013	0.016	0.017	.0 12	0.018	0.062	0.019	0.023	-	-	0.187
BOSWELLIA SERRATA												
TOTAL	7178	12973	61754	92563	75146	73754	131065	57086	31362	-	-	542885
PER HA	0.009	0.017	0.079	0.118	0.096	0.094	0.167	0.073	0.040	-	-	0.692
BRIDELIA RETUSA												
TOTAL	100511	117130	93058	89217	56283	32147	15548	-	-	-	-	503897
PER HA	0.128	0.149	0.119	0.114	0.072	0.041	0.020	-	-	-	-	0.642
CLEISTANTHUS COLLINUS												
TOTAL	453743	453016	403413	234455	147881	103450	54939	-	-	-	-	1850900
PER HA	0.578	0.577	0.514	0.299	0.188	0.132	0.070	-	-	-	-	2.358
DALBERGIA LATIFOLIA												
TOTAL	37963	27194	21017	24004	42483	38407	40105	37952	-	-	-	269127
PER HA	0.048	0.035	0.027	0.031	0.054	0.049	0.051	0.048	-	-	-	0.343
DIOSPYROS MELANOXYLON												
TOTAL	142522	141948	170997	255002	332910	132359	338030	141791	147438	-	64035	1867038
PER HA.	0.182	0.181	0.218	0.325	0.424	0.169	0.431	0.181	0.188	-	0.082	2.378
GARUGA PINNATA												
TOTAL	70892	75418	99717	171352	163985	95210	139240	119829	62652	-	-	998299
PER HA	0.090	0.096	0.127	0.218	0.209	0.121	0.177	0.153	0.080	-	-	1.272
AGERSTROEMIA PARVIFLORA												
TOTAL	101612	121597	112353	99306	117221	92204	73609	-	-	-	-	717905
PER HA	0.129	0.155	0.143	0.127	0.149	0.117	0.094	-	-	-	-	0.915
ANOGEISSUS COROMANDELICA												
TOTAL	111728	156426	166596	142860	179420	175081	158556	17885	99199	-	-	1207757
PER HA	0.142	0.199	0.212	0.182	0.229	0.223	0.202	0.023	0.126	-	-	1.539

6.8 T contd.

...2...

		10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	70-80	80+	Total
MADHUCA LATIFOLIA	TOTAL	39805	64615	73097	130225	144022	163310	257618	353810	175145	166447	48798	1616899
	PER HA	0.051	0.082	0.093	0.166	0.183	0.208	0.328	0.451	0.223	0.212	0.062	2.060
MITRAGYNA PARVIFLORA													
	TOTAL	36193	46798	26781	30590	42954	48279	45255	23329	28168	49419	-	377772
	PER HA	0.046	0.060	0.034	0.039	0.055	0.062	0.058	0.030	0.036	0.063	-	0.481
OUGEINIA DALBERGIODES													
	TOTAL	82140	115070	102978	118761	106099	50078	53484	-	-	-	-	628614
	PER HA	0.105	0.147	0.131	0.151	0.135	0.064	0.068	-	-	-	-	0.801
PTEROCARPUS MARSUPIUM													
	TOTAL	134294	182971	166947	254635	208601	241523	262552	155001	180952	239200	-	2026681
	PER HA	0.171	0.233	0.213	0.324	0.266	0.308	0.334	0.197	0.231	0.305	-	2.582
SHOREA ROBUSTA													
	TOTAL	375781	502458	782103	920245	133 2727	1491844	2220393	955577	399760	652327	553258	10186480
	PER HA	0.479	0.640	0.996	1.172	1.698	1.900	2.829	1.217	0.509	0.831	0.705	12.976
SYZYGIUM CUMINI	Total	65024	76063	103397	93207	106865	155503	196387	130300	115493	121686	618139	1782070
	Per ha	0.083	0.097	0.132	0.119	0.136	0.198	0.250	0.166	0.147	0.155	0.787	2.270
TERMINALIA BELERICA													
	TOTAL	52576	44816	29721	21229	24910	16017	109344	48693	-	-	-	347309
	PER HA	0.067	0.057	0.038	0.027	0.032	0.020	0.139	0.062	-	-	-	0.442
TERMINALIA CRENULATA													
	TOTAL	196519	296651	445107	430576	449793	425510	551549	432607	132106	119224	187700	3667348
	PER HA	0.250	0.378	0.567	0.549	0.573	0.542	0.703	0.551	0.168	0.152	0.239	4.672
MISC SPECIES													
	TOTAL	1934096	1924487	1652882	1285257	994297	903927	1332012	695899	659534	415828	2089793	13888015
	PER HA	2.464	2.452	2.106	1.637	1.267	1.152	1.697	0.886	0.840	0.530	2.662	17.692
ALL SPECIES TOTAL													
	TOTAL	4389015	5034417	5304890	5200414	5279417	4808597	6599308	3375364	2247685	1927937	3728246	47895296
	PER HA	5.591	6.413	6.758	6.625	6.725	6.126	8.407	4.300	2.863	2.456	4.749	61.013

