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ASSISTANCE TO THE FORESTRY SECTOR OF BANGLADESH

**THE KASSALONG AND RANKHIANG  
RESERVED FORESTS IN THE  
CHITTAGONG HILL TRACTS**

evaluation and comparison are the following:

- the Kassalong Reserve still contains appreciable amounts of timber and bamboo type resources, although the area of the predominantly bamboo type has shrunk considerably during the past 20 years.
- the Rankhiang Reserve is in a worse condition. Here, in 1963, nearly 72% of its total area was classified as timber or bamboo type or a mixture of the two, this percentage was down to 31% in 1983. The losses occurred here in the shifting cultivation of the vegetation of the forest types. Together with the "Shifting Cultivation" lands covered with brush, they now account for approximately 58,000 hectares (72% of the total area of both Reserves combined).

in 1984 the effective plantation area percentages are: 21% for Kassalong and 5% for Rankhiang. Also in this respect, the situation in Kassalong is considerably more promising than in Rankhiang.

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INTRODUCTION  
ABSTRACT

One of the main objectives of the inventory unit of Project BGD/79/017, "Assistance to the Forestry Sector of Bangladesh" was to evaluate the forest resources of the Reserved Forests of Kassalong and Rankhiang in the Chittagong Hill Tracts and to compare the findings with those obtained during a survey in 1963-64 by FORESTAL INT. LTD., a consulting company.

Due to travel restrictions in the area concerned the exercise was limited to a pure office activity of photointerpretation, mapping and area calculation.

The most important conclusions which can be drawn from the Project evaluation and comparison are the following :

- the Kassalong Reserve still contains appreciable amounts of timber and bamboo type resources, although the area of the predominantly bamboo types has shrunk considerably during the past 20 years.
- the Rankhiang Reserve is in a much worse condition. Where, in 1963, nearly 97% of its total area was classified as timber or bamboo types or a mixture of the two, this percentage was down to 51% in 1983. Big losses occurred here in the timber as well as in the bamboo types.
- shifting cultivation (jhuming) is the main cause of the regression of the forest types. Together with its "after products" (abandoned lands covered with brush, weeds, young bamboo, permanent small settlements, etc...) it now accounts for approximately 66,000 hectares (27% of the total area of both Reserves combined) against barely 2,100 hectares in 1963.
- in 1981 there were about 23,200 hectares of plantations. When compared to the official figures, the effective plantation area percentages are : 81% for Kassalong and 67% for Rankhiang. Also in this respect, the situation in Kassalong is considerably more promising than in Rankhiang.

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## 1. INTRODUCTION

In 1960 the then Government of Pakistan presented a request to the Canadian Colombo Plan Administration for aid in conducting an inventory in the Kassalong and Rankhiang Reserved Forests in the northern and central portions of the Chittagong Hill Tracts. The request was approved by the Canadian Government in February 1961 and FORESTAL, Forestry and Engineering International Ltd of Vancouver, Canada was engaged to conduct the inventory survey.

New aerial photography of the two forests and adjacent areas at a scale of 1 : 15,840 was taken in March-April by Hunting Survey Corporation Limited of Canada.

Forestal's survey personnel arrived in April 1961 and the field survey was completed in 1963. Compilation and mapping were carried out in Canada and were completed in May 1964.

The results of the forest inventory were submitted in a report which consists of four volumes :

Volume 1 : contains the text of the report and the appendices. The methods of survey are described herein and the results are summarized in the text and presented in more detail in the appendices.

Volume 2 : contains the stand tables, stock tables, and summaries of the volumes.

Volume 3 : contains a complete set of topographic maps for both Forest Reserves at a scale of 1 : 15,840 with contours at 50-foot intervals.

Volume 4 : contains a complete set of forest cover maps for both Forest Reserves at a scale of 1 : 15,840 with contours at 250-foot intervals.

One of the objectives of Project BGD/79/017 "Assistance to the Forestry Sector of Bangladesh" was to re-evaluate, as it turned out exactly 20 years after the Forestal inventory, the forest situation in the two forest reserves. During that lapse of time important changes had taken place affecting the area, configuration and composition of the various strata, inventoried and mapped by Forestal. These changes were caused by accelerated logging, extension of the plantation areas, and considerable intensification of the "jhuming" or shifting cultivation activities.

The Project did not have the manpower facilities nor the time to carry out a complete re-inventory with an intensity equal to that done by Forestal. Furthermore, due to travel restrictions in the areas concerned, practically

no field check or field work could be done.\* The exercise was therefore restricted to a pure office activity which, fortunately, was made easier by the excellent quality of the 1 : 15,000 aerial photography taken in January-February 1984.

The main purpose of the photointerpretation and area measurements was therefore to determine and identify the main changes which had taken place since 1963.

Although the forest typing or stratification adopted by the Project for the photointerpretation could not be the same as that used by Forestal (a minimum but still considerable amount of field checking would have been required) an attempt was made to standardize as much as possible the stratification criteria in order to make the final results compatible with Forestal's.

Much of the following text, dealing with the location of the forest reserves, topography and forest types is either taken over directly from Forestal's report or slightly modified if changes have occurred since 1963.

All tables showing area figures (total areas, forest and non-forest areas, forest strata) are based on Forestal's findings for 1963 and on area calculations done by the Project reflecting the late 1983 situation. All volume figures (for 1963 as well as for 1983) are based on Forestal's inventory results for the reason, mentioned above, that no field work could be carried out by the Project.

The mapping done by the Project (see Appendix 3 for a listing of the strata used during the photointerpretation, together with a description of these strata) was done on the basis of the 1 : 15,840 maps produced by Forestal in order to take advantage of the good quality of these maps, and to facilitate the comparison between the forest conditions in 1963 and 1983.

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\* Some observations could be made in the teak plantations : measurements were taken on 26 sample plots, 13 in Rankhiang and 13 in Kassalong. See chapter 5, page 16.

## 2. DESCRIPTION OF THE AREA

### 2.1 LOCATION (\*)

As shown on the Key Map in Appendix 1, the reserved forests of Kassalong and Rankhiang lie in the administrative district of the Chittagong Hill Tracts which is that portion of Bangladesh bordered to the south and east by Burma, to the east and north by the states of Assam and Tripura in India, and to the west by the Chittagong District on the Bay of Bengal.

The Kassalong Reserved Forest covers approximately 1,645 square kilometres situated in the extreme northern portion of the Chittagong Hill Tracts between latitudes  $22^{\circ} 57' N$  and  $23^{\circ} 45' N$  and between longitudes  $91^{\circ} 55' E$  and  $92^{\circ} 21' E$ . It comprises the entire catchment area of the upper parts of the Kassalong River together with its principal tributaries, the Gangaram and Shishak Rivers and the headwaters of the Myani River.

The Rankhiang Reserved Forest covers approximately 771 square kilometers situated some 65 km to the south of the Kassalong Reserve in the central portion of the Chittagong Hill Tracts. It lies between latitudes  $21^{\circ} 53' N$  and  $22^{\circ} 33' N$  and between longitudes  $92^{\circ} 19' E$  and  $92^{\circ} 37' E$ . It occupies the upper valley of the Rankhiang River and the headwaters of the adjacent Thega and Subalong Rivers.

### 2.2 TOPOGRAPHY (\*)

The topography of the Chittagong Hill Tracts is very rugged and irregular. The configuration consists of a series of ridges running more or less north and south. From these main ridges, innumerable spurs branch off to form a seemingly confused mass of hills and valleys drained by winding streams. The principal river, the Karnaphuli, cuts across the main ridges and runs in an east-west direction over a considerable part of its course. Its main tributaries, the Rankhiang, the Chingri, the Subalong, the Thega, the Kassalong, the Myani, the Shishak, the Gangaram and the Massalong form the main north-south valleys between the ridges.

The hills are generally not very high but are very rugged and broken with steep slopes. The level of the valley bottoms ranges from 30 to 90

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(\*) Chittagong Hill Tracts Forest Inventory Survey - 1961/1963 -

Kassalong and Rankhiang Reserved Forests.

Volume 1 : Report and Appendices.

FORESTAL - Project No F334 - May 1964.

metres above the sea level and the maximum elevation within the Reserves is just over 900 metres. The topography in the Rankiang Reserved Forest is generally more rugged and steep than that in the Kassalong Reserved Forest. In the southern portion of the latter, the valleys are broad and flat and the hills are more rolling and rounded.

