REPORT ON THE FOREST RESOURCES

OF

Coochbehar District

(WEST BENGAL)

FOREST SURVEY OF INDIA

EASTERN ZONE

FEBRUARY • 1986

Contents

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Contents

C O N T E N T S

LIST OF TABLES

MAPS AND DIAGRAMS

P R E F A C E

The forest inventory work in Coochbehar district was taken up by Eastern Zone of Forest Survey Of India for assessing the existing status of forests and plantations of the district. The actual field work was carried out during the period January & February, 1983 under the overall guidance of Shri S.C.Dey, Joint Director of Eastern Zone. Shri D.R.Das, Deputy Director and Shri P.K.Sarkar,S.T.A. were associated with the actual supervision of field work.

For carrying out survey in high forests a systematic sluster sampling design at grid intervals of $2\frac{1}{2}' \times 2\frac{1}{2}'$ was followed. The sampling intensity was about 0.0125 per cent. As regards plantation survey, plots were selected with probability proportional to the area of plantations. There were in all 75 sample plots of which 66 plots were in plantations and 9 in high forests. The standard error for the estimate of volume in the plantation is 10.8%. The observation with respect to high forest is only indicative and no statistical precision is claimed for the same in view of only nine sample plots being available in the high forests.

The present inventory indicates that the forests of the district occur in small scattered pockets, mostly along the courses of rivers. Excepting two patches viz. Patlakhawa and Garodhat which are protected forests and occur in sizeable blocks, most of the other areas are poorly stocked. The average stocking per hectare of plantation is 84.57 m^3 and the same for high forest is 86.07 m^3. There is a huge gap between the recorded production of wood and assessed demand of the same in the district. Even though the district does not have much of forests, the people are accustomed to use timber and fuelwood which comes mostly from adjacent districts and includes drift wood available from rivers during rainy season.

Consumption study was also taken up separately during the month of June-1984. Special emphasis was given to the study of demand and supply position of wood including inter district movement of forest produce. The total annual demand of timber of the district on various accounts was found to be 36,532.17 m^3 which included wood required for house construction, furniture, agricultural implements and industrial wood etc. The annual supply available from recorded sources was only 34,604.425 m^3 . The consumption of fuel wood was calculated as 8,08,467 metric tonnes whereas the recorded annual availability of fuel wood for the district was only 42,015 metric tonnes. Thus the gap between demand and supply with respect to timber and fuelwood was 1927.745 m^3 and 7,66,452 metric tonnes respectively.

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The encouraging feature of the area is that there is a general consciousness among people regarding the value of forests, Illicit felling of trees is very rare. This leaves scope for improvement of forest areas through concentrated regeneration and launching of large scale social forestry programme in areas outside forests to improve the forest wealth and economic upliftment of the local people.

The good work put in by the field and office staff in completion of the project is gratefully acknowledged. We are also thankful to the West Bengal Forest Department for all possible help in conducting field work and for making their records available for collection of data failing which the report could not have been completed.

Sd/-(D.B.Misra)
Director

C H A P T E R - I

BACKGROUND INFORMATION

1.0 Need for survey:

The inventory work of Coochbehar District of West Bengal was taken up primarily for the assessment of plantation stock of the district as desired by the Chief Conservator Of Forests, West Bengal. Since the district is not having much of forest area, it was decided to complete the inventory of high forest areas of the district also to ascertain the total growing stock of forest. While conducting the survey, sample assessment was also done to estimate the consumption of various wood products of the district in order to find out the requirement of the population regarding their dependence on wood. The movement of various categories of wood into the district from outside sources including neighbouring states were also studied to find out the wood balance of the district. The data collected will help the State Forest Department to know the actual status of forest in the district vis-a-vis the demand of wood of the population. The data will also serve as a base for continuous monitoring of the changing pattern of the vegetation of the district in future as embodied in the Forest Survey Of India's objective.

1.1 Name of the catchment:

The district lies in the catchment areas of Tista, Torsa, Jaldhaka, Kaljani and Raidak rivers.

1.2. Situation and boundaries:

The district is situated in the north eastern part of the State. To its north lies the civil district of Jalpaiguri of West Bengal. Eastern portion is bounded by the Assam State. South and West portion is bounded by Bangladesh.

..2.

1.3. Location:

Coochbehar District lies between the latitudes 26° 32' 20" and 25° 57' 40" N and 89° 54' 35" and 88° 47' 40" E.

1.4. Administrative units and areas:

The forest administrative units of the district are Mathabhanga and Coochbehar ranges of Coochbehar Forest Division.

Total forest area under the control of these ranges is 57.8123 km^2. An area of 22.1877 km^2 is encroached and is not under the direct control of the Directorate of Forest, West Bengal. (Source: W.P. Coochbehar 1971-72 to 1980-81).

1.4.1 Distribution of area:

Geographical area (km^2) - 3,387.00
(Source : Census 1971 Coochbehar District).

Forested area(km^2) - 57.81 ✓

2. Locality factor:

2.1. Climate:

The district has highly humid atmosphere with abundant rains, temperature being seldom excessive. Cold season is from mid November to the end of February. Hot season starts from March and continues up to May. June to early October is the monsoon season.

2.1.1. Temperature:

The mean daily minimum temperature in the coldost month of January is 10.4°C and mean daily maximum is 24.1°C. The temperature in January/ February with western disturbance may drop down to even 4°C. Temperature rises from March and becomes as high as 33°C in hottest month.

...3...

The temperature is therefore not excessive but humidity makes the weather unpleasant. In south west monsoon period the day temperature is a bit lower than that in summer but the night temperature is higher. In the post monsoon period the temperature decreases gradually. The highest and lowest ever temperatures were recorded in May 1960 and January, 1955, which were 39.9°C and 3.9°C respectively.

2.1.2 Rainfall:

The average annual rainfall is 3,201.3 mm., (126.03"). Rainfall is more in North-east than that in the South-west. Maximum rainfall takes place during the month of June to September and about 70% of the rainfall is received during South-west monsoon. Yearly variation of rainfall in general is not much. On an average there are about 102 rainy days in a year having rainfall of 2.5 mm. or more per day.

2.1.3 Relative humidity:

Atmosphere is highly humid throughout the year. Sky is clear or lightly clouded during October to April and heavily clouded or overcast during South-west monsoon period.

The wind velocity is normally not much except for a short spell during thunder storm period in April and May. In post monsoon season and Winter, the direction of wind is irregular. In summer it is North-easterly or Easterly but in the afternoon Western winds blow for some days. Fog occurs in winter months for few days only.

..4...

Monthly average temperature in °C.

Month	Year									
	1978		1979		1980		1981		1982	
	Max.	Min.	+Max.	Min.	+Max.	Min.	+Max.	Min.	+Max.	Min
Jan.	23.3	7.16	25.6	8.3	23.4	9.6	23.4	8.7	24.7	9.4
Feb.	25.6	8.7	26.0	9.3	25.3	11.8	25.5	10.7	25.4	10.0
Mar.	30.6	11.02	31.3	12.1	29.1	15.6	29.4	14.4	29.8	17.2
Apr.	32.1	17.5	33.8	19.8	33.1	21.5	29.8	17.3	48.5	18.6
May	31.0	20.1	32.7	22.1	29.8	21.8	30.4	20.8	32.2	21.5
June	31.9	24.3	33.3	23.6	31.9	24.7	32.5	23.3	31.1	23.3
July	31.2	23.9	30.9	23.2	31.8	25.3	30.1	24.0	30.5	23.6
Aug.	32.9	24.8	32.6	25.1	31.5	24.7	30.9	23.8	32.2	24.7
Sep.	30.5	23.4	31.1	24.2	31.6	24.0	30.5	22.9	31.0	23.5
Oct.	31.6	20.3	29.4	20.6	29.6	19.9	31.8	20.2	31.2	20.8
Nov.	27.6	15.3	28.7	17.6	25.6	14.4	28.6	13.8	27.8	16.05
Dec.	26.2	9.2	24.5	12.1	26.4	10.9	24.6	9.9	24.1	12.0

Monthly rainfall data of Coochbehar District in mm.

Month	Year				
	1978	1979	1980	1981	1982
Jan.	0.2	0.0	0.0	11.4	0.0
Feb.	3.0	5.6	22.0	31.2	0.0
March	3.2	2.4	24.2	13.2	38.2
April	100.2	69.2	63.6	369.2	247.6
May	295.6	188.2	309.6	290.4	239.0
June	228.6	197.0	304.2	553.4	618.0
July	228.6	698.2	779.8	1048.6	1415.8
Aug.	124.6	542.6	833.6	530.0	292.0
Sept.	536.2	463.4	214.0	317.6	529.2
Oct.	9.6	266.6	69.6	3.6	36.2
Nov.	9.2	2.8	0.0	0.0	3.2
Dec.	0.0	22.8	0.0	31.0	7.8
Total:	2199.4	2458.0	3194.6	3164.6	3427.4

...5...

Average humidity in % monthly

Month	Year									
	1978		1979		1980		1981		1982	
	Max.	Min	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	94.9	49.4	95.5	52.0	95.3	51.0	93.1	57.9	95.0	54.7
Feb.	99.6	47.3	94.4	45.1	92.5	58.8	90.8	55.5	89.2	44.1
Mar.	92.5	36.6	82.5	32.0	81.9	47.1	85.0	46.5	81.5	49.9
April	78.1	53.8	74.2	35.5	81.0	54.0	83.4	51.1	83.9	64.9
May	85.1	58.9	83.7	60.9	93.0	67.0	90.2	70.1	84.5	54.2
June	90.8	75.6	84.6	71.7	94.0	74.0	88.8	73.1	92.0	76.1
July	90.7	76.1	91.2	79.09	87.0	78.0	92.0	81.5	95.4	82.6
Aug.	86.8	72.8	88.3	73.5	92.0	79.0	93.2	79.9	90.6	73.4
Sept.	92.9	78.7	91.6	75.6	93.9	75.9	92.4	75.8	92.7	72.6
Oct.	82.7	64.3	90.7	70.4	89.6	68.0	85.9	57.1	86.0	58.0
Nov.	89.4	60.1	95.7	61.3	90.0	54.0	89.3	50.0	88.3	55.4
Dec.	92.1	50.2	93.9	57.0	95.0	54.0	90.2	53.0	94.7	56.6

2.2. Topography:

Coochbehar is essentially a flat country with general slope towards S.E. along which the main rivers of the district flow. Most of the high lands are in Pargana Laibazar and low lands lie in Pargana Dinhata. There is no hill or mountain in the district. Greater part of the district is cultivated. Tracts with grass and reeds are seen at places mostly in the oscillation areas of the rivers. Out of 77 plots under survey 71 were found flat and 6 were gently sloping.

2.2.1 Altitude:

The district is almost flat having altitude not more than 150 meters anywhere.

2.2.2 Mountain range:

There is no mountain range in the district.

2.2.3 Aspect:

Not relevant - the terrain being essentially flat.

...6....

2.2.4 Slope:

The whole district has slope less than 10% and is almost a flat terrain.

2.2.5 Drainage:

Rivers in Coochbehar flow from N.W. to S.E. in a slanting course. All of them rise from the Himalayas and enter the district through Jalpaiguri District, thereafter they flow through Rangpur District of Bangladesh and discharge their water into the Brahmaputra. The banks of the rivers are abrupt and the beds sandy. There is generally sandy bank on one side of the stream though at places both the banks are abrupt. Large rivers carry gravels and sand in large quantities. During dry season all but the Tista and Torsa rivers are shallow. Sudden rise in the level of rivers is common in rain. Though the rivers keep to their beds, small oscillations and throwing out of channels are not uncommon. The soil being of recent origin (alluvium mixed with sand) is easily cut by rushing water and is deposited on sites of low velocity. By the end of October the water level come down considerably and by March they become very shallow sometimes even dry. Six principal rivers are (1) The Tista (2) The Jaldhaka (3) The Torsa (4) The Kaljani (5) The Raidak and (6) The Gadadhar.

