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Forest Resources Management Project

Technical Assistance Component

**Final Report: Forest Inventory
of the Coastal Afforestation Divisions**

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Ministry of Environment and Forests
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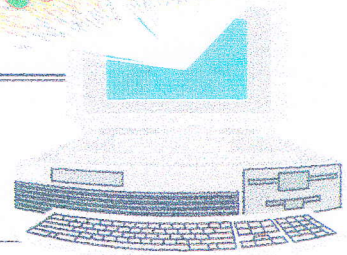
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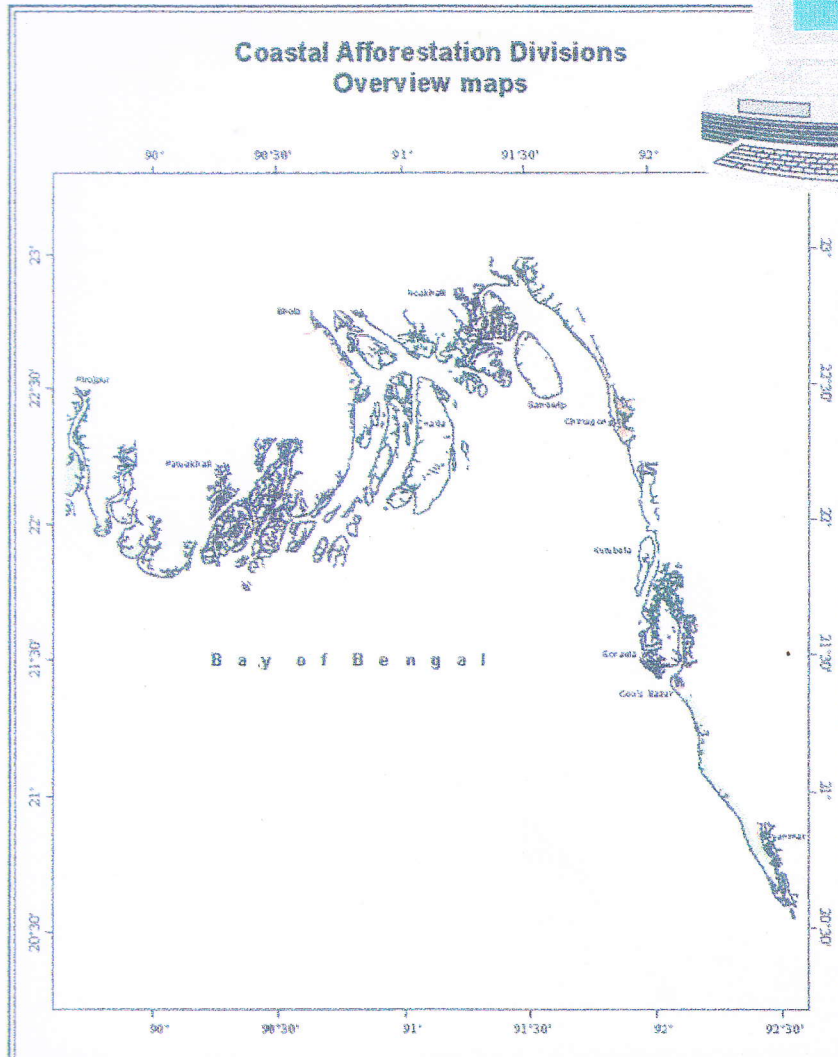
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COASTAL DIVISIONS Forest Statistics



Coastal Afforestation Divisions Overview maps



0 20 40 60 80 100 Kilometers

Scale 1:1,75,00,00

Legend

- International Bounds
- Roads
- Railway
- Land/Water Boundary

- Plantation
- Reserved Forest

Map History

Data Source : GIS Data Base,
Forest Resources Management Project,
Bangladesh Forest Department
Prepared by : F. I. Khan
Date : February 1999

Statistics	Noakhali	Ctg C/A	Bhola	Patuakhali
Area, ha	34223	20042	12420	9848
Sample size	289	408	225	168
NT/ha,				
15+cm dbh	172	10	58	156
BA/ha (sqm.),				
15+cm dbh	5.26	0.29	1.96	5.86
Vol/ha (cum)				
15+cm dbh	25.69	1.02	9.31	36.40
SE%	7.4	18.3	10.5	10.7
Seedlings/ha	13360	15228	641	5840
Saplings/ha	3151	2202	185	967
Poles/ha	1864	737	551	572

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Conclusions and Recommendations

1. The FRMP forest inventory of the Coastal Plantations has generated the desired results as evidenced by the sampling errors of the tree volume and other estimates. The sampling errors of the volume estimates (V10, down to 10-cm diameter, underbark) are 7.1% for Noakhali and 10.5%, 10.7% and 18.3% for Bhola, Patuakhali and Chittagong C/A, respectively. The sampling errors of the total volume (TVOL: stem volume plus crown volume) are slightly lower/better than the above numbers. The precision of the estimates is well within the target of about 10% but not more than 20% sampling error for the divisional volume estimates as prescribed in the sampling design phase of the forest inventory sub-component of FRMP. The sampling errors at the stratum and species levels, at least for the important stratum (10 years or older stands) and species (Keora), generally about 7 to 10% (about 17% in Chittagong C/A), are also well within the designed target of 20% sampling error. In the case of the four C/A Divisions, to increase the precision of estimates to a sampling error of 5% at the division level would have required more than twice the time and resources available for the job. Based on these considerations, it is concluded that the statistics presented in this report are adequate for forest management planning of the C/A Divisions.
2. The Coastal plantations have increased in area since the last photography (1984) and forest inventory (1984-1987): more than five times in Noakhali, about six times in Chittagong C/A, about 3.5 times in Bhola and about 2.5 times in Patuakhali (based on the FRMP RIMS-GIS database and the 1987 forest inventory report of FAO UNDP BGD/85/085). But, the stocking per ha has decreased particularly in Chittagong C/A Division where the total area of plantations has increased six times but the total volume of trees has increased only about 1.9 times. In Noakhali, the increase in tree volume is about 5.2 times compared to about 5.6 times increase in area; in Bhola, 1.6 times increase in total volume as

¹ All programming tasks were done by Delwar Hossain, Computer Programmer, FRMP-TA except the first prototype of DEVP which was programmed by A. Revilla.

against 3.5 times increase in area; and in Patuakhali, 2.3 times increase in total volume versus 2.5 times increase in area. Clearly, the situation in Chittagong C/A needs some drastic measures if the plantations are to be maintained at higher levels of stocking. While stocking varied from 10 to 60 cu.m./ha in Chittagong C/A in 1984, the NRMP inventory shows only about 4.0 cu.m./ha (5-cm dbh+ trees/poles). The same observation and recommendation also apply in the case of Bhola.

The following figures summarize the levels of stocking in the four C/A Divisions.

Coastal Division	NT/ha, 10-cm dbh+	TVOL/ha, 10-cm dbh+	Poles/ha, 2.5-10cm dbh	Saplings per ha	Seedlings per ha
Noakhali	361	31	1864	3152	13360
Chittagong	69	3	738	2202	15228
Bhola	193	17	551	186	641
Patuakhali	217	48	572	967	5840

3. A significant number of trees in the older plantations, particularly those that are more than 20 years old, were observed to be dead or dying. The number can be as high as 20 to 30% in some places. This observation partly explains the decrease in the average volume stocking of the plantations over the last 12 years. This observation also suggests the need to consider a management strategy to utilize some of these resources before they die and rot. This should of course be done in line with the protective services of the forest plantations against cyclones and the issue on land ownership over these areas.
4. A **continuing resources change assessment system** (CRCAS) for the C/A plantations is also hereby recommended. CRCAS must be designed, supported and implemented to provide timely (at least annually) resource change statistics for the Forest Managers, the Leaders and people to respond effectively to any aggravating circumstances. The basic components of CRCAS has now been set in place by FRMP at the RIMS/GIS Wing of FD. What are needed are: a) staff to operate and maintain the system, b) annual field check/enumeration/measurement of one-tenth to one-fifth of the 20" by 20" grid plot clusters so that all plot clusters would have been re-visited/re-enumerated in five to 10 years, c) annual/biennial acquisition of appropriate satellite imageries covering portions (sensitive portions) of the C/A plantations to detect resource change, d) ground monitoring system to check areas identified on the satellite imagery to have unusual activities/changes, and e) RIMS/GIS personnel to conduct necessary studies including strategic studies to manage and conserve the C/A plantations for the maximum benefit of the people of Bangladesh.

Scope and Objectives of the Forest Inventory Sub-Component of FRMP

The FRMP forest inventory sub-component covers eight Forest Divisions, namely: the Sundarbans Reserved Forest, Sylhet, Chittagong, Cox's Bazar, Noakhali C/A, Chittagong C/A, Patuakhali C/A and Bhola C/A Forest Divisions. As indicated in the sampling design specifications of these forest inventories, the objectives of the FRMP inventories are threefold. The primary objective is to generate information on the

standing timber and other resources (bamboo, rattan, nipa and medicinal plants) for integrated forest management planning purposes. The second objective is to provide abstract time-series data, whenever possible, for plantation yield modeling purposes. And, the third objective is to set up or at least provide a basis for setting up a system of "hidden" recurrent sample plots for continuous monitoring and assessment of change in the target forest areas.

Target Precision, Sample Size (No. of Plots) and Sample Plot Configuration

Target precision. - The FRMP forest inventories, except for the C/A plantations, were designed to attain a precision of the estimates of not greater than 5% sampling error based on the volume of trees/ha in each division, not more than 10 to 15% sampling error for each of the more important strata, and not more than 20% sampling error for the other strata. In the case of the C/A plantations, these precision levels were somewhat compromised/relaxed to 10% sampling error of the volume estimate at the Division level but the 20% maximum sampling error was maintained at least for the important strata (10 years or older plantations) and major species (Keora). These precision levels are considered adequate for forest management planning purposes.

Sample size, n, for the C/A plantations. – There were no available information on the coefficient of variation of tree volume statistics on the C/A plantations. Sampling errors for various strata are given in the 1987 report of the FAO/UNDP Project BGD/85/085 but the number of plots were not reported hence it was not possible to estimate the coefficient of variation upon which to base the sample size (no. of plots/plot clusters). Moreover, the plantations have changed over the years. Thus, the sample size question was approached by considering at least three alternative grids for a systematic sample, namely, 20"x20", 40"x20" and 40"x40". After a brief field visit to the plantations in Noakhali, it was estimated that a 40"x20" systematic sample grid would yield a precision of the volume estimates of not more than 5% sampling error for the four C/A Divisions combined. But, then the forest inventory of the C/A Divisions is required to provide adequate timber resources information for management planning at the Division level, hence, the 20"x20" systematic sample grid was decided upon which was estimated to yield a sampling error of 10% to 15% at the individual Division level, and about 10 to 20% sampling error for the important stratum and species. The 20"x20" systematic sample grid called for the enumeration of some 716 plot clusters in Noakhali, 374 in Chittagong C/A, 328 in Bhola and 293 in Patuakhali based on the available information on areas of plantations in the four Divisions. The planned sample size and the number of plot clusters actually enumerated in each Division are as follows.

C/A Division	Est. Area, ha, up to 1992	Planned sample size, n	No. of Plot Clusters, actual	Area as per RIMS-GIS, ha
Noakhali	24027	716	289	34223.2
Chittagong C/A	12535	374	408	20042.1
Bhola	11022	328	225	12420.3
Patuakhali	9835	293	168	9848.1

The planned sample size was not attained in actual field sampling because of the lack of time and trained manpower. Nevertheless, the results of the forest inventory of the C/A plantations are not too far from the prescribed precision of estimates.