The topography of the Rankiang Reserved Forest is generally more rugged and steep than that in the Kassalong Reserved Forest. In the southern portion of the latter, the valleys are broad and flat and the hills are more rolling and rounded. The hills are generally not very high but are very rugged and broken with steep slopes. The level of the valley bottoms ranges from 50 to 90 metres above sea level. The main drainage is to the south. The main rivers are the Rankiang, the Chiant, the Sublong, the Thega, the Kassalong, the Hsueh, the Gishak, the Gargam and the Kassalong. The main drainage is to the south. The main rivers are the Rankiang, the Chiant, the Sublong, the Thega, the Kassalong, the Hsueh, the Gishak, the Gargam and the Kassalong. The main drainage is to the south. The main rivers are the Rankiang, the Chiant, the Sublong, the Thega, the Kassalong, the Hsueh, the Gishak, the Gargam and the Kassalong.

(\*) Chiantang Hill Forest Inventory Survey - 1964/1965



### 3. DESCRIPTION OF THE FOREST

#### 3.1 GENERAL (\*)

The forest cover of the Chittagong Hill Tracts is widely and erratically variable and is difficult to classify. It consists of a mixture of many tropical evergreen and tropical deciduous trees, occurring in association with each other and with bamboo jungle. Over 100 tree species have been recognized, to which numerous undergrowth shrubs and brush-like species must be added. No one forest type is uniform or clearly defined over a large area. This is probably due to the erratic topography, as aspect seems to exert an important influence on the character of the vegetation. The forest is ecologically a transitional type and has many of the characteristics of the Burmese forests and also of the forests of the Eastern Himalayas. However, it lacks the indigenous Teak of the Burmese forests and the Sal of the Eastern Himalayan forests. This is probably a reflection of the geographical location at the northern limit of the tropics but at a relatively low elevation. The extensive practice of shifting agriculture and the associated fires prior to the reservation of the forests have served to introduce further complexities in the character of the vegetation. True virgin forest or climax forest is practically non-existent.

#### 3.2 TIMBER TYPES (\*)

The forest types are not distinct and are often intermingled and merge into one another. The overall impression is of an evergreen forest. The majority of the small understorey trees are evergreen whereas the majority of the dominant and emergent trees are deciduous. However, some of these deciduous trees shed their leaves during the cold season and others during the monsoon, so that the forests always appear evergreen. The forests are uneven-aged with only the occasional even-aged stands occurring on small areas that had been subjected to jhumming<sup>(+)</sup>. The stands are multi-storied and pure stands of a single species do not occur naturally. In the upper storey, the occurrence of any one species is usually limited to a few trees per acre. However, two species, Garjan and Civit, dominate the heavy volume stands. (A listing of tree species by their common and scientific names is presented in Appendix 4).

Average merchantable volume per hectare is low, rarely exceeding 350 cubic metre per hectare in the best stands.

Several of the dominant species attain a diameter at breast height of over 150 cm and many of the trees are buttressed at the base.

(+) "jhum, jhuming" = shifting cultivation ; "jhumia" = shifting cultivator.



The forest types described in the following paragraphs are the ones recognized in the Forest Service working plans for the areas. As there are such a vast number of tree, shrub, vine and weed species present, only the more common and important are mentioned.

#### Tropical Wet Evergreen Forest :

This type occurs commonly in the deep valleys where the water supply is plentiful. It favours the slopes with a northern aspect where shade is prevalent. The largest trees are over 30 metre high and the most important species are Chapalish, Chundul, and Narikeli. Important species occurring as the lower storey are Pitraj, Toon, and Nageswar. Banana plants constitute an important part of the undergrowth.

#### Tropical Mixed Evergreen Forest :

This type occupies the greater part of the Chittagong Hill Tracts, both on the hilly, undulating ground and on the alluvial flats. The emergent trees are mainly deciduous species and attain heights from 45 to 60 metres. The principal species are Garjan, Civit, Narikeli and Chundul. In the middle storey the common and important species are Tali, Kamdeb, Chapalish, Nageswar, Pitraj, Jam, Banderhola, Champa and Toon. The height of this storey is generally from 30 to 45 metres. The most common species in the lowest storey are Batna, Jam, Jarul, Chalmugra, Pitraj, Pitali, Kamdeb, Gamar and Uriam.

#### Tropical Moist Deciduous Forest :

This type is found on new alluvial lands at the edge of rivers and in low-lying areas. The trees are interspersed with large open patches of Khagra and other grasses or reeds, and with extensive patches of bananas. The principal tree species are deciduous and the most important are Kadam, Pitali and Banderhola.

#### Open Deciduous Forest :

On the dry, exposed slopes with a southern aspect the larger trees occur as scattered individuals. The principal species are Koroi, Pitali, Banderhola, Champa, Chikrassi, and Toon. There is a dense undergrowth of small, stunted evergreen tree species and of Assam lota, a weed species which grows profusely to form an almost impenetrable, tangled mass of intertwining stems.

#### Savannah :

Covering a large part of the Unclassed State Forest Land of the Chittagong Hill Tracts and extending into parts of the Reserved Forests are large open areas covered with sungrass (Imperata arundinaceae) which attains an average



height of four feet. Some widely scattered deciduous trees occur as land marks.

### 3.3 BAMBOO TYPES (\*)

Bamboo is found in abundance throughout both the Kassalong and Rankhiang Reserved Forests. Eight species of bamboo are indigenous to the Chittagong Hill Tracts. Four of these species, Muli, Mitenga, Daloo and Orah are of commercial importance. A fifth species, Kaliserri, reaches commercial size but is of limited occurrence. The remaining three species, Kali, Bariala and Basali, are of small size and assume a shrub-like or scandent growth and are of little commercial importance.

Muli is the predominant bamboo in the Chittagong Hill Tracts. It occurs as undergrowth in many of the timber stands and over extensive areas as pure bamboo stands. The latter are found mainly on well drained slopes. Muli develops a ramifying rhizome system which spreads rapidly. Individual, straight, erect culms are produced at intervals of 60 to 90 cm along the rhizomes. On good sites these culms grow to a height of 18 metres and attain diameters of 7.5 cm. Average stands of Muli are 9 to 12 metres tall with a diameter of 5 cm. The rhizome survives fire and the effect of jhuming; thus Muli is often the main colonizer if the forest is destroyed.

The Muli bamboo flowers, and dies, gregariously over large areas with a life cycle which varies from 45 to 60 years. Five to six years are required after flowering and seeding before new merchantable culms are produced. Thereafter, new culms are produced each year and reach merchantable size and condition in two or three years. Unfortunately, the Muli bamboo flowered and died in the Chittagong Hill Tracts in 1959 and 1960, just prior to the Forestal inventory and an estimate of the growing stock of this species could not be made.

Daloo, Orah and Mitenga, the other three important bamboo species found in the Chittagong Hill Tracts, grow as an understorey in the timber types or in association with Muli in the pure bamboo stands. They prefer shaded, moist sites. They grow in clumps which have from 40 to 100 culms, ranging in height from 12 to 24 metres and in diameter from 5 to 12.5 cm, the average being 18 metres in height and about 10 cm in diameter.

### 3.4 REGENERATION AND PLANTATIONS (\*)

Natural regeneration in the undisturbed Forest Reserves is quite plentiful and there is an abundance of seed, seedlings and young growing stock. However, this perpetuates the existing stand which has a high proportion of

species of little or no present utility. To rectify this situation, it has been the policy of the Forest Department to clear-cut areas of the forest and to resort to a system of artificial regeneration. Plantations were first started in 1871 when Teak seed was obtained from Burma. Various methods of planting have been attempted. Teak has been the species used for most of the plantations. It has been planted as pure stands and in varying mixtures with other exotics, mainly Honduras Mahogany, and with some of the species indigenous to the Chittagong Hill Tracts, mainly Jarul, Gamar, Garjan and Chapalish. Plantations have been established using a strip method, a standard six by six planting in blocks, and by taungya cultivation by jhumias. The latter method has proved the most satisfactory. However, with the development of mechanized logging in the area, the jhumias cannot cope with the extensive areas requiring taungya cultivation and a system combining artificial and natural regeneration has been prescribed. Taungya plantations are made in large 20 to 40 ha blocks that have been clear-felled. In these areas the natural forest are left between the exploited blocks. These strips are supposed to function as a seed source and as a protective strip against fire and wind.

