



Common tree allometric equations for the Sundarbans, Coastal and Village zones of Bangladesh



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EXECUTIVE SUMMARY

This report contains final report of activity 1 “Development of biomass allometric models for the Sundarbans, coastal and village zones of Bangladesh under LoA “FAOBGDLOA2017-033” under the the project titled “Strengthening National Forest Inventory and Satellite Land Monitoring System in support of REDD+ in Bangladesh” of Forest Department. The best fit allometric equation of total above-ground biomass for the Sundarbans was $TAGB = EXP(-6.7189 + 2.1634 * Ln (D) + 0.3752 * Ln (H) + 0.6895 * Ln (W))$ and the best fit allometric equation of carbon in total above-ground biomass was $C_TAGB = EXP(-7.5236 + 2.1628 * Ln (D) + 0.3834 * Ln (H) + 0.7004 * Ln (W))$ (where D = Diameter at Breast Height in cm, H = Total Height in m and W = wood density in Kg/m³). The best fit allometric equation of total above-ground biomass for *Sonneratia apetala* of coastal plantation was $TAGB = EXP(-1.7608 + 2.0077 * Ln (D) + 0.2981 * Ln (H))$, and the best fit allometric equation of carbon in total above-ground biomass was $C_TAGB = EXP(-2.5035 + 2.0042 * Ln (D) + 0.3188 * Ln (H))$. Finally, the best fit allometric equation of total above-ground biomass for the village zone was $TAGB = EXP(-6.0325 + 1.9715 * Ln (D) + 0.8193 * Ln (W))$.

LIST OF ACRONAME

AIC	Akaike Information Criterion
AICw	Akaike Information Criterion Weight
BEF	Biomass Expansion Factor
C_TAGB	Carbon in Total Above-ground Biomass
CF	Correction Factor
DBH	Diameter at Breast Height
H	Total Height
LN	Natural logarithum
ME	Model Efficiency
R2	Coefficient of Determination
RMSE	Root Mean Square Error
RSE	Residual Standard Error
TAGB	Total Above-ground Biomass
VIF	Variance Influential Factor
W	Wood density

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1. INTRODUCTION

Bangladesh has been divided into five zones to support forest monitoring and assessment (RIMS 2016). The zones are the Sundarbans, Coastal, Village, Hill and Sal zones. There are very limited biomass allometric models available to calculate the carbon and biomass in Bangladesh. Meanwhile, common allometric models for the Sal zone has already been prepared. Precise estimation of biomass and carbon stock in these zones require robust common allometric models. The Sundarbans is dominated by *Heritiera fomes* and the frequently occurring tree species are *Xylocarpus mekongensis*, *Bruguiera gymnorrhiza*, *Excoecaria agallocha*, *Avicennia officinalis*, *Avicennia marina*, *Sonneratia alba*, *Sonneratia caseolaris*, *Rhizophora apiculata*, and *Rhizophora mucronata*. In other ways, Bangladesh has world largest manmade mangrove forest (175 km²) at the coastal areas. Four mangroves species (*Sonneratia alba*, *Avicennia officinalis*, *Sonneratia caseolaris* and *Excoecaria agallocha*) were found in the plantation, but *S. alba* and *A. officinalis* are the most prominent.

Village zone contains a pool of tree species diversity and are the major source of timber at present. The Bangladesh Forest Inventory is collecting field data for 1858 sample plots according to the sampling design presented by BFD (2016). Presently, This LOA will provide support Bangladesh Forest Inventory to develop common allometric biomass equation for the Sundarbans and coastal zones using non-destructive (Branch ramification) method (Picard et al. 2012). However, secondary volume data (stem and bigger branch volume) of 10 to 11 species (*Albizia procera*, *A. saman*, *A. rechariana*, *Syzygium spp. Badi*, *Gmelina arboria*, *Mangifera indica*, *Artocarpus heterophylus*, *Pitraj*, and *Swenenia macrophylla*) from 6 districts (Chittagong, Dinajpur, Magura, Moulavibazer, Mymensingh and Pirojpur) of the village zone will be converted to biomass using wood density value of the respective species. Afterward, these processed data will be used to derive biomass allometric models. This LOA contains 3 different activities, but this report containing one activity on development of allometric equation for the Sundarbans, coastal and village zone of Bangladesh.

2. ACTIVITY 1: DEVELOPMENT OF BIOMASS ALLOMETRIC MODELS FOR THE SUNDARBANS, COASTAL AND VILLAGE ZONES OF BANGLADESH

2.1 ACTIVITY 1A: DEVELOP A SAMPLING STRATEGY FOR THE SUNDARBANS AND COASTAL ZONE

Destructive methods (felling of trees) to develop the allometric biomass models can not be followed for the forest areas in Bangladesh due to the ban on felling trees in the natural forests since 1989. Therefore, the allometric models can be derived from non-destructive (Branch ramification) method (Picard et al. 2012). A manual was developed for the collection of data from non-destructive tree samples (Mahmood 2017).

The sample trees of the 13 species (*Agaiala cucullate*, *Avicennia marina*, *Avicennia officinalis*, *Bruguiera gymnorrhiza*, *Bruguiera sexangular*, *Excoecaria agallocha*, *Lumnitzera racemose*, *Rhizophora apiculata*, *Rhizophora mucronate*, *Sonneratia apetala*, *Sonneratia casularis*, *Xylocarpus granatum*, *Xylocarpus mekongensis*) were collected throughout the Sundarbans from its dominated and mixed stand; covering all saline zones (Less, moderate and strong salinity) and wide range of DBH. Sampling of tree, from different saline zones and vegetation types were done with great care and well-defined strategy. Range and mean value of DBH and Total Height of these species can be known from literature and present BFI (Bangladesh Forest Inventory) data. Sampling with circular sample plots of 8 m radius can be appropriate for the Sundarbans.

Sample tree of *Sonneratia apetala* will be collected from the pure patch of coastal afforestation with different age classes to cover wide range of DBH. However, range and mean value of DBH and Total Height of *S. apetala* can be known from literature and present BFI (Bangladesh Forest Inventory) data. Sampling with circular sample plots of 8 m radius can be appropriate for the coastal plantation also. A total of 60 individual tree were selected for this purpose.

The selection of individual tree for the development of allometric equation can be performed depending on the information available (Forest types, range and mean DBH, Girth, Total Height and the final objective). Here, we consider that DBH is sufficient to stratify the population. The number of sample is the tradeoff among precision, time and budget. Trees with broken top, hollow, damaged by natural calamities and animals, suppressed and diseases affected will be avoided.

2.2 ACTIVITY 1B: COLLECT FIELD DATA FROM THE SUNDARBANS AND COASTAL ZONE; PROCESSING OF SECONDARY VOLUME DATA OF VILLAGE ZONE

2.2.1 FIELD MEASUREMENT FOR THE SUNDARBANS AND COASTAL ZONE

Development of allometric models for biomass requires extensive planning, field works (sampling of individual tree within each forest stratum, sampling of plants within stands; measurement of standing tree dimensions; felling of branches; separating and weighing of different branch wood and leaves; sub-sampling of branches and leaves for further assessment and data recording), sample analysis in the laboratory, and data analysis. These activities are difficult and expensive to repeat.

A tree consists of different parts or components. Total height, bole height, and DBH of standing sample trees will be measured. The above-ground parts of the selected trees can be categorized as following parts.

Crown	Leaves
	Leaf containing smaller branches (LCB)
	Smaller branches (diameter < 7 cm)
	Bigger branches (diameter > 7 cm)
Bole	Bole with bark
	Bark
	Buttresses
	Stump

Semi-destructive measurement method was used to estimate the biomass of sampled trees of 13 species of the Sundarbans and *Sonneratia apetala* of the coastal zone. This method involved direct measurement of certain parts (smaller branches diameter < 7 cm and leaves) and volume and wood density measurement of other parts (bole and bigger branches diameter > 7 cm). This measurement technique was as follows:

- Biomass measurement from trimmed parts of trees.
 - Select the representative numbers of branches from the tree and measure the diameter at the base or each selected branch and record in data form (Annex 1).
 - Selected branches were trimmed and separate them into leaf containing smaller branches and woody branches and measure their fresh biomass in the field and record in data form (Annex 1).

- Fresh weight of representative sub-sample of trimmed parts was measured to calculate fresh to oven-dry weight conversion ratio as described and record in data form (Annex 2).
- Conversion ratio of fresh weight of leaves with leaf containing smaller branches
 - Leaves should be separated from the branches to get fresh weight of leaves of a tree. But, separation of all leaves from a tree is very time consuming and sometimes almost impossible for bigger sized trees. Therefore, conversion ratio of fresh weight of leaves with leaf containing smaller branches is required to overcome this difficulty. Therefore, 10 samples of 0.25 to 0.5 kg leaves with leaf containing smaller branches were collected from the sampled trees.
 - Identification number for each sample was assigned
 - Measure fresh weight of each sample (leaves with leaf containing smaller branches) and immediately separate the leaves from the leaf containing smaller branches (Figure 2) and record the fresh weight of leaves and leaf containing smaller branches.