Sample plot configuration. – The “sample plot” adopted for the FRMP forest inventories is a **cluster of five plots** where a “plot” is actually a set of sub-plots, one sub-plot each for seedlings (1-m radius), saplings (2-m radius), poles (5-m radius), and trees (11-m radius in the case of the C/A plantations). The five plots in the plot cluster for tree species in the C/A plantations (also in the Sundarbans Reserved Forest) are spaced 50 meters apart reckoned from the center plot along the cardinal directions.

The details of the sampling design specifications can be found in the first fielding report of the Forest Inventory Specialist (June 1995).

Field Sampling

A sample of the Field Data Enumeration Form for the C/A plantations (and SRF) is given in Appendix 1. The field sampling procedures and instructions are contained in the second report of the FIS (July 1995). These procedures/instructions were refined during the training of the field sampling crews starting with the ACFs in October 1995. The codes for the plot and tree description variables and codes for trees and other species are shown in Appendices 2 and 3, respectively.

Field sampling started after the field crews had been trained in the respective Divisions, in October 1996 in the case of the Coastal Afforestation Divisions. All regular field enumeration activities were completed in May 1997. Field sampling activities were under the direct supervision of the DFO-MPD (Khulna).

Data Entry and Validation

Data entry and initial validation for the C/A Divisions was scheduled to start as soon the field data sheets arrived in Khulna. Data entry and validation for the other Forest Divisions started after the field work season in 1996. To meet this schedule, the Data Entry and Validation Program (DEVP) was designed starting in December 1995 and programming was scheduled in early 1996. The first prototype of DEVP was ready in May 1996 as scheduled. The structure and technical specifications of the dbf tables and DEVP are indicated in Appendix 4. The details are given in Annex 1 of the FIS' report for his second mission (May 1996).

All data entry and initial validation activities were completed by the Forest Divisions in September 1997. These activities were also under the direct supervision of the respective DFO-WP, by the DFO-WP (Khulna) in the case of the SRF and C/A Divisions.

Tree Volume Equations Studies

A set of tree volume equations studies was planned for the Sundarbans specifically for Sundri, Gewa, Keora, Baen, Kankra, Dhundul, Passur and Goran including weight equations for Goran and Golpatta. Data collection were finally completed in October 1997 and the data were then entered into appropriate files and the computer program to extract the information needed to derive the tree volume equations was developed and written. These studies were finally completed in January 1998 (Appendix 5) and have been used to generate the final volume statistics for the Sundarbans and C/A plantations. The new equations have been found to be more efficient than the ones used by ODA in the 1984 forest inventory of the Sundarbans. These equations were also used to generate the C/A forest statistics in the absence of more efficient equations for these plantations.

Data Processing

The Field Data Processing Program (FDPP). - Design of FDPP started in early 1996 and the technical specifications, flow charts and algorithms were ready in May 1996 to guide the Programmer in encoding FDPP. The draft of the details of the design and technical specifications are contained in Annex 2 of the FIS' report for his second mission (May 1996). The final revisions/refinements are given in the revised version of the same document prepared and submitted in October 1997.

Programming started before July 1996 and individual modules were tested as soon as they were finished. Debugging and refinements continued to be made until the Sylhet and Sundarbans databases were received for final validation and processing.

Final data validation. - Final validation of the four databases were done as soon as the data sets were received for processing. Identification of the stratum of each plot cluster as determined on the GIS vegetative cover maps also had to wait for completion of digital mapping of the C/A Divisions. The maps of the C/A Divisions were completed only recently.

Of the plot clusters enumerated for the C/A Divisions, 288, 400, 223 and 161 were found valid for final processing for Noakhali, Chittagong C/A, Bhola and Patuakhali, respectively.

The final strata and species/group. - In the case of the C/A plantations, only two strata and two species/group were considered in the generation of the forest statistics. The strata are: "Planted up to 1986/natural stand" and "Planted after 1986". The species/group classes are: Keora and Others.

Data processing. - After the location coordinates and respective stratum of the plot clusters were validated, data processing of these data sets was done to generate the stand and stock tables for trees 15-cm DBH and bigger, poles, saplings and seedlings. Both the per hectare and total forest statistics for each Division were generated in the case of V10 (volume down to 10-cm diameter, underbark). Only the per ha values were printed and reported here for the VTOT (total bole and crown volume) estimates.

The forest area statistics. – Table 1 shows the areas of the C/A plantations by stratum and forest range for the four Divisions. As of the latest RIMS-GIS database, there are more than 34,200 ha of plantations in Noakhali, 20,000 ha in Chittagong C/A, 12,400 ha in Bhola (Barisal) and 9,800 ha in Patuakhali. Table 2 gives the distribution of the field sample plot clusters by range.

Trees and regeneration. - Table 3 summarizes the tree statistics including poles, saplings and seedlings. The sampling errors of the various estimates are also indicated in Table 3. Chittagong C/A and Bhola present a gloomy picture in terms of plantation stocking. Chittagong C/A, on the average, has only about 10 trees/ha or about 1.0 cu.m. (V10)/ha of trees in its plantations, but it has about 738 poles (2.5 to 15-cm DBH), more than 2000 saplings and 15000 seedlings per ha. On the other hand, Bhola has about 58 trees or 9.3 cu.m./ha, about 550 poles but very few regeneration, only 186 saplings and 640 seedlings per ha. The detailed stand and stock tables (per hectare values): number of trees, basal area, V10 for trees with 15-cm or bigger DBH, VTOT for 10 to 15-cm DBH trees, and number of small poles (2.5 to 10-cm DBH), saplings and seedlings are given in Appendix 6. The total divisional estimates are also detailed in Appendix 6. The per hectare estimates for VTOT are given in Appendix 7 while the non-merchantable volumes are shown in Appendix 8.

In summary, there are about 1.1 million cu.m. (VTOT) of wood in the C/A plantations of Noakhali, about 60% of which are in merchantable volume (V10). The corresponding estimates for Chittagong C/A, Bhola and Patuakhali are: 80,000 cu.m. (VTOT) or 20,000 cu.m. (V10), about 220,000 cu.m. (VTOT) or 115,000 cu.m. (V10), and about 480,000 cu.m. (VTOT) or about 350,000 cu.m. (V10), respectively. In terms of non-merchantable volumes, there are about 6.00 cu.m./ha in Noakhali, 0.47 in Chittagong C/A, 2.95 in Bhola and 8.65 in Patuakhali.

The Confidence Limits

Confidence limits of stratum mean. - The 95% confidence limits of the stratum mean, \bar{x} , is given by the familiar expression:

$$\bar{x} \pm t \cdot se$$

where: t is the t-value at 5% with degrees of freedom, $nh-1$ (where nh is the sample size of stratum h) and se is the standard error of the stratum mean.

Confidence limits of the population mean. - The 95% confidence limits of the population mean, \bar{x}_d , in stratified sampling is more complicated than the usual procedure specifically in determining its effective degrees of freedom, ne .

$$\bar{x}_d \pm t \cdot sed$$

where: t is the t-value at 5% level with degrees of freedom ne and sed is the standard error of the population mean; ne is given by the following expression (From: Cochran).

$$ne = (\sum Gh * Sh^2)^2 / \sum (Gh^2 * Sh^4 / (nh-1))$$

where: $Gh = Nh * (Nh - nh) / nh$,
 Sh^2 is the sample variance of stratum h ,
 Nh is the size of stratum h ,
 nh is the sample size for stratum h , and
 Nh and nh are in the same units, e.g. ha.

Table 5 shows the computation of the effective degrees of freedom, **ne**, based on V10. In all cases in the four C/A Divisions, the effective degrees of freedom of the V10 estimates is more than 120, hence, the corresponding t-value to establish the 95% confidence interval is 1.96. The 95% confidence interval of the V10/ha estimates for the four C/A Divisions are, therefore, as follows.

Noakhali: 17.44 – 1.96*1.238 to 17.44 + 1.96*1.238 or **15.01 to 19.87 cu.m./ha**

Chittagong C/A: 1.02 - 0.36 to 1.02 + 0.36 or **0.66 to 1.38 cu.m./ha**

Bhola: 9.31 – 1.91 to 9.31 + 1.91 or **7.40 to 11.22 cu.m./ha**

Patuakhali: 36.40 – 7.63 to 36.40 + 7.63 or **28.77 to 44.03 cu.m./ha**

Assessment of Change in the Forest Resources

From the last photography in 1984 and the last inventory in 1987 (Drigo, et al, 1987. FAO/UNDP BGD/85/085) to the FRMP forest inventory and mapping in 1994 to 1997, there have been significant changes in the C/A plantations. The available information on forest resources change in these areas is summarized in Table 4.

The Coastal plantations have increased in area over the 12-year period: more than five times in Noakhali, about six times in Chittagong C/A, about 3.5 times in Bhola and about 2.5 times in Patuakhali (based on the FRMP RIMS-GIS database and FAO 1987 forest inventory report). But, the stocking per ha has decreased particularly in Chittagong C/A Division where the total area of plantations has increased six times but the total volume of trees has increased only about 1.9 times. In Noakhali, the increase in tree volume is about 5.2 times compared to about 5.6 times increase in area; in Bhola, 1.6 times increase in total volume as against 3.5 times increase in area; and in Patuakhali, 2.3 times increase in total volume versus 2.5 times increase in area. Clearly, the situation in Chittagong C/A needs some drastic measures if the plantations are to be maintained at higher levels of stocking. While stocking varied from 10 to 60 cu.m./ha in Chittagong C/A in 1984, the NRMP inventory shows only about 4.0 cu.m./ha (5-cm dbh+ trees/poles).

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Table 1. Areas of C/A Plantations by Stratum and Range (in ha): 1996

Noakhali C/A

Stratum	Char					Char Alexend	All Ranges
	Charbat	Jahajmar	Alauddin	Habibia	Nalchira		
Planted: up to 1986/N	2955.9	9954.3	838.5	1755.5	2272.0	1793.9	22203.8
Planted: after 1986	2080.6	155.4	767.7	2866.8	2469.8	6.5	12019.4
Total	5036.5	10109.7	1606.2	4622.3	4741.8	1800.4	34223.2

Chittagong C/A

Stratum	Head										All Ranges		
	Mirsarai	Sitakund	Quarters	Banskh	Kutubdi	Gurakgh	Teknaf	Sandwi	Moheshk	Charand		Urir Ch	Chanua
Planted: upto 1986/N	4049.4	1421.5	191.3	428.7	81.2	1808.6	309.2	468.8	605.3	199.3	1888.6	331.4	11783.3
Planted: after 1986	1303.9	60.7	196.7	16.0	5.8	545.0	115.2	3084.3	734.4	77.3	2088.8	30.7	8258.8
Total	5353.3	1482.2	388.0	444.7	87.0	2353.6	424.4	3553.1	1339.7	276.6	3977.4	362.1	20042.1

Bhola C/A

Stratum	Kukri		Majer		Char			All Ranges
	Mukri	Char	Nonpura	Fashion	Daulat	Khan	Ranges	
Planted: upto 1986/N	3533.2	287.9	2909	1034.9	1120.5	8885.5	8885.5	
Planted: after 1986	365.1	49.9	493.0	20.6	2606.2	3534.8	3534.8	
Total	3898.3	337.8	3402	1055.5	3726.7	12420.3	12420.3	

Patuakhali C/A

Stratum	Char					All Ranges	
	Patharg	Golachip	Montaz	Mohipur	Amtali		Dashmi
Planted: upto 1986/N	2352.5	2300.4	2347.8	306.0	583.2	348.8	8238.7
Planted: 1986 and up	330.5	629.9	184.1	233.5	185.7	45.7	1609.4
Total	2683.0	2930.3	2531.9	539.5	768.9	394.5	9848.1