The plantations have suffered severely from cyclones on several occasions and, in addition, large areas of plantation have been inundated by the artificial lake behind the Kaptai Dam. The total plantation area within the two Reserved Forests covered about 6,900 hectares at the time of Forestal's survey and reached about 24,900 hectares in 1981.

Details are given in Appendix 5 - Area Compilation Sheets.

## 4. AREAS OF FOREST TYPES AND PLANTATIONS

Table 1 : SUMMARY TABLE OF TOTAL AREAS (in ha)

A. KASSALONG

Land type	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Productive forest land	154,546	94	111,781	68
of which				
Predominantly timber	81,208	49	75,603	46
Predominantly bamboo	73,338	45	36,178	22
Non-forested areas	3,711	2	46,960	29
Unproductive land	6,270	4	5,707	3
<b>Total</b>	<b>164,527</b>	<b>100</b>	<b>164,448</b>	<b>100</b>

B. RANKHIANG

Land type	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Productive forest land	74,695	97	39,017	51
of which				
Predominantly timber	29,269	38	19,217	25
Predominantly bamboo	45,426	59	19,800	26
Non-forested areas	372	3	36,624	47
Unproductive land	2,037		1,463	2
<b>Total</b>	<b>77,104</b>	<b>100</b>	<b>77,104</b>	<b>100</b>

Table 2 : SUMMARY OF AREA CLASSIFICATION (in ha)A. KASSALONG

Ground Cover	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Timber types	52,689	32.0	46,395	28.2
Mixed timber - bamboo	23,506	14.3	14,878	9.0
Mixed bamboo - timber	31,972	19.4	23,525	14.3
Bamboo types	41,366	25.1	12,653 <sup>+</sup>	7.7
Plantations (*)	5,013	3.1	14,330	8.7
Non-forested areas (**)	3,711	2.3	46,960	28.6
Non productive areas	893	0.5	330	0.2
Water and swamps	5,377	3.3	5,377	3.3
Total	164,527	100.0	164,448	100.0

(\*) The Forestal figure for plantations refers to established plantations plus the area of proposed plantations scheduled to be established up to 1965.

The BGD/79/017 figure represents the situation in 1981, the clearings and logged areas of 1982-84 having been classified as recent clearings and logging areas under "Non-forested areas".

(\*\*) The non-forested areas include :

brush and reeds (= NCC or non-commercial cover), jhum, all clearings, logged and selectively logged areas, agriculture and settlements, natural regeneration or protection strips inbetween the plantation blocks. Table 3 gives a breakdown of this ground cover class, very important with regard to jhuming (shifting cultivation).

(+) All Muli bamboo.



B. RANKHIANG

Ground Cover	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Timber types	20,325	26.3	7,116	9.2
Mixed timber - bamboo	6,933	9.0	3,228	4.2
Mixed bamboo - timber	17,519	22.7	6,194	8.0
Bamboo types	27,907	36.2	13,606*	17.7
Plantations (*)	2,011	2.6	8,873	11.5
Non-forested areas (**)	372	0.5	36,624	47.5
Non productive areas	1,060	1.4	486	0.6
Water and swamps	977	1.3	977	1.3
Total	77,104	100.0	77,104	100.0

(\*) The Forestal figure for plantations refers to established plantations plus the area of proposed plantations scheduled to be established up to 1965.

The BGD/79/017 figure represents the situation in 1981, the clearings and logged areas of 1982-84 having been classified as recent clearings and logging areas under "Non-forested areas".

(\*\*) The non-forested areas include :  
brush and reeds (= NCC or non-commercial cover), jhum, all clearings, logged and selectively logged areas, agriculture and settlements, natural regeneration or protection strips inbetween the plantation blocks. Table 3 gives a breakdown of this ground cover class, very important with regard to jhumming (shifting cultivation).

(+) All Muli bamboo

Table 3 : COMPONENTS OF THE NON-FORESTED AREA (in ha)

## A. KASSALONG

Ground Cover	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Definitely logged or cleared				
or	251	0.15	2,402	1.46
Recently logged for plantations				
Undifferentiated natural vegetation <sup>+</sup>	816	0.50	9,126	5.57
Non commercial cover (brush and reeds)	476	0.29	- <sup>++</sup>	-
Agriculture and settlements	72	0.04	353	0.21
Jhum	2,096	1.27	4,352	2.65
Young muli bamboo on recently abandoned jhum areas	-	-	341	0.21
Mixed jhum**	-	-	30,386	18.47
<b>Total</b>	<b>3,711</b>	<b>2.25*</b>	<b>46,960</b>	<b>28.57*</b>

(\*) The Forestal figure for plantations refers to established plantations plus the area of proposed plantations scheduled for establishment in the future. The forestal figure for plantations refers to established plantations plus the area of proposed plantations scheduled for establishment up to 1983.

(\*) The differences of 0.05% and 0.03% with the figures of table 2 is due to rounding off.

(\*\*) This is a mosaic of jhum, patches of brush or weeds, abandoned jhum and small settlements, impractical and purposeless to delineate individually.

(+) This is not a uniform type : it is a mixture of natural forest, high forest, jhum, brush, clearings and cultivation between plantation areas. In Kassalong it also includes the natural regeneration or protection strips (NRS).

(++) Included in the Mixed Jhum.

## B. RANKHIANG

Ground Cover	FORESTAL 1963		BGD/79/017 - 1983	
	Area	% of total	Area	% of total
Definitely logged or cleared				
or	99	0.13	906	1.18
Recently logged for plantations				
Undifferentiated natural vegetation <sup>+</sup>	-	-	4,741	6.15
Non commercial cover (brush and reeds)	117	0.15	- <sup>++</sup>	-
Agriculture and settlements	152	0.20	139	0.18
Jhum	4	0.01	5,348	6.94
Young muli bamboo on recently abandoned jhum areas	-	-	4,918	6.38
Mixed jhum <sup>**</sup>	-	-	20,572	26.68
Total	372	0.49*	36,624	47.51*

(\*) The difference of 0.01% with the figure of table 2 is due to rounding off.

(\*\*) This is a mosaic of jhum, patches of brush or weeds, abandoned-jhum and small settlements, impractical and purposeless to delineate individually.

(+) This is not a uniform type : it is a mixture of natural forest, high forest, jhum, brush, clearings and cultivation between plantation areas.

(++) Included in the Mixed jhum.



**Table 4 : AREA AND COMPOSITION OF THE PLANTATIONS  
UP TO AND INCLUDING 1981 (\*) (in ha)**

**A. KASSALONG**


Age class	Stratum group (+)						Total
	1	2	3	4	5	6**	
8	-	-	-	-	-	2,047	2,047
7B	1,585	23	1,670	55	30	209	3,572
7A	999	91	421	64	36	67	1,678
6B	2,262	250	1,343	230	110	-	4,195
6A	630	12	457	23	4	-	1,126
5B	508	77	205	-	37	-	827
5A	488	38	185	3	22	-	736
4	106	9	31	-	-	-	146
3	-	3	-	-	-	-	3
2	-	-	-	-	-	-	-
<b>Total</b>	<b>6,578</b>	<b>503</b>	<b>4,312</b>	<b>375</b>	<b>239</b>	<b>2,323</b>	<b>14,330</b>

(\*) Logged and recently cleared areas, referring to the years 1982/83, have been delineated on the 1984 aerial photographs and mapped as such. It is assumed that they are planted.

(\*\*) This stratum group applies to the age classes 8, 7B and 7A only, to plantations for which species composition and/or crown density could not be ascertained. Furthermore, it is not certain at all that these plantations are all really established.

(+) See Appendix 3.

## B. RANKHIANG



Age class	Stratum group (+)						Total
	1	2	3	4	5	6**	
8	-	-	-	-	-	1,619	1,619
7B	1,053	12	409	17	7	387	1,885
7A	427	7	263	26	10	-	733
6B	1,687	28	884	18	8	-	2,625
6A	562	2	382	5	3	-	954
5B	251	-	86	-	-	-	337
5A	163	-	12	-	-	-	175
4	146	-	49	-	-	-	195
3	98	-	114	22	-	-	234
2	37	-	72	6	1	-	116
<b>Total</b>	<b>4,424</b>	<b>49</b>	<b>2,271</b>	<b>94</b>	<b>29</b>	<b>2,006</b>	<b>8,873</b>

(\*) Logged and recently cleared areas, referring to the years 1982/83, have been delineated on the 1984 aerial photographs and mapped as such. It is assumed that they are planted.