The Tista which rises from North Sikkim is the largest river, which neither have any tributary within the district nor it throws out any distributary. It flows for about 25 km. in the district. The bed is about 1-2 km. wide and sandy. Bank is normally high on one side and sloping on other side.

The Jaldhaka rises in Bhutan hills and enters the district through Jalpaiguri. From Chokhekata the river has the name Mansai. It receives the Torsa near Gosanimari temple and takes the name Dharla or Dhalla.

..7..

Torsa has its origin outside India. It flows through Bhutan by the name Amo Chu then flows through Jalpaiguri District and subsequently enters Coochbehar District.

Kaljani is formed in the eastern Duars with the combination of Alaikusi and Dima, and the combined water takes the name Kaljani at Alipurduar where they join. It enters Coochbehar by the north of Taluk Kholta. It joins Torsa at Panisala. It is a quick flowing river with a formed bed and shelving banks. It has good depth and about 300 meter wide.

Raidak enters the district from Duars in between taluk Dorka and Chengtimari. There are two rivers of same name flowing parallel at some distance apart. The western branch enters Coochbehar at Dorka and eastern stream enters by the west of taluk Khagrabari and is known as Rangbarsuti. Both the streams unite in taluk Salbari and ultimately joins the Gadadhar(Sankosh).

Gadadhar goes by the name Sankosh in the upper course. It flows about 15 km. through the district where it receives the Takulla, the Jorai and the Raidak and then moves out the district.

2.2.6 Beels and marshes:

The district has a large number of abandoned courses of changing rivers which connect the rivers during the monsoon; others are completely insular accumulated water. These are beels or marshy land which are used for growing of fish and steeping of jute. These also occasionally serve as irrigation water for the tobacco field. There are about 25 important beels.

....8.....

There is no spring in the district. Level of sub-soil water is quite high. Shallow wells are within 15 - 20 feet deep. Water generally remains at the level of 8 - 12 feet. In monsoon when the rivers are in spate, this level rises up even up to the reach of hand.

2.3. Geology, rock and soil:

The soil of Coochbehar is alluvial and of very recent origin. It is mostly sandy and loose. There is hardly any good depth of clay in the district. Surface soil is loamy and mostly up to 3' deep and in some places even less. Underneath it is all bare sand. Mostly the soil is ash colour, black loam is found in the eastern part of the district i.e. from Goalpara border to the Kaljani. Some black loam is found between the Jaldhaka and the Tista and in the old valley of Dharla. The district has no major seismic disturbances, however, in 1897 an earthquake upheaved the beds of many beels and water courses, and caused heavy silting.

2.3.1 General distribution of rock system and soil:

There is no hill or mountain in the district and no major out-crop of rock formation anywhere. The country is flat and the soil is alluvial.

2.3.2 Mineral resources:

There is no mineral resources worth mentioning in the District.

3. Landuse pattern and assessment of condition of land erosion status etc.

3.1. Land use:

The present land use of the district is as follows:-

....9.....

Estimate of area ('000 hectares) under twelve fold classes of land, 1981-82 in the district of Coochbbhar

Area according to village records.	Forest	Area under non-agri. uses.	Barren & unculturable land	Permanent pastures & other grazing lands	Land under misc. trees crops & groves not included in net area shown	Culturable waste land.	Fallow land other than current fallow	Current fallow	Net area sown	Total cropped area.	Area sown more than once
1	2	3	4	5	6	7	8	9	TO	11	12
341.350	5.699	60.C12	5,309	2.278	8.107	3.451	2.585	0.884	253.025	482.550	229.525

Source:- Economic and Evaluation Branch, Directorate of Agriculture, Government Of West Bengal.
Taken from report on Land Utilisation and Corporation Survey in West Bengal, 1981-82.

3.2. Soil:

The soil of the district has been formed by alluvial deposits. As the top soil is loamy, the soil of the district is fertile and very good for agricultural crops like paddy, jute, tobacco, green vegetables etc. At the time of survey two grids of forested areas fall in low land. Since one grid represents 3.75 km^2 of forested area, 7.5 km^2 of forested area is considered to be on low land with tall grasses and very few trees.

The soil in various samples plots were examined for its texture, consistency, depth, presence of coarse fragments and humus content. The following tables indicate the occurrence and distribution of various soil types in the project area:-

Table No.3.2.1
Plots by soil texture.

Soil texture	Clay loam	Loam	Sandy loam	Sandy	Total
No. of plots	23	24	22	6	75

Table No.3.2.2.
Plots by coarse fragments.

Presence of coarse fragments.	Loose Boulder	Gravelley	No. coarse fragments	Total
No. of plots	-	-	75	75

TABLE No. 3.2.3
Plots by soil depth.

Soil depth	From 30-90 cm.	90 cm. and more	Total
No. of plots	14	61	75

Table No.3.2.4
Plots by soil consistency

Soil consistency	Friable	Slightly compact	Compact	Total
No. of plots	31	42	2	75

Table No.3.2.5.

Plots by soil humus:

Humus status	No. humus	Depth less than 5 cm.	Total
No. of plots	2	73	75

The above tables show that the majority of the soil of forest areas has clayey loam to sandy loam texture with consistency varying from friable to slightly compact and depth varying from 30 cm. to more than 90 cm. The soil contains no coarse fragments, and the humus is less than 5 cm. thick in most of the forest floors.

The following is the distribution of plots of project area according to erosion status:-

Plots by soil erosion

Erosion status	No erosion	Moderate erosion	Heavy erosion	Total
No. of plots	64	6	5	75

The type of erosion noted is sheet erosion.

4. People and their socio-economic condition:

4.1. General:

The population of Coochbehar district is 17,71,643(1981 Census) out of which 16,49,383(81%) persons live in rural areas. The Scheduled Caste and Scheduled Tribe population are 8,83,084 and 10,105 respectively i.e. more than 50% of the population belongs to traditionally backward classes. The literacy percentage of the district is 29.99% i.e. 5,31,326 persons are counted as literate in 1981 Census. Out of the literates, the percentage of male population is 68.89 and the same for female is 31.11 only.

4.2. Livelihood classes:

The following table indicates distribution of the population according to livelihood classes (Source :- Directorate of Census Operation, 1981 Census)

Agricultural labourer	Cultivators	Other workers	Household industry, manufacturer, processing, service, repair.	Marginal labourer	Non-worker
1,39,914	2,67,173	96,147	10,356	14,370	12,43,683

Thus about 78.65% of the working population earn their livelihood from agriculture. Good soil, rain and other climatic and topographical condition have favoured the district to produce good agricultural crops like paddy, jute, tobacco, pulses(mug, masur, khasari, thakri, kulti, archar) whoat, barley, sugar-cane etc. (Source :- 1981 Census, Directorate of Census Operation).

4.3. Cultivation details:

All available lands earmarked for cultivation have gradually been put to intensive agricultural production with improved irrigation facilities and introduction of fertilizers. The principal crop of the district is paddy of which winter paddy is the main cultivation. Next in order of land use comes the cultivation of jute followed by wheat cultivation. Tobacco is one of the most economically grown crop in the district and its quality is comparable to any such crop grown in the foreign countries. Other important cultivated crops are Mustard, Pulses, Linseed oil and Mesta etc.

...13 ...

4.4. Census of domestic animals:

The latest census of domestic animals indicate the following population:-

Sl.No.	Type	Number	Population
1.	Cattle	13,54,520	4.00
2.	Buffaloe	2,21,492	0.65
3.	Sheeps, Goats & Pigs.	23,06,216	6.81

It will thus be seen that the domestic animal population is more than double the population of the human being in the district. One hectare of land has to support about five cattle and about seven goats and sheep. This indicates that the pressure of domestic animal is very high on the land and the same pressure is reflected on forest land also.

4.4.1 People and their socio-economic condition:

There are two principal communities - the Hindus and the Muslims. The percentages are 78.4 and 21.1 respectively. Others are Buddhists, Sikhs, Christians and Jains.

Among the Scheduled Castes, Rajbansies are the largest in number followed by the Namasudras. Other Scheduled Caste communities are Bagdi, Dhulies, Chamar, Jolia, Kaibartas, Bauris, Dhobas etc. Scheduled castes are lagging behind in education.

Labour participation is proportionately higher among Scheduled Castes. They are mostly engaged in primary sectors i.e. agriculture. Some are also engaged in household industries, trade and commerce.

...14.....

Scheduled Tribe:

Oraons are the largest in numbers followed by Rabhas, Garos and Santhals. They are very backward in education and are mostly engaged in agriculture with only a few in industries. They developed a sense of isolation previously but now the feeling is gradually disappearing with Government taking up welfare activities for the social uplift of the tribal people.

4.4.2 Industrial dependence:

The district is industrially backward. At present there is no large scale industry. Number of registered SSI units upto September, 1979 was only 2278 and that of unregistered has been assessed at 4627. Most of these units are engaged in the fields of textiles, food products, chemical products, wood works, tobacco products etc. Some village industries such as handloom, weaving, paddy husking, biri making, oil processing etc. grew up after the migration of displaced persons. Persons employed in these industries hardly constitute 4% of the total population. Nonavailability of resources is the main reason for the bleak picture. These SSI units are concentrated mainly in Mekhliganj, Tufanganj, Dhalbari, Ghoksadanga, Rupumari, Coochbehar, Dinhata and Mathabhanga areas of the district. Many of these traditional cottage industries have become sick due to high degree of competition from commercial products; replacement of basic articles by synthetic fibres, absence of quality control and inadequate financial assistance (Source:- Report of industrial potential survey Coochbehar - Directorate of Cottage and Small scale Industries, West Bengal).

...15 .....

4.4.3 Economic standing:

The people in general are poor. Per capita annual income has been estimated to be around Rs. 575.90 of which 68.61% comes from agriculture. About 85% of the total population is engaged in agriculture as against 60% in the state as a whole. Thus a large number of families live below the povery line (Source:- Industrial Pot Survey Reports, Cottage and Small Scale Industries, Directorate of West Bengal, Page-5).

4.4.4 Dependence on forests:

As the forest area is hardly 1.67% of the total area of the district, the dependence of people on the forest of the district is very less, but due to unsatisfactory supply of coal and steel and availability of timbers in the nearby districts there is considerable dependence of local population on wood products and firewood. There are 34 Saw Mills and one Plywood mill in the district. The average employment per Saw Mill varies from 9 to 34, most of which are permanent in nature. Besides there are about 80 dealers who deals with fuelwood.

4.4.5 Special programme of development in forestry:

Scheme of I.T.D.P., N.R.E.P., Special Component Plan for Scheduled Caste, Social Forestry etc. are being carried out in the district with the participation of different departments. Under these schemes plantations are raised, primarily of locally important species, for development of fodder resources, creation of minor forest produce, raising of lac and tasar hosts on available lands to improve the economic condition of the local people and building up of rural small scale industry for self sustenance.

...16...

5. Forests:

The distribution of forests in the district is very eratic and is mostly spread in small pockets along the coarses of rivers. There are only two sizeable areas where forests occur reasonably compact one being Patlakhawa and other Atiamochar (Garodhat) complex. Remaining forests are mostly located in small patches on the bank of rivers. These forests are therefore subjected to annual inundation and a sizeable portion of these forests have been engulfed by widening of river beds. The net area of forests, is therefore less than the area borne on record.