Figure 1: Separation of leaves from the leaf containing smaller branches in the field

- Measurement from untrimmed parts of trees
 - Identification number was given to the all untrimmed branches and measure their base diameter and record in data form (Annex 1)
 - Bigger branches and bole were divided into suitable sections marking and give identification number for each section as shown in Figure 1
 - Diameter at thicker and thinner end of each bole section and bigger branches were measured and record in data form (Annex 1).

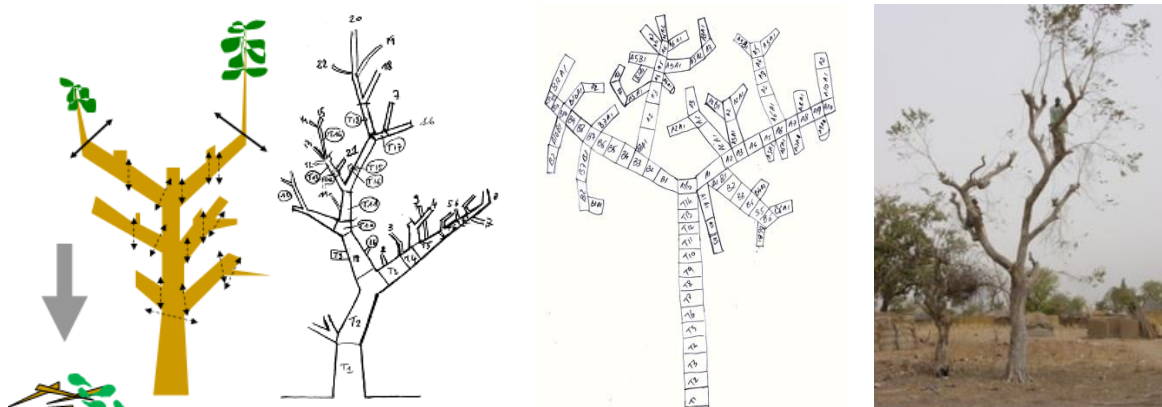


Figure 2: Measurement of biomass and volume of bigger sized trees using semi-destructive method. (Source of illustration: Picard et al. 2012)

2.2.2 PROCESSING OF SECONDARY VOLUME DATA OF VILLAGE ZONE

Raw data of stem volume of nine species were collected from Bangladesh Forest Research Institute. The species are *Albezia procera*, *Albizia rechariana*, *Albizia saman*, *Aphanamixis polystachya*, *Artocarpus heterophylus*, *Lannea coromandelica*, *Mengifera indica*, *Swietenia macrophylla* and *Syzygium cumini*. The following Table 1 shows species wise observation. Tree wise log volume were computed to get tree wise stem volume. Wood density value of the said species were collected from secondary sources and used to estimate the biomass of stem. However, Total Above-ground Biomass (TAGB) of the data was estimated from Biomass Expansion Factor (BEF). A common biomass expansion factor was derived from another set of biomass data from Hill and Sal zone (Table 2) and 10 models (Table 3). Finally the best fit common equation of BEF for village zone was derived as $BEF = EXP(3.8839 - D)^{0.1072} + EXP(c)*D/H^2 + 1$ with lowest RSE (0.2611) (Table 3). The processed data of the village zone has been presented at Annex 3.

Table 1: Species wise observation

Sl no	Species	Observation
1	<i>Albezia procera</i>	85
2	<i>Albizia rechariana</i>	352
3	<i>Albizia saman</i>	61
4	<i>Aphanamixis polystachya</i>	48
5	<i>Artocarpus heterophylus</i>	64
6	<i>Lannea coromandelica</i>	34
7	<i>Mengifera indica</i>	59
8	<i>Swietenia macrophylla</i>	49
9	<i>Syzygium cumini</i>	65
	Total	817

Table 2: Data to derive the Biomass Expansion Factor

Scientific Name	DBH (cm)	Total Height (m)	Bole Biomass with Bark (kg)	Total Above-ground Biomass (kg)	Biomass Expansion Factor
<i>Mangifera indica</i>	10.90	6.25	12.40	33.90	2.73
<i>Mangifera indica</i>	8.30	4.94	9.45	19.02	2.01
<i>Mangifera indica</i>	18.30	8.00	38.21	94.98	2.49
<i>Mangifera indica</i>	19.10	8.00	45.02	112.94	2.51
<i>Syzygium cumini</i>	19.00	10.40	66.12	113.76	1.72
<i>Syzygium cumini</i>	15.20	9.07	41.93	67.55	1.61
<i>Syzygium cumini</i>	16.50	8.86	42.33	68.64	1.62
<i>Syzygium cumini</i>	29.10	10.14	182.50	281.54	1.54
<i>Syzygium cumini</i>	23.60	10.60	97.74	163.64	1.67
<i>Artocarpus heterophyllus</i>	15.80	6.48	25.38	56.11	2.21
<i>Artocarpus heterophyllus</i>	16.70	9.50	48.87	73.34	1.50
<i>Artocarpus heterophyllus</i>	27.50	10.47	134.63	236.30	1.76
<i>Artocarpus heterophyllus</i>	12.80	8.50	27.57	46.14	1.67
<i>Albizia procera</i>	25.80	10.65	159.05	227.51	1.43
<i>Albizia procera</i>	25.90	11.86	163.11	239.25	1.47
<i>Syzygium grande</i>	16.51	13.10	156.35	227.24	1.45
<i>Albizia spp.</i>	17.27	11.50	82.27	123.00	1.50
<i>Syzygium grande</i>	21.59	11.10	143.44	244.69	1.71
<i>Syzygium grande</i>	18.29	7.50	72.87	176.19	2.42
<i>Albizia spp.</i>	18.54	9.80	55.24	120.70	2.19
<i>Albizia spp.</i>	20.32	10.30	93.14	183.23	1.97
<i>Albizia spp.</i>	46.48	14.70	578.24	756.75	1.31
<i>Swietenia mahagoni</i>	51.56	22.30	1167.40	1643.37	1.41
<i>Swietenia mahagoni</i>	24.89	18.40	292.47	368.93	1.26
<i>Swietenia mahagoni</i>	34.29	17.30	463.83	495.67	1.07
<i>Swietenia mahagoni</i>	21.08	16.30	205.68	246.03	1.20
<i>Swietenia mahagoni</i>	31.75	16.30	441.06	540.50	1.23
<i>Swietenia mahagoni</i>	34.29	12.90	336.20	458.08	1.36
<i>Swietenia mahagoni</i>	24.89	15.30	240.76	286.59	1.19
<i>Swietenia mahagoni</i>	29.72	12.30	272.37	402.26	1.48
<i>Swietenia mahagoni</i>	21.34	13.30	160.66	220.13	1.37
<i>Swietenia mahagoni</i>	22.86	10.60	150.52	191.91	1.27
<i>Swietenia mahagoni</i>	26.67	17.90	301.92	366.30	1.21
<i>Swietenia mahagoni</i>	18.80	7.70	104.02	155.67	1.50
<i>Swietenia mahagoni</i>	23.88	11.20	158.86	205.35	1.29
<i>Swietenia mahagoni</i>	42.93	18.30	726.46	834.02	1.15
<i>Swietenia mahagoni</i>	31.24	15.60	361.11	466.19	1.29
<i>Albizia spp.</i>	83.06	32.90	4090.22	5667.24	1.39
<i>Albizia spp.</i>	41.15	19.40	811.02	1018.41	1.26
<i>Albizia spp.</i>	37.59	21.60	934.08	1077.86	1.15
<i>Albizia spp.</i>	22.35	15.20	197.67	252.48	1.28
<i>Albizia spp.</i>	16.26	9.50	69.25	108.69	1.57

Table 3: Equation of Biomass Expansion (BEF) factor for village zone

Sl	BEF equation	a	b	c	Adjusted R2	RMSE	AIC	RSE
1	$BEF = a + b \cdot D$	3.5049	-0.2573		0.2732	0.3388	35.7229	0.3429
2	$BEF = a \cdot \text{EXP}(D \cdot b)$	2.2125	-0.0136		0.2225	0.3504	43.1005	0.3546
3	$BEF = a \cdot H^b$	5.8501	-0.5375		0.5593	0.2638	19.2532	0.2670
4	$BEF = a \cdot \text{EXP}(H \cdot b)$	2.7127	-0.0445		0.4668	0.2902	27.2545	0.2937
5	$BEF = a \cdot (D \cdot H)^b$	6.0245	-0.2408		0.4588	0.2923	27.8840	0.2959
6	$BEF = a - (D \cdot H)^b$	3.8316	0.1430		0.3820	0.3124	33.4559	0.3162
7	$BEF = a \cdot (D/H)^b$	1.3904	0.1878		-0.0231	0.4019	54.6294	0.4068
8	$BEF = a \cdot \text{EXP}(D/H)^b$	1.3504	0.0778		-0.0314	0.4036	54.9680	0.4085
9	$BEF = \text{EXP}(a - D)^b + \text{EXP}(c) \cdot D + 1$	12.3520	0.0724	-5.6536	0.3531	0.3196	43.3777	0.3235
10	$BEF = \text{EXP}(a - D)^b + \text{EXP}(c) \cdot D/H^2 + 1$	3.8839	0.1072	0.8791	0.5786	0.2580	25.3735	0.2611