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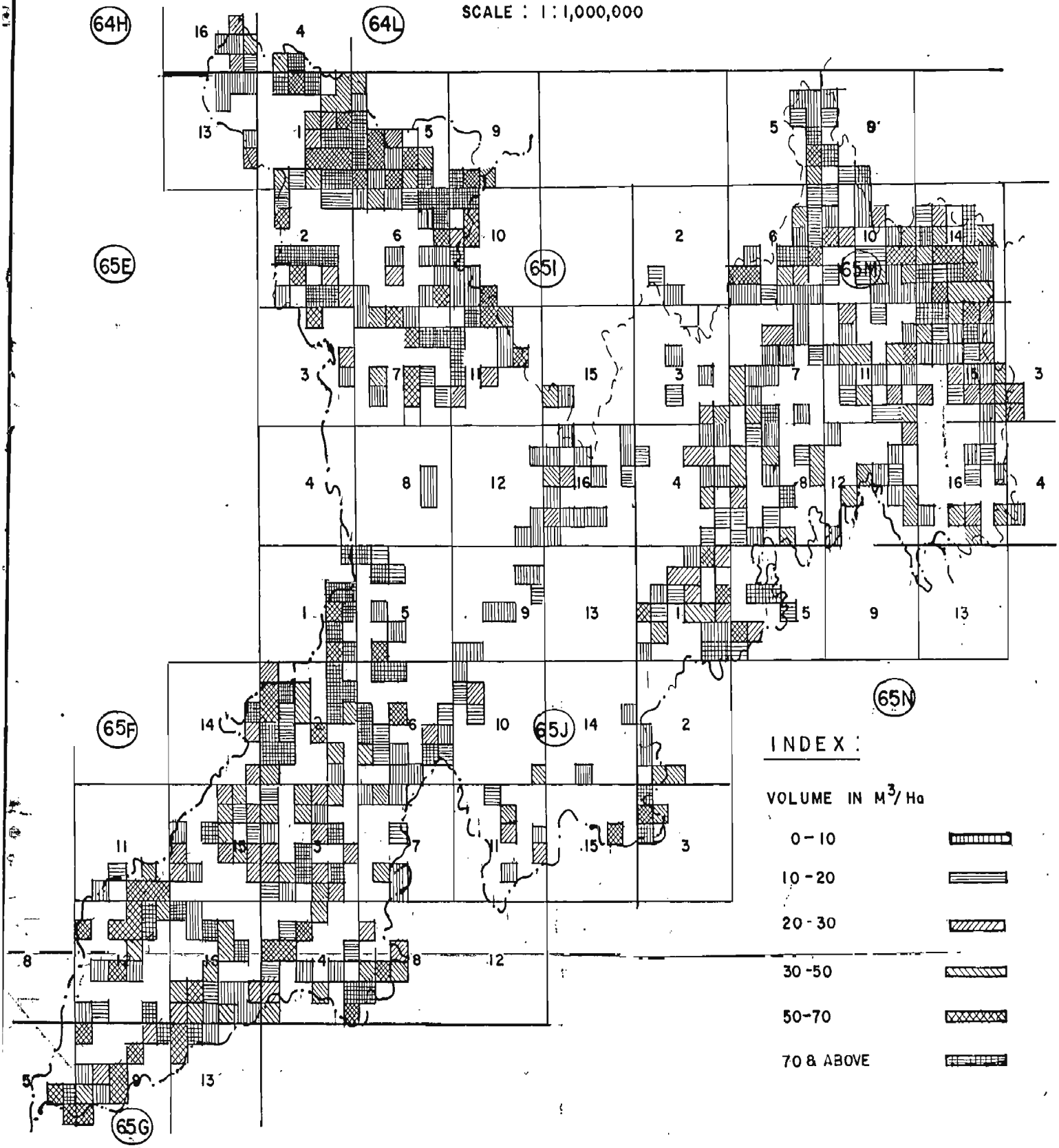
VOLUME IN M^3 / Ha