(\*\*) This stratum group applies to the age classes 8, 7B and 7A only, to plantations for which species composition and/or crown density could not be ascertained. Furthermore, it is not certain at all that these plantations are all really established.

(+) See Appendix 3.

## 5. STOCKING AND SITE INDEX OF THE TEAK PLANTATIONS

26 sample plots were measured in the Teak plantations of the 2 Reserve Forests : 13 in Rankhiang and 13 in Kassalong. This number is of course too small to allow any definite conclusions but, from the two graphs shown hereafter, for general information, it seems that :

- stocking in the plantations can be compared to the average stocking in the Chittagong District (approximately the average of curves 1 and 2, page 8, Working Paper No 4).
- the average site index, at 50 years, is approximately 5 m higher than in the Chittagong District.

Figure 1 : Site index curve for Teak, obtained from data collected on 26 sample plots in the plantations

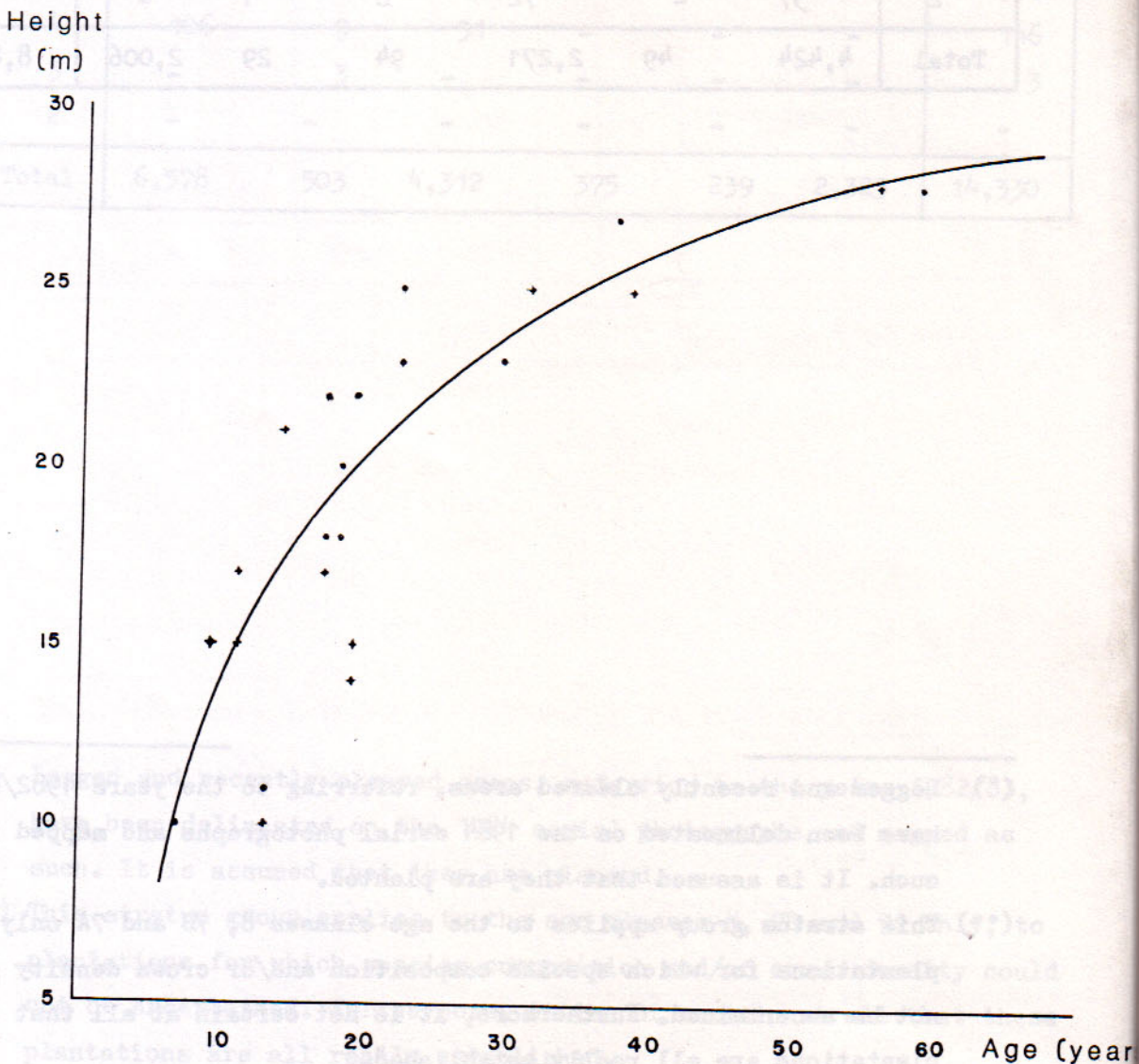
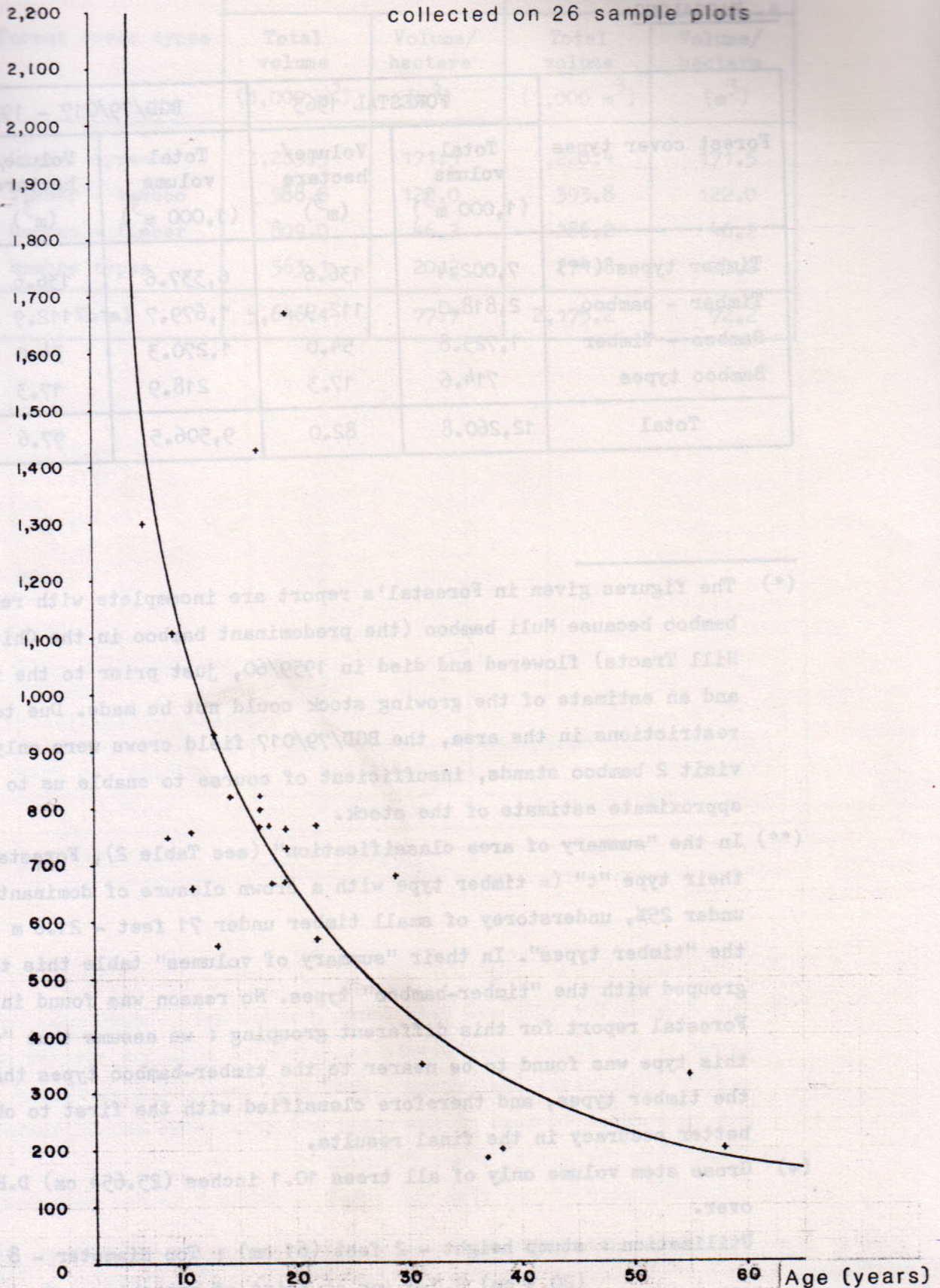