5.1. Composition and condition of crops:

The basic forest of Coochbehar district is of savanah type which has got patches of Sal in high areas, and Bombax and Albizzia in low areas. Other species mixed are Careya arborea, Lagerstroemia parviflora, Bauhinia purpurea, Dillenia pentagyna, Acacia catechu, Dalbergia sissoo, Trewia nudiflora, and Bischofia javanica etc. The grasses are represented by Saccharum species, Arundo donax, Phragmites karka, Imperata cylindrica, Narenga porphynocoma etc.

In addition to above a small patch of Ardisia swamp forests also occur in the low lying area of Patlakhawa with thickets of Ardisia nerifolia. Other species found in this swamp forests belong to genera like Eugenia, Stereospermum, Bischofia and Trewia.

...17 ...

The condition of forests in the district is rather poor. High girth trees are very much limited in number and incidence of grazing is very heavy. Damage to forests by flood and fire is also frequent. However, patches of Sal occurring in Barosalbari, Natabari, Mahismari, Gossanimari etc. which are protected by local people through years have attained reasonable quality size.

5.2. Stratification:

Since the species in forests occur in intermixed fashion and no forest type is of any appreciable magnitude, the entire natural forest has been placed under high forest stratum. Similarly all the plantations have been grouped under one stratum viz., plantation stratum.

5.3. Legal status:

Prior to the merger of the State of Coochbehar to India, the forests were the exclusive property of His Highness, the Maharaja Bhup Bahadur of Coochbehar. No rights or concession ever existed. Management was done under the provision of Coochbehar Forest Act, (Act No.II of 1908) and the Rules and Orders of the then State Council. The accession of the State to the Indian Union took place on the 12th September, 1949. Betweeen 12th September to 31st December, 1949 it was under a Chief Commissioner and was known as Chief Commissioner's Province in the Government Of India. On 1st January, 1950, it merged into State Of West Bengal by virtuo of an order under section 290(a) of the Government of India Act, 1935. On the 3rd of January, 1950 the erstwhile State Forests were taken charge of by Shri K.L.Lahiri, the then Divisional Forest Officer, Buxa Forest Division on behalf of West Bengal Forest Department. The forests in two main blocks namely Patlakhawa and Atiamochar along with

...18....

some older plantations in isolated patches were declared as protected forests on the 29th April, 1962. Other areas mostly in Mathabhanga Range still remains as unclassed forests.

The following are the status of the forests now occurring in the district:-

Range	R.F.	Protected Forests	Unclassed State Forests	Khasmahal Forests	Total Forests
Cochbehar	Nil	4049.29	398.72	83.12	4531.13
Mathabhanga	Nil	62.71	952.03	335.36	1250.10
					5781.23

5.4. Demarcation and forest settlement:

The forests are demarcated by the artificial boundaries with placement of wooden boundary pillars after checking with R.S.Maps. Where R.S. maps were not available, boundaries were checked with reference to C.S.maps.

5.5 Right and privileges:

No right exists except the right of way wherever roads of P.W.D. or district board passes through the forests. Besides, certain concessions on the use of the forest land have been granted to fixed demand holders under specific agreement.

5.6 Past system of management:

The past History of the forests of the district is very obscure as prior to 1950s the forests belonged to the Raj Estate of Coochbehar. However, available records indicate that except some selection felling of commercially valuable species regular forest exploitation was not done in the area during this period. Patlakhawa and Garodhat forests were however maintained with the main objective of making it fit for the shelter and growth of the Wild Life population located there. Some

....19...

amount of thinning in the congested crops were however done to improve the crop and to meet the local demand. The 'beel' areas were however leased from time to time for development of fisheries. Patches of forests on high land which did not have good forest coverage were time to time afforested with Teak and a number of such plantations were raised in isolated manner in high land areas. Some of the plantations dates back to 1890s and stray girth of 7' - 8' of Teak are found there.

5.6.1 Present system of management:

Almost the entire forest of the district is now placed under Development Working Circle with the objective of conversion of existing poor type of forest and blank areas by artificial regeneration of commercially valuable species with clear felling where necessary. A portion of the forests of Mathabhanga Range which was placed under Riverain Working Circle in the 2nd Working Plan for Coochbehar Forest Division do not contain exploitable trees of any significant extent now so the areas of Mathabhanga Range is also subjected to artificial regeneration wherever the stability of soil is there.

In the choice of species, Teak has received highest priority followed by Sissoo and Khair as per land suitability. In addition, Simul, Jarul and Kadam are also being raised on areas depending on local conditions. Some bamboo, Poplar and Eucalyptus have also been raised on experimental basis.

5.6.2. Thatch working:

The forest area of the district contain a large tract of thatch grass which has got commercial demand. These thatch grasses are sold annually by auction as well as by permit in the beginning of the Winter season.

...20.....

5.6.3 Exploitation:

The disposal of various forest produce is done by auction after departmental exploitation from forest to depot. The volume of poles are also included in timber figures.

The following is the outturn of forest produces during the years mentioned(as collected from the Divisional Forest Office).

Year	Timber in m3 1000	Firewood in m3 1000	Thatch grass in bundles	Revenue in Rs.	Expenditure in Rs.
1979-80	0.66	0.56	Nil	6,33,782.00	8,36,718.00
1980-81	0.427	1.821	2000	76,719.52	10,15,780.00
1981-82	0.857	1.921	8000	4,56,276.00	9,94,655.00

6. Forest Resources Information:

6.1 Crop composition:

The high forest of Coochbehar district has no dominance of any particular species and crop consists of all sorts of species.

Distribution of plots as per predominant size classes are as follows:-

Predominant d.b.h.	Below 10 cm.	10-20 cm.	20-30 cm.	30-40 cm.	40-50 cm.	50 cm. & above	Total
No. of plots	1	6	-	1	-	1	9
% of occurrence.	11.11	66.67	-	11.11	-	11.11	100

Majority of the crop has dia. less than 20 cm. and approximately 14% of the area has been found to contain degraded and scrubby vegetation.

6.2 Plantation:

66 plots were surveyed in the plantation areas. The following is the distribution of predominant diameter classes in the plots surveyed.

..21.....

Predominant d.b.h.	Below 10 cm.	10-20 cm.	20-30 cm.	30-40 cm.	Total
No. of plots	3	47	12	4	66
% of occurrence.	4.54	71.22	18.18	6.06	100

Majority of the crop is below 20 cm. dia. and the area contains pole crop with density ' 2 - '6.

6.3. General assessment:

Stocking/plantation is in general good. Illicit felling has been noticed in four(4) out of nine(9) high forest plots, and 25 out of 66 in plantation plots i.e. about one third of the whole forest is affected by this problem.

7. Maps and photographs:-

Maps showing the following details have been given:-

i) Project area
ii) Inventory design.
iii) Road, Railway lines.
iv) Distribution of Govt. Forests.

8. Infrastructure:

8.1 Administrative:

Following is the executive staff pattern of the division in the portion of Coochbehar district:-

Divisional Forest Officer	- 1No.	Overlaps Jalpaiguri district portion of the Division.
Asstt. Divisional Forest Officer.	- 1 No.	
Range Officer	- 2 Nos.	
Forestor	- 9 Nos.	
Guard	- 19 "	
Watchman	- 8 "	
Listed Watchman	- 15 "	
Orderly	- 2 "	
Boatman	- 1 No.	
Bunglow Chowkidar	- 1 No.	

....22....

8.2 Communication facility:

All the Sub-Divisional Headquarters are connected with the district Headquarters by metalled road. Besides the Police station and other important places are also connected by roads. The following is the road net work in the district:-

Type of road	National Highway.	State Highway	Major Distt. road	Ordinary Distt. road	Village road	Forest road	Local Bodies
Length in km.	61	43	161	266	44	32.5	-

Source:- 1. Report on Industrial Potential Survey, Directorate of Cottage & Small Scale Industries, West Bengal.

2. 2nd Working Plan.

9. Forest based industries and markets:

The industrial activities in the district are based on traditional lines and are primarily artisan oriented. The industries are mostly on small and cottage scale. Following are the major forest based industries in the district:-

1. Saw Mill Industry
2. Plywood Factory.

9.1 Saw Mill:

Saw Mill is the most important forest based industry of the district. There are 31 Saw Mills of which 10 contain veneer unit also. The survey indicates that the present total annual installed capacity of the industry is about 30,000 m^3 but the actual outturns of the Saw Mills is only 18,000 m^3 i.e. they work below their installed capacity. This is due to insufficient and irregular supply of electricity, raw material and labour trouble. The distribution of surveyed Saw Mills(27 numbers) according to their annual capacity are as follows:-

...23.....

Annual capacity	300 m3 & below	300 to 600 m3	600 to 1000 m3	1000 m3 and above	Total
No. of Saw Mills	Nil	4	3	20	27
% of occurrence	-	15	11	74	-
Capacity of Veneer Unit.	2	3	-	1 (included within 27 unit)	6

Out of these 27 Saw Mills most of them obtain their raw material either from the privately owned trees of the district or from outside the district. On an average they get 72% of the timber from the Forest Department including outside district and 28% from the privately owned trees.

The comparative figures are as follows:-

Surveyed	Installed capacity utilised				No. of Saw Mills		
	Upto 25%	25-50%	50-75%	75-100%	Obtaining material fully from private sources.	No. of Saw Mill obtaining material more than 50% from Pvt. sources i.e. less than 50% from Government	No. of Saw Mill obtaining material less than 50% from Pvt. sources i.e. more than 50% from Govt. sources
1	2	3	4	5	6	7	8
27	3	9	8	7	3 Nos.	2 Nos.	22 Nos.

No. of saw mills obtaining material less than 50% from outside the district.	No. of Saw Mills obtaining material more than 50% from outside the district
9	10
10 Nos.	17 Nos.

About 20% of the total production of Saw Mills is consumed within the district and the rest has got its market outside the district, mostly at Calcutta.

C H A P T E R - II

INVESTIGATION AND METHODOLOGY

2.1. Objective:

The broad objective of the inventory were as follows:-

i) Estimation of the plantation stock of the area and to indicate the availability of resources in high forests.

ii) Examining the present rate of consumption of wood by existing population and industry.

iii) Assessment of the net wood balance in the district.

2.2 Aerial reconnaissance:

No aerial reconnaissance was carried out in the district.

2.3 Photo-interpretation and mapping:

Maps of photo-interpretation were not available for the district. Field inventory work was carried out on the basis of Survey Of India Topo sheets in the scale of 1: 50,000.

The following maps have been used:-

1. 78 F/7 - Scale 1: 50,000
2. 78 F/11- Scale 1: 50,000
3. 78 F/15- Scale 1" = 1 mile.

Besides, maps supplied by Divisional Forest Officer, Coochbehar Division on the scale of 1" = 1.5 miles were also used.

2.4. Inventory design(High Forest):

For the purpose of inventory of the high forests the standard sampling design as adopted for Forest Survey Of India was followed.

...25.....

Each topographical map sheet pertaining to the district was divided into grids of $2\frac{1}{2}'$ x $2\frac{1}{2}'$ which formed the basic sampling units. Two square plots of 0.1 ha. area were laid out in each sampling unit and data was collected in the prescribed field forms.