NO: 6.8M

MAP OF KORAPUT DISTT

SCALE : 1 : 1,000,000



Contents

C H A P T E R - VII

INVENTORY RESULTS - GROWING STOCK BAMBOOS

7.Ø GENERAL:

As stated in Chapter V para 5.15, about 318Ø sq.km. of forest area of Koraput district has bamboo, out of which 3Ø sq.km., area has pure bamboo and the rest 315Ø sq.km. has bamboo in association with tree vegetation. The species of bamboo occuring in these areas is Dendrocalamus strictus. The classification of bamboo forest has been made by bamboo quality, clump sizes, no. of culms/clump, soundness and age classes. Estimation of bamboo growing stock was made on the basis of data collected from 318 sample plots where bamboos were found during the course of inventory survey. The following paragraphs deal with the bamboo growing stock.

7.1 BAMBOO CLUMPS/HA BY QUALITY AND CLUMP SIZE CLASSES:

Table no. 7.1 T gives distribution of bamboo clumps/ha by quality and clump sizes. The table indiates that majority of bamboo areas have first quality bamboo. About 157.5 clumps/ha of first quality and 95.39 clumps/ha of second and third quality bamboos were found to occur in Koraput district.

Table No. 7.1T

Bamboo clumps/ha by quality and clump size classes

Quality	Clump sizse classes			Total
	1	2	3	
Quality 1	122.22	31.16	4.12	157.5
Quality 2 & 3	82.31	13.Ø8	-	95.39

7.2 TOTAL BAMBOO CLUMPS BY QUALITY AND CLUMP SIZES:

Table no.7.2 T gives the distribution of total bamboo clumps by quality and clump sizes found in Koraput district. The distribution reveals that total 37,8ØØ,ØØØ clumps of different size classes (i.e. diameter upto 1 m, 1-2 m and more than 2 m) under first quality bamboo and 3,434,Ø4Ø clumps of different size classes under second quality bamboos were found to occur in these forests.

Table No.7.2 T

Total bamboo clumps by quality and clump size classes

Quality	Clump size classes			Total
	1	2	3	
1	29,332,800	7,478,400	988,800	37,800,000
2 + 3	2,963,160	470,880	-	3,434,040

7.3 NO. OF CULMS/CLUMP BY CLUMP SIZE AND QUALITY:

Table no. 7.3 T gives further distribution of total culms per clump by clump size class and quality of bamboo. The distribution reveals that the first quality bamboo clumps have more culms per clump as compared to 2nd and 3rd quality. Number of culms/clump increases as we proceed from lower clump size class to higher clump size classes.

Table No. 7.3 T

No. of culms/clump by clump size class and quality

Quality	Clump size classes		
	1	2	3
1	7.3925	22.4767	50.2143
2 + 3	4.9149	8.6666	-

7.4 CULMS/HA BY SOUNDNESS, BAMBOO QUALITY AND CLUMP SIZES:

Table no. 7.4 T gives distribution of culms per ha by soundness of culms, bamboo quality and clump size classes. The distribution reveals that in all 903.52, 700.38 and 206.88 culms per hectare respectively were found in various clump sizes of first quality bamboos. In second and third quality bamboo 404.55 and 113.37 culms/ha were found respectively in two different clump sizes. The distribution further indicates that the no. of culms per hectate in lower size of clumps is more as the small sized clumps occur more commonly than the big sized clumps.