Figure 2 : Stocking of Teak, obtained from data collected on 26 sample plots

No. of trees per ha



## 6. TOTAL VOLUMES

Table 5 : SUMMARY OF VOLUMES EXCLUDING BAMBOO (\*) (+)

## A. KASSALONG

Forest cover types	FORESTAL 1963		BGD/79/017 - 1983	
	Total volume (1,000 m <sup>3</sup> )	Volume/ hectare (m <sup>3</sup> )	Total volume (1,000 m <sup>3</sup> )	Volume/ hectare (m <sup>3</sup> )
Timber types (**)	7,002.4	136.6	6,337.6	136.6
Timber - bamboo	2,818.0	112.9	1,679.7	112.9
Bamboo - timber	1,725.8	54.0	1,270.3	54.0
Bamboo types	714.6	17.3	218.9	17.3
Total	12,260.8	82.0	9,506.5	97.6

- (\*) The figures given in Forestal's report are incomplete with regard to bamboo because Muli bamboo (the predominant bamboo in the Chittagong Hill Tracts) flowered and died in 1959/60, just prior to the inventory, and an estimate of the growing stock could not be made. Due to travel restrictions in the area, the BGD/79/017 field crews were only able to visit 2 bamboo stands, insufficient of course to enable us to give an approximate estimate of the stock.
- (\*\*) In the "summary of area classification" (see Table 2), Forestal includes their type "t" (= timber type with a crown closure of dominant trees under 25%, understorey of small timber under 71 feet - 21.6 m high) in the "timber types". In their "summary of volumes" table this type is grouped with the "timber-bamboo" types. No reason was found in the Forestal report for this different grouping : we assume that "volume-wise" this type was found to be nearer to the timber-bamboo types than to the timber types, and therefore classified with the first to obtain a better accuracy in the final results.
- (+) Gross stem volume only of all trees 10.1 inches (25.654 cm) D.B.H. and over.
- Utilization : stump height - 2 feet (61 cm) ; Top diameter - 8 inches (20.3 cm) D.U.B. or at point of branching.

## B. RANKHIANG

Forest cover types	FORESTAL 1963		BGD/79/017 - 1983	
	Total volume (1,000 m <sup>3</sup> )	Volume/ hectare (m <sup>3</sup> )	Total volume (1,000 m <sup>3</sup> )	Volume/ hectare (m <sup>3</sup> )
Timber types (**)	3,285.5	171.5	1,220.4	171.5
Timber - bamboo	988.5	122.0	393.8	122.0
Bamboo - timber	809.0	46.2	286.2	46.2
Bamboo types	563.1	20.2	274.8	20.2
<b>Total</b>	<b>5,646.1</b>	<b>77.7</b>	<b>2,175.2</b>	<b>72.2</b>



(\*\*) The figures for 1983 are very rough guesses only, based only on the areas of the forest cover types and assuming that the species are evenly distributed over these types. This assumption obviously will not be correct in most of the cases and great care should therefore be taken with the use of these figures.

(\*\*) The difference of 0.1 with the total in Table 2 is due to rounding off.

(\*) Gross volume only of all trees 10.1 inches (25.8 cm) D.B.H. and over. Utilization : stump height = 2 feet (61 cm) ; Top diameter = 8 inches (20.3 cm) D.B.H. or at point of branching.

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Table 6 : SUMMARY OF VOLUMES BY SPECIES (in 1,000 m<sup>3</sup>) (+)

## A. KASSALONG

Species	FORESTAL 1963	BGD/79/017 - 1983*
Garjan	2,200.7	1,706.3
Civit	659.6	511.4
<u>Other Merchantable sp.</u>		
Banderhola	467.9	362.8
Batna	54.0	41.9
Chalmugra	170.5	132.2
Champa	137.7	106.8
Chapalish	305.6	237.0
Chikrassi	128.9	99.9
Chundul	467.4	362.4
Dakijam	59.0	45.7
Gamar	124.4	96.5
Jarul	190.9	148.0
Kadam	49.2	38.1
Kamdeb	63.9	49.5
Koroi	32.7	25.4
Nageswar	74.5	57.8
Narikeli	264.6	205.2
Jam	57.0	44.2
Pitali	68.4	53.0
Pitraj	317.0	245.8
Tali	288.0	223.3
Toon	40.8	31.6
Uriam	261.9	203.1
<u>Total other Merchantable Species</u>	3,624.3	2,810.2
Miscellaneous species	5,776.1	4,478.6
<b>Total all Species</b>	12,260.7 <sup>(**)</sup>	9,506.5

(\*) The figures for 1983 are very rough guesses only, based only on the areas of the forest cover types and assuming that the species are evenly distributed over these types. This assumption obviously will not be correct in most of the cases and great care should therefore be taken with the use of these figures.

(\*\*) The difference of 0.1 with the total in Table 5 is due to rounding off.

(+) Gross volume only of all trees 10.1 inches (25.654 cm) D.B.H. and over.  
Utilization : stump height - 2 feet (61 cm) ; Top diameter - 8 inches (20.3 cm) D.U.B. or at point of branching.

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B. RANKHIANG

Species	FORESTAL 1963	BGD/79/017 - 1983*
Garjan	573.2	220.8
Civit	1,134.0	436.8
<u>Other Merchantable sp.</u>		
Banderhola	51.7	20.0
Batna	89.4	34.4
Chalmugra	59.7	23.0
Champa	18.1	7.0
Chapalish	76.8	29.6
Chikrassi	32.6	12.6
Chundul	182.0	70.0
Dakijam	56.8	22.0
Gamar	18.6	7.2
Jarul	116.3	44.8
Kadam	13.4	5.2
Kamdeb	107.5	41.4
Koroi	23.9	9.2
Nageswar	19.6	7.6
Narikeli	78.0	30.0
Jam	53.3	20.5
Pitali	45.6	17.6
Pitraj	56.2	21.7
Tali	132.0	50.9
Toon	21.2	8.0
Uriam	112.7	43.4
<u>Total other Merchantable Species</u>	1,365.4	526.1
Miscellaneous species	2,573.5	991.5
<b>Total all Species</b>	<b>5,646.1</b>	<b>2,175.2</b>



## 7. CONCLUSIONS

A. KASSALONG

1. Since 1963 the productive forest land has decreased by approximately 42,800 hectares. The following changes have occurred in the types :

timber types	:	less	6,300	hectares
mixed timber-bamboo	:	less	8,600	"
mixed bamboo-timber	:	less	8,400	"
bamboo types	:	less	28,700	"
			<hr/>	
			52,000	"

The plantation areas have increased by about 9,300 hectares.

From the above figures it is quite clear that the biggest loss of forest area has occurred in the predominantly bamboo types. (Mixed bamboo-timber plus bamboo : 22% of total area against 44% in 1963). The pure timber types still represent 28% of the total area (against 32% in 1963), which is an encouraging and promising situation, totally different from that of Rankhiang.

2. Shifting cultivation is the main cause of the regression of the predominantly bamboo and, to a lesser extent, the predominantly timber types.

In 1963, approximately 2,100 hectares were classified as jhum. In 1983, jhum, mixed jhum, and young muli bamboo on recently abandoned jhum areas cover approximately 35,000 hectare. All of this area however should not be considered yet as a total loss: it is hoped that the fallow period will be sufficiently long to allow some of these types (especially the abandoned lands in the mixed jhum and the areas now covered by young muli bamboo) to return to a bamboo or mixed bamboo-timber type.

3. In 1981, the official Forest Department figure for the total area of plantation in Kassalong was 17,800 and  $\pm$  2,300 hectare were foreseen for planting in 82 and 83. If we consider the 2,400 hectares of recently logged areas for plantations (see table 3, page 12) as planted, we arrive at a total figure, as of end of 1983, of 16,700 hectares, which is not a bad situation at all, compared to other plantation areas in the country.