The plot centres of the two sample plots were selected in the following manner:-

One side of the square plot of an area of .1 ha. comes to 34.62 metres or .6324 mm. on a map of 1:50,000 scale. Depending on the length and width of each $2\frac{1}{2}'$ x $2\frac{1}{2}'$ grid the number of sample plots that can exist on X axis and Y axis is worked out.

Two random number are chosen one for the X-axis and one for the Y-axis, the S-W corner of $2\frac{1}{2}'$ x $2\frac{1}{2}'$ grid is considered as the origin.

The location of the second plot centre is obtained by joining the first plot centre with the grid centre and extending it to an equal distance in the opposite direction.

2.4.1 Inventory design(Plantation):

Since individual plantations vary in size, it was proposed to select plantations with probability proportional to the size. For this purpose, all plantations of different ages within each age group of plantation was listed with area.

Two random numbers were selected from random numbers tables, one in the range of total number of plantation in a particular group and other in the range of maximum area of a plantation in the group.

If the area of the plantation corresponding to the first selected number is greater than the second selected number, the plantation is included in the sample otherwise second pair of random numbers is selected and the same process continued till the required number of plantations are included in the sample.

....26.....

In each of the selected plantation, two plots are randomly chosen.

Size of the plot:

The plot size is determined by the age of the plantation. In case of older plantation (i.e. plantation of 1925 and earlier) 0.1 ha., 0.05 ha. plot per plantation between 1925 & 1955 and .025 ha. plot per plantation between 1956 to 1975. ✓

2.5 Constitution of parties:

A total of 3 parties were deployed for the inventory. Each party consisted of a Crew Leader an Assistant Crew Leader and two Fieldmen helped by some daily labourers.

Jeeps with trailor were provided for camp shifting and movement into forests. One Truck was also placed with the parties for movement of camps etc. The parties were provided with full camping equipments.

The field work started in January, 1983 and was completed during February, 1983.

2.5.1 Field instructions:

General directives and guidelines were given to the field parties for successful implementation of inventory. Strict observance of these instructions was ensured during the course of data collection. The data collected in the field was recorded in the following field forms:-

...27...

Type of field form used	Description
Plot Approach Form (Form No.1)	Details of journey upto reference point and conspicuous features were recorded.
Plot Description Form (Form No.2)	General observation on an area of 2 ha. around the plot centre made.
Plot Enumeration Form (Form No.3)	Measurement of all sound trees from 5 cm. d.b.h. and above in a plot entered.
Sample Tree Form (Form No.4)	An area of 0.025 ha.($\frac{1}{4}$th of the plot) is chosen in N-W quadrant for sample tree measurement.
Herbs/Shrubs Form	Records of ground vegetation done.
Range Information Form	Various data from Range collected.
Household Consumption Form	Details of wood consumed for various domestic purpose recorded.
Industrial Consumption Study Form.	Survey of Saw Mills etc. made and data collected.

...28....

C H A P T E R - III.

DATA ANALYSIS.

3.1 General:

The data processing is carried out in three stages mainly manual processing, processing on unit record machine and processing on computer.

3.2 Manual Processing:

It involves the following steps:-

a) Documentation of the field information.

b) Coding the field forms where it is not incorporated.

c) Checking of the data filled in the forms.

d) Reconciliation of the discrepancies with the field officer.

3.3 Processing on Unit Record Machine:

It involves :-

a) Punching and verification of the data.

b) Sorting and collating cards for proper input.

3.4. Processing on Electronic Computer:

It comprises of:-

a) Loading of the data on magnetic tape.

b) Consistency checking and correction of data.

c) Processing of final tables.

3.5 Area assessment:

In absence of aerial photographs for the area, the assessment of area could not be based on usual photo-interpretation methods.

The area as available from the Forest Department and other sources is as under:-

Sl.No.	Stratum	Area(ha.)	
1.	Plantation	1484.50	x84.569
2.	High forest	4296.73	x86.068
	Total Forest Area:	5781.23	

57.81

...29...

3.6 Inventory Results:

During the process of field inventory, it became evident that older stock of plantations(created by the Rajas) prior to the year, 1945, have virtually disappeared from the area. The older stock have been subjected to gradual process of exploitation to meet the departmental requirement and also off the ever-increasing population in the area. Consequently the extent of areas under older plantation existing is negligible and may be considered to be insignificant.

3.6.1 Tree density study(Plantation Stratum):

The density of stems in the plantation stratum is 406 stem/ha.

Regarding important species in the stratum, it is observed that Tectona grandis is the predominant plantation species and accounts for about 28.9% of the stems followed by Anthocephalus cadamba(28.0%), Dalbergia sissoo(21.8%), Lagerstroemia speciosa (5.7%) and Acacia catechu(2.5%).

A study of the plantation crop by its diameter class shows that trees in higher girth class is limited and stems above (50-59 cm.) diameter class is practically absent.

The distribution of the species by its diameter class depicts the following picture:-

Sl.No.	Diameter class(cm.)	Percentage
1.	10-19	66.9
2	20-29	25.0
3	30-39	6.8
4	40-49	1.0
5	50-59	0.3

The above table shows that 92% of the total stems belong to the diameter class(10-29 cm.) and stems above 40 cm. diameter is rather insignificant.

....30...

Thus it can be safely stated that the plantation stock in the area belongs to the younger series that needs protection and care so that the crop can establish itself.

3.6.2 High forest:

The distribution of trees by species and diameter class is shown in the table number 1.2.

The number of stems per hectare in the stratum is 130. Acacia catechu is the main species which contributes 33.9% of the total stems followed by Bombax ceiba (21.5%), and Eugenia species (12.3%)

Regarding the pattern of distribution of the crop in the stratum, it is seen that 53.8% stems belong to the diameter class (10-19 cm.), 15.3% to diameter class(20-29 cm.), 3.1% to (30-39 cm.), 10.8% to each of (40-49 cm.) and (50-59 cm.) dia. class while 6.2% stems belong to (60-69 cm.) diameter class.

Thus about 69% of the stems are within 30 cm. diameter. Trees above 30 cm. diameter class comprises of about 31% of the total stems which extent up to diameter class(60-69 cm.). Trees above 70 cm. diameter is totally absent in the area.

3.7 Volume studies:

The estimation of volume for plantation and high forest is separately derived as given in table number 2.1.

3.7.1 Plantation stratum:

The volume per hectare in the stratum is 84.569 m^3. This low outturn is primarily due to the fact that higher girth trees in the stratum is practically absent and trees are concentrated within 20 cm. diameter.

The principal volume contributing species in the stratum are Tectona grandis (39.6%), Anthocephalus cadamba (23.7%) and Dalbergia sissoo (17.1%) .

.....31.....

Regarding the distribution of volume by diameter classes, it is observed that 32.5% volume pertains to the diameter class (10-19 cm.), 35.4% to diameter class (20-29 cm.), 22.6% to the diameter class (30-39 cm.), 5.5% to the diameter class (40-49 cm.) and 4.0% in the diameter class (50-59 cm.).

3.7.2 High forest:

Distribution of volume per ha. for high forest is given in table number 2.2.

Volume per hectare in the stratum is 86.068 m^3/ha. It is observed that Bombax ceiba contribute 52.4% of the total volume followed by Bischofia javanica (21.4%) and Eugenia species (10.8%).

Regarding the distribution of volume in various diameter classes, it is seen that 8.5% of the total volume pertains to the diameter class (10-19 cm.), 6.9% to the diameter class (20-29 cm.), 2.7% to the diameter class (30-39 cm.), 19.0% to the diameter class (40-49 cm.), 35.2% to the diameter class (50-59 cm.) and 27.7% to the diameter class (60-69 cm.). Thus, out of the total volume in the stratum about 82% is contributed by trees above 40 cm. diameter.

C H A P T E R - IV.

GROWING STOCK AND YIELD

4.1 General:

The district has barely 1.67% of the total area under forests. The forest are mostly confined to the river courses and are subjected to gradual inundation resulting in sizeable loss of forest area by the widening of river beds each year.

During the course of inventory, the poor condition of the crop became evident by limited number of high girth trees and low outturn both in plantation and high forests.

4.2. Inventory results stratawise:

The estimation of growing stock has been made for various strata and are already included in Chapter-III.

4.3 Annual Yield:

No attempt has been made to estimate the total annual yield and also to prescribe a management model for the forests of the district alone as main portion of the forests of the Division fall in the adjoining areas of Jalpaiguri district and the management of forest is controlled on Divisional basis.

Further, the forest area of the district is very small, scattered in patches, and the stocking is poor with complete absence of high girth trees. It would, therefore, not be judicious to fell the trees for immediate return. The area being prone to inundation and the stability of the soil being uncertain, conservation and development of the forests should be the main object of forest management in the district.

....33....

C H A P T E R - V.

LOGGING AND ACCESSIBILITY STUDY.

5.1. Objective:

Logging study was carried out to find out the existing logging practice, details of extraction facility and the operational cost involved in the present system of working with the object of suggesting improvement to the existing system, if any.

5.2. Terrain classification:

Since the entire area of the district is flat, terrain classification is not pertinent in the district.

5.3 Existing logging practice:

An analysis of the logging practices in the area indicato that felling is usually carried out by axe which is also used for lopping, debranching and debarking. Use of cross cut saw was found in making logs from bigger sized trees. The operations are carried out at the stump site.

At present logging is mainly done by the Forest Department. Felling, debarking, cross cutting and stacking at the forest is done by labourers employed departmentally. Transport of the logs and firewood from the coupe to the departmental depot is done by hired truck on contract basis. Felling is usually done in the coupe which are marked according to the prescriptions of the Working Plans. The felled trees are cut into logs of different sizes.

Main agency for transport of timber is road transport. The land transport system consists of two parts:- (i) Off road transport i.e. up to

....34.....

truckable point and (ii) road transport. Various Off-road transport system are prevalent in the area. But mainly it is done by bullock cart.

There are two departmental depots one each at Coochbehar and Patlakhawa. Forest produces are arranged in lots as per gradation of timber, fuelwood etc. and the lots are put to public auction from time to time for their final disposal.

5.4. Extraction routes:

National highway number 31 connecting Gauhati and Siliguri passes for 61 km. in the district. Besides, the different road lengths under P.W.D. and Forest Department are as under:-

ROAD LENGTH IN KM.

P.W.D.					Forest Deptt.Road
Metalled			Unmetalled		Unmetalled
NH	SH	Major District Road.	Ordinary District Road	Village Road	
61	43	161	266	44	32.4

All the neighbouring district Headquarters and the Sub-Divisional Headquarters of the district are connected by metalled roads. Unmetalled roads are of no use during rainy season for the purpose of transport of timber by trucks.

There are 4 main Railways Stations and about 100 km. of Railway line in the district, about 5570 m^3 of log, 1070 m^3 of sawn timber, 84 m^3 of Veneer and 4826 m^3 of fuel wood had been transported by rail in 1983-84 (financial year).

5.5. Operational cost:

The rate of felling, logging, transport etc. has been fixed as follows:- Felling, logging(including cross cutting of logs and debarking) are Rs. 12/m^3, Rs.11/m^3 and Rs. 10/m^3 respectively for Sal, hardwood and softwood.

...35...

The rate of transport from the only operating area of Garodhat to the departmental depots at Coochbehar and Patlakhawa having a distance range of 50-70 km., is fixed as Rs. 100/m^3 for timber. The operation of transport includes (i) the off road transport i.e. from coupe to the road and (ii) the transport from road side to the dopot(departmental) including loading and unloading. The timber is carried by the private trucks on contract basis.