Contents

Table No. 7.4 T

Culms/ha by soundness, bamboo quality and clump size classes

Quality	Clump size class	Green sound	Green damaged	Dry sound	Dry damaged	Decayed	Total
1	1	448.55	211.14	71.2Ø	139.94	32.69	9Ø3.52
	2	321.21	144.16	56.79	125.51	52.71	7ØØ.38
	3	91.23	19.13	24.13	43.26	29.13	2Ø6.88
2+3	1	232.93	131.34	7.ØØ	32.28	-	4Ø4.55
	2	42.15	17.44	13.Ø8	37.7Ø	2.91	113.37

7.5 TOTAL CULMS BY SOUNDNESS,QUALITY AND CLUMP SIZES:

Table no. 7.5 T gives the distribution of total culms by soundness, quality and clump sizes. The distribution reveals that in all 434,587,2ØØ culms of first quality and 18,645,12Ø culms of second and third quality bamboos were estimated to occur in Koraput district. These culms were classified as green sound, green damaged, dry sound, dry damaged and decayed culms depending upon their condition and soundness. The table indicates that out of total 453,232,32Ø culms, 216,54Ø,48Ø culms (48%) are green sound and 37,5Ø4,68Ø culms are dry sound. Remaining 95,22Ø,28Ø are green damaged and 76,648,92Ø culms are dry damaged but utilizable and the rest 27,591,96Ø culms (6%) are decayed which have no utility.

Table No. 7.5 T

Total no.of culms in 'ØØØ' by soundness of culms, quality and clump size classes

Quality	Clump size class	Green sound	Green damaged	Dry sound	Dry damaged	Decayed	Total
1	1	1Ø7652.Ø	5Ø673.6Ø	17Ø88.ØØ	33585.6Ø	7845.6Ø	216844.8Ø
	2	77Ø9Ø.4Ø	34598.4Ø	13629.6Ø	3Ø122.4Ø	1265Ø.4Ø	168Ø91.2Ø
	3	21895.2Ø	4591.2Ø	5791.2Ø	1Ø382.4Ø	6991.2Ø	49651.2Ø
2+3	1	8385.48	4728.24	252.ØØ	1198.Ø8	-	14563.8Ø
	2	1517.4Ø	627.84	47Ø.88	1360.44	1Ø4.76	4Ø81.32

7.6 BAMBOO STOCK BY SOUNDNESS, QUALITY AND CLUMP SIZES:

Table no. 7.6 T gives the distribution of bamboo stock (green) in tonnes by soundness of culms, their quality and clump sizes. The distribution indicates that, in all 1,Ø6Ø,298.4 tonnes of green bamboos(sound + damaged) exist under various qualities. Remaining 698,442.4 tonnes are dry sound and dry damaged bamboo under various qualities. In all 1,758,74Ø.8 tonnes of green bamboo stock was estimated to be found in Koraput district. The weight of dry bamboos (sound + damaged) has been converted to green weight as per the factor taken for various types of bamboos as explained in sub-para 4.7.6 of Chapter IV on Data Processing.

Table No. 7.6 T

Bsmboo(green stock) in tonnes by soundness of culm, quality and clump size classes.

Quality	Clump size class.	Green sound	Green damaged	Dry sound	Dry damaged	Total
1	1	4Ø3686.9	1Ø81Ø3.Ø	154314.Ø	156Ø5.7	822Ø9.6
	2	33Ø315.7	72394.7	126555.5	14Ø187.8	669453.7
	3	95663.6	13Ø05.8	56343.3	47410.8	212423.5
2+3	1	22431.1	9Ø38.8	2182.1	5183.2	38835.2
	2	4474.7	1184.1	4Ø74.7	5885.3	15618.8
Total		1Ø6Ø298.4		698442.4		=1758740.8

7.7 BAMBOO STOCK BY QUALITY AND CLUMP SIZE:

Table no. 7.7 T gives distribution of bamboo stock (green) in tonnes by quality and clump sizes. The distribution reveals that in various clump sizes (i.e. below 1 m diameter, 1-2 m diameter and over 2 m diameter at the base of the clump) there is respectively 822Ø9.6, 669453.7 and 212423.5 tonnes of first quality green bamboo stock. The second and third quality green bamboo stock being 38832.2 and 15618.5 tonnes in the first two clump sizes.