Table 2. Distribution of Plot Clusters by Range

Division: Noakhali C/A

Range	Char		Char		Char		Char		Char		Char	
	Bata	Jahajmar	Alauddin	Habibia	Nalchira	Sagoria	Compani	Alexende	All Ranges	Alexende	All Ranges	All Ranges
Area (ha)	5036.5	10109.7	1606.2	4622.3	4741.8	1800.4	1189.0	5117.3	34223.2	5117.3	34223.2	34223.2
No. of PC	69	54	15	46	57	22	6	20	289	20	289	289

Division: Chittagong C/A

Range	Head Quarters		Banskhali		Gurakgha		Teknaf		Sandwip		Moheshk		Charand		Urir Char		Chanua		All Ranges	
	Mirsarai	Sitakund	Quarters	Quarters	444.7	87.0	2353.6	424.4	3553.1	24	1339.7	276.6	3977.4	362.1	20042.1	14	408			
Area (ha)	5353.3	1482.2	388.0	24	35	10	58	10	24	20	12	103	14	20042.1	14	408				
No. of PC	67	31	24	31	35	10	58	10	24	20	12	103	14	20042.1	14	408				

Division: Bhola (Barisal) C/A

Range	Kukri Mukri		Majer Char		Char Fashion		Daulat Khan		All Ranges	
	3898.3	83	337.8	0	1055.5	30 <th>3726.7 <th>46 <th>12420.3 <th>225</th> </th></th></th>	3726.7 <th>46 <th>12420.3 <th>225</th> </th></th>	46 <th>12420.3 <th>225</th> </th>	12420.3 <th>225</th>	225
Area (ha)	3898.3	83	337.8	0	1055.5	30	3726.7	46	12420.3	225
No. of PC	83	0	66	66	30	30	46	46	225	225

Division: Patuakhali C/A

Range	Pathargat		Golachip		Montaz		Mohipur		Amtali		Dashmia		All Ranges	
	2683.0	28 <th>2930.3</th> <th>61 <th>2531.9</th> <th>55 <th>539.5</th> <th>9 <th>768.9</th> <th>7 <th>394.5</th> <th>8 <th>9848.1 <th>168</th> </th></th></th></th></th></th>	2930.3	61 <th>2531.9</th> <th>55 <th>539.5</th> <th>9 <th>768.9</th> <th>7 <th>394.5</th> <th>8 <th>9848.1 <th>168</th> </th></th></th></th></th>	2531.9	55 <th>539.5</th> <th>9 <th>768.9</th> <th>7 <th>394.5</th> <th>8 <th>9848.1 <th>168</th> </th></th></th></th>	539.5	9 <th>768.9</th> <th>7 <th>394.5</th> <th>8 <th>9848.1 <th>168</th> </th></th></th>	768.9	7 <th>394.5</th> <th>8 <th>9848.1 <th>168</th> </th></th>	394.5	8 <th>9848.1 <th>168</th> </th>	9848.1 <th>168</th>	168
Area (ha)	2683.0	28	2930.3	61	2531.9	55	539.5	9	768.9	7	394.5	8	9848.1	168
No. of PC	28	61	61	61	55	55	9	9	7	7	8	8	9848.1	168

Table 3. Summary of Tree Statistics by Stratum and Division

Noakhali C/A:

	Trees, 15-cm DBH +				Poles, 10-15cm DBH			Poles, 2.5-10cm	Saplings	Seedlings
	NT/ha	BA/ha	Vol/ha	SE%	NT/ha	BA/ha	Vol/ha	No./ha	No./ha	No./ha
Stratum 1	171.90	5.26	25.69	7.40	248.92	2.19	7.21	1329	2270	10529
Stratum 2	26.31	0.56	2.20	22.30	223.23	1.94	6.42	1690	4780	18591
Both Strata	120.80	3.61	17.44	7.10	239.90	2.10	6.93	1456	3152	13360

SE%=4.9 SE%=7.2 SE%=10.4

Chittagong C/A:

	Trees, 15-cm DBH +				Poles, 10-15cm DBH			Poles, 2.5-10cm	Saplings	Seedlings
	NT/ha	BA/ha	Vol/ha	SE%	NT/ha	BA/ha	Vol/ha	No./ha	No./ha	No./ha
Stratum 1	12.49	0.36	1.28	17.70	56.85	0.49	1.44	505	1810	13491
Stratum 2	7.05	0.20	0.65	49.20	61.15	0.53	1.47	837	2763	17707
Both Strata	10.25	0.29	1.02	18.30	58.62	0.50	1.45	642	2202	15228

SE%=9.4 SE%=11.3 SE%=8.3

Bhola (Barisal) C/A:

	Trees, 15-cm DBH +				Poles, 10-15cm DBH			Poles, 2.5-10cm	Saplings	Seedlings
	NT/ha	BA/ha	Vol/ha	SE%	NT/ha	BA/ha	Vol/ha	No./ha	No./ha	No./ha
Stratum 1	69.33	2.41	11.84	10.90	78.38	0.68	2.31	199	244	796
Stratum 2	30.57	0.81	2.95	38.20	278.90	2.43	8.14	647	38	253
Both Strata	58.30	1.96	9.31	10.50	135.45	1.18	3.97	326	186	641

SE%=14.5 SE%=24.4 SE%=26.8

Patuakhali C/A:

	Trees, 15-cm DBH +				Poles, 10-15cm DBH			Poles, 2.5-10cm	Saplings	Seedlings
	NT/ha	BA/ha	Vol/ha	SE%	NT/ha	BA/ha	Vol/ha	No./ha	No./ha	No./ha
Stratum	155.70	5.86	36.40	10.70	61.09	0.54	1.77	450	967	5840

SE%=13.5 SE%=24.2 SE%=16.8

Table 4. Comparative Areas (ha) and Tree Volumes (cu.m.) in C/A Plantations in 1984 and 1996

Division : Noakhali													
Ranges	Char Bata	Jahajmaral	har Alaudd	Habibia	Malchira	Sagoria	Companig	Char Ale	Total				
Area 1984	1108.0	2746.0	248.0	587.0	480.0	309.0	587.0	0.0	6065.0				
1996	5036.5	10109.7	1606.2	4622.3	4741.8	1800.4	1189.0	5117.3	34223.2				
Volume 1984	26246	123217	1510	14873	19749	21851	4728	0	212173				
TVOL 1996	161168	323510	51398	147914	151738	57613	38048	163754	1095142				
V10 1996	87837	176313	28012	80613	82697	31399	20736	89246	596853				
Division : Chittagong													
Ranges	Mirsarai	Sitakundra	Headquarte	Banskhali	Kutubdia	Gorokghata	Teknaf	Sandwip	Moheshkhi	Charand	Urir Ch	Chanud	Total
Area 1984	633.0	507.0	102.0	435.0	235.0	1064.0	366.0	0.0	0.0	0.0	0.0	0.0	3342.0
1996	5353.3	1482.2	388.0	444.7	87.0	2353.6	424.4	3553.1	1339.7	276.6	3977.4	362.1	20042.1
Volume 1984	14107	5391	1095	5890	484	9034	6390	0	0	0	0	0	42390
TVOL 1996	21413	5929	1552	1779	348	9414	1698	14212	5359	1106	15910	1448	80168
V10 1996	5460	1512	396	454	89	2401	433	3624	1366	282	4057	369	20443
Division : Bhola (Barisal)													
Ranges	KukriMukri	Majer Char	Monpura	Char Fashid	Daulat Kha	Total							
Area 1984	2224.0	197.0	1129.0	15.0	0.0	3565.0							
1996	3898.3	337.8	3402.0	1055.5	3726.7	12420.3							
Volume 1984	123740	710	14139	131	0	138720							
TVOL 1996	69390	6013	60556	18788	66335	221081							
V10 1996	36293	3145	31673	9827	34696	115633							
Division : Patuakhali													
Ranges	Patharghata	Golachipa	Charmonata	Mohipur	Amtali	Dashmia	Total						
Area 1984	2006.0	1103.0	194.0	188.0	516.0	0.0	4007.0						
1996	2683.0	2930.3	2531.9	539.5	768.9	394.5	9848.1						
Volume 1984	109761	63962	8409	1845	28515	0	212493						
TVOL 1996	131467	143585	124063	26436	37676	19331	482557						
V10 1996	97661	106663	92161	19638	27988	14360	358471						

Sources: Drigo, R., et al. 1987. The maturing mangrove plantations of the Coastal Afforestation Project. 68p(++)
and results of the FRMP forest inventories.

Table 5. Calculation of the Effective Degrees of Freedom of the Volume (VTOT) Estimates

Noakhali

Stratum	Nh	nh	S ² h	Gh	Gh*S ² h	Gh ² *(S ² h) ² /(nh-1)
1	22203.8	225	1462.51	2168946	3172105406	4.49208E+16
2	12019.4	63	33.71	2281091	76895588.9	9.53699E+13
					3249000995	4.50161E+16
						234.493834

ne = 234

t05 = 1.96

Chittagong C/A

Stratum	Nh	nh	S ² h	Gh	Gh*S ² h	Gh ² *(S ² h) ² /(nh-1)
1	11783.3	351	40.4563	383789.8	15526715.4	6.88797E+11
2	8258.8	49	10.8896	1383737	15068338.7	4.73031E+12
					30595054.1	5.41911E+12
						172.7328024

ne = 172

t05 = 1.96

Bhola

Stratum	Nh	nh	S ² h	Gh	Gh*S ² h	Gh ² *(S ² h) ² /(nh-1)
1	8885.5	202	604.6986	381966.5	230974627	2.65419E+14
2	3534.8	21	61.1822	591456.2	36186591.6	6.54735E+13
					267161218	3.30893E+14
						215.7046756

ne = 215

t05 = 1.96

Patuakhali: df = 160

t05 = 1.96

Appendix 1. Field Data Enumeration Form

Appendix 2. Plot and Tree Description Codes

PLOT/TREE DESCRIPTION CODES
(Mangrove Forest and Coastal Plantations)

Land use category

- 1 Tidal forest
- 2 Coastal forest
- 3 Natural hill forest
- 4 Forest plantation
- 5 Bush/shrubland
- 6 Fruit/other trees
- 7 Agriculture
- 8 No vegetation
- 9 Settlement
- 10 Others

Forest type

- 1 Mangrove forest
- 2 Nipa forest
- 3 Coastal forest
- 6 Forest plantation

Stand Condition:

Mangrove forest

- 1 Harvested, less than 5 years ago
- 2 Harvested, 5 or more years ago

Nipa forest

- 1 Newly harvested
- 2 Harvested, more than one year ago
- 3 Cleared

Forest plantations

- 1 Well-stocked (at least 50% crown cover or of original stocking)
- 2 Poorly stocked (< 50% crown cover or of original stocking)
- 3 Failure
- 4 Destroyed by fire
- 5 Eroded
- 6 Encroached
- 7 Handed over to Revenue Department

Damage

- 0 No damage
- 1 Slight damage, tree will survive
- 2 Heavy damage, tree will die
- 3 Uprooted
- 4 Felled
- 5 Broken
- 6 Dead

Infestation

- 0 No infestation
- 1 Insect infestation
- 2 Climbed by rattan
- 3 Slightly infested with climbers
- 4 Severely infested with climbers
- 5 Infested with mistletoe (*Loranthus* sp.)
- 6 "Top dying" (die-back)
- 7 Others

Tree grade

- 1 Straight and clean without damage, circular cross-section, apparently sound
- 2 Similar to 1 but up to half of surface is knotty or cross-section is irregular, or with slight sweep
- 3 Twisted and knotty, or with other defects which reduce usable volume by up to 25%, such as rot, burn, physical damage, forks or bends
- 4 Very knotty and bent, or with defects which reduce usable volume by up to 25 to 50%
- 5 Reject, with such defects that only less than 50% of volume is usable