5.6 Proposed logging practice including road planning:

The total quantity of forest produce worked in the district in 1981-82 was about 2.77 thousand cu.m. of which fuelwood was 1.92 thousand cu.m. The revenue received during that year was Rs. 4,56,276/-, that means Rs. 165/- por cu.m. of forest produce. To transport this quantity of timber and firewood the existing infrastructure is sufficient, so nothing is suggested for immediate future in this respect.

C H A P T E R - VI.

CONSUMPTION STUDY.

6.1. Objectives:

During the course of inventory, it was seen that a huge quantum of wood is consumed within the project area by the local population.

Accordingly, it was felt necessary to conduct a low intensity sample survey with the following broad objectives:-

i) to estimate the local consumption of wood for various household purpose.

ii) to estimate the consumption of wood by wood based industries of the area.

6.2 Sampling design:

A two stage stratified random sampling was adopted in the present study.

The total sampling units falling in the project area were first stratified into urban and rural sectors in the first stage of sampling.

The second stage of sampling constituted the households covering both the rural and urban sectors of the district.

The total number of sampling units in urban area was 76 while in rural areas it was 224. Thus, the intensity of sampling in urban and rural area was 0.5% and 0.1% respectively.

Besides, assessment of consumption of wood by local industries was also carried out by actual inventory in selected localities.

6.3 Consumption by large industries:

— No large industry which consume wood exists in the district.

....37 ....

6.4. Consumption by small scale industries:

Saw Mills and Veneer units are the only wood based industries of the district. A survey of 27 Saw Mills with six Veneer units was carried out and the total log input of the mills has been estimated as 9501 m^3/yr.

6.5 Consumption by local population:

The internal consumption of wood by local population has been estimated. The estimates of consumption has been made separately under the following categories.

6.5.1 House construction and repair:

Type of house in an area is greatly influenced by climate, economic condition and tradition of the people. Field survey reveals that the average per capita consumption of wood for construction of house is about 0.143 m^3 in rural and 0.354 m^3 in urban areas respectively. Further it has been ascertained that the longivity of a house in the area is 15 years (as the rainfall is more) and about 10% of the wood is needed for annual repair.

6.5.2 Furniture making:

The average per capita consumption of wood for furniture making is estimated to be 0.039 m^3 in rural area and 0.138 m^3 in urban area. Besides, the longivity of furniture wood has been taken to be 20 years(i.e. 1/20th of wood is the annual requirement).

6.5.3 Agricultural implements:

Per capita consumption towards agricultural implements is estimated to be .00958 m^3 for rural and .00795 m^3 for urban sector and replacement in required on every two year.

6.5.4 Firewood consumption:

A low intensity sample survey was conducted to ascertain the per capita consumption of fuel wood.

It has been estimated that the per capita consumption of firewood in rural areas is 0.463 m^3 and in urban areas it is 0.368 m^3 per annum.

...38.....

The following table gives an abstract of local use of wood under various categories as per estimation made in earlier paragraphs:-

WOOD CONSUMPTION

Sl. No.	Item	Rural		Urban		Total wood in use.
		Percapita	Net	Percapita	Net	
1.	House construction(m3)	.1433	236356.58	.354	43280.04	279636.62
2.	Furniture(m3)	.0390	64325.93	.138	16871.88	81197.81
3.	Agricultural implements(m3)	.00958	15834.07	.00795	965.85	16799.92
4.	Fuelwood (tonnes)	.4629	763499.39	.3678	44967.22	808466.61
5.	Industrial wood (m3)/(Veneer)					5430.00

Besides wood, coal cowdung, K.Oil and agricultural wastes are the conventional fuel material in the area. The table below shows the comparative quantity of fuel for different items used by the rural and urban population. From the tables, it is clear that the rate of consumption of coal, K.Oil and electricity is much higher in urban areas than in rural areas while consumption of cowdung, agricultural waste and fuelwood are more in rural areas than in urban areas.

NON-WOOD FUEL CONSUMPTION

(Population is 16,49,383 in rural areas and 1,22,260 in urban areas)

Items	Percapita consumption		Annual consumption	
	Rural	Urban	Rural(000 kg.)	Urban(000 kg.)
Coal(Kg.)	0.403	30,455	664.701	3725.428
Cowdung(Kg.)	139.03	0.354	229264.237	32.280
K.Oil(Ltr.)	7.24	11.941	532.92	178744.12
Electricity(KWH)	0.51	25.36	481185.33	3100513.60
Agricultural waste(Kg.)	58.587	4.47	96632402.00	546502.20

....39.....

6.6. Consumption of bamboo:

The per capita annual consumption of Muli bamboo has been found to be 26.374 number. Hence, the total consumption of bamboo in the area is 46725312 numbers. Bamboo being mostly of Melocana species is primarily used for making frames of roofs and matted wall. It is also used for fencing the courtyard, gardens and making cattle sheds.

The entire bamboo required comes from private land.

6.7. Wood balance:

The total consumption of fuelwood in the district is 8,08,467 mt and the total fuelwood available from various recorded sources are given below:-

Dry leaves and sticks	Firewood from forest of the district	From outside the district which is utilised within the district as per record in 1983-84.	Saw Mill waste(30% of the total timber as off cuts.	Total (in M.tonnes)
1753.9265	1372.1428	16289.2	22605.69	42014.9593

Thus there is a huge deficit of about 7,66,452 M.T. of fuelwood supply in the district as revealed from recorded sources.

This deficit is primarily met from drift wood coming down the principal rivers like Teesta, Torsa, Jaldhaka, Raidak, Sankosh etc. which originate from the hilly areas of Sikkim and Bhutan passing through rich forest areas of Jalpaiguri District. The uprooted trees from hills and Dooars forests are deposited in the river Chars of Coochbehar District where the land is almost flat and river beds are much wider and have winding courses. A good quantity of firewood requirement is also met up from periodic cutting, lopping and thinning of trees standing in private land.

...40...

The availability of the timber in log and sawn form are as follows:-

Item	Private source (from Saw Mill)	Forest of the district	Coming from outside (Checkpost figure 1983-84)	Total	Going outside the district. (Checkpost figure)	Balance remains in the distt. (in cu.m.)
Log	5144	857	74495.32	80496.32	31661.17	48835.15(R) (Sawn 34184.605*
Sawn	-	-	2323.87	2323.87	1904.05	419.82

R = Round

* Considering 70% output of sawn timber from round log, the total sawn timber available for the district use becomes 34604.425 m^3 (34184.605 + 419.82).

The annual demand of timber of the district on various accounts is as follows:-

House construction, 1/15th of fig. in Table-II.	Furniture 1/20th of fig. of Table-II.	Agricultural implements1/2 of Table-II	Industrial wood(from Saw Mill)	Total
18642.42	4059.89	8399.96	5429.9	36532.17
Supply available from recorded sources as analysed above				34604.425

The difference of 1927.745 m^3 between the demand and availability of wood is met up from the private sources and unrecorded receipt of timber logs coming from river drift.

...41....

C H A P T E R - VII

ECOLOGICAL CHANGE AND STATUS OF FLORA AND FAUNA.

7.1. Degree of disturbance:

The natural change of course of rivers and flood causes frequent damage to the forests. In floods of 1968 some damage was caused to the plantation of Atiamochar and Khagribari. Maximum havoc was done to Mathabhanga Range. About 200 ha. of forests were washed away and about 50 ha. of plantation was affected and the loss was estimated to be of Rs. 11,15,300/-. In Patlakhawa lot of trees were uprooted including trees raised in plantation areas. The sand and debries carried and deposited by flood caused insufficient aeration which brought casualty to some standing trees also. Dead standing trees after being affected by fungus and insect pests created unhygienic condition to the other living trees.

Mikania cordata is an obnoxious climber which causes great injury to the plantations and regenerations as its growth is very fast and it smoothers the young forests saplings.

Illicit grazing is very much in existence in the forests of Patlakhawa and Garodhat. It affects natural regeneration particularly of superior spp. Damage by fire is also not infrequent.

Rats and Mice cause some damge to plantations by gnawing roots of young seedlings at the level of coller. Besides above, some insects and fungus also cause damage to trees to some extent.

The forests of this district through small were rich in wild animal in past particularly in Patlakhawa and Garodhat resdrves which were the shooting reserves of the erstwhile Raj estate. Patlakhawa had a number of Rhinoceros, Leopard, Swamp deer, Hog deer and Barking Deer, which are no longer seen.

...42.....

The Garodhat reserve earlier contained wild Buffaloes, Wild Boar, Spotted deer, Barking Deer and hog Deer which have also vanished from the area. The present population of wild animal of the district now include only the leopard cats, Civets, Jackle, Rabbit etc. The avi-fauna include Jungle fowl, Grey patridges, Black patridges, Imperial pigeon, Green pigeon, Doves, Titirs, Pankauries etc. In earlier years, some Floricans were also seen in the area but they do not exist now. Small animals include Rodents, bats, house mouse, stripped squirrel, grey headed flying squirrel and flying foxes.

Among the reptiles, common cobra(Naja naja), Black Krait, common Krait are common. King Cobra and python are uncommon. Non-poisonous snakes like dhaman and water snake are common. Among lizards most common are Gecko, Monitor, Blood sucker and skink.

The pisces include Mahseer, Kalbose, Bowali, Pati, Kursha, Murul, Bacha, Baspata etc. Hilsa is also found in river Mansai.

A number of migratory ducks come to the district during the winter months and stay in the sweeps of big rivers, beels, ponds etc. They include Brahmny duck, common teal, cotton teal, Garginy teal, whistling teal, Gadwall, Pintail, Shoveller, Merganser duck, Wood duck, Spotbills, Mallard, Poachard, Duckchicks etc. Some Geese are also often seen in the lower reaches of Gadadhar(Sonkosh) river.

7.2 Quantitative and qualitative assessment:

Present survey indicates that the trees are mostly under 20 cm. diameter and trees above 40 cm. diameter are only 12% in high forest, as per details given.

..43..

Stratum	Predominant dia. class (in cm.)					
	Less than 10	10-19	20-29	30-39	40 & above	Total plots
High forest	1	6	-	1	1	9
% of occurrence	11.11	66.67	-	11.11	11.11	100
Plantation	3	47	12	4	-	66
% of occurrence	4.55	71.21	18.18	6.06	-	100

77.78% of total area of high forests contain crop below 20 cm. and the same is 75.76% in plantation area. The crop consists of the following species but in general there is no dominance of any particular species except Simul, Sissoo in some areas like Patlakhawa.

The influence of biotic factors is evident from the following table showing incidence of grazing, injury to crop and fire damage.

Grazing incidence.

Stratum	Type of grazing			
	Heavy grazing	Medium grazing	Light grazing	No grazing
High forest	3	5	1	Nil
% of occurrence	33.33	55.56	11.11	-
Plantation	19	44	3	Nil
% of occurrence	28.78	66.67	4.55	-

Stratum	Injury to crop							
	Borer attack	Top dry	Girdling & illicit felling	Scarring	Lopping	Wind & flood damage.	Other injuries	No. injuries
High forest	-	-	4	-	-	1	2	2
% of occurrence	-	-	44.45	-	-	11.11	22.22	22.22
Plantation	-	-	25	-	-	15	20	6
% of occurrence	-	-	37.88	-	-	22.73	30.30	9.09

...44...