Table No. 7.7 T

Bamboo (green stock) in tonnes by quality amd clump size classes

Quality	Clump size class		
	1	2	3
1	822Ø9.6	669453.7	212423.5
2 + 3	38832.2	15618.5	-

Contents

7.8 GREEN BAMBOO STOCK BY QUALITY, CLUMP SIZES, AGE AND SOUNDNESS OF CULM AND CLUMP SIZES:

Table no. 7.8 T gives distribution of green bamboo stock by quality, clump sizes, age and soundness of culms. The distribution further reveals that 46813.6 tonnes of sound culms and 6824.8 tonnes of damaged culms of current year were estimated to be existing in the district. The current year's culms contribute about Ø.3% to the bamboo stock. The culms having age one year and more were further distributed by their diameter classes(b.h.) i.e. 2-5 cm, 5-8 cm, and over 8 cm. The table indicates that in all the bamboo qualities 1492137.3 tonnes (85%) of the total stock exists under diameter class 2-5 cm. Remaining 2Ø9694.9 tonnes (12%) is under diameter class 5-8 cm. The higher diameter class (8 cm +) was found to be absent. From the distribution it can be concluded that though the major bamboo crop is of 1st quality, the size of the bamboos is small and there is deterioration in quality day by day. The reason for this is the over exploitation of bamboos by various agencies without regards to the sound silvicultural practices prescribed for harvesting of bamboos

Table No. 7.8 T

Green bamboo stock in tonnes by bamboo quality, clump size classes, age, soundness and diameter classes

Quality	Clump size class	Green sound culms					
		One season old			Over two season old		
		Current year	2< 5	5<8	8+	2<5	5<8	8+
1	1	25226.2	139855.9	15429.1	-	2Ø5819.5	17356.2	-
	2	14467.7	71Ø3Ø.6	11Ø32.9	-	177724.2	56Ø6Ø.3	-
	3	233Ø.7	12523.2	1857.9	-	67Ø7.9	11143.9	-
2+3	1	4161.2	11724.Ø	-	-	6545.9	-	-
	2	627.8	181Ø.5	-	-	2Ø36.4	-	-
Total		46813.6	236944.2			459933.9		

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Table No. 7.8 T (contd.)

Quality	Clump size class	Green damaged					
		One season old			Over two season old		
		Current year	2<5	5<8	8+	2< 5	5<8	8+
1	1	3Ø79.9	45685.8	3857.3	-	46319.4	916Ø.6	-
	2	3145.4	17992.3	3677.9	-	393Ø9.5	8269.6	-
	3	1Ø6.Ø	1527.9	1857.3	-	6264.1	325Ø.5	-
2+3	1	441.2	64Ø9.9	414.8	-	1772.9	-	-
	2	52.3	339.5	-	-	792.3	-	-
Total		6824.8	71955.4			94458.2		

Table No. 7.8 T (contd.)

Quality	Clump size class	Dry sound			Dry damaged			Total
		2<5	5<8	8+	2<5	5<8	8+	
1	1	144672.3	9641.7	-	139914.5	16391.2	-	822Ø9.6
	2	113693.4	12862.1	-	125486.8	147Ø1.Ø	-	669453.7
	3	47Ø57.4	9285.9	-	43696.2	3714.6	-	212423.5
2+3	1	2182.1	-	-	5183.2	-	-	38835.2
	2	4Ø74.4	-	-	5885.3	-	-	15618.5
Total		311679.6			32Ø166.Ø			1758742.5
Grand total of 2<5 = 1495137.3.								

7.9 DRY BAMBOO STOCK BY QUALITY, SIZE, AGE AND SOUNDNESS:

Table no. 7.9 T gives distribution of dry bamboo stock (in tonnes) by bamboo quality, clump size classes, age and soundness. For obtaining a conversion factor from green bamboo weight to dry bamboo weight , 126 bamboo samples of different diameter classes were collected from various sample plots of Koraput district during the survey work. These samples were weighed and cut in small pieces so as to completely dry them up in oven to get oven dry weight. After

removal of complete moisture, a constant oven dry weight was obtained. 10% of the oven dry weight was added to the oven dry weight to get standard air dry weight as indicated below.