Where, D = Diameter at Breast Height, H = Total Height

2.3 ACTIVITY 1C: PERFORM LABORATORY ANALYSIS OF SUBSAMPLES AND PROCESS FIELD AND SECONDARY DATA

2.3.1 SUB-SAMPLING OF PLANT PARTS FOR FRESH TO OVEN-DRY WEIGHT CONVERSION RATIO

Sub-sampling for estimating fresh to oven-dry (80 °C) weight conversion ratio were done immediately in the field to avoid rapid moisture loss. The sub-sampling and sample processing of different parts (leaf, leaf containing smaller branches and smaller branches) of sampled plants were done in the laboratory. Fresh to oven-dry weight conversion ratio of plant parts has been presented in the following Table 4.

Table 4: Fresh to oven-dry weight conversion ratio of different parts of the Sundarbans and coastal zone

Species	Leaf		Leaf containing smaller Branches		Smaller branch	
	Average	SE	Average	SE	Average	SE
<i>Agaiala cucullata</i>	0.33	0.01	0.07	0.00	0.56	0.01
<i>Avicennia marina</i>	0.31	0.00	0.46	0.03	0.46	0.01
<i>Avicennia officinalis</i>	0.34	0.01	0.13	0.00	0.52	0.03
<i>Bruguiera gymnorrhiza</i>	0.33	0.01	0.44	0.01	0.54	0.03
<i>Bruguiera sexangula</i>	0.34	0.00	0.39	0.00	0.57	0.04
<i>Excoecaria agallocha</i>	0.24	0.00	0.29	0.01	0.50	0.01
<i>Lumnitzera racemosa</i>	0.20	0.00	0.44	0.01	0.54	0.02
<i>Rhizophora apiculata</i>	0.27	0.01	0.41	0.06	0.58	0.00
<i>Rhizophora mucronata</i>	0.31	0.00	0.36	0.00	0.55	0.01
<i>Sonneratia apetala</i>	0.26	0.01	0.39	0.01	0.49	0.00
<i>Sonneratia casularis</i>	0.29	0.01	0.32	0.00	0.49	0.02
<i>Xylocarpus granatum</i>	0.32	0.00	0.10	0.01	0.55	0.01
<i>Xylocarpus mekongensis</i>	0.13	0.01	0.20	0.04	0.57	0.02

2.3.2 BRANCH ALLOMETRY FOR THE SUNDARBANS AND COASTAL ZONE

Branch allometric models were developed among base diameter of trimmed branches and oven-dried biomass of leaf, leaf containing smaller branch and branches. The following Table 5, 6 and 7 have been presented the species specific best fit allometric models.

Table 5: Best fit allometric models for leaf biomass for the Sundarbans and Coastal zone

Species Name	Formula	a	b	Adjusted R ²	RSE	AIC	CF
<i>Aglaia cucullata</i>	Leaf = EXP(a + b Ln (Base dia))	-4.0796	2.023	0.8231	0.3538	37.3858	1.0646
<i>Avicennia marina</i>	Leaf = EXP(a + b Ln (Base dia))	-4.5993	2.3638	0.7746	0.5414	68.38	1.1579
<i>Avicennia officinalis</i>	Leaf = EXP(a + b Ln (Base dia))	-3.716	1.994	0.7556	0.438	64.4919	1.1007
<i>Bruguiera gymnorhiza</i>	Leaf = EXP(a + b Ln (Base dia))	-3.0609	1.5128	0.5639	0.6241	45.5902	1.215
<i>Bruguiera sexangula</i>	Leaf = EXP(a + b Ln (Base dia))	-3.4903	1.7975	0.7072	0.539	69.6291	1.1564
<i>Excoecaria agallocha</i>	Leaf = EXP(a + b Ln (Base dia))	-6.0017	3.0875	0.657	0.7955	51.4976	1.3722
<i>Heretiera fomes</i>	Leaf = EXP(a + b Ln (Base dia))	-4.0676	2.1718	0.85	0.4333	259.2247	1.0984
<i>Lumnitzera racemosa</i>	Leaf = EXP(a + b Ln (Base dia))	-4.3626	2.3206	0.7795	0.4796	36.7502	1.1219
<i>Rhizophora apiculata</i>	Leaf = EXP(a + b Ln (Base dia))	-3.2717	1.9581	0.8424	0.3005	15.19	1.0462
<i>Rhizophora mucronata</i>	Leaf = EXP(a + b Ln (Base dia))	-3.3272	2.1257	0.8979	0.2714	10.1145	1.0375
<i>Sonneratia apetala</i>	Leaf = EXP(a + b Ln (Base dia))	-3.5254	1.7886	0.7639	0.4277	50.6566	1.0958
<i>Sonneratia caseolaris</i>	Leaf = EXP(a + b Ln (Base dia))	-4.8072	2.0644	0.5602	0.664	74.6073	1.2467
<i>Xylocarpus granatum</i>	Leaf = EXP(a + b Ln (Base dia))	-4.0261	1.7756	0.3366	0.5774	80.4932	1.1814
<i>Xylocarpus mekongensis</i>	Leaf = EXP(a + b Ln (Base dia))	-5.773	2.3974	0.8341	0.4191	43.4842	1.0918

Table 6: Best fit allometric models for leaf containing smaller branches (LCB) for the Sundarbans and Coastal zone

Species Name	Formula	a	b	Adjusted R ²	RSE	AIC	CF
<i>Aglaia cucullata</i>	LCB = EXP(a + b Ln (Base dia))	-6.7731	2.023	0.8231	0.3538	37.3858	1.0646
<i>Avicennia marina</i>	LCB = EXP(a + b Ln (Base dia))	-4.987	2.3638	0.7746	0.5414	68.38	1.1579
<i>Avicennia officinalis</i>	LCB = EXP(a + b Ln (Base dia))	-5.3753	1.994	0.7556	0.438	64.4919	1.1007
<i>Bruguiera gymnorhiza</i>	LCB = EXP(a + b Ln (Base dia))	-5.0596	1.5128	0.5639	0.6241	45.5902	1.215
<i>Bruguiera sexangula</i>	LCB = EXP(a + b Ln (Base dia))	-5.1979	1.7975	0.7072	0.539	69.6291	1.1564
<i>Excoecaria agallocha</i>	LCB = EXP(a + b Ln (Base dia))	-6.4432	3.0875	0.657	0.7955	51.4976	1.3722
<i>Heretiera fomes</i>	LCB = EXP(a + b Ln (Base dia))	-4.4019	2.1718	0.85	0.4333	259.2247	1.0984
<i>Lumnitzera racemosa</i>	LCB = EXP(a + b Ln (Base dia))	-4.5513	2.3206	0.7795	0.4796	36.7502	1.1219
<i>Rhizophora apiculata</i>	LCB = EXP(a + b Ln (Base dia))	-4.6884	1.9581	0.8424	0.3005	15.19	1.0462
<i>Rhizophora mucronata</i>	LCB = EXP(a + b Ln (Base dia))	-4.9495	2.1257	0.8979	0.2714	10.1145	1.0375
<i>Sonneratia apetala</i>	LCB = EXP(a + b Ln (Base dia))	-3.9736	1.7886	0.7639	0.4277	50.6566	1.0958
<i>Sonneratia caseolaris</i>	LCB = EXP(a + b Ln (Base dia))	-5.5872	2.0644	0.5602	0.664	74.6073	1.2467
<i>Xylocarpus granatum</i>	LCB = EXP(a + b Ln (Base dia))	-6.2551	1.7756	0.3366	0.5774	80.4932	1.1814
<i>Xylocarpus mekongensis</i>	LCB = EXP(a + b Ln (Base dia))	-6.7932	2.3974	0.8341	0.4191	43.4842	1.0918

Table 7: Best fit allometric models for smaller branches for the Sundarbans and Coastal zone