Stratum	Fire incidence			
	Very heavy	Frequent	Occasional	No fire
High forest	1	1	1	6
% of occurrence	11.11	11.11	11.1	66.67
Plantation	Nil	6	40	20
% of occurrence	-	9.09	60.61	30.30

Stratum	Occurrence of Weeds				
	Very dense	Dense	Moderate	Scanty	Absent
High forest	2	4	-	1	2
% of occurrence	22.22	44.45	-	11.11	22.22
Plantation	5	26	24	11	Nil
% of occurrence	7.58	39.39	36.36	16.67	-

The above figures show that the entire area is subjected to grazing. Only 11.11% of high forest and 4.55% of plantation area is lightly grazed and the rest area is under moderate to heavy grazing. 22% of high forest and 9% of plantation area is free from physical injury. About 44.45% of high forest and 37.88% of the plantation is affected by illicit felling and 11.11% of high forest and 22.73% of plantation have flood damages respectively. Fire incidence is less in high forests but is quite significant in plantation areas.

.....45.....

C H A P T E R - VIII.

PHOTO-INTERPRETATION AND REMOTE SENSING STUDIES.

Aerial photo-interpretation for Northern district of West Bengal has not been done by Forest Survey Of India, therefore, no thematic map in 1: 50,000 scale has been prepared for this area including Coochbehar district. A satellite imagery map for West Bengal has however been prepared during the period 1981-83 based on visual interpretation of false colour composites of landsat imagery in 1: 1 million scale.

According to this imagery, the forest areas of Coochbehar district has been calculated as under:-

Closed forests	- 22.50 km^2
Open forests	- 24.99 "
Total:	- 47.49 "

The imagery has shown existence of only three forest patches in the district, one in Patlakhawa, second in Atiamochar(Garodhat) and third at Jamaldha. The small scattered patches of fores s/plantation existing in the district has not been shown in the vegetation map as in none of these areas the actual forest cover is more than 1 km^2 in a patch.

...46.....

C H A P T E R - IX

PLANTATION ACTIVITIES IN THE FOREST AND URBAN AREAS WITH SPECIAL REFERENCE TO SOCIAL FORESTRY:

9.1 Plantation activities in the forest and urban areas with special reference to Social Forestry:

Regular plantations started with the establishment of the Coochbehar Forest Division in 1951. The area planted upto 1971-72 is only 718.41 ha. Between the period 1972-73 to 1982-83 about 506 ha. of plantations were raised. The planted species are mostly Teak, Kadam, Sissoo, Jarul, Simul and Khair.

The object of raising plantation is to restock the open riverain areas with commercial species of more economic value. The areas with poor and miscellaneous forests are put under plantations after clearfelling the areas.

The areas of plantations and the cost of raising the same in the two ranges of the district for the years 1979-80 to 1982-83 are as follows:-

Year	Area planted in ha.	Per ha. cost of plantation(Rs.)
1979-80	81.16	2,150/-
1980-81	58.16	2,200/-
1981-82	44.77	2,350/-
1982-83	145.07	2,350/-
1983-84	33.07	2,350/-

These plantations were mainly raised in Chengtimari, Atiamochar, Dorko, Chhotosalbari, Rasik bill, Singimari, Uchalpokri and Chatsingimari areas.

.47...

9.2 Social Forestry activities:

Social forestry activity is a programme of covering different classes of available non-forest lands by trees with the object of meeting local demand of wood and other minor forest produce and for creating employment to the local people through planting. It covers the following categgries:

1. Strip plantation.
2. Creation of village wood lot.
3. Farm forestry
4. Rehabilitation of degraded forests.

Plantations under this scheme have been taken up in the district since 1981-82.

Area of plantation in ha. in Coochbehar under Social Forestry.

Year	Strip plantation	Village wood lot	Farm forestry	R.D.F.	Total
1981-82	-	5.00	60.00	265.00	330.00
1982-83	51.00	10.07	373.97	125.00	560.13
1983-84	98.73	20.79	35.47	-	154.99

The percentage of area planted in the district with reference to W.B. total are as follows:-

Year	Strip plantation	Village wood lot	Farm forestry	R.D.F	Total
1981-82 (1st year)	Nil	5.16	2.07	4.64	3.59
1982-83	2.80	2.82	5.58	6.35	2.77
1983-84	2.92	2.88	0.31	-	1.44
Cumulative	2.63	3.05	2.73	3.60	2.97

....48 ...

Average cost involved per hectare in strip planting is Rs. 3,500/- and those in village wood lot is Rs. 2,250/-. The average cost of farm forestry is Rs. 3,125/- and that of Sal forest rehabilitation is Rs. 970/- per hectare.

There are lots of vested patches of land along the courses of principal rivers where Social Forestry works with species of shorter rotation can be taken up with voluntary participation of the local population.

..49..

C H A P T E R - X

RESULTS AND CONCLUSIONS

10.1 Main results and conclusions:

(a) Results of inventory indicate that the district is primarily agrarian and forests occupy only 1.67% of the geographical area of the district. Except two patches namely Patlakhawa and Garodhat which are protected forests, most of the other forest areas are unclassed and occur in small scattered patches along the course of principal rivers of the district.

(b) Plantation activity though started in late 19th century yet the extent of plantations raised upto 1951, that means the year of creation of the forest division, is limited. Older plantations occur in isolated blocks over available high land and a sizeable portion of the stock of these older plantations have already been cut and removed to meet the requirement of Department and various other purpose.

(c) The growing stock per ha. in the plantation stratum is 84.57 m^3 and the same in high forest stratum is 86.07 m^3. The comparative low figures of growing stock in both the strata are due to the crop being mostly in younger stages and low lying grassy patches falling within the forests and plantation areas.

(d) Though the total growing stock of forests in the district is low, yet the consumption of wood, particularly fuelwood, is quite high due to good forest areas existing in neighbouring districts. The gap between actual consumption and recorded outturn of timber and fuelwood is mostly bridged by availability of huge quantity of drift wood coming down the rivers during the rainy season, which are collected by local people, and unrecorded import of timber and fuelwood from the adjacent districts.

(e) In spite of the fact that the district has very little forests, the people in general are forest conscious and they do not destroy the forests unnecessarily. Therefore,

...50...

the district has a good potentiality for launching large scale social forestry programme.

10.2 Variation from past studies:

(a) Record of the Forest Department indicate that there has been sizeable shrinkage in the forest areas of the district due to encroachment (mostly in early 50s) and washing away of the forest areas along the widening course of the rivers.

(b) Some amount of damage to the forests have also taken place due to siltation and sand deposition along river banks after major floods particularly in the year 1950 and 1968.

(c) With the increase in the human population of the district and shrinkage of forest area, the per capita availability of forest which was .01 ha. in 1951 has come down to .003 ha. in 1981.

(d) There has been a considerable decrease in the wildlife population of the district. Important species like Tiger and Rhinoceros which used to move freely in the forest areas of the district in recent past are non-existent now.

10.3 Final recommendations and proposals:

(a) Existing poorly stocked and blank areas of high lands are to be immediately planted up with commercially important species to increase the productive capacity of the forest land.

(b) The low lying areas where economic tree planting is not possible should be reared up properly for management of grass land specially thatch grass which has tremendous demand in the market and also fetches a good revenue.

(c) It is necessary to make an inventory of trees growing in private lands in order to assess the total growing stock of forest species available over the entire area of the district. This will help in proper study of wood balance in the district.

...51....

(d) Social forestry programme has to be taken up in still bigger scale in marginal land, vested waste lands, other fallow land and Government land along road-side, railway line, canal bank etc. Since the population of the district is basically tree conscious success of social forestry programme is likely to be more in this district.

(e) There are a number of check posts in the district but they are not manned for 24 hours. Since a lot of inter state movement of wood takes place through this district, it is suggested that some important check posts of the district should be manned for 24 hours. This will help in keeping proper account of wood coming in or passing through the district.

(f) Some introduction of wild animals particularly Swamp deer and Rhinoceros may be made in Patlakhawa protected forests as the habitat condition there is ideal for introduction of such animals.

(g) With proper restocking of wild animals, improvement of boating and communication facilities, Patlakhawa can be developed as a good tourist spot being close to district town of Coochbehar and adjacent to two main State High ways.

...52....

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...53....

Table No. 1.1

DISTRIBUTION OF STEMS PER HECTARE BY SPECIES AND DIAMETER CLASS

STRATUM : PLANTATION

Species name with code	Diameter class (in cm.)										Total
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+	
Acacia catechu(006)	10.134	-	-	-	-	-	-	-	-	-	10.134
Albizzia chinensis(039)	0.779	1.170	0.389	-	-	-	-	-	-	-	2.338
Albizzia species(046)	-	0.779	1.170	0.389	-	-	-	-	-	-	2.338
Anthocephalus cadamba(065)	81.564	28.749	3.495	-	-	-	-	-	-	-	113.808
Artocarpus species(080)	0.389	-	-	-	-	-	-	-	-	-	0.389
Bombax ceiba(109)	5.393	3.119	1.559	-	-	-	-	-	-	-	9.971
Cassia siamea(153)	3.489	3.489	-	-	-	-	-	-	-	-	6.979
Dalbergia sissoo(222)	62.874	23.255	2.339	-	-	-	-	-	-	-	88.468
Eugenia cymosa(284)	1.163	-	-	-	-	-	-	-	-	-	1.163
Ficus species(308)	1.163	-	-	-	-	-	-	-	-	-	1.163
Gmelina arborea(327)	3.509	3.119	0.779	-	-	-	-	-	-	-	7.407
Lagerstroemia speciosa(398)	18.025	1.054	0.531	-	-	-	-	-	-	-	23.181
Mallotus philippinensis(441)	-	1.163	-	-	-	-	-	-	-	-	1.163
Shorea robusta(633)	3.720	2.308	2.125	-	-	-	-	-	-	-	8.153
Syzygium cuminii(665)	0.389	-	-	-	-	-	-	-	-	-	0.389
Tectona grandis(673)	56.850	31.322	14.021	3.571	1.428	-	-	-	-	-	117.192
Terminalia belerica(676)	0.389	-	-	-	-	-	-	-	-	-	0.389
Terminalia catappa(678)	-	1.163	-	-	-	-	-	-	-	-	1.163
Terminalia tomentosa(681)	0.389	-	-	-	-	-	-	-	-	-	0.389
Others(924)	7.758	0.779	1.319	-	-	-	-	-	-	-	9.856
Total:	271.548	101.569	27.727	3.960	1.428	-	-	-	-	-	406.132

Table No, 1.2

DISTRIBUTION OF STEMS PER HECTARE BY SPECIES AND DIAMETER CLASS

Stratum: High Forest

Species name with code	Diameter classes (in cm.)										Total
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+	
Acacia catechu(006)	42.00	2.000	-	-	-	-	-	-	-	-	44.000
Amoora rohituka(069)	-	2.000	-	-	-	-	-	-	-	-	2.000
Bischofia javanica(107)	-	2.000	-	2.000	2.000	4.000	-	-	-	-	10.000
Bombax ceiba(109)	-	6.000	-	10.000	8.000	4.000	-	-	-	-	28.000
Erythrina suberosa(278)	-	-	-	-	2.000	-	-	-	-	-	2.000
Erythrina species(279)	2.000	-	-	-	-	-	-	-	-	-	2.000
Eugihea species(289)	6.000	2,000	4.000	2.000	2.000	-	-	-	-	-	16.000
Ficus species(308)	2.000	-	-	-	-	-	-	-	-	-	2.000
Lannea coromendelica(400)	2.000	-	-	-	-	-	-	-	-	-	2.000
Trewia nudiflora(695)	2.000	-	-	-	-	-	-	-	-	-	2.000
Others(924)	14.000	6.000	-	-	-	-	-	-	-	-	20.000
Total:	70.000	20.000	4.000	14.000	14.000	8.000	-	-	-	-	130.000