Size class of culm	Oven dry weight in %	Air dry weight in % (Oven dry + 10% of oven dry weight)
2 to 5 cm.dia.	53.08%	58.38%
5 to 8 cm.dia.	55.84%	61.38%

On the basis of the above air dry weight factors, the green weight of the bamboo stock found in Koraput district were reduced in terms of dry weight and the same is given in Table no. 7.9 T.

Table No. 7.9 T

Dry bamboo stock in tonnes by bamboo quality, clump size classes, age, soundness and diameter classes

Quality	Class size class	Green sound						
			One to two season old			Over two season old		
		Current year	2 <5	5<8	8+	2<5	5<8	8+
1	1	14727.1	81647.9	9470.4	-	120157.4	10653.2	-
	2	8446.2	41467.7	6772.0	-	103755.4	34409.8	-
	3	1360.7	7311.0	1140.4	-	39586.3	6840.1	-
2	1	2429.3	6844.5	-	-	3821.5	-	-
	2	366.5	1056.9	-	-	1188.9	-	-

Table No. 7.9 T (contd.)

Quality	Clump size class	Green damaged					
		One-two season old			Over two season old		
		Current year	2<5	5<8	8+	2<5	5<8	8+
1	1	1798.0	26671.4	2367.6	-	27041.3	5622.8	-
	2	1836.3	10503.9	2257.5	-	22948.9	5075.9	-
	3	61.9	892.0	1140.0	-	3657.0	1995.2	-
2	1	257.6	3742.1	254.6	-	1035.0	-	-
	2	30.5	198.2	-	-	462.5	-	-

Table No. 7.9 T(contd.)

Quality	Class size class	Dry sound			Dry damaged			Total
		2<5	5<8	8+	2<5	5<8,	8+	
1	1	84459.7	5918.1	-	81682.1	10060.9	-	482277.9
	2.	66374.2	7894.8	-	73259.2	9023.5	-	394025.3
	3	27472.1	5699.7	-	25509.8	2280.0	-	124946.2
2.	1	1273.9	-	-	3025.9	-	-	22684.4
	2	2378.6	-	-	3435.8	-	-	9117.9

7.10 BABMOO DRY STOCK CORRESPONDING TO BAMBOO GREEN STOCK BY QUALITY, SOUNDNESS AND CLUMP SIZES:

Table no. 7.10 T gives distribution of dry bamboo stock in tonnes corresponding to bamboo green stock by soundness, quality and clump size classes. The table indicates that the first quality bamboos have dry stock of 482277.9, 394025.3 and 122946.2 tonnes under clump size class 1, 2, and 3 respectively whereas the second quality bamboos have dry bamboo stock of 22684.4 and 9117.9 tonnes under clump size 1 and 2 respectively. The culm size over 8 cms under 2nd class bamboo was found to be absent.

Table 7.10 T

Bamboo (dry stock) in tonnes corresponding to Bamboo(green stock) by soundness of culms, quality and clump size class.

Quality	Clump size class	Green sound	Green damaged	Dry sound	Dry damaged	Total
1	1	236656.0	63501.1	90377.8	91743.0	482277.9
	2	194851.1	42622.5	74269.0	82282.7	394025.5
	3	56238.5	7746.1	33171.8	27789.8	122946.2
2	1	13095.3	5289.3	1273.9	3025.9	22684.4
	2	2612.3	691.2	2378.6	3435.8	9117.9

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Annexure - I

Glossary of vernacular (Oriya) names with corresponding Botanical names of common species met with in Koraput district.