Species Name	Formula	a	b	Adjusted R ²	RSE	AIC	CF
<i>Aglaia cucullata</i>	Smaller branch = EXP(a + b Ln (Base dia))	-4.2024	3.195	0.954	0.265	11.9696	1.0358
<i>Avicennia marina</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.7638	2.8663	0.9545	0.2667	11.719	1.0362
<i>Avicennia officinalis</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.6752	2.8025	0.9253	0.3084	28.6926	1.0487
<i>Bruguiera gymnorhiza</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.1462	2.5362	0.9544	0.2646	7.8306	1.0356
<i>Bruguiera sexangula</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.0707	2.5195	0.9591	0.2436	4.5028	1.0301
<i>Excoecaria agallocha</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.9205	2.9198	0.9477	0.2477	4.8231	1.0311
<i>Heretiera fomes</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.8477	2.9511	0.945	0.3382	150.5871	1.0588
<i>Lumnitzera racemosa</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.8098	2.8504	0.9779	0.1674	-13.7603	1.0141
<i>Rhizophora apiculata</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.0463	2.6516	0.9196	0.2788	11.2806	1.0396
<i>Rhizophora mucronata</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.1662	2.5801	0.965	0.1863	-10.2013	1.0175
<i>Sonneratia apetala</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.331	2.6268	0.9593	0.2334	0.9932	1.0276
<i>Sonneratia caseolaris</i>	Smaller branch = EXP(a + b Ln (Base dia))	-4.0055	3.0178	0.9621	0.2199	-2.7673	1.0245
<i>Xylocarpus granatum</i>	Smaller branch = EXP(a + b Ln (Base dia))	-3.2882	2.5742	0.824	0.2811	17.1453	1.0403
<i>Xylocarpus mekongensis</i>	Smaller branch = EXP(a + b Ln (Base dia))	-4.5758	3.2412	0.9739	0.2085	-6.7742	1.022

2.3.3 OVEN-DRY BIOMASS OF SAMPLED TREES OF THE SUNDARBANS AND COASTAL ZONE

The fresh biomass of leaf, leaf containing smaller branches and smaller branches of trimmed branches was converted to oven-dry biomass using fresh to oven-dry weight conversion ratio at 80 °C. However, tree wise volume of bigger branches and stem were converted to oven-dry biomass using the species-specific wood density value collected from secondary sources following this formula.

$$\text{Log biomass (kg)} = \text{Log volume (m}^3\text{)} \times \text{Wood/bark density (kg/m}^3\text{)}$$

The processed biomass data of the Sundarbans and coastal zone has been presented in Annex 4 and 5.

2.3.4 CARBON AND NUTRIENT CONCENTRATION IN PLANT PARTS OF THE SUNDARBANS AND COASTAL ZONE

Carbon in plant tissue was estimated from the loss of ignition at 450 °C and nutrients in plant tissue was measured from acid digestion followed by chlorometric method and Flame photometer. However, carbon and nutrients (nitrogen, phosphorus and potassium) concentration in different parts of 13 species of the Sundarbans zone and *Sonneratia apetala* of the coastal zone have been presented in Tables 8-10. Comparatively higher concentration of carbon was observed in stem and bigger branches of all the species while, leaves contain higher concentration of all nutrients.

Table 8: Carbon concentration in plant parts of the Sundarbans zone

Species	Carbon (%) in Plant Parts				
	Leaves	LCB	Smaller branch	Bigger branch	Stem
<i>Aglaia cucullata</i>	44.60±0.23	44.63±0.28	49.11±0.33	49.31±0.39	49.75±0.27
<i>Avicennia marina</i>	43.68±0.25	46.27±0.47	48.36±0.23	49.03±0.31	49.81±0.35
<i>Avicennia officinalis</i>	43.74±0.41	46.73±0.28	47.67±0.54	48.98±0.22	50.71±0.37
<i>Bruguiera gymnorhiza</i>	45.82±0.16	44.43±0.80	47.55±0.45	49.89±0.23	50.94±0.23
<i>Bruguiera sexangula</i>	45.55±0.18	46.00±0.57	49.13±0.47	49.68±0.24	50.67±0.38
<i>Excoecaria agallocha</i>	43.08±0.10	44.88±0.27	45.05±0.20	47.52±0.19	48.91±0.26
<i>Heritiera fomes</i>	47.44±0.06	45.69±0.15	46.69±0.15	49.22±0.07	49.35±0.05
<i>Lumnitzera racemosa</i>	46.23±0.32	40.41±0.13	47.75±0.24	48.96±0.37	49.74±0.22
<i>Rhizophora mucronata</i>	44.48±0.39	44.07±0.26	49.10±0.17	49.72±0.24	50.55±0.45
<i>Rhizophora apiculata</i>	44.86±0.14	45.56±0.20	48.96±0.23	49.28±0.35	50.82±0.77
<i>Sonneratia apetala</i>	43.37±0.34	47.22±0.53	48.29±0.39	49.61±0.34	50.33±0.53
<i>Sonneratia caseolaris</i>	44.50±0.15	44.88±0.45	49.04±0.16	49.06±0.10	49.18±0.16
<i>Xylocarpus granatum</i>	42.55±0.23	45.82±0.30	48.48±0.38	49.55±0.46	49.82±0.60
<i>Xylocarpus moluccensis</i>	42.01±0.18	45.77±0.42	48.27±0.26	48.55±0.34	49.70±0.32

Table 9: Carbon concentration in plant parts of the coastal zone

Species	Carbon (%) in Plant Parts				
	Leaves	LCB	Smaller branch	Bigger branch	Stem
<i>Sonneratia apetala</i>	44.11±0.14	47.03±0.28	49.02±0.42	50.31±0.15	50.88±0.44

Table 10: Nutrient in plant part of the Sundarbans zone

Species	Plant parts	Nitrogen (mg/g)	Phosphorus (mg/g)	Potassium (mg/g)
<i>Aglaia cucullata</i>	Leaf	11.01±0.22	0.78±0.00	18.25±0.41
	Smaller Branch	5.23±0.34	0.054±0.00	11.11±0.29
	Bigger Branch	1.16±0.44	0.019±0.00	2.21±0.00
	Stem	0.895±0.05	0.01±0.00	1.64±0.10
<i>Avicennia marina</i>	Leaf	6.33±0.33	1.09±0.01	13.15±0.21
	Smaller Branch	2.32±0.11	0.39±0.07	8.09±0.41
	Bigger Branch	0.71±0.01	0.091±0.08	2.23±0.08
	Stem	0.88±0.02	0.097±0.04	1.17±0.02
<i>Bruguiera gymnorhiza</i>	Leaf	11.07±0.16	0.71±0.00	16.75±0.49
	Smaller Branch	5.23±0.36	0.05±0.00	6.72±0.44
	Bigger Branch	3.02±0.18	0.021±0.00	3.21±0.00
	Stem	1.55±0.03	0.01±0.00	1.61±0.00
<i>Bruguiera sexangula</i>	Leaf	10.04±0.33	0.83±0.02	12.41±0.23
	Smaller Branch	6.11±0.26	0.56±0.00	7.51±0.21
	Bigger Branch	3.32±0.65	0.061±0.08	2.31±0.067
	Stem	1.02±0.04	0.057±0.00	1.12±0.04
<i>Excoecaria agallocha</i>	Leaf	12.07±0.19	0.53±0.00	14.75±0.49
	Smaller Branch	5.81±0.07	0.04±0.00	6.72±0.49
	Bigger Branch	1.56±0.07	0.016±0.00	5.21±0.00
	Stem	0.96±0.04	0.01±0.00	3.64±0.10
<i>Heritiera fomes</i>	Leaf	7.06±0.14	0.77±0.00	11.62±0.11
	Smaller Branch	1.22±0.13	0.09±0.07	8.07±0.27
	Bigger Branch	0.71±0.02	0.081±0.00	3.93±0.07
	Stem	0.68±0.05	0.077±0.00	3.16±0.04

Table 11: Nutrient in plant part of the Sundarbans zone (Cont.)