Appendix 3 Species Codes

Forest Species: Sundarbans and Coastal Divisions

	Vernacular Name	Botanical Name	Code Name	Code No.	Commercial Group/Class
<u>Trees:</u>					
1.	Amur	<i>Amoora cucullata</i>	AU	201	5
2.	Babul	<i>Acacia nilotica</i>	BB	202	5
3.	Baen	<i>Avicennia officinalis</i>	BA	203	5
4.	Ban jam	<i>Eugenia fruticosa</i>	BJ	204	5
5.	Batla/Batul	<i>Excoecaria indica</i>	BL	205	5
6.	Bhacla/Baral	<i>Intsia bijuga</i>	BE	206	5
7.	Bhola	<i>Hibiscus tiliaceus</i>	BO	207	5
8.	Bon Lichu	<i>Lepisanthes rubiginosa</i>	BC	208	5
9.	Bon Notoy	<i>Mallotus repandus</i>	BY	209	5
10.	Choyla/Ora/Soyla	<i>Sonneratia caseolaris</i>	CY	210	5
11.	Dhundul	<i>Xylocarpus granatum</i>	DN	211	5
12.	Doyal	<i>Mucuna gigantea</i>	DY	212	5
13.	Gab	<i>Diospyros peregrina</i>	GB	213	5
14.	Garjan/Jhanna	<i>Rhizophora mucronata</i>	JN	214	5
15.	Gewa	<i>Excoecaria agallocha</i>	GW	215	3
16.	Goran	<i>Ceriops decandra</i>	GN	216	5
17.	Jhanna/Garjan	<i>Rhizophora mucronata</i>	JN	214	5
18.	Jhao	<i>Tamarix indica</i>	JA	217	5
19.	Jir	<i>Ficus sp.</i>	JI	218	5
20.	Kankra	<i>Bruguiera gymnorhiza</i>	KA	219	5
21.	Karanj/Karanja	<i>Pongamia pinnata</i>	KR	220	5
22.	Keora	<i>Sonneratia apetala</i>	KE	221	4
23.	Khalisha/Khalshi/ Khulsha	<i>Aegiceras corniculatum</i>	KC	222	5
24.	Kirpa/Kripa	<i>Lumnitzera racemosa</i>	KP	223	5
25.	Ora/Choyla/Soyla	<i>Sonneratia caseolaris</i>	CY	210	5
26.	Passur	<i>Xylocarpus mekongensis</i>	PS	224	5
27.	Sadda Baen/ White Baen	<i>Avicennia alba</i>	SB	225	5
28.	Shingra	<i>Cynometra ramiflora</i>	SG	226	5
29.	Sitka/Sitki	<i>Clerodendrum inerme</i>	SK	227	5
30.	Sundri	<i>Heritiera fomes</i>	SU	228	3
31.	Sundri Lota	<i>Brownlowia tersa</i>	SL	229	5
32.	White Baen/ Sadda Baen	<i>Avicennia alba</i>	SB	225	5
33.	Miscellaneous/Unknown species		UM	299	5

Legend:
 1 - Special Class
 2 - Class A
 3 - Class B
 4 - Class C
 5 - Class D

1.	Golpatta	<i>Nypa fruticans</i>	GP	290
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Appendix 4. Structure of Data Entry Table

Table A4

Table A4. Structure of Data Entry Table (with DEVP and final validation criteria) for the Sundarbans and Coastal Plantations: Enumeration Form 3

No	Field Name	Variable Name	Type	Width	Dec'l Pt.	Technical DEVP	Specifications Final
1	Data form	CFORM	C	1	0	=1, 2 or 3	=3
2	Plot cluster number	CPCN	C	4	0	=001 to 1300	=001 to 1300
3	Longitude: degrees	CLONGDEG	C	2	0	=88 to 93	See Table A2-4
4	Lon: minutes	CLONGMIN	C	2	0	=0 to 59	=0 to 59
5	Lon: seconds	CLONGSEC	C	2	0	=0 to 59	=0,10,20,30,40,50
6	Latitude: degrees	CLATDEG	C	2	0	=20 to 27	See Table A2-4
7	Lat: minutes	CLATMIN	C	2	0	=0 to 59	=0 to 59
8	Lat: seconds	CLATSEC	C	2	0	=0 to 59	=0,10,20,30,40,50
9	Plot No.	CPLOTNO	C	2	0	=1 to 5	=1,2,3,4 or 5
10	Control	CCONTROL	C	1	0	=0 or 1	=0 or 1
11	Record type1	CRECTYPE1	C	1	0	=1 to 6	=1
12	Division	CDIVISION	C	2	0	=1 to 30	See Table A2-5
13	Range	CRANGE	C	2	0	=1 to 50	See Table A2-5
14	Beat	CBEAT	C	2	0	=1 to 99	See Table A2-5
15	Block	CBLOCK	C	3	0	=1 to 500	=1 to 55
16	Compartment	CCOMPART	C	3	0	=1 to 500	=1 to 55
17	Land use category	CLUSEC	C	1	0	=1 to 9	=1,2,4,5,6,7,8 or 9
18	Forest type	CFOTY	C	1	0	=1 to 6	=1, 2, 3 or 6
19	Stand condition	CSTCO	C	1	0	=1 or 2	=1, 2, 3 or 4
20	Year logged/ planted	CYRLOP	C	2	0	=70 to 97	=70 to 97
21	No. of records (NR): trees/poles	CNORETP	C	2	0	= 0 to 50	= 0 to 50
22	NR:seedlings	CNRSEED	C	2	0	=0 to 30	=0 to 30
23	NR: saplings	CNRSAP	C	2	0	=0 to 20	=0 to 20
24	NR: nipa	CNRNIPA	C	2	0	=0 to 15	=0 to 15
25	NR: nipa seedlings	CNRNIPAS	C	1	0	=1	1
26	Crew number	CCREWNUM	C	2	0	=0 to 30	=0 to 30
27	Date: day	CDAY	C	2	0	=1 to 31	=1 to 31
28	Date: month	CMONTH	C	2	0	=1 to 12	=1 to 12
29	Date: year	CYEAR	C	2	0	=95 to 98	=95 to 98

30	Invalid subplot (IS): seedlings	CISSE	C	1	0	=0	=0 or 1
31	IS: saplings	CISSA	C	1	0	=0	=0 or 1
32	IS: nipa seedlings	CISNISE	C	1	0	=0	=0 or 1
33	IS: nipa	CISNIPA	C	1	0	=0	=0 or 1
34	IS: poles	CISPOLES	C	1	0	=0	=0 or 1
35	IS: trees	CISTREES	C	1	0	=0	=0 or 1
36	Record type2	CRECTYPE2	C	1	0	=1 to 6	=4
37	Consecutive number 1	CONSNUM1	C	2	0	=1 to 50	=1 to 50
38	Species code: seedlings	CSCSEED	C	3	0	=100 to 299	=201 to 299
39	No. of stems: seedlings	CNSSEED	C	2	0	=0 to 20	=0 to 20
40	SC: saplings	CSCSAP	C	3	0	=100 to 299	=201 to 299
41	NS: saplings	CNSSAP	C	2	0	=0 to 20	=0 to 20
42	Record type: nipa	CRTNIPA	C	1	0	=6	=6
43	SC: nipa	CSCNIPA	C	3	0	=290	=290
44	NS: nipa seedlings	CNSNIPAS	C	2	0	=0 to 15	=0 to 15
45	Maturity: nipa	CMATURITY	C	1	0	=1 for M1 =2 for M2	=1 for M1 =2 for M2
46	No. of leaves	CTNOLEAV	C	1	0	=1 to 9	=1 to 9
47	No. of utilizable leaves	CNUTLEAV	C	1	0	=1 to 9	=1 to 9
48	Harvest status	CHARSTA	C	1	0	=1 for U =2 for C	=1 for U =2 for C
49	Flower/fruit	CFLFR	C	1	0	=0, 1 or 2	=1 (flower), =2 (fruit), =0, otherwise
50	Height of NEWS nipa	CHTNIPA	N	4	1	=3.0 to 14.0	=3.0 to 14.0
51	Horizontal distance 1	CHORDIS1	N	4	1	=5.0 to 14.0	=5.0 to 14.0
52	Percent to base	CPCTB1	C	2	0	=0 or (+ or -) 1 to 15%	=0 or (+ or -) 1 to 15%
53	Percent to top	CPCTTOP1	C	3	0	=20 to 120%	=20 to 120%
54	Length of leaf	CLENLEAF	N	4	1	=2.5 to 12.0	=2.5 to 12.0

55	Total no. of leaflets	CTNOLLET	C	3	0	=25 to 120	=25 to 120
56	No. of util. leaflets	CNUTLLET	C	3	0	=15 to 110	=15 to 110
57	Record type3	CRECTYPE3	C	1	0	=2, 3 or 5	=5
58	Consecutive number 2	CCONSNUM2	C	2	0	=1 to 50	=1 to 50
59	SC: poles	CSCPOLES	C	3	0	=100 to 299	=201 to 299
60	DBH: poles	CDBHPOLES	N	4	1	=2.5 to 19.5	=2.5 to 14.5
61	SC: trees	CSCTREES	C	3	0	=100 to 299	=201 to 299
62	DBH/DAB	CDBHTREES	N	5	1	=14.6 to 120.0	=14.6 to 120.0
63	Buttress height	CHTBUT	N	3	1	=1.1 to 8.0	=1.1 to 8.0
64	Damage	CDAMAGE	C	1	0	=0 to 6	=0 to 6
65	Grade	CGRADE	C	1	0	=1 to 5	=1 to 5
66	Infestation	CINFEST	C	1	0	=0 to 6	=0 to 6
67	Bole height	CBOLEHT	N	4	1	=0.5 to 40.0	=0.5 to 40.0
68	Tree height	CTREEHT	N	4	1	=4.0 to 50.0	=4.0 to 50.0
69	Hor. distance	CHORDIS2	N	4	1	=5.0 to 40.0	=5.0 to 40.0
70	Height of base	CHTBASE	N	3	1	=0.0 to 3.0	=0.0 to 3.0
71	Percent to base	CPCTB2	C	3	0	=0 or (+ or -) 1 to 30%	=0 or (+ or -) 1 to 30%
72	Percent to crown point	CPCTCP	C	3	0	=0 or (= or -) 1 to 150%	=0 or (+ or -) 1 to 150%
73	Percent to top	CPCTTOP2	C	3	0	=0 or (+ or -) 1 to 150%	=0 or (+ or -) 1 to 150%

C - Character

N - Numeric

**Appendix 5. The FRMP Tree Volume Equations for the
Sundarbans and C/A Plantations**

Appendix 5. The FRMP Tree Volume Equations for the Sundarbans (Including Weight Equations for Goran and Golpatta)

Notes: The regression modeling procedures used to derive the following equations involved eliminating the heteroscedasticity (heterogeneous variance) problem in the data sets. It should be noted that the presence of heteroscedasticity in each of the data sets violates one of the basic assumptions of regression models. Tree volume equations derived by regression procedures with very high coefficient of determination can give very inefficient estimates if heteroscedasticity is not corrected in the data.

The following tree volume equations give better volume estimates than the ones used in the ODA forest inventory of the Sundarbans. The details of the comparisons are given in Appendix 11 (SRF FI Report).

In the following equations, **V10E** is the equation or estimated tree volume, including branches that are at least 2 m long, down to 10-cm diameter underbark; **VTOTE** is the total tree volume including bole volume and branch volume of wood that are at least 2 m long, down to 10-cm diameter underbark, and non-merchantable crown/branch volume, overbark; **BVCRE** is the bole volume, underbark, up to the crown point; and **VNME** is the non-merchantable volume, overbark. In all cases, **V10E = 0** if DBH is less than 10 cm.