Table No. 2.1

DISTRIBUTION OF VOLUME PER HECTARE BY SPECIES AND DIAMETER

Stratum: Plantation

Species name with code	Diameter classes (in cm.)										Total
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+	
Acacia catechu(006)	1.054	-	-	-	-	-	-	-	-	-	1.054
Albizzia chinensis(039)	0.081	0.455	0.228	-	-	-	-	-	-	-	0.764
Albizzia species(046)	-	0.081	0.684	0.382	-	-	-	-	-	-	1.147
Anthocephalus cadamba(065)	8.483	8.136	3.432	-	-	-	-	-	-	-	20.051
Artocarpus species(080)	0.040	-	-	-	-	-	-	-	-	-	0.040
Bombax ceiba(109)	0.609	1.011	1.074	-	-	-	-	-	-	-	2.694
Cassia siamea(153)	0.363	0.987	-	-	-	-	-	-	-	-	1.350
Dalbergia sissoo(222)	6.539	6.581	1.368	-	-	-	-	-	-	-	14.488
Euginea cymosa(284)	0.121	-	-	-	-	-	-	-	-	-	0.121
Ficus species(308)	0.121	-	-	-	-	-	-	-	-	-	0.121
Gmelina arborea(327)	0.365	0.883	0.456	-	-	-	-	-	-	-	1.704
Lagerstroemia speciosa(398)	2.019	0.335	0.358	-	-	-	-	-	-	-	2.712
Mallotus philippinensis(441)	-	0.329	-	-	-	-	-	-	-	-	0.329
Shorea robusta(633)	0.387	0.653	1.243	-	-	-	-	-	-	-	2.283
Syzygium cuminii(665)	0.040	-	-	-	-	-	-	-	-	-	0.040
Tectona grandis(673)	6.367	9.960	9.464	4.282	3.387	-	-	-	-	-	33.462
Terminalia belerica(676)	0.040	-	-	-	-	-	-	-	-	-	0.040
Terminalia catappa(678)	-	0.329	-	-	-	-	-	-	-	-	0.329
Terminalia tomentosa(681)	0.044	-	-	-	-	-	-	-	-	-	0.044
Others(924)	0.804	0.220	0.772	-	-	-	-	-	-	-	1.796
Total:	27.477	29.960	19.079	4.666	3.387	-	-	-	-	-	84.569

Contents

Table No. 2.2.

DISTRIBUTION OF VOLUME(M^3) PER HECTARE BY SPECIES AND DIAMETER CLASS

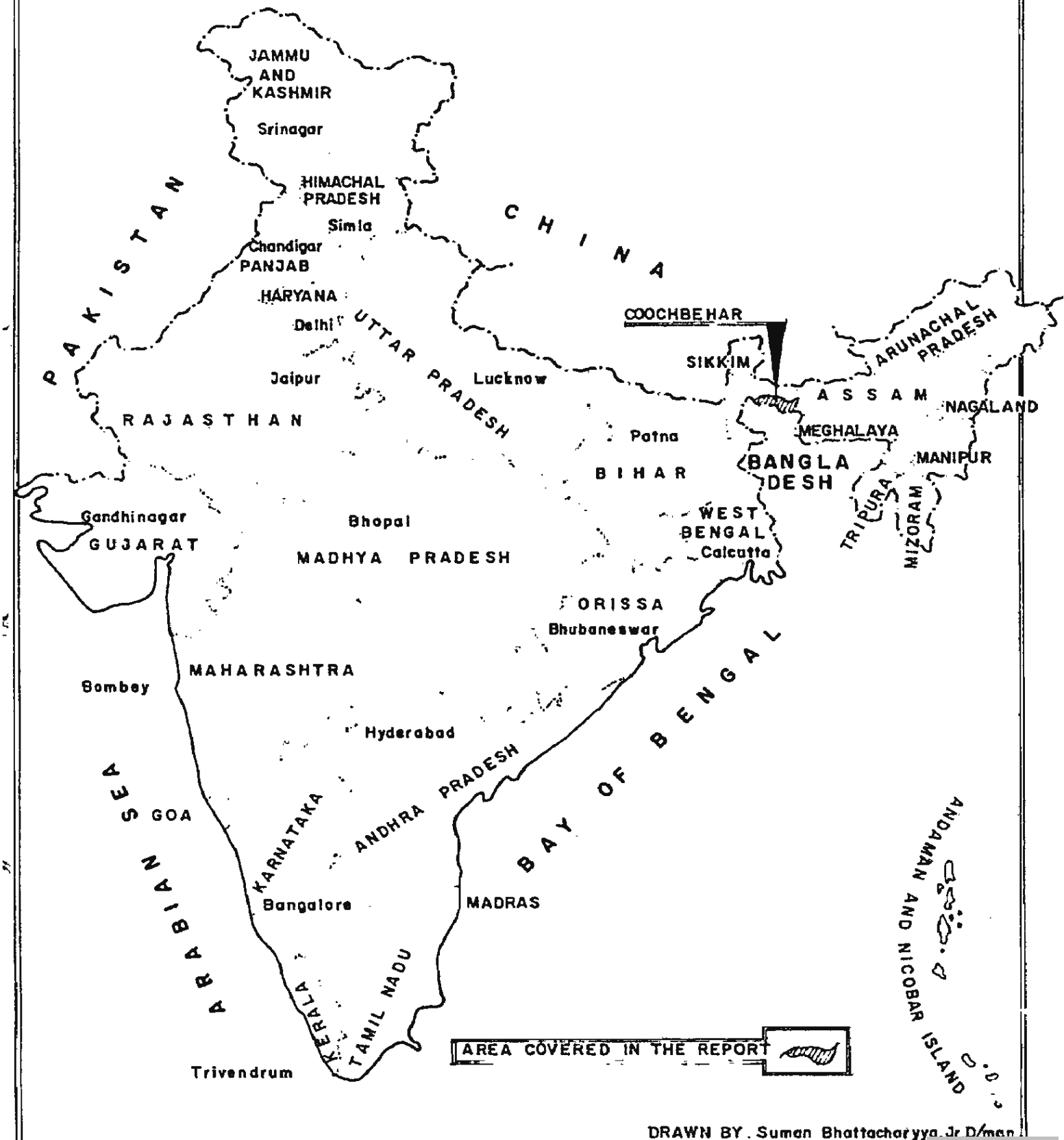
Stratum: High Forests

Species name with code	Diameter classes(in cm.)										Total
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+	
Acacia catechu(006)	4.368	0.566	-	-	-	-	-	-	-	-	4.934
Amoora rohituka(069)	-	0.566	-	-	-	-	-	-	-	-	0.566
Bischofia javanica(107)	-	0.614	-	2.232	4.244	11.300	-	-	-	-	18.390
Bombax ceiba(109)	-	1.944	-	12.190	18.472	12.512	-	-	-	-	45.118
Erythrina suberosa(278)	-	-	-	-	3.784	-	-	-	-	-	3.784
Erythrina species(279)	0.208	-	-	-	-	-	-	-	-	-	0.208
Euginea species(289)	0.624	0.566	2.340	1.964	3.784	-	-	-	-	-	9.278
Ficus species(308)	0.208	-	-	-	-	-	-	-	-	-	0.208
Lannea coromendelica(400)	0.208	-	-	-	-	-	-	-	-	-	0.208
Trewia nudiflora(695)	0.220	-	-	-	-	-	-	-	-	-	0.220
Others(924)	1.456	1.698	-	-	-	-	-	-	-	-	3.154
Total:	7.292	5.954	2.340	16.386	30.284	23.812	-	-	-	-	86.068

MAP OF INDIA

SHOWING PROJECT AREA IN COOCHBEHAR DISTRICT WEST BENGAL

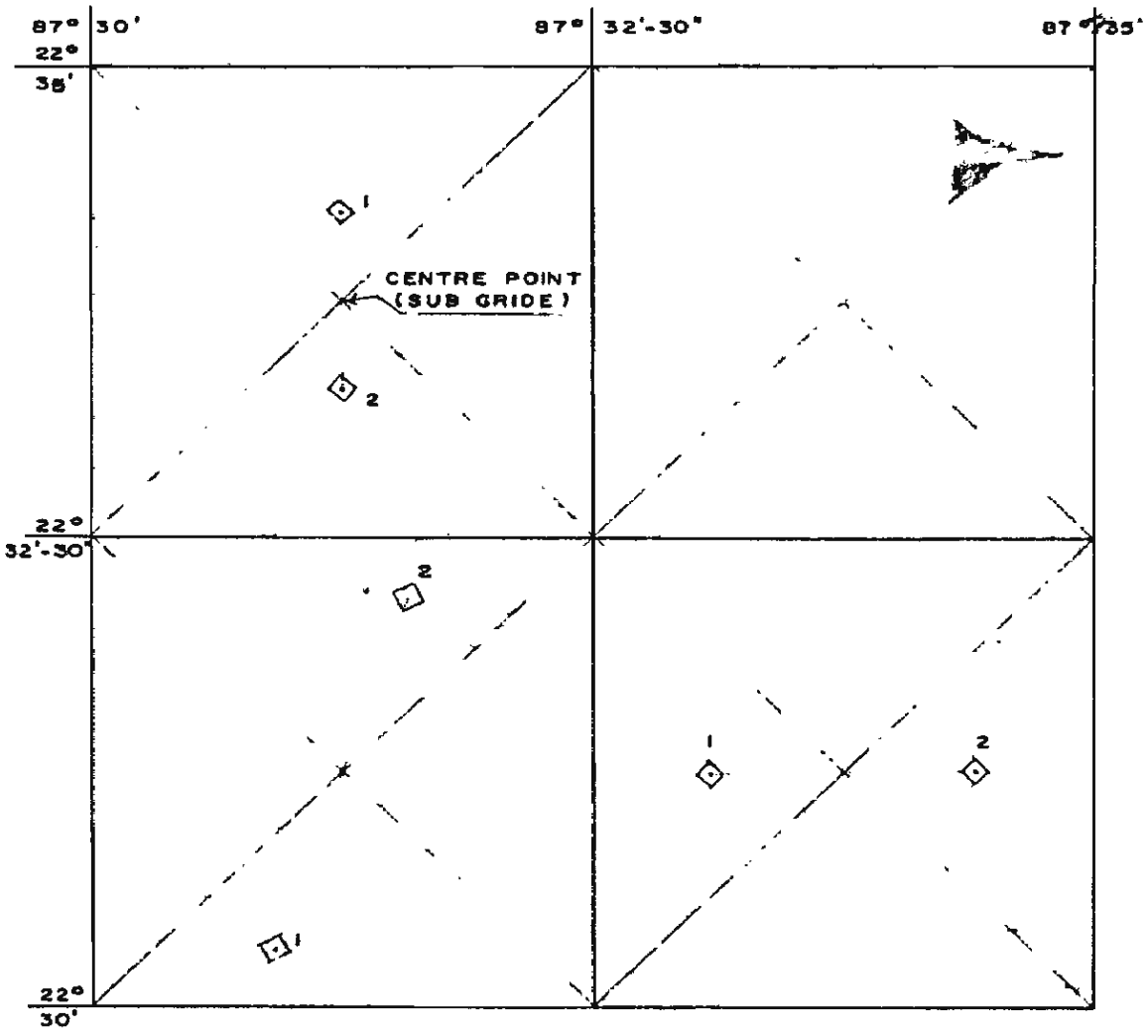
SCALE :- 1: 5,000,000



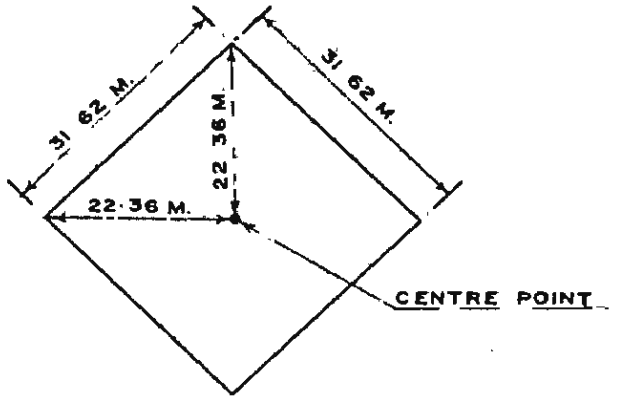
DRAWN BY . Suman Bhattacharyya Jr D/man

FOREST SURVEY OF INDIA

INVENTORY DESIGN



FIRST PLOT IS SELECTED RANDOMLY AND THE SECOND PLOT IS SITUATED AT AN EQUAL DISTANCE FROM THE CENTRE OF THE FIRST PLOT TO THE CENTRE OF 2'-30" x 2'-30" SUB GRID AND IS JUST IN THE OPPOSIT DIRECTION.