Species	Plant parts	Nitrogen (mg/g)	Phosphorus (mg/g)	Potassium (mg/g)
<i>Lumnitzera racemosa</i>	Leaf	6.11±0.12	0.82±0.00	16.23±0.22
	Smaller Branch	5.41±0.35	0.053±0.00	6.99±0.21
	Bigger Branch	1.02±0.18	0.023±0.00	2.41±0.00
	Stem	0.97±0.15	0.011±0.00	1.32±0.05
<i>Rhizophora mucronata</i>	Leaf	9.23±0.88	0.74±0.00	15.66±0.52
	Smaller Branch	7.22±0.33	0.54±0.00	7.71±0.34
	Bigger Branch	1.45±0.07	0.031±0.02	2.49±0.06
	Stem	0.88±0.02	0.019±0.00	1.07±0.01
<i>Rhizophora apiculata</i>	Leaf	8.11±0.36	0.71±0.00	15.11±0.29
	Smaller Branch	4.28±0.31	0.07±0.00	5.49±0.27
	Bigger Branch	1.77±0.09	0.02±0.00	2.12±0.00
	Stem	0.73±0.02	0.01±0.00	1.14±0.05
<i>Sonneratia apetala</i>	Leaf	10.12±0.44	0.61±0.00	16.33±0.51
	Smaller Branch	5.34±0.19	0.052±0.00	7.82±0.12
	Bigger Branch	2.19±0.02	0.024±0.00	4.01±0.17
	Stem	0.95±0.03	0.018±0.00	1.56±0.01
<i>Sonneratia caseolaris</i>	Leaf	12.55±0.72	0.71±0.00	15.15±0.38
	Smaller Branch	8.88±0.48	0.04±0.00	11.21±0.25
	Bigger Branch	2.16±0.24	0.017±0.00	5.81±0.00
	Stem	1.04±0.04	0.01±0.00	1.87±0.01
<i>Xylocarpus granatum</i>	Leaf	7.71±0.14	0.59±0.01	17.28±0.29
	Smaller Branch	4.23±0.33	0.071±0.00	7.03±0.47
	Bigger Branch	0.71±0.02	0.042±0.00	1.93±0.07
	Stem	0.69±0.05	0.015±0.00	1.01±0.00
<i>Xylocarpus moluccensis</i>	Leaf	6.98±0.34	0.73±0.00	14.11±0.32
	Smaller Branch	4.83±0.21	0.06±0.00	9.12±0.51
	Bigger Branch	1.02±0.02	0.024±0.00	2.19±0.00
	Stem	0.78±0.01	0.01±0.00	1.03±0.10

Table 12: Nutrient in plant part of the Coastal zone

Species	Plant parts	Nitrogen (mg/g)	Phosphorus (mg/g)	Potassium (mg/g)
<i>Sonneratia apetala</i>	Leaf	11.88±0.32	0.721±0.00	17.18±0.86
	Smaller Branch	6.12±0.21	0.048±0.00	7.06±0.08
	Bigger Branch	1.84±0.02	0.02±0.00	2.45±0.11
	Stem	0.85±0.03	0.015±0.00	1.06±0.00

2.3.5 CARBON AND NUTRIENT CONCENTRATION IN PLANT PARTS OF THE VILLAGE ZONE

Carbon in plant tissue was estimated from the loss of ignition at 450 °C and nutrients in plant tissue was measured from acid digestion followed by colorimetric method and Flame photometer. However, carbon and nutrients (nitrogen, phosphorus and potassium) concentration in different parts of 9 species of the village zone have been presented in Tables 12-13. Comparatively higher concentration of carbon was observed in stem and bigger branches of all the species while, leaves contain higher concentration of all nutrients as reported for the Sundarbans and coastal zone.

Table 13: Carbon in plant part of the Village zone

Species	Carbon (%) in Plant Parts			
	Leaves	Smaller branch	Bigger branch	Stem
<i>Albezia procera</i>	43.88±0.29	48.27±0.26	48.55±0.34	49.70±0.32
<i>Albizia rechardiana</i>	43.98±0.66	48.36±0.23	49.03±0.31	49.81±0.35
<i>Albizia saman</i>	46.17±0.34	48.96±0.23	49.28±0.35	49.18±0.16
<i>Aphanamixis polystachya</i>	45.22±0.36	48.29±0.39	49.61±0.34	49.82±0.60
<i>Artocarpus heterophylus</i>	43.25±0.28	47.75±0.24	48.96±0.37	48.98±0.22
<i>Lannea coromandelica</i>	43.92±0.21	48.48±0.38	49.55±0.46	48.91±0.26
<i>Mengijera indica</i>	46.81±0.16	46.69±0.15	49.22±0.07	50.82±0.77
<i>Swietenia macrophylla</i>	46.24±0.62	49.04±0.16	49.06±0.10	49.74±0.22
<i>Syzygium cumini</i>	43.51±0.44	49.11±0.33	49.31±0.39	50.55±0.45

Table 14: Nutrients in plant part of the Village zone

Species	Plant parts	Nitrogen (mg/g)	Phosphorus (mg/g)	Potassium (mg/g)
<i>Albezia procera</i>	Leaf	16.04±0.42	1.23±0.03	28.55±0.78
	Smaller Branch	8.33±0.44	0.45±0.01	17.81±0.92
	Bigger Branch	1.06±0.32	0.034±0.00	6.21±0.23
	Stem	0.96±0.00	0.02±0.00	2.04±0.12
<i>Albizia rechardiana</i>	Leaf	17.71±0.63	1.84±0.01	24.55±0.98
	Smaller Branch	6.22±0.19	0.69±0.07	11.23±0.89
	Bigger Branch	0.81±0.01	0.35±0.02	6.23±0.58
	Stem	0.72±0.02	0.06±0.00	1.98±0.02
<i>Albizia saman</i>	Leaf	18.02±0.78	1.74±0.03	26.785±0.87
	Smaller Branch	8.23±0.23	0.53±0.03	11.67±0.84
	Bigger Branch	2.51±0.15	0.071±0.00	4.02±0.30
	Stem	0.71±0.02	0.05±0.00	1.85±0.11
<i>Aphanamixis polystachya</i>	Leaf	16.42±0.19	1.92±0.07	25.46±0.84
	Smaller Branch	6.78±0.76	0.96±0.00	12.64±0.81
	Bigger Branch	1.92±0.28	0.63±0.00	2.85±0.87
	Stem	0.89±0.01	0.04±0.00	1.62±0.14
<i>Artocarpus heterophylus</i>	Leaf	18.06±0.79	1.83±0.00	25.75±0.69
	Smaller Branch	7.66±0.18	0.44±0.00	11.53±0.69
	Bigger Branch	1.06±0.03	0.076±0.00	2.41±0.21
	Stem	0.71±0.02	0.032±0.00	2.02±0.14
<i>Lannea coromandelica</i>	Leaf	18.28±0.54	1.77±0.00	27.62±0.81
	Smaller Branch	5.28±0.13	0.9±0.07	12.45±0.77
	Bigger Branch	1.72±0.02	0.61±0.03	3.93±0.07
	Stem	0.98±0.05	0.041±0.00	2.07±0.14
<i>Mengijera indica</i>	Leaf	17.39±0.12	1.82±0.00	26.73±0.72
	Smaller Branch	7.59±0.31	0.73±0.00	10.39±0.65
	Bigger Branch	1.22±0.17	0.043±0.01	2.71±0.17
	Stem	0.86±0.11	0.031±0.00	1.61±0.12
<i>Swietenia macrophylla</i>	Leaf	14.23±0.38	1.74±0.00	25.85±0.73
	Smaller Branch	7.52±0.27	0.84±0.00	11.52±0.83
	Bigger Branch	1.05±0.04	0.071±0.02	2.29±0.07
	Stem	0.82±0.02	0.041±0.00	1.11±0.01
<i>Syzygium cumini</i>	Leaf	18.31±0.66	1.81±0.00	25.69±0.65
	Smaller Branch	7.28±0.64	0.7±0.00	12.72±0.78
	Bigger Branch	1.57±0.09	0.06±0.00	2.45±0.07
	Stem	0.83±0.01	0.045±0.00	1.27±0.02

2.4 ACTIVITY 1D: DEVELOP OF THE ALLOMETRIC EQUATIONS FOR THE SUNDARBANS AND COALSTAL ZONE; VILLAGE ZONE

2.4.1 COMMON ALLOMETRIC EQUATION FOR THE SUNDARBANS ZONE

Biomass data of 14 species of the Sundarbans zone was collected in two phases. Phase one contained 260 individuals and phase two contained 82 individuals, which was denoted as Data Set A and Data Set B (Table 14-15). The Data Set A was used to derive the common allometric equation for the Sundarbans zone. However, the Data Set B was used to test the validation of the derived equation as well as to compare with frequently used pan-tropical and regional models.