Species/Code	FRMP Equations
Sundri (<i>Heritiera fomes</i>) 228	$V10E = -0.02363 + 0.00001800 * D2H + 0.0002210 * D2$ $VTOTE = 0.008298 + 0.00001529 * D2H + 0.0003505 * D2$ $BVCRE = -0.0044196 + 0.00001364 * D2H + 0.0002378 * D2$ $VNME = VTOTE - V10E$
Gewa (<i>Excoecaria agallocha</i>) 215	$V10E = 0.00003149 * D2H$ $VTOTE = 0.00003797 * D2H$ $BVCRE = 0.00003070 * D2H$ $VNME = -0.005021 + 0.0001890 * DH$
Keora (<i>Sonneratia apetala</i>) 221	$V10E = -0.0083256 + 0.00003824 * D2H - 0.0001201 * D2$ $VTOTE = 0.00003848 * D2H$ $BVCRE = 0.000002284 * D2H + 0.0001526 * DH$ $VNME = 0.03426 + 0.000002895 * D2H$
Baen (<i>Avicennia officinalis</i>) 203	$V10E = 0.00003704 * D2H - 0.002267 * H$ $VTOTE = 0.0002572 * D2 + 0.00002387 * D2H$ $BVCRE = 0.0057935 + 0.00002695 * D2H$ $VNME = VTOTE - V10E$
Kankra (<i>Bruguiera gymnorhiza</i>) 219	$V10E = -0.01971 + 0.00003729 * D2H$ $VTOTE = 0.00004555 * D2H$ $BVCRE = 0.00006299 * VTOTE * VTOTE$ $VNME = VTOTE - V10E$
Passur (<i>Xylocarpus mekongensis</i>) 224	$V10E = -0.01806 + 0.0001358 * D2 + 0.00002695 * D2H$ $VTOTE = 0.0002887 * D2 + 0.0002752 * D2H$ $BVCRE = 0.00002939 * D2H$ $VNME = VTOTE - V10E$

Dhundul (<i>Xylocarpus granatum</i>) 211	$V10E = -0.008143 + 0.00003819 * D2H$ $VTOTE = 0.00009118 * D2H - 0.000004678 * D2H2$ $BVCRE = 0.007231 + 0.00002885 * D2H$ $VNME = VTOTE - V10E$
Goran (<i>Ceriops decandra</i>) 216	$VOL = 0.001429 - 0.001111 * D + 0.0004294 * D2$ $WT = 1.337 - 0.8816 * D + 0.3876 * D2$
Golpatta (<i>Nypa fruticans</i>) 290	$ULME = -1.0802 + 1.4524 * LM - 0.1081 * LM^2$ $WT = -1.4555 + 1.1953 * ULME$ Alternatively, $WT = -1.3734 + 0.8882 * LM$

Legend: D2 = DBH², where DBH is in cm.
H = total tree height in m.
D2H = D2 * H
D2H2 = D2 * H²
Volumes are all in cu. m.
WT = weight in kg.
LM = length of leaf in m.
ULME = length of utilized/split leaf in m. as estimated by the equation

Note: For quick estimation of the non-merchantable volume of stands (not individual trees), the following percentages of the total volume may be used: Sundri – 8.6%; Gewa – 4.0%; Keora – 10.2%; Baen – 18.3%; Kankra – 10.5%; Passur – 14.6%; and Dhundul – 14.5%.

Appendix 6. Detailed Stand and Stock Tables (No. of Trees/ha, BA/ha, V10/ha (Trees), Poles, Saplings and Seedlings/ha) and Detailed Tree Statistics for the C/A Plantations (Total No., BA and V10 of Trees, Total Poles, Saplings and Seedlings)

Division : Noakhali C/A (19)

Date: 01/24/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 225

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	92.42	2.15	9.02	53.85	1.98	10.56	11.23	0.61	3.59	2.36	0.19	1.15
Other TS	8.92	0.20	0.76	2.57	0.09	0.40	0.37	0.02	0.09	0.09	0.01	0.03
TOTAL	101.3	2.35	9.78	56.42	2.07	10.96	11.59	0.63	3.68	2.46	0.20	1.18

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.08	-	-	-	-	-	-	160.0	4.95	24.41	7.7
Other TS	-	-	-	-	-	-	-	-	-	11.95	0.31	1.28	20.3
TOTAL	0.10	0.01	0.08	-	-	-	-	-	-	171.9	5.26	25.69	7.4

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 63

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	25.05	0.53	2.04	1.00	0.03	0.14	-	-	-	-	-	-
Other TS	0.25	0.00	0.02	-	-	-	-	-	-	-	-	-
TOTAL	25.30	0.53	2.06	1.00	0.03	0.14	-	-	-	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	26.06	0.56	2.18	22.3
Other TS	-	-	-	-	-	-	-	-	-	0.25	0.00	0.02	99.9
TOTAL	-	-	-	-	-	-	-	-	-	26.31	0.56	2.20	22.3

Coastal Forest : All strata

Total No. of plot clusters : 288

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.76	1.58	6.57	35.29	1.30	6.90	7.28	0.39	2.33	1.53	0.13	0.75
Other TS	5.88	0.13	0.50	1.67	0.06	0.26	0.24	0.01	0.06	0.06	0.00	0.02
TOTAL	74.64	1.71	7.07	36.96	1.36	7.16	7.52	0.41	2.39	1.59	0.13	0.77

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.06	0.01	0.05	-	-	-	-	-	-	112.9	3.41	16.60	7.4
Other TS	-	-	-	-	-	-	-	-	-	7.84	0.21	0.84	20.1
TOTAL	0.06	0.01	0.05	-	-	-	-	-	-	120.8	3.61	17.44	7.1

Simple random sample mean : 20.55
 Variance of mean : 1.59
 Simple random sample sampling error : 7.74

Forest Statistics by Species Group, Stratum and Forest Division :
 No. of Trees (nearest 10), Basal Area (nearest 10 sqm) and Volume (nearest 10 cu m)]

Date : 01/24/1998

Division : Noakhali C/A (19)

Species Group : 1. Keora 2. Others

Coastal Forest : Stratum 1 (Year planted: upto 1985/natural stand) Stratum Area : 22203.80 Ha

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	2052130	47770	200220	1195570	43990	234490	249260	13490	79790	52440	4320	25620
Other TS	198080	4350	16960	57110	2020	8860	8180	440	1910	2080	150	640
TOTAL	2250210	52110	217180	1252680	46010	243360	257440	13930	81700	54520	4470	26260

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	2210	320	1880	-	-	-	-	-	-	3551610	109890	542000	7.7
Other TS	-	-	-	-	-	-	-	-	-	265450	6960	28380	20.3
TOTAL	2210	320	1880	-	-	-	-	-	-	3817050	116850	570390	7.4

Coastal Forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 12019.40 Ha

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	301140	6340	24480	12050	390	1690	-	-	-	-	-	-
Other TS	3010	60	290	-	-	-	-	-	-	-	-	-
TOTAL	304150	6390	24760	12050	390	1690	-	-	-	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	313180	6730	26170	22.3
Other TS	-	-	-	-	-	-	-	-	-	3010	60	290	99.9
TOTAL	-	-	-	-	-	-	-	-	-	316190	6780	26450	22.3

Coastal Forest : All strata

Total Area : 34223.20 Ha

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	2353270	54100	224700	1207610	44380	236180	249260	13490	79790	52440	4320	25620
Other TS	201090	4400	17250	57110	2020	8860	8180	440	1910	2080	150	640
TOTAL	2554360	58510	241950	1264720	46400	245050	257440	13930	81700	54520	4470	26260

Species Group	Trees by Diameter Class												Total	S.E%
	40-50			50-60			60+			Total				
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol		
Keora	2210	320	1880	-	-	-	-	-	-	3864790	116610	568170	7.4	
Other TS	-	-	-	-	-	-	-	-	-	268460	7020	28670	20.1	
TOTAL	2210	320	1880	-	-	-	-	-	-	4133240	123630	596840	7.1	

Simple random sample sampling error : 7.74

Division : Chittagong C/A (20)

Date: 01/24/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 351

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	5.74	0.13	0.45	2.69	0.10	0.41	0.53	0.03	0.12	0.07	0.01	0.02
Other TS	2.41	0.06	0.16	0.95	0.03	0.10	0.09	0.00	0.02	-	-	-
TOTAL	8.15	0.19	0.61	3.64	0.13	0.51	0.61	0.03	0.14	0.07	0.01	0.02

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	9.03	0.27	1.00	17.4
Other TS	-	-	-	-	-	-	-	-	-	3.45	0.10	0.28	27.8
TOTAL	-	-	-	-	-	-	-	-	-	12.49	0.36	1.28	17.7

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 49

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	3.61	0.08	0.25	1.61	0.06	0.23	0.11	0.01	0.03	-	-	-
Other TS	0.97	0.02	0.07	0.64	0.02	0.06	0.11	0.01	-	-	-	-
TOTAL	4.58	0.10	0.33	2.25	0.08	0.29	0.21	0.01	0.03	-	-	-

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	5.33	0.15	0.52	51.9
Other TS	-	-	-	-	-	-	-	-	-	1.72	0.05	0.13	100.0
TOTAL	-	-	-	-	-	-	-	-	-	7.05	0.20	0.65	49.2

Coastal Forest : All strata

Total No. of plot clusters : 400

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	4.86	0.11	0.37	2.25	0.08	0.33	0.35	0.02	0.08	0.04	0.00	0.01
Other TS	1.82	0.04	0.12	0.83	0.03	0.08	0.09	0.01	0.01	-	-	-
TOTAL	6.68	0.15	0.50	3.07	0.11	0.42	0.45	0.02	0.09	0.04	0.00	0.01

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	7.51	0.22	0.80	18.8
Other TS	-	-	-	-	-	-	-	-	-	2.74	0.08	0.22	32.2
TOTAL	-	-	-	-	-	-	-	-	-	10.25	0.29	1.02	18.3

Simple random sample mean : 1.21
 Variance of mean : 0.20
 Simple random sample sampling error : 16.83

Forest Statistics by Species Group, Stratum and Forest Division :
 No. of Trees (nearest 10), Basal Area (nearest 10 sqm) and Volume (nearest 10 cu m)]

Date : 01/24/1998

Division : Chittagong C/A (20)

Species Group : 1. Keora 2. Others

Coastal Forest : Stratum 1 (Year planted: upto 1985/natural stand) Stratum Area : 11783.30 Ha

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	67600	1560	5350	31730	1170	4780	6230	330	1390	880	70	280
Other TS	28450	670	1880	11220	400	1180	1020	50	280	-	-	-
TOTAL	96060	2230	7230	42950	1570	5950	7240	390	1660	880	70	280

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E ₃
Keora	-	-	-	-	-	-	-	-	106450	3130	11790	17.4	-
Other TS	-	-	-	-	-	-	-	-	40680	1120	3340	27.8	-
TOTAL	-	-	-	-	-	-	-	-	147130	4250	15130	17.7	-

Coastal Forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 8258.80 Ha

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	29860	680	2100	13300	500	1930	890	50	240	-	-	-
Other TS	7980	170	610	5320	200	460	890	60	-	-	-	-
TOTAL	37840	850	2710	18620	700	2400	1770	110	240	-	-	-

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	44040	1230	4270	51.9
Other TS	-	-	-	-	-	-	-	-	-	14190	430	1070	100.0
TOTAL	-	-	-	-	-	-	-	-	-	58230	1650	5340	49.2