S.No.	Local Name	Botanical Name
1.	Andiri	Bursera serrata
2.	Atundi	Combretum decandrum
3.	Aonla	Emblica officinalis
4.	Arakh	Calotropis procera
5.	Amba	Mangifera indica
6.	Ankhu-kolt	Carrisa spinarum
7.	Anchu	Morinda tinctoria
8.	Akanabindhi	Cissampelos pareira
9.	Asan	Terminalia crenulata
10.	Ananta-mula	Hemidesmus indicus
11.	Arjun	Terminalia arjuna
12.	Amda	Spondias mangifera
13.	Amthi	Bauhinia retusa
14.	Ankula	Alangium lamarckii
15.	Arkala	Millettia auriculata
16.	Bahada	Terminalia belerica
17.	Bela	Aegle marmelos
18.	Barangi	Albizzia stipulata
19.	Bija	Pterocarpus marsupium
20.	Baincha	Flacourtia sepiaria
21.	Behenta	Limonia acidissima
22.	Bamur	Acacia arabica
23.	Ban-khajuri	Phoenix acaulis
24.	Ban-capasia	Kydia calycina
25.	Ban-tulsi	Perilla ocimoides
26.	Bandhan	Ougeinia dalbergioides
27.	Bhanta	Clerodendron infortunatum
28.	Budel-mal	Spatholobus roxburghii
29.	Bat-guri	Ardisia solenasea
30.	Bam-oda	Zingiber casumunar
31.	Bans(Dongor)	Dendrocalamus strictus
32.	Bans(Pani)	Oxytenanthera albociliata
33.	Bans(Patsi)	Oxytenanthera monostigma
34.	Bans(Topi)	Cephalostachyum purgracile
35.	Bet	Calamus species
36.	Bara	Ficus bengalensis
37.	Bod-kurhein	Wrightia tomentosa
38.	Barbakulia	Dalbergia paniculata
39.	Benimonj	Casearia tomentosa
40.	Ban-kandul	Atylosia volubilis
41.	Bankadeli	Musa superba
42.	Bhalia	Semicarpus anacardium
43.	Bhersinga	Murraya koenigii

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44.	Bheru	Chloroxylon swietenia
45.	Baidhanka	Mucuna prurita
46.	Boro	Callicarpa lanata
47.	Baruna	Crataeva religiosa
48.	Chadel gudi	Vitex peduncularis
49.	Chauli	Elaeodendron glaucum
50.	Chara	Buchanania latifolia
51.	Chandan	Santalum album
52.	Chhatian	Alsotonia scholaris
53.	Chhai patoli	Stereospermum angustifolium
54.	Chhota Rai	Dillenia aurea
55.	Chun -koli	Zizyphus funiculosa
56.	Bengasag(Brahmi buti)	Hydrocotyle asiatica
57.	Dam kurudu	Gardenia latifolia
58.	Dhatki	Woodfordia fruticosa
59.	Dhauranjan	Holoptelia integrifolia
60.	Dhaman	Grewia tiliaefolia
61.	Dumtari(Chilli-mal)	Acacia pinnata
62.	Dhaura	Anogeissus latifolia
63.	Dimiri	Ficus glomerata
64.	Dudhi-mal (Gar)	Cryptolepsis buchanani
65.	Gambhari	Gmelina arborea
66.	Girli	Indigofera pulchella
67.	Garkhair	Albizzia procera
68.	Gila	Entada scandens
69.	Genduli	Sterculia urens
70.	Gurudu(kurlu)	Gardenia gummifera
71.	Ghanto	Zizyphus xylopyra
72.	Gonairi	Cochlospermum gossipium
73.	Giringa	Pterospermum heyneanum
74.	Gohira	Acacia leucophloea
75.	Gud mari	Premna herbacea
76,	Gutikhadika	Nyctanthes arbortristis
77.	Gad panas	Litsia macrophylla
78.	Gandh palas	Miliusa velutina
79.	Harida	Terminalia chebula
80.	Haldi(Ban)	Curcuma amada
81.	Hinjala	Barringtonia acutangula
82.	Had kinkali	Murraya exotica
83.	Hatkan	Leea macrophylla
84.	Iswar-jata	Asparagus racemosus
85.	Jatjotia	Urena species
86.	Jamu	Syzygium cumini
87.	Jamarla	Antidesma diandrum
88.	Jamla	Homonoia riparia
89.	Japhra	Bixa orellana
90.	Kaitha	Feronia elephantum
91.	Khurdu	Gardenia turgida
92.	Kendu	Diospyros melanoxylon
		" sylvatica
93.	Kamalagundi	Mallotus philippinensis
94.	Kanteikoli	Zizyphus oenoplia
95.	Karada	Cleistanthus collinus
96.	Khus-khus (Bena)	Vetiveria zizanioides
97.	Karanjo	Pongamia glabra