B. RANKHIANG

1. Since 1963 the productive forest land has decreased by approximately 35,700 hectares. The following changes have occurred :

timber types	:	less	13,200	hectares
mixed timber-bamboo	:	less	3,700	"
mixed bamboo-timber	:	less	11,300	"
bamboo types	:	less	14,300	"

The plantation areas have increased by about 6,800 hectares. This is an average of 1,800 ha/year when considering the period 1963-83 but it is obvious that the average rates during the last 10 and 5 years must have been much higher than during the previous periods and we can safely estimate that the present one must be around 2,500 hectares per year and, at that rate, the "reserved" forests of Rankhiang will have ceased to exist within another 10 years. (Various instances, including FAO, have predicted that by 1990-2000, many presently well-known areas of tropical forest will have disappeared. The reserved forest of Rankhiang can undoubtedly be included in the list. The large-crowned high forest, a sub-type of the timber types now only covers an area of about 4,800 hectares).

2. Shifting cultivation (Jhuming) is also here the main cause of the continuous regression of the high forest and bamboo types. Where, in 1963, Forestal classified 4 (!) hectares as jhum, nearly 30,000 hectares were affected somehow by jhuming in 1983 (jhum land, abandoned jhum land covered by brush, weeds, young bamboo etc...). Hopefully some of the abandoned jhum land, especially that now covered by young bamboo, will remain abandoned and provide some useful crop in the future.
3. In 1981, the official Forest Department figure for the total area of plantations in the Hill Tracts South Division was 16,200 hectares. Besides Rankhiang, also the Reserved Forest of Sitapahar is part of that Division (see Technical Note No. 3). 1,800 hectares are assumed to have been planted in 82-83, bringing the total to 18,000 hectares of which approximately 3,430 belong to Sitapahar. The plantations in Rankhiang should therefore have covered an area of approximately 14,570 hectares. In reality it was 8,870 or, assuming that the 900 hectares of cleared land (see Table 3) have been planted, 9,770 hectares.

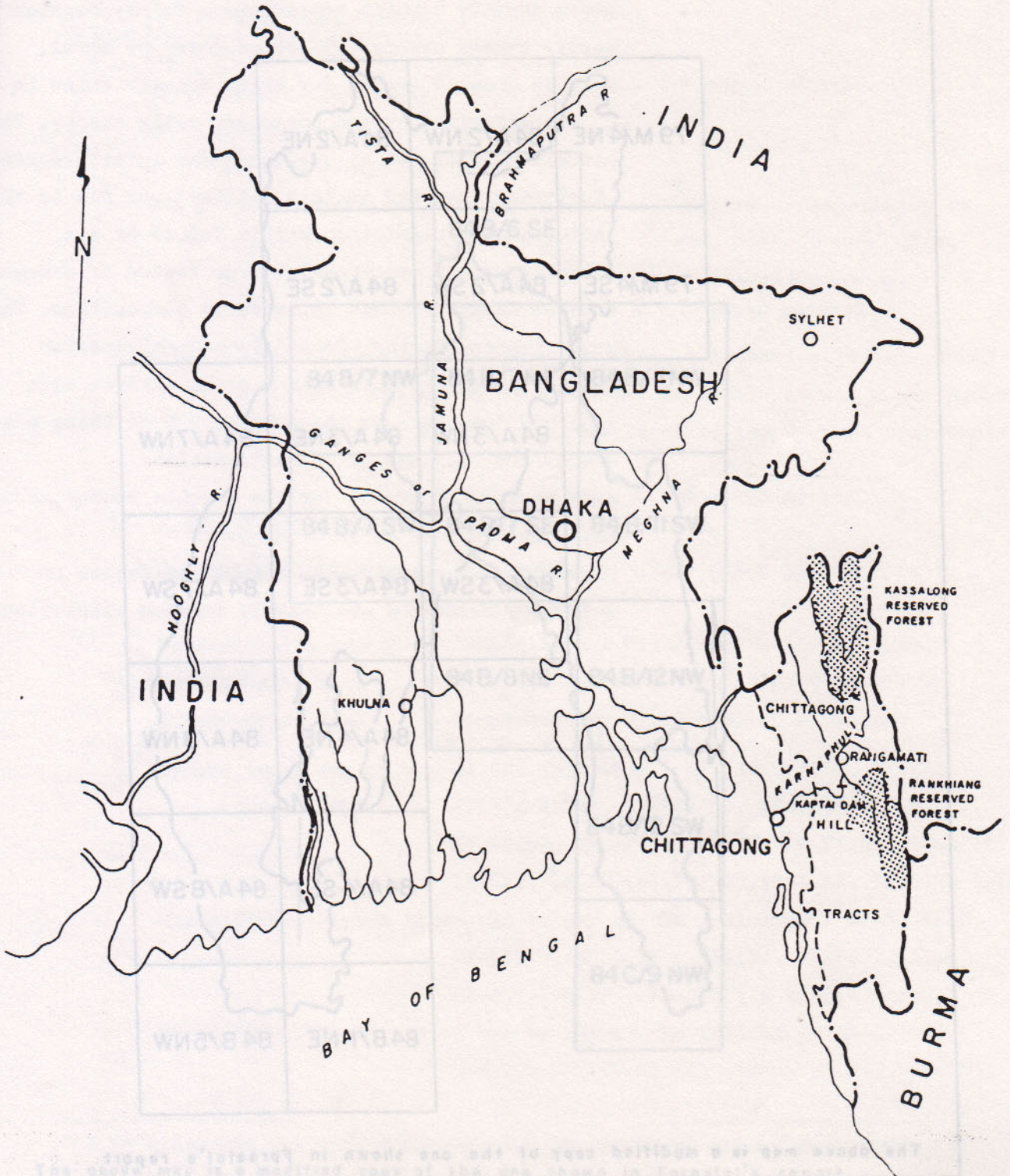
This is still a discrepancy of 4,800 hectares or 33% which is the average (deficit) figure for the whole of the plantation areas in the Chittagong District and Chittagong Hill Tracts.

Note : for reasons explained earlier in the text no volume figures are given for bamboo. The reader can easily arrive at his own estimates by using the information on A.D. bamboo volumes contained in "A Study on Supply and Demand of Bamboos and Canes in Bangladesh" by M.R. Choudhury - Field Document No. 9, UNDP/FAO Project BGD/78/010. December 1984.