Coastal Forest : All strata

Total Area : 20042.10 Ha

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	97460	2240	7450	45040	1660	6710	7110	380	1620	880	70	280
Other TS	36430	840	2490	16540	610	1640	1900	110	280	-	-	-
TOTAL	133890	3070	9940	61570	2270	8350	9020	490	1900	880	70	280

Species Group	Trees by Diameter Class												Total	S.E%
	40-50			50-60			60+			Total				
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol		
Keora	-	-	-	-	-	-	-	-	150490	4360	16060	18.8		
Other TS	-	-	-	-	-	-	-	-	54870	1550	4410	32.2		
TOTAL	-	-	-	-	-	-	-	-	205360	5910	20470	18.3		

Simple random sample sampling error : 16.83

Division : Bhola C/A (17)

Date: 01/24/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1986/Natural stand)

No. of plot clusters : 202

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	29.38	0.71	2.91	28.64	1.02	5.02	7.26	0.42	2.45	2.47	0.20	1.13
Other TS	0.82	0.02	0.09	0.53	0.02	0.10	0.10	0.01	0.02	-	-	-
TOTAL	30.20	0.73	3.00	29.17	1.04	5.12	7.36	0.43	2.47	2.47	0.20	1.13

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.09	0.03	0.01	0.03	-	-	-	67.89	2.37	11.62	11.0
Other TS	-	-	-	-	-	-	-	-	-	1.44	0.04	0.21	53.4
TOTAL	0.10	0.01	0.09	0.03	0.01	0.03	-	-	-	69.33	2.41	11.84	10.9

NOTE : NT - No. of trees
 BA - Basal area in sqm/ha

Vol - Volume in cu m/ha
 S.E. - Sampling Error

TS - Tree species
 N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 21

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	22.30	0.53	1.84	7.77	0.26	1.00	0.50	0.02	0.11	-	-	-
TOTAL	22.30	0.53	1.84	7.77	0.26	1.00	0.50	0.02	0.11	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	30.57	0.81	2.95	38.2
TOTAL	-	-	-	-	-	-	-	-	-	30.57	0.81	2.95	38.2

Coastal Forest : All strata

Total No. of plot clusters : 223

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	27.37	0.66	2.61	22.70	0.80	3.87	5.34	0.31	1.78	1.76	0.14	0.81
Other TS	0.58	0.01	0.06	0.38	0.01	0.07	0.07	0.00	0.02	-	-	-
TOTAL	27.95	0.67	2.67	23.08	0.82	3.95	5.41	0.31	1.80	1.76	0.14	0.81

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			S.E%
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	
Keora	0.07	0.01	0.06	0.02	0.00	0.02	-	-	-	57.27	1.92	9.16	10.6
Other TS	-	-	-	-	-	-	-	-	-	1.03	0.03	0.15	53.4
TOTAL	0.07	0.01	0.06	0.02	0.00	0.02	-	-	-	58.30	1.96	9.31	10.5

Simple random sample mean : 11.00
 Variance of mean : 1.19
 Simple random sample sampling error : 10.80

Forest Statistics by Species Group, Stratum and Forest Division :
 No. of Trees (nearest 10), Basal Area (nearest 10 sqm) and Volume (nearest 10 cu m)]

Date : 01/24/1998

Division : Bhola C/A (17)

Species Group : 1. Keora 2. Others

Stratum Area : 8885.50 Ha

Coastal Forest : Stratum 1 (Year planted: upto 1986/Natural stand)

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	261100	6340	25890	254500	9040	44580	64550	3730	21750	21910	1740	10080
Other TS	7250	170	780	4710	170	900	850	50	220	-	-	-
TOTAL	268350	6510	26670	259210	9210	45480	65400	3780	21970	21910	1740	10080

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	930	130	760	230	50	220	-	-	-	603220	21030	103270	11.0
Other TS	-	-	-	-	-	-	-	-	-	12810	390	1910	53.4
TOTAL	930	130	760	230	50	220	-	-	-	616020	21410	105180	10.9

Coastal Forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 3534.80 Ha

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	78820	1860	6500	27450	920	3540	1770	90	390	-	-	-
TOTAL	78820	1860	6500	27450	920	3540	1770	90	390	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	108050	2870	10440	38.2
TOTAL	-	-	-	-	-	-	-	-	-	108050	2870	10440	38.2

Coastal Forest : All strata

Total Area : 12420.30 Ha

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	339920	8200	32390	281960	9960	48120	66320	3920	22150	21910	1740	10080
Other TS	7250	170	780	4710	170	900	850	50	220	-	-	-
TOTAL	347170	8370	33170	286660	10130	49020	67170	3870	22370	21910	1740	10080

Species Group	Trees by Diameter Class												Total	S.E%
	40-50			50-60			60+			Total				
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol		
Keora	930	130	760	230	50	220	-	-	-	711260	23900	113710	10.6	
Other TS	-	-	-	-	-	-	-	-	-	12810	390	1910	53.4	
TOTAL	930	130	760	230	50	220	-	-	-	724070	24290	115610	10.5	

Simple random sample sampling error : 10.80

Division : Patuakhali C/A (18)

Date: 01/24/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 161

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.81	1.60	8.60	45.45	1.70	10.90	21.04	1.18	8.12	8.79	0.75	5.61
Other TS	5.35	0.12	0.36	2.99	0.11	0.29	1.09	0.06	0.24	0.18	0.02	0.09
TOTAL	74.17	1.72	8.96	48.44	1.81	11.19	22.13	1.24	8.36	8.96	0.77	5.70

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	1.47	0.21	1.47	0.44	0.10	0.71	-	-	-	146.0	5.54	35.41	10.9
Other TS	0.10	0.01	0.02	-	-	-	-	-	-	9.71	0.32	0.99	41.7
TOTAL	1.56	0.22	1.48	0.44	0.10	0.71	-	-	-	155.7	5.86	36.40	10.7

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Forest Statistics by Species Group, Stratum and Forest Division :
 No. of Trees (nearest 10), Basal Area (nearest 10 sqm) and Volume (nearest 10 cu m)]

Date : 01/24/1998

Division : Patuakhali C/A (18)

Species Group : 1. Keora 2. Others

Stratum Area : 8238.70 Ha

Coastal Forest : Stratum 1 (Year planted: upto 1985/natural stand)

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	566940	13150	70880	374440	14010	89810	173360	9720	66910	72380	6210	46210
Other TS	44090	990	2960	24610	930	2370	9000	510	1980	1460	130	740
TOTAL	611030	14140	73850	399050	14930	92180	182360	10230	68890	73840	6350	46950

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	12070	1740	12100	3640	810	5820	-	-	-	1202830	45630	291730	10.9
Other TS	810	110	130	-	-	-	-	-	-	79960	2670	8190	41.7
TOTAL	12880	1850	12230	3640	810	5820	-	-	-	1282790	48300	299920	10.7

Stand Tables by Species, Stratum and Division for Seedlings, Saplings and poles (No. of stems/ha) .

Division : Noakhali C/A (19) Date : 02/05/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 225

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	3791.68	19.5	1104.90	16.3
Others	6737.37	19.4	1165.43	13.6
TOTAL	10529.05	14.3	2270.33	10.6

Species group	Poles by Diameter Class (in cm)						Total		
	2.5-5	5-10	10-15						
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%
Keora	243.38	496.53	392.12	4.21	16.29	1132.03	4.21	16.29	6.4
Others	249.81	339.67	57.34	0.57	1.69	646.82	0.57	1.69	11.5
TOTAL	493.19	836.20	449.46	4.78	17.97	1778.85	4.78	17.97	4.8

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 63

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	4183.53	17.3	1952.19	13.3
Others	14407.40	18.6	2827.55	15.0
TOTAL	18590.93	15.0	4779.74	9.8

Species group	Poles by Diameter Class (in cm)					Total			
	2.5-5	5-10	10-15			No./ha	BA/ha	Vol/ha	S.E%
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%
Keora	336.50	830.44	322.86	3.23	11.98	1489.81	3.23	11.98	9.6
Others	289.31	234.04	8.39	0.08	0.19	531.74	0.08	0.19	21.7
TOTAL	625.81	1064.5	331.25	3.31	12.16	2021.55	3.31	12.16	8.7

Coastal Forest : All strata

Total No. of plot clusters : 288

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	3929.30	13.8	1402.47	10.6
Others	9431.13	13.5	1749.18	10.3
TOTAL	13360.43	10.4	3151.65	7.2

Species group	Poles by Diameter Class (in cm)									
	2.5-5		5-10		10-15			Total		
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%	
Keora	276.08	613.80	367.80	3.87	14.77	1257.68	3.87	14.77	5.5	
Others	263.68	302.57	40.15	0.40	1.16	606.40	0.40	1.16	10.4	
TOTAL	539.77	916.37	407.94	4.26	15.93	1864.08	4.26	15.93	4.4	

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
10.90, 7.88 and 4.20

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Statistics by Species group, Stratum and Division for Seedlings, Saplings and Poles;
No of stems (nearest 10)

Division : Noakhali C/A (19)

Date : 02/05/1998

Species Group : 1. Keora 2. Others

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

Stratum Area : 22203.80 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	84189700	19.5	24532980	16.3
Others	149595220	19.4	25876980	13.6
TOTAL	233784920	14.3	50409950	10.6

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	5403960	11024850	8706550	93480	361590	25135370	93480	361590	6.4
Others	5546730	7541970	1273170	12660	37500	14361860	12660	37500	11.5
TOTAL	10950690	18566820	9979720	106130	399090	39497230	106130	399090	4.8

Coastal forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 12019.40 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	50283520	17.3	23464150	13.3
Others	173168300	18.6	33985450	15.0
TOTAL	223451820	15.0	57449610	9.8

Species group	Poles by Diameter Class (in cm)								
	2.5-5	5-10	10-15		Total				
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	4044530	9981390	3880580	38820	143930	17906620	38820	143930	9.6
Others	3477330	2813020	100840	960	2240	6391200	960	2240	21.7
TOTAL	7521860	12794410	3981430	39780	146170	24297820	39780	146170	8.7

Coastal Forest : All strata
 Total Area : 34223.20 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	134473220	13.8	47997150	10.6
Others	322763520	13.5	59862430	10.3
TOTAL	457236740	10.4	107859550	7.2

Species group	Poles by Diameter Class (in cm)						Total			
	2.5-5		5-10		10-15		No. stems	BA	Vol	S.E%
	No. stems	No. stems	No. stems	BA	Vol					
Keora	9448480	21006230	12587120	132310	505520	43041830	132310	505520	5.5	
Others	9024080	10354980	1373990	13620	39740	20753050	13620	39740	10.4	
TOTAL	18472550	31361220	13961150	145930	545260	63794920	145930	545260	4.4	

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
 10.90, 7.88 and 4.20

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Stand Tables by Species, Stratum and Division for Seedlings, Saplings and poles (No. of stems/ha) .