Table 15: Species and their respective number of observation and wood density (Data Set A) used to develop the common allometric equation for the Sundarbans zone

Sl	Species	Family	Number of observation	Wood density (kg/m ³)
1	<i>Aglaia cucullata</i>	Meliaceae	13	600
2	<i>Avicennia marina</i>	Avicenniaceae	14	648
3	<i>Avicennia officinalis</i>	Avicenniaceae	17	605
4	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	4	764
5	<i>Bruguiera sexangula</i>	Rhizophoraceae	18	764
6	<i>Excoecaria agallocha</i>	Euphorbiaceae	26	405
7	<i>Heretiera fomes</i>	Sterculiaceae	77	810
8	<i>Lumnitzera racemosa</i>	Combretaceae	9	710
9	<i>Rhizophora apiculata</i>	Rhizophoraceae	5	814
10	<i>Rhizophora mucronata</i>	Rhizophoraceae	10	843
11	<i>Sonneratia apetala</i>	Lythraceae	16	529
12	<i>Sonneratia caseolaris</i>	Lythraceae	11	389
13	<i>Xylocarpus granatum</i>	Meliaceae	19	567
14	<i>Xylocarpus mekongensis</i>	Meliaceae	21	730
Total			260	

Table 16: Species and their respective number of observation (Data Set B) used for model validation for the Sundarbans zone

Sl	Species	Family	Number of observation
1	<i>Aglaia cucullata</i>	Meliaceae	6
2	<i>Avicennia marina</i>	Avicenniaceae	5
3	<i>Avicennia officinalis</i>	Avicenniaceae	6
4	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	1
5	<i>Bruguiera sexangula</i>	Rhizophoraceae	8
6	<i>Excoecaria agallocha</i>	Euphorbiaceae	9
7	<i>Heretiera fomes</i>	Sterculiaceae	20
8	<i>Lumnitzera racemosa</i>	Combretaceae	4
9	<i>Rhizophora apiculata</i>	Rhizophoraceae	1
10	<i>Rhizophora mucronata</i>	Rhizophoraceae	2
11	<i>Sonneratia apetala</i>	Lythraceae	4
12	<i>Sonneratia caseolaris</i>	Lythraceae	5
13	<i>Xylocarpus granatum</i>	Meliaceae	5
14	<i>Xylocarpus mekongensis</i>	Meliaceae	6
Total			82

Common allometric equations for the Sundarbans zone were derived from the Data Set A using R statistical software. The equations for above-ground biomass and carbon in above-ground biomass are presented in the following Tables 16-17 (Where, TAGB = Total above-ground biomass in Kg, D = Diameter at Breast Height in cm, H = Total Height in m and W = wood density in Kg/m³). The best fit allometric equation of total above-ground biomass was TAGB = EXP(-6.7189 + 2.1634 * Ln (D) + 0.3752 * Ln (H) + 0.6895 * Ln (W)) with lowest AIC = -69.3284 and highest adjusted R² = 0.9852 and AICw = 1.0000 value compared to other equations (Table 16). While, the best fit allometric equation of carbon in total above-ground biomass was C_TAGB = EXP(-7.5236 + 2.1628 * Ln (D) + 0.3834 * Ln (H) + 0.7004 * Ln (W)) having lowest AIC = -70.6024 and highest adjusted R² = 0.9853 and AICw = 1.0000 value compared to other equation (Table 17).

Table 17: Parameter estimate and comparison among the allometric models for total above-ground biomass (TAGB) of the Sundarbans zone

Sl	Allometric Equation	a	b	c	d	e	Adjusted R2	RSE	AIC	AICw	CF
1	TAGB = EXP(a + b Ln (D))	-1.9272	2.3517				0.9706	0.2951	107.1300	0.0000	1.0445
2	TAGB = EXP(a + b Ln (D) + c Ln (H))	-2.4317	2.1341	0.4953			0.9760	0.2661	55.4106	0.0000	1.0362
3	TAGB = EXP(a + b Ln (D) + c Ln (H) + d Ln (W))	-6.7189	2.1634	0.3752	0.6895		0.9852	0.2085	-69.3284	1.0000	1.0222
4	TAGB = EXP(a + b Ln (D) + c Ln (D)^2 + d Ln (D)^3 + e Ln (W))	-6.2652	1.5612	0.3737	-0.0552	0.7499	0.9827	0.2247	-28.4895	0.0000	1.0259
5	TAGB = EXP(a + b Ln (D^2 * H * W))	-8.7170	0.9318				0.9758	0.2679	56.8924	0.0000	1.0365
6	TAGB = EXP(a + b Ln (D) + c Ln (W))	-6.8023	2.3258	0.7623			0.9822	0.2291	-22.3743	0.0000	1.0267
7	TAGB = EXP(a + b Ln (D^2* H) + c Ln (W))	-6.5747	0.9441	0.5877			0.9781	0.2542	31.6867	0.0000	1.0330
8	TAGB = EXP(a + b Ln (D^2* H))	-2.8387	0.9543				0.9713	0.2916	101.0792	0.0000	1.0434

Table 18: Parameter estimate and comparison among the allometric models for carbon in total above-ground biomass (C_TAGB) of the Sundarbans zone

Sl	Allometric Equation	a	b	c	d	e	Adjusted R2	RSE	AIC	AICw	CF
1	C_TAGB = EXP(a + b Ln (D))	-2.6534	2.3551				0.9702	0.2973	111.0835	0.0000	1.0452
2	C_TAGB = EXP(a + b Ln (D) + c Ln (H))	-3.1682	2.1330	0.5055			0.9758	0.2673	57.8320	0.0000	1.0365
3	C_TAGB = EXP(a + b Ln (D) + c Ln (H) + d Ln (W))	-7.5236	2.1628	0.3834	0.7004		0.9853	0.2080	-70.6024	1.0000	1.0220
4	C_TAGB = EXP(a + b Ln (D) + c (Ln (D))^2 + d (Ln (D))^3 + e Ln (W))	-7.0928	1.5959	0.3567	-0.0525	0.7632	0.9827	0.2256	-26.3921	0.0000	1.0261
5	C_TAGB = EXP(a + b Ln (D^2 * H * W))	-9.4583	0.9335				0.9762	0.2657	52.7055	0.0000	1.0359
6	C_TAGB = EXP(a + b Ln (D) + c Ln (W))	-7.6088	2.3287	0.7748			0.9822	0.2295	-21.4524	0.0000	1.0268
7	C_TAGB = EXP(a + b Ln (D^2* H) + c Ln (W))	-7.3811	0.9454	0.5999			0.9784	0.2528	28.7751	0.0000	1.0326
8	C_TAGB = EXP(a + b Ln (D^2* H))	-3.5676	0.9558				0.9713	0.2919	101.4942	0.0000	1.0435

In comparison, the best fit total above-ground biomass equation of this study ($\ln(\text{TAGB}) = -6.7189 + 2.1634 \cdot \ln(D) + 0.3752 \cdot \ln(H) + 0.6895 \cdot \ln(W)$) was more efficient in terms of model prediction error (MPE) and model efficiency characteristics. Our derived model has shown lowest (1.139%) of MPE and highest (0.972) ME compared to other frequently used pan-tropical and regional allometric equations. Moreover, the pan-tropical equation ($\text{TAGB} = W \cdot \exp(-1.349 + 1.98 \cdot \ln(D) + 0.207 \cdot (\ln(D))^2 - 0.0281 \cdot (\ln(D))^3)$) of Chave et al. (2005), which was used to estimate the total above-ground biomass of the Sundarbans during the carbon inventory 2010 (Rahman et al. 2015) showed 2nd lowest in model efficiency characteristic (Table 18). However, this model of Chave et al. (2005) is “*biologically implausible and statistically dubious equation*” according to Sileshi (2014). The independent variables ($\ln(D)$, $(\ln(D))^2$, $(\ln(D))^3$) of this equation also showed multicollinearity (Variance influential factor values of $\ln(D)$, $(\ln(D))^2$, and $(\ln(D))^3$) were 490.013, 2085.819 and 602.9218 respectively) among them, which was far away from the reference value (10) and indicated unacceptable characteristics of a multiple regression equation (Sileshi, 2014).

Table 19: Comparison of the best fit total above-ground biomass (TAGB) equations of the Sundarbans Zone and frequently used pan-tropical and regional allometric equation

Model no	Source	Equation	Type	n	R ²	MPE (%)	ME	Remark
3	Present study	$\text{TAGB} = \text{EXP}(-6.7189 + 2.1634 \cdot \ln(D) + 0.3752 \cdot \ln(H) + 0.6895 \cdot \ln(W))$	Common	260	0.9852	1.139	0.972	Best fit TAGB allometric equation derived from this study
1	Brown, 1997 (Moist)	$\text{TAGB} = \exp(-2.134 + 2.5430 \cdot \ln(D))$	Pan-tropical	170		34.749	-0.015	
3	Nelson et al., 1999	$\ln(\text{TAGB}) = -1.8985 + 2.1569 \cdot \ln(D) + 0.3888 \cdot \ln(H) + 0.7218 \cdot \ln(W)$	Central amazon	132	0.991	4.491	0.9647	
4	Chave et al., 2005	$\text{TAGB} = W \cdot \exp(-1.349 + 1.98 \cdot \ln(D) + 0.207 \cdot (\ln(D))^2 - 0.0281 \cdot (\ln(D))^3)$	Pan-tropical	1808		6.684	0.804	This equation was previously used to estimate Total Above-ground Biomass of the Sundarbans
5	Chave et al., 2005	$\text{TAGB} = \exp(-2.977 + \ln(D^2 \cdot H \cdot W))$	Pan-tropical	1505		21.892	0.956	
	Chave et al., 2014	$\text{TAGB} = \exp(-2.6986 + 0.976 \cdot \ln(D^2 \cdot H \cdot W))$	Pan-tropical	4004		12.240	0.968	
8	Brown et al., 1989 (Moist)	$\text{TAGB} = \exp(-3.1141 + 0.9719 \cdot \ln(D^2 \cdot H))$	Pan-tropical	168	0.97	11.967	0.935	
	Djomo et al., 2010	$\ln(\text{TAGB}) = -3.2249 + 0.9885 \cdot \ln(D^2 \cdot H)$	Tropical Africa	274	0.971	11.374	0.948	