### KEY MAP

Scale = 1 : 3,484,000

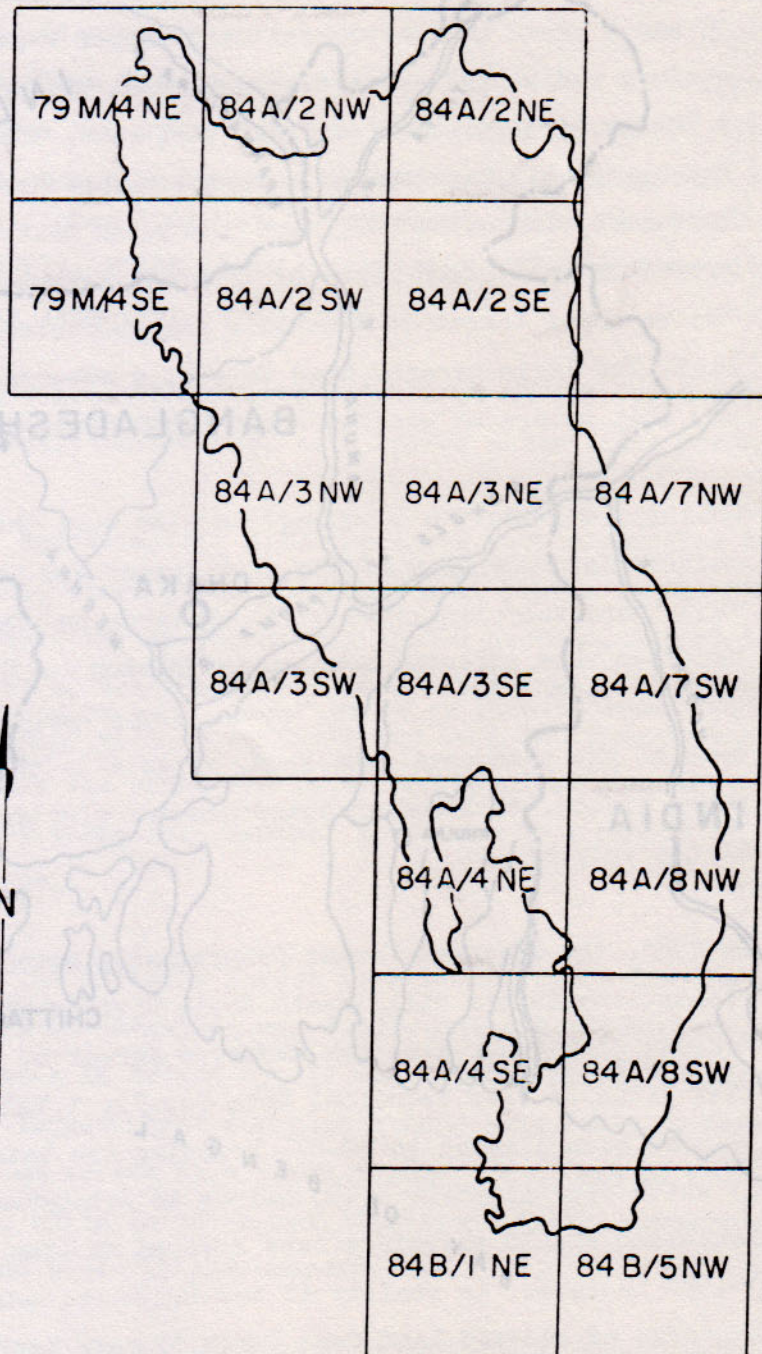


The above map is a modified copy of the one shown in Forestal's report

## MAP SHEET INDEX

### KASSALONG RESERVED FOREST

Scale = 1:525,750



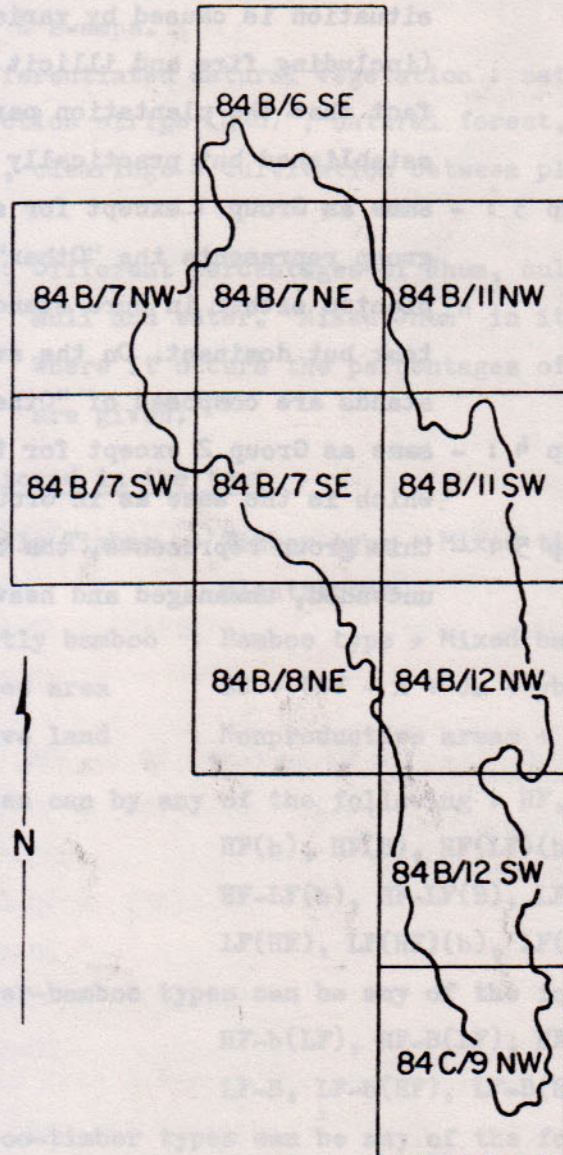
The above map is a modified copy of the one shown in Forestal's report



### MAP SHEET INDEX

### RANKHIANG RESERVED FOREST

Scale = 1:525,750



The above map is a modified copy of the one shown in Forestal's report

Appendix 3

## CODIFICATION AND DESCRIPTION OF THE STRATA AND TYPES

1. Plantations

Stratum Group 1 : - all site classes combined\*\*\*

- pure or dominantly Teak (on the average 75% or more of the stand) ;
- crown density 1 which represents a fairly regular mostly closed canopy (75% crown cover or more).

Stratum Group 2 : - same as Group 1 except for crown density which is class 2, characterized by and unclosed, motly canopy. This situation is caused by various human interferences (including fire and illicit felling), or due to the fact that the plantation partly failed or was established but practically never tended or managed.

Stratum Group 3 : - same as Group 1 except for species composition. This group represents the "Other" (non-Teak) species planted either in pure stands or in mixture with teak but dominant. On the average 70% of these mixed stands are composed of "Other" species.

Stratum Group 4 : - same as Group 2 except for the species composition which is the same as in Group 3.

Stratum Group 5 : - this group represents, the completely failed or untended, unmanaged and heavily damaged plantations.

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(\*\*\*) This is the case for all five groups.

## 2. Forest and cover types

### i. Basic map symbols

HF : High Forest.

LF : Low Forest.

b : Muli bamboo.

B : Other bamboo.

A : Agriculture & settlements.

Br : Brush.

yb : Young Muli bamboo.

Jm : Jhum.

RC : Recent clearings.

NP : Non-productive, steep, rocky areas.

W : Water & swamps.

UNV : Undifferentiated natural vegetation : natural regeneration or protection strips (NRS)\*, natural forest, high forest, jhum, brush, clearings & cultivation between plantation areas.

Mixed jhum : Different percentages of Jhum, cultivation, brush, young muli and water. "Mixed Jhum" in itself is not a map symbol. Where it occurs the percentages of its various components are given.

### ii. Types mentioned in the text

Predominantly Timber : Timber type + Mixed timber-bamboo type + plantations.

Predominantly bamboo : Bamboo type + Mixed bamboo-timber type.

Non-forested area : RC + UNV + A + Jm + yb + Mixed Jhum + Br.

Unproductive land : Nonproductive areas + Water & Swamps.

Timber types can be any of the following : HF, HF(LF)(B), HF-LF, HF(b), HF(B), HF(LF)(b), HF(LF)(B), HF-LF, HF-LF(b), HF-LF(B), LF-HF, LF-HF(b), LF-HF(B), LF(HF), LF(HF)(b), LF(HF)(B), LF, LF(b) & LF(B).

Mixed timber-bamboo types can be any of the following : HF-b, HF-B, HF-b(LF), HF-B(LF), HFb(B), HF-B(b), LF-b, LF-B, LF-b(HF), LF-B(HF) & LF-B(b).

Mixed bamboo-timber types can be any of the following : b-HF(LF), b-HF, b-LF(HF), b-LF, b(HF), b(LF), b-B(HF),

(\*) In Kassalong the NRS, which occur only there and are of importance, are indicated as such on the maps.



b-B(LF), B-HF, B-LF(HF), B-LF, B-LF(b),  
B(HF), B(LF) & B-b(LF).

Bamboo type : Only Muli bamboo.

iii. Proportion of each type within a combined type

T : 90% or more of any type.

e.g. : HF means 90% or more of HF ; b means 90% or more of b  
& so on.

T<sub>n</sub> : Any productive type as a proportion of a combined type.

T<sub>1</sub>(T<sub>2</sub>) : 75 to 90% (25 to 10%)

e.g. : HF(LF) = 75 to 90% of HF & 25 to 10% of LF

LF(HF) = " " " " LF " " " " HF

HF(b) = " " " " HF " " " " b

and so on.

T<sub>1</sub>-T<sub>2</sub> : 50 to 75% - 50 to 25%

e.g. : HF-LF = 50-70% of HF & 50-25% of LF

LF-b = " " LF " " b

LF-HF = " " LF " " HF

and so on.

T<sub>1</sub>(T<sub>2</sub>)(T<sub>3</sub>) : 60 to 80% (25 to 15%) (15 to 5%)

e.g. : HF(LF)(b) = 60-80% of HF, 25-15% of LF &  
15-10% of b

LF(HF)(B) = 60-80% of LF, 25-15% of HF &  
15-10% of B and so on.

T<sub>1</sub>-T<sub>2</sub>(T<sub>3</sub>) : 40 to 60% - 40 to 30% (20 to 10%)

e.g. : HF-LF(b) = 40-60% of HF, 40-30% of LF &  
20-10% of b

LF-b(HF) = 40-60% of LF, 40-30% of b &  
20-10% of HF

b-B(LF) = 40-60% of b, 40-30% of B &  
20-10% of LF and so on.