Division : Chittagong C/A (20)

Date : 02/05/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 351

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	2771.40	12.4	415.88	14.8
Others	10720.13	12.9	1394.16	17.3
TOTAL	13491.53	10.3	1810.04	13.5
Total	17,707.46	13.2	2763.58	17.9

Stratum I

Stratum II

Species group	Poles by Diameter Class (in cm)						Total			
	2.5-5	5-10	10-15				No./ha	BA/ha	Vol/ha	S.E%
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%	
Keora	110.57	198.29	71.81	0.77	2.96	380.67	0.77	2.96	9.9	
Others	92.04	104.33	29.15	0.31	0.69	225.51	0.31	0.69	13.4	
TOTAL	202.61	302.62	100.96	1.08	3.66	606.18	1.08	3.66	7.9	

925.93 0.85 2.46 16.0

Stratum II

Coastal Forest : All strata

Total No. of plot clusters : 400

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	2659.09	13.3	442.60	17.0
Others	12569.71	9.9	1760.37	13.7
TOTAL	15228.80	8.3	2202.97	11.3

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%
Keora	142.87	250.50	71.17	0.73	2.73	464.53	0.73	2.73	12.0
Others	139.42	109.36	24.63	0.26	0.43	273.41	0.26	0.43	14.8
TOTAL	282.28	359.86	95.80	0.99	3.16	737.94	0.99	3.16	9.1

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
8.98, 11.57 and 7.11

=====

Statistics by Species group, Stratum and Division for Seedlings, Saplings and Poles;
No of stems (nearest 10)

Division : Chittagong C/A (20)

Date : 02/05/1998

Species Group : 1. Keora 2. Others

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

Stratum Area : 11783.30 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	32656240	12.4	4900440	14.8
Others	126318510	12.9	16427810	17.3
TOTAL	158974750	10.3	21328240	13.5

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	1302880	2336510	846160	9070	34930	4485550	9070	34930	9.9
Others	1084540	1229350	343480	3650	8170	2657250	3650	8170	13.4
TOTAL	2387410	3565860	1189640	12730	43090	7142800	12730	43080	7.9

Coastal forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 8258.80 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	20637590	28.3	3970170	33.4
Others	125604790	15.0	18853680	20.8
TOTAL	146242370	13.2	22823860	17.9

Species group	Poles by Diameter Class (in cm)								
	2.5-5	5-10	10-15			Total			S.E%
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	
Keora	1560500	2683950	580180	5530	19730	4824630	5530	19730	21.2
Others	1709650	962480	150230	1570	550	2822450	1570	550	25.8
TOTAL	3270150	3646430	730410	7100	20280	7647070	7020	20280	16.0

Coastal Forest : All strata

Total Area : 20042.10 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	53293830	13.3	8870610	17.0
Others	251923290	9.9	35281490	13.7
TOTAL	305217110	8.3	44152110	11.3

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	2863380	5020450	1426340	14610	54660	9310160	14610	54660	12.0
Others	2794190	2191820	493720	5230	8710	5479730	5230	8710	14.8
TOTAL	5657560	7212290	1920050	19820	63370	14789910	19820	63370	9.1

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
8.98, 11.57 and 7.11

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Stand Tables by Species, Stratum and Division for Seedlings, Saplings and poles (No. of stems/ha) .

Division : Bholā C/A (17)

Date : 02/05/1998

Species Group : 1. Keora

2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 202

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	646.87	29.9	177.28	26.2
Others	149.18	71.2	67.50	61.9
TOTAL	796.05	27.4	244.78	25.1

Species group	Poles by Diameter Class (in cm)						Total			
	2.5-5	5-10	10-15							
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%	
Keora	19.23	115.33	149.04	1.63	6.35	283.59	1.63	6.35	13.4	
Others	30.59	33.92	9.11	0.09	0.30	73.62	0.09	0.30	34.2	
TOTAL	49.82	149.25	158.15	1.72	6.65	357.22	1.72	6.65	12.6	

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 21

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	252.63	100.0	37.89	100.0
Others	-	-	-	-
TOTAL	252.63	100.0	37.89	100.0

Species group	Poles by Diameter Class (in cm)					Total			
	2.5-5	5-10	10-15			No./ha	BA/ha	Vol/ha	S.E%
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%
Keora	135.41	510.51	391.68	3.83	13.92	1037.60	3.83	13.92	22.0
Others	1.21	-	-	-	-	1.21	-	-	100.2
TOTAL	136.62	510.51	391.68	3.83	13.92	1038.82	3.83	13.92	22.1

Coastal Forest : All strata

Total No. of plot clusters : 223

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	534.67	29.1	137.61	25.4
Others	106.72	71.2	48.29	61.9
TOTAL	641.39	26.8	185.90	24.4

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha	Vol/ha	S.E%
Keora	52.30	227.80	218.10	2.26	8.51	498.19	2.26	8.51	11.1
Others	22.23	24.27	6.52	0.06	0.21	53.01	0.06	0.21	31.0
TOTAL	74.52	252.06	224.61	2.32	8.72	551.20	2.32	8.72	13.2

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
26.75, 24.86 and 11.33

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Statistics by Species group, Stratum and Division for Seedlings, Saplings and Poles;
No of stems (nearest 10)

Division : Bholia C/A (17)

Date : 02/05/1998

Species Group : 1. Keora 2. Others

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

Stratum Area : 8885.50 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	5747760	29.9	1575220	26.2
Others	1325540	71.2	599770	61.9
TOTAL	7073300	27.4	2174990	25.1

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	170870	1024770	1324300	14480	56460	2519840	14480	56460	13.4
Others	271810	301400	80950	800	2660	654150	800	2660	34.2
TOTAL	442680	1326160	1405240	15280	59120	3174080	15280	59120	12.6

Coastal forest : Stratum 2 (Year planted: 1986 and up)

Stratum Area : 3534.80 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	893000	100.0	133930	100.0
Others	-	-	-	-
TOTAL	893000	100.0	133930	100.0

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	478650	1804550	1384510	13540	49190	3667710	13540	49190	22.0
Others	4280	-	-	-	-	4280	-	-	100.2
TOTAL	482920	1804550	1384510	13540	49190	3672020	13540	49190	22.1

Coastal Forest : All strata

Total Area : 12420.30 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	6640760	29.1	1709160	25.4
Others	1325540	71.2	599780	61.9
TOTAL	7966290	26.8	2308920	24.4

Species group	Poles by Diameter Class (in cm)								
	2.5-5		5-10		10-15		Total		
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%
Keora	649520	2829320	2708810	28020	105650	6187640	28020	105650	14.1
Others	276080	301390	80940	800	2660	658410	800	2660	14.0
TOTAL	925600	3130710	2789750	28830	108310	6846060	28830	108310	13.2

Simple random sample sampling errors of Seedlings, Saplings and Poles are :
26.75, 24.86 and 11.33

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Stand Tables by Species, Stratum and Division for Seedlings, Saplings and poles (No. of stems/ha) .

Division : Patuakhali C/A (18)

Date : 02/05/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 161

Species group	Seedlings		Saplings	
	No./ha	S.E%	No./ha	S.E%
Keora	2803.19	21.7	255.29	28.1
Others	3037.80	26.6	712.41	32.0
TOTAL	5840.99	16.8	967.70	24.2

Species group	Poles by Diameter Class (in cm)						Total			
	2.5-5		5-10		10-15		No./ha	BA/ha	Vol/ha	S.E%
No./ha	No./ha	No./ha	BA/ha	Vol/ha	No./ha	BA/ha				
Keora	90.38	170.31	107.91	1.19	4.66	368.60	1.19	4.66	16.0	
Others	114.57	74.89	14.20	0.15	0.34	203.66	0.15	0.34	24.1	
TOTAL	204.95	245.20	122.11	1.34	5.00	572.26	1.34	5.00	12.6	

Statistics by Species group, Stratum and Division for Seedlings, Saplings and Poles;
No of stems (nearest 10)

Division : Patuakhali C/A (18) Date : 02/05/1998
Species Group : 1. Keora 2. Others
Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)
Stratum Area : 8238.70 Ha

Species group	Seedlings		Saplings	
	No. stems	S.E%	No. stems	S.E%
Keora	23094640	21.7	2103260	28.1
Others	25027520	26.6	5869330	32.0
TOTAL	48122160	16.8	7972590	24.2

Species group	Poles by Diameter Class (in cm)									
	2.5-5			5-10			10-15			Total
	No. stems	No. stems	No. stems	BA	Vol	No. stems	BA	Vol	S.E%	
Keora	744610	1403130	889040	9800	38390	3036790	9800	38390	16.0	
Others	943910	617000	116990	1240	2760	1677890	1240	2760	24.1	
TOTAL	1688520	2020130	1006030	11040	41150	4714680	11040	41150	12.6	

**Appendix 7. Detailed Stand and Stock Tables
(with Total Volume instead of V10)**

Division : Noakhali C/A (19)

Date: 01/27/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 225

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	92.42	2.15	13.16	53.85	1.98	14.13	11.23	0.61	4.65	2.36	0.19	1.48
Other TS	8.92	0.20	1.15	2.57	0.09	0.58	0.37	0.02	0.12	0.09	0.01	0.04
TOTAL	101.3	2.35	14.31	56.42	2.07	14.71	11.59	0.63	4.77	2.46	0.20	1.52

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.11	-	-	-	-	-	-	160.0	4.95	33.52	7.5
Other TS	-	-	-	-	-	-	-	-	-	11.95	0.31	1.89	20.3
TOTAL	0.10	0.01	0.11	-	-	-	-	-	-	171.9	5.26	35.41	7.2

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 63

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	25.05	0.53	3.07	1.00	0.03	0.20	-	-	-	-	-	-
Other TS	0.25	0.00	0.04	-	-	-	-	-	-	-	-	-
TOTAL	25.30	0.53	3.11	1.00	0.03	0.20	-	-	-	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	26.06	0.56	3.27	22.1
Other TS	-	-	-	-	-	-	-	-	-	0.25	0.00	0.04	100.0
TOTAL	-	-	-	-	-	-	-	-	-	26.31	0.56	3.31	22.1

Coastal Forest : All strata

Total No. of plot clusters : 288

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.76	1.58	9.62	35.29	1.30	9.24	7.28	0.39	3.01	1.53	0.13	0.96
Other TS	5.88	0.13	0.76	1.67	0.06	0.38	0.24	0.01	0.08	0.06	0.00	0.02
TOTAL	74.64	1.71	10.38	36.96	1.36	9.61	7.52	0.41	3.09	1.59	0.13	0.98

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.06	0.01	0.07	-	-	-	-	-	-	112.9	3.41	22.90	7.2
Other TS	-	-	-	-	-	-	-	-	-	7.84	0.21	1.24	20.2
TOTAL	0.06	0.01	0.07	-	-	-	-	-	-	120.8	3.61	24.13	6.9

Simple random sample mean : 28.39
 Variance of mean : 2.14
 Simple random sample sampling error : 7.52

Division : Chittagong C/A (20)

Date: 01/27/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 351

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	5.74	0.13	0.71	2.69	0.10	0.58	0.53	0.03	0.17	0.07	0.01	0.03
Other TS	2.41	0.06	0.27	0.95	0.03	0.15	0.09	0.00	0.03	-	-	-
TOTAL	8.15	0.19	0.97	3.64	0.13	0.73	0.61	0.03	0.20	0.07	0.01	0.03

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	9.03	0.27	1.49	17.1
Other TS	-	-	-	-	-	-	-	-	-	3.45	0.10	0.45	27.7
TOTAL	-	-	-	-	-	-	-	-	-	12.49	0.36	1.94	17.5

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 49

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	3.61	0.08	0.41	1.61	0.06	0.34	0.11	0.01	0.04	-	-	-
Other TS	0.97	0.02	0.11	0.64	0.02	0.07	0.11	0.01	-	-	-	-
TOTAL	4.58	0.10	0.52	2.25	0.08	0.42	0.21	0.01	0.04	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E.S
Keora	-	-	-	-	-	-	-	-	-	5.33	0.15	0.79	51.6
Other TS	-	-	-	-	-	-	-	-	-	1.72	0.05	0.18	100.0
TOTAL	-	-	-	-	-	-	-	-	-	7.05	0.20	0.97	48.6