DETAILS OF PLOT

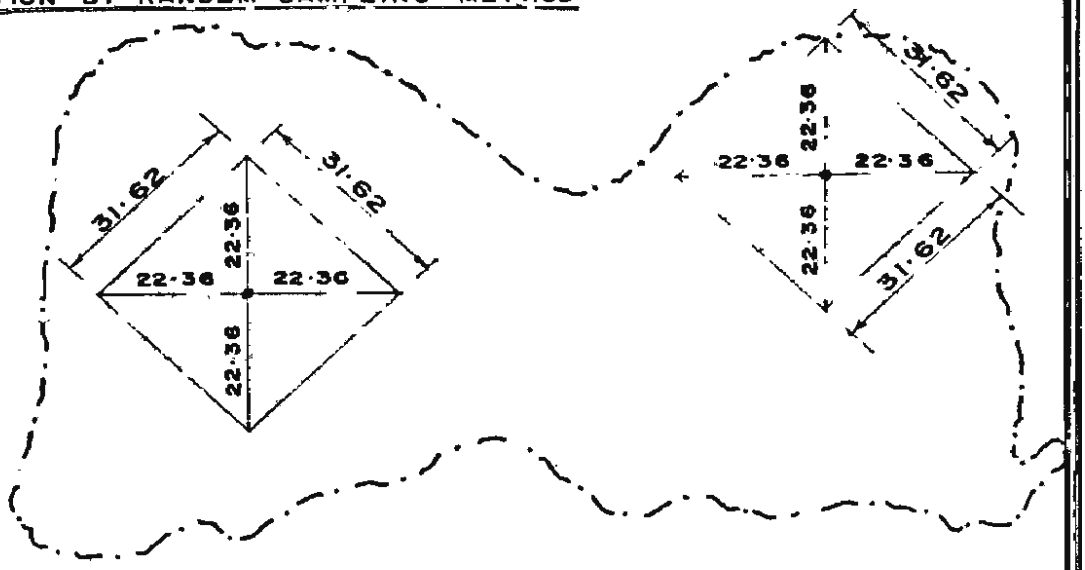
DRAWN BY : Suman Bhattacharjee, Jr.D/man

Contents

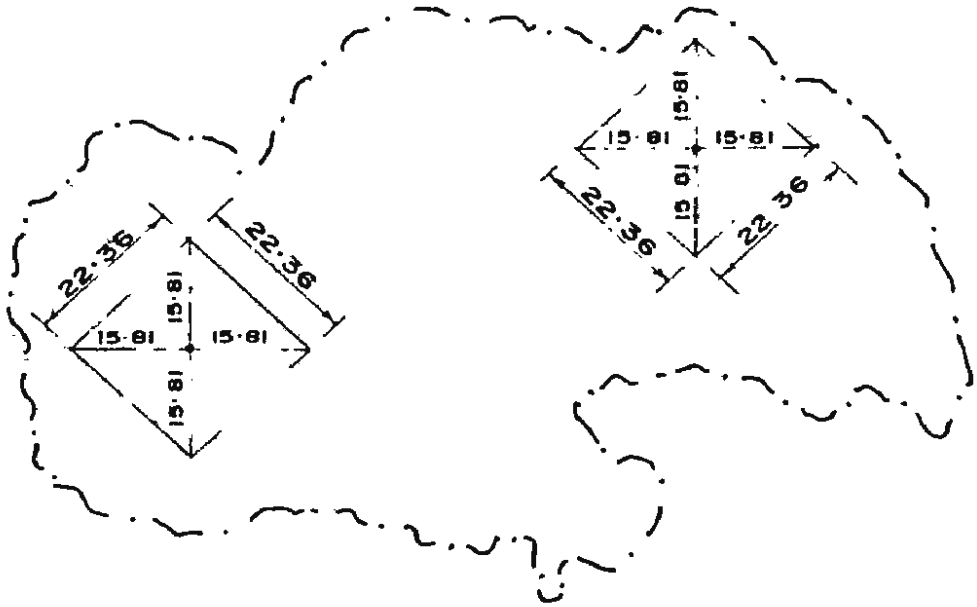
ORIENTATION OF PLOT IN PLANTATION SURVEY

SELECTION BY RANDOM SAMPLING METHOD

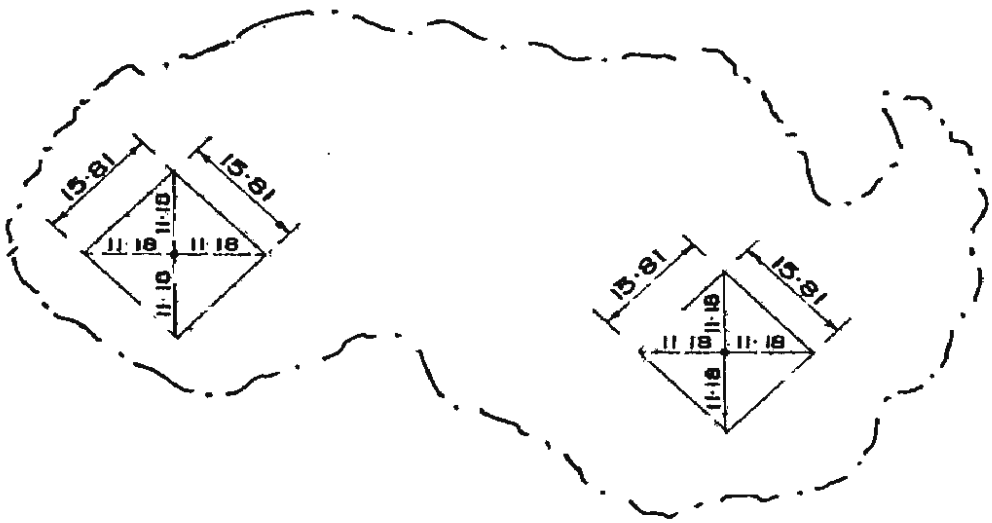
PLOT SIZE
0·1 Hactre



PLOT SIZE
0·05 Hactre



PLOT SIZE
0·025 Hactre



NOTE — ALL DIAMENSION ARE IN METRE

+ CROSS SECTION OF PLOT (CENTRE OF THE PLOT)

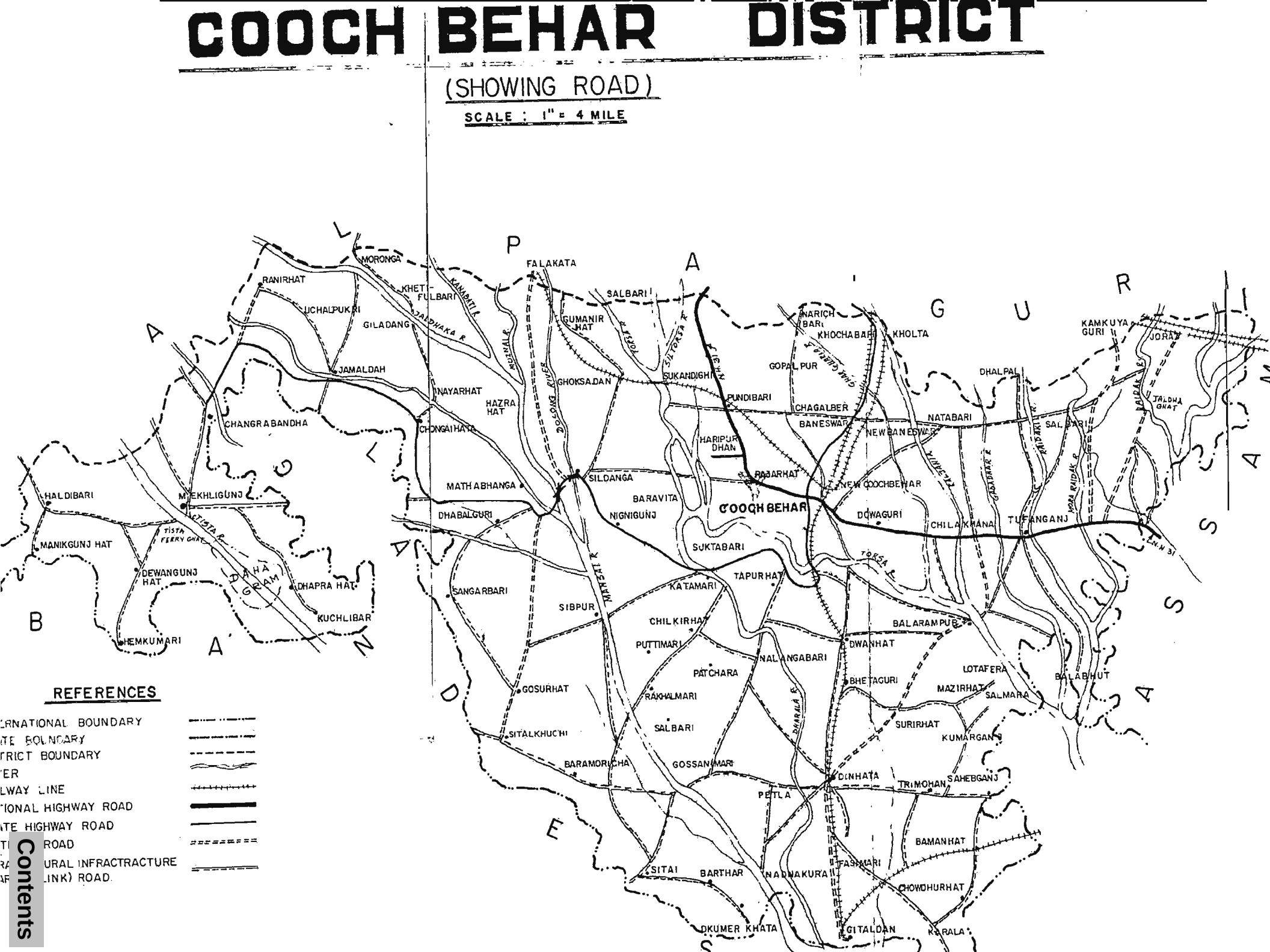
DRAWN BY'-Suman Bhattacharyy

Contents

COOCH BEHAR DISTRICT

(SHOWING ROAD)

SCALE : 1" = 4 MILE



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- LWAY LINE
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- TE HIGHWAY ROAD
- ROAD
- URAL INFRACTRACTURE LINK) ROAD.

Contents