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98.	Kirkichi	Mimosa himalayana
99.	Kodali	Sterculia villosa
100.	Kansa (Budhimahul)	Hymenodictyon excelsum
101.	Kasi	Bridellia retusa
102.	Kochila	Strychnos nux-vomica
103.	Koilakha	Asteracantha longifolia
104.	Khair	Acacia catechu
105.	Kansarilota	Ipomoea pes-caprae
106.	Katak	Strychnos potatorum
107.	Kumbhi	Careya arborea
108.	Kekad	Garuga pinnata
109.	Kundo-phul	Jasminum humile
110.	Kusum	Schleichera oleosa
111.	Kalami sag	Ipomoea reptans
112.	Kurum	Adina cordifolia
113.	Kulhia kanda	Dioscorea spp.
114.	Kandei	Urginea indica
115.	Laipalas	Butea superba
116.	Mahalimba	Ailanthus excelsa
117.	Mardha-mal	Spatholobus roxburghii
118.	Mahul	Bassia latifolia
119.	Madang	Loranthus Spp.
120.	Moi	Lannea coromandelica
121.	Muturi	Smilax macrophylla
122.	Makadkendu	Diospyros embryopteris
123.	Mur-muri	Helicteres isora
124.	Mundi	Mitragyna parvifolia
125.	Mali (bara)	Hiptage madablota
126.	Mohana	Randia dumatorum
127.	Malpi	Patalidium barlerioides
128.	Makha	Schrebera swietenoides
129.	Murga	Agave species
130.	Nalbali	Cipadessa futicosa
131.	Nim	Azadirachta indica
132.	Nirmuli	Cuscuta reflexa
133.	Oluo (Ban)	Amorphophallus species
134.	Palasa	Butea monosperma
135.	Patmasu(Gandha palas)	Miliusa velutina
136.	Paldhua	Erythrina suberosa
137.	Papuni	Oroxylon indicum
138.	Padhel	Stereospernum suaveolens
139.	Palua	Curcuma aromatica
140.	Phasi	Anogeissus acuminata
141.	Pengu-mal	Celastrus paniculata
142.	Pipal	Ficus religiosa
143.	Purhei(Padeikoli)	Ficus cunia
144.	Poi-gam	Eugenia operculata
145	Panas	Artocarpus integrifolia
146,	Petchurimal	Ventilago madaraspatana
147.	Panasi	Eulaliopsis binata
148.	Phul badhuni	Thysanolaena agrostis
149.	Pita alu	Dioscorea spp.
150.	Rani-kathi	Flemingia chappar
151.	Rai	Dillenia pentagyna
152.	Rohini	Soymida febrifuga

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153	Raj simal	Xanthoxylon rhetsa
154.	Runjo	Abrus precatorius
155.	Saguan	Tectona grandis
156.	Sahada	Streblus asper
157.	Sal(Sargi)	Shorea robusta
158.	Salai	Boswellia serrata
159.	Sena(Sidha)	Largerstroemia parviflora
160.	Siali	Bauhinia vahlii
161.	Siju	Euphorbia royaleana
162.	Simul	Salmalia malabarica
163.	Sinkulia (Sweeper grass)	Heteropogon contortus
164.	Siris	Albizzia lebbek
165.	Sisoo	Dalbergia latifolia
166.	Sunari	Cassia fistula
167.	Suna-ragoda	Grewia hirsuta
		Strobilanthes circarensis
		Strobilanthes jeyporensis
		Strobilanthes auriculatus
168.	Sugandhi-mal	Ichnocarpus frutescenes
169.	Sigakai (Chilli)	Acacia concinna
170.	Salap	Caryota urens
171.	Saru (Bono)	Colocasia spp.
172.	Tentuli	Tamarindus indica
173.	Tal	Borassus flabellifer
174.	Telkuran	Ixora parviflora
175.	Thelka	Randia uliginosa
176.	Tilai	Wendlandia tinctoria
177.	Tangini	Xylia xylocarpa
178.	Tandi(Kasatandi)	Saccharum spontaneum

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ANNEXURE – II

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