Coastal Forest : All strata

Total No. of plot clusters : 400

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	4.86	0.11	0.59	2.25	0.08	0.48	0.35	0.02	0.11	0.04	0.00	0.02
Other TS	1.82	0.04	0.20	0.83	0.03	0.12	0.09	0.01	0.02	-	-	-
TOTAL	6.68	0.15	0.79	3.07	0.11	0.60	0.45	0.02	0.13	0.04	0.00	0.02

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	7.51	0.22	1.20	18.7
Other TS	-	-	-	-	-	-	-	-	-	2.74	0.08	0.34	30.8
TOTAL	-	-	-	-	-	-	-	-	-	10.25	0.29	1.54	18.1

Simple random sample mean : 1.82
 Variance of mean : 0.30
 Simple random sample sampling error : 16.69

Division : Bhola C/A (17)

Date: 01/27/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1986/Natural stand)

No. of plot clusters : 202

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	29.38	0.71	4.28	28.64	1.02	6.85	7.26	0.42	3.17	2.47	0.20	1.46
Other TS	0.82	0.02	0.11	0.53	0.02	0.12	0.10	0.01	0.03	-	-	-
TOTAL	30.20	0.73	4.38	29.17	1.04	6.98	7.36	0.43	3.20	2.47	0.20	1.46

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.11	0.03	0.01	0.03	-	-	-	67.89	2.37	15.91	10.8
Other TS	-	-	-	-	-	-	-	-	-	1.44	0.04	0.26	52.9
TOTAL	0.10	0.01	0.11	0.03	0.01	0.03	-	-	-	69.33	2.41	16.17	10.7

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 21

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	22.30	0.53	2.85	7.77	0.26	1.48	0.50	0.02	0.15	-	-	-
TOTAL	22.30	0.53	2.85	7.77	0.26	1.48	0.50	0.02	0.15	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	30.57	0.81	4.48	38.1
TOTAL	-	-	-	-	-	-	-	-	-	30.57	0.81	4.48	38.1

Coastal Forest : All strata

Total No. of plot clusters : 223

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	27.37	0.66	3.87	22.70	0.80	5.32	5.34	0.31	2.31	1.76	0.14	1.05
Other TS	0.58	0.01	0.08	0.38	0.01	0.09	0.07	0.00	0.02	-	-	-
TOTAL	27.95	0.67	3.95	23.08	0.82	5.41	5.41	0.31	2.33	1.76	0.14	1.05

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.07	0.01	0.08	0.02	0.00	0.02	-	-	-	57.27	1.92	12.65	10.5
Other TS	-	-	-	-	-	-	-	-	-	1.03	0.03	0.19	52.9
TOTAL	0.07	0.01	0.08	0.02	0.00	0.02	-	-	-	58.30	1.96	12.84	10.4

Simple random sample mean : 15.07
 Variance of mean : 1.59
 Simple random sample sampling error : 10.57

Division : Patuakhali C/A (18)

Date: 01/27/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 161

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.81	1.60	11.69	45.45	1.70	13.97	21.04	1.18	10.16	8.79	0.75	6.88
Other TS	5.35	0.12	0.45	2.99	0.11	0.36	1.09	0.06	0.29	0.18	0.02	0.11
TOTAL	74.17	1.72	12.14	48.44	1.81	14.33	22.13	1.24	10.46	8.96	0.77	6.99

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	1.47	0.21	1.81	0.44	0.10	0.87	-	-	-	146.0	5.54	45.38	10.7
Other TS	0.10	0.01	0.02	-	-	-	-	-	-	9.71	0.32	1.24	40.8
TOTAL	1.56	0.22	1.84	0.44	0.10	0.87	-	-	-	155.7	5.86	46.61	10.4

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Appendix 8. Detailed Stand and Stock Tables
(with Non-merchantable Volume instead of V10)

Division : Noakhali C/A (19)

Date: 02/02/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 225

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	92.42	2.15	4.16	53.85	1.98	2.91	11.23	0.61	0.73	2.36	0.19	0.19
Other TS	8.92	0.20	0.40	2.57	0.09	0.18	0.37	0.02	0.03	0.09	0.01	0.01
TOTAL	101.3	2.35	4.55	56.42	2.07	3.09	11.59	0.63	0.77	2.46	0.20	0.20

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.01	-	-	-	-	-	-	160.0	4.95	8.01	6.9
Other TS	-	-	-	-	-	-	-	-	-	11.95	0.31	0.62	21.3
TOTAL	0.10	0.01	0.01	-	-	-	-	-	-	171.9	5.26	8.62	6.5

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 63

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	25.05	0.53	1.09	1.00	0.03	0.05	-	-	-	-	-	-
Other TS	0.25	0.00	0.01	-	-	-	-	-	-	-	-	-
TOTAL	25.30	0.53	1.10	1.00	0.03	0.05	-	-	-	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	26.06	0.56	1.14	21.4
Other TS	-	-	-	-	-	-	-	-	-	0.25	0.00	0.01	100.0
TOTAL	-	-	-	-	-	-	-	-	-	26.31	0.56	1.15	21.4

Coastal Forest : All strata

Total No. of plot clusters : 288

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.76	1.58	3.08	35.29	1.30	1.90	7.28	0.39	0.48	1.53	0.13	0.12
Other TS	5.88	0.13	0.26	1.67	0.06	0.12	0.24	0.01	0.02	0.06	0.00	0.00
TOTAL	74.64	1.71	3.34	36.96	1.36	2.02	7.52	0.41	0.50	1.59	0.13	0.13

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.06	0.01	0.01	-	-	-	-	-	-	112.9	3.41	5.59	6.6
Other TS	-	-	-	-	-	-	-	-	-	7.84	0.21	0.40	21.1
TOTAL	0.06	0.01	0.01	-	-	-	-	-	-	120.8	3.61	6.00	6.2

Simple random sample mean : 6.99
 Variance of mean : 0.47
 Simple random sample sampling error : 6.80

Division : Chittagong C/A (20)

Date: 02/02/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)

No. of plot clusters : 351

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	5.74	0.13	0.25	2.69	0.10	0.14	0.53	0.03	0.03	0.07	0.01	0.01
Other TS	2.41	0.06	0.10	0.95	0.03	0.05	0.09	0.00	0.01	-	-	-
TOTAL	8.15	0.19	0.35	3.64	0.13	0.19	0.61	0.03	0.04	0.07	0.01	0.01

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	9.03	0.27	0.42	15.8
Other TS	-	-	-	-	-	-	-	-	-	3.45	0.10	0.16	28.1
TOTAL	-	-	-	-	-	-	-	-	-	12.49	0.36	0.58	17.0

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 49

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	3.61	0.08	0.15	1.61	0.06	0.08	0.11	0.01	0.01	-	-	-
Other TS	0.97	0.02	0.03	0.64	0.02	0.02	0.11	0.01	-	-	-	-
TOTAL	4.58	0.10	0.19	2.25	0.08	0.10	0.21	0.01	0.01	-	-	-

Trees by Diameter Class														
Species Group	40-50			50-60			60+			Total				
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%	
Keora	-	-	-	-	-	-	-	-	-	-	5.33	0.15	0.24	50.4
Other TS	-	-	-	-	-	-	-	-	-	-	1.72	0.05	0.05	100.0
TOTAL	-	-	-	-	-	-	-	-	-	-	7.05	0.20	0.30	46.7

Coastal Forest : All strata

Total No. of plot clusters : 400

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	4.86	0.11	0.21	2.25	0.08	0.11	0.35	0.02	0.02	0.04	0.00	0.00
Other TS	1.82	0.04	0.08	0.83	0.03	0.04	0.09	0.01	0.00	-	-	-
TOTAL	6.68	0.15	0.29	3.07	0.11	0.15	0.45	0.02	0.03	0.04	0.00	0.00

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	7.51	0.22	0.35	18.3
Other TS	-	-	-	-	-	-	-	-	-	2.74	0.08	0.12	29.5
TOTAL	-	-	-	-	-	-	-	-	-	10.25	0.29	0.47	17.5

Simple random sample mean : 0.55
 Variance of mean : 0.09
 Simple random sample sampling error : 16.18

Division : Bholu C/A (17)

Date: 02/02/1998

Species Group : 1. Keora 2. Other Tree Species

Coastal forest : Stratum 1 (Year planted: upto 1986/Natural stand)

No. of plot clusters : 202

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	29.38	0.71	1.33	28.64	1.02	1.50	7.26	0.42	0.49	2.47	0.20	0.19
Other TS	0.82	0.02	0.02	0.53	0.02	0.02	0.10	0.01	0.00	-	-	-
TOTAL	30.20	0.73	1.35	29.17	1.04	1.51	7.36	0.43	0.49	2.47	0.20	0.19

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.10	0.01	0.01	0.03	0.01	0.00	-	-	-	67.89	2.37	3.52	10.3
Other TS	-	-	-	-	-	-	-	-	-	1.44	0.04	0.04	53.0
TOTAL	0.10	0.01	0.01	0.03	0.01	0.00	-	-	-	69.33	2.41	3.57	10.2

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available

Coastal forest : Stratum 2 (Year planted: 1986 and up)

No. of plot clusters : 21

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	22.30	0.53	0.98	7.77	0.26	0.38	0.50	0.02	0.03	-	-	-
TOTAL	22.30	0.53	0.98	7.77	0.26	0.38	0.50	0.02	0.03	-	-	-

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	-	-	-	-	-	-	-	-	-	30.57	0.81	1.38	38.4
TOTAL	-	-	-	-	-	-	-	-	-	30.57	0.81	1.38	38.4

Coastal Forest : All strata

Total No. of plot clusters : 223

Species Group	Trees by Diameter Class											
	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	27.37	0.66	1.23	22.70	0.80	1.18	5.34	0.31	0.36	1.76	0.14	0.14
Other TS	0.58	0.01	0.01	0.38	0.01	0.01	0.07	0.00	0.00	-	-	-
TOTAL	27.95	0.67	1.24	23.08	0.82	1.19	5.41	0.31	0.36	1.76	0.14	0.14

Species Group	Trees by Diameter Class												
	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	0.07	0.01	0.01	0.02	0.00	0.00	-	-	-	57.27	1.92	2.92	10.3
Other TS	-	-	-	-	-	-	-	-	-	1.03	0.03	0.03	53.0
TOTAL	0.07	0.01	0.01	0.02	0.00	0.00	-	-	-	58.30	1.96	2.95	10.2

Simple random sample mean : 3.36
 Variance of mean : 0.33
 Simple random sample sampling error : 9.95

Division : Patuakhali C/A (18) Date: 02/02/1998
 Species Group : 1. Keora 2. Other Tree Species
 Coastal forest : Stratum 1 (Year planted: upto 1985/natural stand)
 No. of plot clusters : 161

Trees by Diameter Class												
Species Group	15-20			20-25			25-30			30-40		
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol
Keora	68.81	1.60	3.24	45.45	1.70	2.61	21.04	1.18	1.49	8.79	0.75	0.82
Other TS	5.35	0.12	0.10	2.99	0.11	0.07	1.09	0.06	0.04	0.18	0.02	0.01
TOTAL	74.17	1.72	3.34	48.44	1.81	2.68	22.13	1.24	1.53	8.96	0.77	0.83

Trees by Diameter Class													
Species Group	40-50			50-60			60+			Total			
	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	NT	BA	Vol	S.E%
Keora	1.47	0.21	0.19	0.44	0.10	0.08	-	-	-	146.0	5.54	8.42	10.0
Other TS	0.10	0.01	0.01	-	-	-	-	-	-	9.71	0.32	0.23	35.9
TOTAL	1.56	0.22	0.20	0.44	0.10	0.08	-	-	-	155.7	5.86	8.65	9.7

NOTE : NT - No. of trees Vol - Volume in cu m/ha TS - Tree species
 BA - Basal area in sqm/ha S.E. - Sampling Error N.A. - Not available