MPE = Model prediction error, ME = Model efficiency

2.4.2 ALLOMETRIC EQUATION OF *SONNERATIA APETAL* OF THE COASTAL PLANTATION

Biomass data of *Sonneratia apetal* was also collected in two phases. Phase one known as Data Set A and phase two known as Data Set B. The Data Set A was used to derive the allometric equation and the Data Set B was used to test the validation and comparison of the derived equation. The equations for above-ground biomass and carbon in above-ground biomass are presented in the following Table 19-20 (Where, TAGB = Total above-ground biomass in Kg, D = Diameter at Breast Height in cm, H = Total Height in m. The best fit allometric equation of total above-ground biomass was $\ln(\text{TAGB}) = -1.7608 + 2.0077 \cdot \ln(D) + 0.2981 \cdot \ln(H)$ with lowest AIC = -6.6647 and highest adjusted R² = 0.9744 and AICw = 0.6646 value compared to other equations (Table 17). While, the best fit allometric equation of carbon in total above-ground biomass was $\ln(\text{C_TAGB}) = -2.5035 + 2.0042 \cdot \ln(D) + 0.3188 \cdot \ln(H)$ having lowest AIC = -8.0115 and highest adjusted R² = 0.9754 and AICw = 0.7190 value compared to other equation (Table 20).

Table 20: Parameter estimate and comparison among the allometric models for total above-ground biomass (TAGB) of *Sonneratia apetal* of coastal plantation

Sl	Allometric Equation	a	b	c	Adjusted R ²	RSE	AIC	AICw	CF
1	TAGB = EXP(a + b * Ln (D))	-1.7867	2.2718		0.9732	0.2216	-5.1624	0.3136	1.0249
2	TAGB = EXP(a + b * Ln (H))	-0.9575	2.3028		0.8856	0.4576	70.2378	0.0000	1.1104
3	TAGB = EXP(a + b * Ln (DH))	-1.5543	1.1792		0.9592	0.2733	16.6117	0.0000	1.0380
4	TAGB = EXP(a + b * Ln (D) + c * Ln (H))	-1.7608	2.0077	0.2981	0.9744	0.2143	-6.6647	0.6646	1.0237
5	TAGB = EXP(a + b * Ln (D ² H))	-1.6723	0.7812		0.9703	0.2333	0.1697	0.0218	1.0276

Table 21: Parameter estimate and comparison among the allometric models for carbon in total above-ground biomass (C_TAGB) of *Sonneratia apetal* of coastal plantation

Sl	Allometric Equation	a	b	c	Adjusted R ²	RSE	AIC	AICw	CF
1	C_TAGB = EXP(a + b * Ln (D))	-2.5313	2.2867		0.9739	0.2200	-5.9262	0.2535	1.0245
2	C_TAGB = EXP(a + b * Ln (H))	-1.7016	2.3200		0.8879	0.4558	69.8063	0.0000	1.1094
3	C_TAGB = EXP(a + b * Ln (DH))	-2.3000	1.1874		0.9608	0.2696	15.2164	0.0000	1.0370
4	C_TAGB = EXP(a + b * Ln (D) + c * Ln (H))	-2.5035	2.0042	0.3188	0.9754	0.2116	-8.0115	0.7190	1.0231
5	C_TAGB = EXP(a + b * Ln (D ² H))	-2.4178	0.7866		0.9715	0.2296	-1.4840	0.0275	1.0267

In comparison, the best fit total above-ground biomass equation of this study ($TAGB = EXP(-1.7608+2.0077* Ln (D)+ 0.2981* Ln (H))$) has appeared as more efficient in terms of model efficiency characteristics. Our derived model has shown highest (0.952) ME compared to other frequently used pan-tropical and regional allometric equations and derived common allometric model for the Sundarbans (Table 21).

Table 22: Comparison of the best fit total above-ground biomass (TAGB) equations of *Sonneratia apetala* of coastal plantation and frequently used pan-tropical and regional allometric equation

Model no	Source	Equation	Type	n	R ²	ME	Remarks
	Present study	$TAGB = EXP(-1.7608+2.0077* Ln (D)+ 0.2981* Ln (H))$	Species specific	52	0.9744	0.952	
	Common best fit model of the Sundarbans of this Study	$TAGB = EXP(-6.7189+2.1634*Ln(D)+ 0.3752*Ln(H)+0.6895*Ln(W))$	Common	260	0.9852	0.931	Best fit common allometric model for the Sundarbans zone
1	Brown, 1997 (Moist)	$TAGB = exp(-2.134+2.5430*Ln (D))$	Pan-tropical	170		-0.712	
3	Nelson et al., 1999	$Ln (TAGB) = -1.8985+2.1569*Ln(D)+0.3888*Ln(H)+0.7218*Ln(W)$	Central amazon	132	0.991	0.902	
4	Chave et al., 2005	$TAGB = W*exp(-1.349+1.98* Ln(D)+0.207*(Ln (D))^2-0.0281*(Ln(D))^3)$	Pan-tropical	1808		0.845	
5	Chave et al., 2005	$TAGB = exp(-2.977+Ln(D^2*H*W))$	Pan-tropical	1505		0.948	
	Chave et al., 2014	$TAGB = exp(-2.6986+0.976*Ln(D^2*H*W))$	Pan-tropical	4004		0.925	
8	Brown et al., 1989 (Moist)	$TAGB = exp(-3.1141+0.9719*Ln(D^2*H))$	Pan-tropical	168	0.97	0.751	
	Djomo et al., 2010	$Ln (TAGB) = -3.2249+0.9885*Ln(D^2*H)$	Tropical Africa	274	0.971	0.655	

MPE = Model prediction error, ME = Model efficiency

2.4.3 ALLOMETRIC EQUATION FOR THE VILLAGE ZONE

Biomass data of 9 species of the village zone was divided into two sets. Set A contained 650 individuals and Set B contained 167 individuals (Table 22-23). The Data Set A was used to derive the common allometric equation for the Sundarbans zone. However, the Data Set B was used to test the validation of the derived equation as well as to compare with frequently used pan-tropical and regional models.

Table 23: Species and their respective number of observation (Data Set A) used to develop the common allometric equation for the Village zone

Sl	Species	Family	Number of observation	Wood density (kg/m ³)
1	<i>Albezia procera</i>	Fabaceae	68	730
2	<i>Albizia rechardiana</i>	Fabaceae	277	580
3	<i>Albizia saman</i>	Fabaceae	49	590
4	<i>Aphanamixis polystachya</i>	Meliaceae	39	620
5	<i>Artocarpus heterophylus</i>	Moraceae	51	580
6	<i>Lannea coromandelica</i>	Anacardiaceae	27	495
7	<i>Mengifera indica</i>	Anacardiaceae	47	540
8	<i>Swietenia macrophylla</i>	Meliaceae	40	500
9	<i>Syzygium cumini</i>	Myrtaceae	52	701
Total			650	

Table 24: Species and their respective number of observation (Data Set B) used for model validation for the Village zone

Sl	Species	Family	Number of observation
1	<i>Albezia procera</i>	Fabaceae	17
2	<i>Albizia rechardiana</i>	Fabaceae	75
3	<i>Albizia saman</i>	Fabaceae	12
4	<i>Aphanamixis polystachya</i>	Meliaceae	9
5	<i>Artocarpus heterophylus</i>	Moraceae	13
6	<i>Lannea coromandelica</i>	Anacardiaceae	7
7	<i>Mengifera indica</i>	Anacardiaceae	12
8	<i>Swietenia macrophylla</i>	Meliaceae	9
9	<i>Syzygium cumini</i>	Myrtaceae	13
Total			167

Common allometric equations for the Village zone were derived from the Data Set A using R statistical software. The equations for above-ground biomass and carbon in above-ground biomass are presented in the following Table 14-15 (Where, TAGB = Total above-ground biomass in Kg, D = Diameter at Breast Height in cm, H = Total Height in m and W = wood density in Kg/m³). The best fit

allometric equation of total above-ground biomass was $TAGB = \text{EXP}(-6.0325 + 1.9715 \cdot \text{Ln}(D) + 0.8193 \cdot \text{Ln}(W))$ with lowest AIC = 98.8925 and highest adjusted R2 = 0.9455 and AICw = 0.3526 value compared to other equations (Table 26).