Appendix 4 (\*)

VERNACULAR AND BOTANICAL NAMES OF THE SPECIES

Tree Species which were Tallied by name

<u>Vernacular Name</u>	<u>Botanical Name</u>
Banderhola (Kacha)	Duabanga grandiflora (Roxb.) Walp.
Batna	Quercus Spp.
Chalmugra	Hydnocarpus kurzii (King) Warburg.
Champa (Champaful)	Michelia champaca Linn.
Chapalish	Artocarpus chapalasha Roxb.
Chikrassi	Chukrasia velutina Wight et Arn.
Chundul	Tetrameles nudiflora R. Br.
Civit	Swintonia floribunda Griff.
Dakijam	Syzygium grande (Wt.) Walp.
Gamar	Gmelina arborea Linn.
Garjan	Dipterocarpus Spp.
Jarul	Lagerstroemia speciosa Pers.
Kadam	Anthocephalus chinensis (Lam.) Rich.
Kamdeb	Calophyllum polyanthum Wall.
Koroi	Albizia Spp.
Nageswar	Mesua ferrea Linn.
Narikeli	Pterygota alata (Roxb.) R. Br.
Jam	Syzygium Spp.
Pitali	Trewia nudiflora Linn.
Pitraj (Rata)	Amoora Spp. ; Dysoxylum Spp.
Tali	Palaquium polyanthum Benth.
Toon	Toona ciliata M.J. Roem.
Teak**	Tectona grandis Linn. f.
Uriam	Mangifera sylvatica Roxb.

(\*) Chittagong Hill Tracts Forest Inventory Survey - 1961/1963 - Kassalong and Rankhiang Reserved Forests.

Volume 1 : Report and Appendices - Appendix 2.

(\*\*) Teak is found in plantations only. It is not indigenous to the Chittagong Hill Tracts, but was established from imported Burmese seed.

Tree Species which were Tallied as "Miscellaneous"

<u>Vernacular Name</u>	<u>Botanical Name</u>
Arjan	<i>Polyalthia simiarum</i> Bth. and Hook. f.
Arsol	<i>Vitex</i> Spp.
Badam (Kat-badam)	<i>Terminalia catappa</i> Linn.
Banspata	<i>Podocarpus neriifolius</i> Don.
Bansua jarul (Mon-jarul)	<i>Lagerstroemia macrocarpa</i> Wall.
Bohal	<i>Cordia dichotoma</i> Forst. f.
Bahera	<i>Terminalia bellerica</i> Roxb.
Bandor lotya (Bon-sonalu)	<i>Cassia nodosa</i> Ham.
Barta (Dewa)	<i>Artocarpus lakoocha</i> Roxb.
Boilam	<i>Anisoptera scaphula</i> (Roxb.) Pierre.
Chalta	<i>Dillenia indica</i> Linn.
Chatian (Chatim)	<i>Alstonia scholaris</i> R. Br.
Dakrum (Rangkat)	<i>Mitragyna parvifolia</i> (Roxb.) Korth.
Dharmara	<i>Stereospermum personatum</i> (Hasak) Chatt.
Gundroi (Kostori)	<i>Cinnamomum cecidodaphne</i> Meissn.
Gutgutya	<i>Protium serratum</i> (Wall. ex Colebr.).
Hansak	<i>Xanthophyllum flavescens</i> Roxb.
Hargaza	<i>Dillenia pentagyna</i> Roxb.
Haritaki	<i>Terminalia chebula</i> Retz. ; <i>T. citrina</i> Roxb.
Hatipoila (Moos)	<i>Pterospermum acerifolium</i> Willd.
Jalpai	<i>Elaeocarpus</i> Spp.
Jhau	<i>Casuarina litorea</i> L., Diss. Stickman.
Jhumka bhadi	<i>Engelhardtia spicata</i> Bl.
Jiul bhadi	<i>Lanea coromandelica</i> (Houtt.) Merr.
Jungurjya	<i>Derris robusta</i> Bth.
Kalaboil (Chamfata)	<i>Sapium baccatum</i> Roxb.
Kalda (Khalta)	<i>Diospyros pilosula</i> Roxb.
Kanak	<i>Schima wallichii</i> (Dc.) Korth.
Kanta koroï (Hiori)	<i>Anogeissus acuminata</i> (Roxb.) Wall. es Bedd.
Keabong	<i>Carallia brachiata</i> (Lour.) Merr.
Kom	<i>Nauclea sessilifolia</i> Hook. f.
Lou bhadi (Kanjai)	<i>Bischofia javanica</i> Blume
Minjiri	<i>Cassia siamea</i> Lamk.
Pacca saj	<i>Terminalia crenulata</i> Roth.
Panisaj	<i>Terminalia myriocarpa</i> Heurck et Muell. Arg.
Phata kharoola	<i>Aporosa roxburghii</i> Baill.
Rangkat (Haldu)	<i>Adina cordifolia</i> Hook. f.

Shaugan (Shampan)

Sheradong (Raktan)

Shonalu

Silbhadi

Simul

Tejbahal

Telsur

Udal

*Sterculia scaphigera* Wall.

*Lophopetalum fimbriatum* Wight.

*Cassia fistula* Linn.

*Garuga pinnata* Roxb.

*Bombax ceiba* Linn. and *B. insigne* Wall.

*Cinnamomum cecidodaphne* Meissn and *c. iners* Reth.

*Hopea odorata* Roxb.

*Firmiana colorata* Roxb. ; *Sterculia villosa* Roxb.

Bamboo Species

<u>Vernacular Name</u>	<u>Botanical Name</u>
<b>Commercial species :</b>	
Daloo	<i>Neohouzeaua dullooa</i> (Gamble) Camus
Kaliserri	<i>Oxytenanthera auriculata</i> Kurz
Mitenga	<i>Bambusa tulda</i> Roxb.
Muli	<i>Melocanna baccifera</i> (Roxb.) Kurz
Orah	<i>Dendrocalamus longispathus</i> (Kurz) Kunz
<b>Non-commercial species :</b>	
Kali	<i>Oxytenanthera nigrociliata</i> Munro
Bariala	<i>Bambusa vulgaris</i> Schrad, ex Wendl.
Basali	<i>Teinostachyum griffithii</i> Munro
Chatian (Chatia)	<i>Alstonia scholaris</i> L. Br.
Dakrus (Dangrat)	<i>Hitragyna parvifolia</i> (Roxb.) Korth.
Dharuara	<i>Stereospermum personatum</i> (Hassk) Chitt.
Gudroi (Kostori)	<i>Cinnamosma cecidodaphne</i> Meisn.
Gutguiza	<i>Protium serratum</i> (Wall. ex Colubr.)
Hanak	<i>Xanthophyllum flavescens</i> Roxb.
Margasa	<i>Millettia pentagona</i> Roxb.
Haritaki	<i>Terminalia chebula</i> Retz. ; <i>T. vitriata</i> Roxb.
Natipolla (Neas)	<i>Pterocarpus acrifolius</i> Willd.
Jalpal	<i>Elaeocarpus</i> Spp.
Jhau	<i>Casuarina litorea</i> L., Miss. Sticksan.
Jhuska bhadi	<i>Eragelhardtia spicata</i> Bl.
Jiul bhadi	<i>Lannea coromandelica</i> (Houtt.) Merr.
Jungurjya	<i>Derris robusta</i> Bth.
Kalaboll (Kawfata)	<i>Sapindus baccatus</i> Karb.
Kalda (Khalta)	<i>Diospyros pilosula</i> Roxb.
Kanak	<i>Schinus wallichii</i> (DC.) Korth.
Kanta koroi (Kiori)	<i>Anogeisus acuminata</i> (Roxb.) Wall. ex Bedd.
Kebong	<i>Carallia brachiata</i> (Houtt.) Merr.
Koa	<i>Nandea sessilifolia</i> Hook. f.
Lon bhadi (Lanjai)	<i>Mischocleis javanica</i> Blume
Minjiri	<i>Cassia siamea</i> Lessk.
Pacca raj	<i>Terminalia crenulata</i> Roth.
Pandaj	<i>Terminalia myriocarpa</i> Heurck et Muell. Arg.
Phata kharaola	<i>Aporosa ruxburghii</i> Baill.
Rangrat (Haidu)	<i>Adina cordifolia</i> Hook. f.

Shrubs and Plants of ImportanceVernacular NameBotanical Name

Assamlota

Eupatorium odoratum Linn.

Sungrass

Imperata arundinacea Cyrill.

Khagra

Saccharum spontaneum Linn.

Cane species :

Gallak

Daemonorops jenkinsianus Mart.

Kerak

Calamus latifolius Roxb.

Maricha, Jaithbeth

Calamus viminalis Willd.

Bandaris, Kirig

Calamus tenuis Roxb.

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