Table 25: Parameter estimate and comparison among the allometric models for total above-ground biomass (TAGB) of the Village zone

Sl	Allometric equation	a	b	c	d	e	Adjusted R2	RSE	AIC	AICw	CF
1	TAGB = EXP(a + b Ln (D))	-0.8544	1.9861				0.9392	0.2746	168.2895	0.0000	1.0384
2	TAGB = EXP(a + b Ln (D) + c Ln (H))	-0.8128	2.0313	-0.0738			0.9395	0.2737	165.9522	0.0000	1.0382
3	TAGB = EXP(a + b Ln (D) + c Ln (H) + d Ln (W))	-5.9281	2.0004	-0.0468	0.8069		0.9455	0.2595	98.9687	0.3394	1.0344
4	TAGB = EXP(a + b Ln (D) + c Ln (D)^2 + d Ln (D)^3 + e Ln (W))	-5.0272	0.8074	0.4431	-0.0539	0.8138	0.9456	0.2591	99.1626	0.3080	1.0343
5	TAGB = EXP(a + b Ln (D^2 * H * W))	-5.5534	0.7220				0.8997	0.3528	494.0709	0.0000	1.0642
6	TAGB = EXP(a + b Ln (D) + c Ln (W))	-6.0325	1.9715	0.8193			0.9455	0.2599	98.8925	0.3526	1.0344
7	TAGB = EXP(a + b Ln (D^2 * H) + c Ln (W))	-7.6108	0.7186	1.0495			0.9005	0.3510	489.4362	0.0000	1.0636
8	TAGB = EXP(a + b Ln (D^2 * H))	-0.9657	0.7239				0.8903	0.3689	552.2326	0.0000	1.0704

Moreover, in comparison, the best fit total above-ground biomass equation of this study ($TAGB = \text{EXP}(-6.0325+1.9715 \cdot \text{Ln}(D)+0.8193 \cdot \text{Ln}(W))$) has appeared as more efficient in terms of model efficiency characteristic. Our derived model has shown highest (0.9455) model efficiency which is closest to 1 compared to other frequently used pan-tropical and regional allometric equations and derived common allometric model for the Sundarbans (Table 28).

Table 26: Comparison of the best fit total above-ground biomass (TAGB) equations of the Village zone and frequently used pan-tropical and regional allometric equation

Model no	Source	Equation	Type	n	R ²	ME
	Present study	$TAGB = \text{EXP}(-6.0325+1.9715 \cdot \text{Ln}(D)+0.8193 \cdot \text{Ln}(W))$	Common	650	0.9455	0.946
1	Brown, 1997 (Moist)	$TAGB = \text{exp}(-2.134+2.5430 \cdot \text{Ln}(D))$	Pan-tropical	170		-2.481
3	Nelson et al., 1999	$\text{Ln}(TAGB) = -1.8985+2.1569 \cdot \text{Ln}(D)+0.3888 \cdot \text{Ln}(H)+0.7218 \cdot \text{Ln}(W)$	Central amazon	132	0.991	0.546
4	Chave et al., 2005	$TAGB = W \cdot \text{exp}(-1.499+2.148 \cdot \text{Ln}(D)+0.207 \cdot (\text{Ln}(D))^2 - 0.0281 \cdot (\text{Ln}(D))^3)$	Pan-tropical	1808		-3.003
5	Chave et al., 2005	$TAGB = \text{exp}(-2.977+\text{Ln}(D^2 \cdot H \cdot W))$	Pan-tropical	1505		0.287
	Chave et al., 2014	$TAGB = \text{exp}(-2.6986+0.976 \cdot \text{Ln}(D^2 \cdot H \cdot W))$	Pan-tropical	4004		0.208
8	Brown et al., 1989 (Moist)	$TAGB = \text{exp}(-3.1141+0.9719 \cdot \text{Ln}(D^2 \cdot H))$	Pan-tropical	168	0.97	0.000
	Djomo et al., 2010	$\text{Ln}(TAGB) = -3.2249+0.9885 \cdot \text{Ln}(D^2 \cdot H)$	Tropical Africa	274	0.971	-0.305

ME = Model efficiency

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Annex 1: Field data form for fresh biomass and diameter measurement of logs of individual tree

Survey date:

Name of team leader:

Tree no:

Scientific name:

Local name:

Administrative location:

Coordinates of the sample tree:

Longitude: Latitude:

Altitude: Average slope:

Forest types:

A. Measurement of tree dimension

Diameter at 0.3 m (cm)						
DBH (cm)						
Total height (m)	Standing		Felled			
Bole length (m)	Standing		Felled			
Buttress no (if any)						
	1	2	3	4	5	6
Buttress height (m)						
Buttress width (m)						
Buttress length (m)						
Age (year)						

B. Measurement of selected trimmed branched

SL no	Base diameter (cm)	Fresh weight of tree parts (kg)		
		Leaves containing smaller branches	Woody part of branch	Total

C. Base diameter of untrimmed branches

SL no	Diameter (cm)

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ANNEX 1: (CONT..)

D. Length and diameter measurement of untrimmed bole

Log ID	Log length (m)	Bark thickness (cm)		Diameter with bark (cm)		Diameter without bark (cm) = (Diameter with bark -2 x bark thickness)	
		Thicker end	Thinner end	Thicker end	Thinner end	Thicker end	Thinner end

E. Length and diameter measurement of untrimmed bigger branches

Branch Log ID	Branch Log length (m)	Bark thickness (cm)		Diameter with bark (cm)		Diameter without bark (cm) = (Diameter with bark -2 x bark thickness)	
		Thicker end	Thinner end	Thicker end	Thinner end	Thicker end	Thinner end

Annex 2: Fresh to oven-dry weight conversion ratio for sub-samples of trees

Survey date:

Name of team leader:

Name of researcher:

Scientific name:

Local name:

A. Leaves

Sample tree no	Sample ID no	Sub-sample fresh weight (kg)	Sub-sample weight at laboratory (kg)	Sub-sample oven-dry weight (kg)	Conversion ratio = $\frac{\text{Oven dry weight (kg)}}{\text{Fresh weight (kg)}}$
Average					

B. Leaf containing smaller branches

Sample tree no	Sample ID no	Sub-sample fresh weight (kg)	Sub-sample weight at laboratory (kg)	Sub-sample oven-dry weight (kg)	Conversion ratio = $\frac{\text{Oven dry weight (kg)}}{\text{Fresh weight (kg)}}$
Average					

C. Woody parts of smaller branches (Diameter < 7 cm)

Sample tree no	Sample ID no	Sub-sample fresh weight (kg)	Sub-sample weight at laboratory (kg)	Sub-sample oven-dry weight (kg)	Conversion ratio = $\frac{\text{Oven dry weight (kg)}}{\text{Fresh weight (kg)}}$
Average					

Annex 3: Processed biomass data of village zone

Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m ³)	Total above-ground (kg)
Albezia procera	32.13	18.00	462.453	730	595.332
Albezia procera	14.32	9.50	84.849	730	145.008
Albezia procera	15.27	11.50	99.477	730	156.502
Albezia procera	21.00	11.00	173.374	730	273.543
Albezia procera	8.91	6.00	18.301	730	39.890
Albezia procera	28.00	12.50	243.620	730	367.154
Albezia procera	32.45	14.50	419.707	730	595.401
Albezia procera	26.98	12.00	278.623	730	427.814
Albezia procera	26.73	7.50	181.995	730	406.024
Albezia procera	34.68	16.00	593.124	730	808.536
Albezia procera	21.95	12.00	151.213	730	228.548
Albezia procera	32.45	12.00	300.584	730	477.829
Albezia procera	40.09	15.50	503.548	730	716.343
Albezia procera	15.97	10.00	49.623	730	82.299
Albezia procera	49.00	20.00	689.642	730	898.612
Albezia procera	30.23	15.00	297.105	730	410.900
Albezia procera	22.91	9.00	123.996	730	224.610
Albezia procera	10.50	5.50	19.096	730	44.460
Albezia procera	25.45	7.00	160.023	730	376.114
Albezia procera	42.16	17.00	413.426	730	565.533
Albezia procera	24.12	12.50	181.491	730	269.723
Albezia procera	49.44	14.00	469.627	730	758.554
Albezia procera	25.52	12.50	236.626	730	352.999
Albezia procera	6.94	4.50	13.303	730	33.870
Albezia procera	28.32	11.50	277.425	730	440.738
Albezia procera	10.50	7.50	53.214	730	103.329
Albezia procera	29.27	16.00	305.352	730	409.551
Albezia procera	17.02	10.00	58.776	730	97.254
Albezia procera	26.73	15.00	259.994	730	356.864
Albezia procera	31.18	18.00	368.007	730	473.057
Albezia procera	20.11	13.00	93.634	730	136.925
Albezia procera	52.50	22.00	950.386	730	1203.887
Albezia procera	23.54	15.00	191.712	730	263.347
Albezia procera	11.20	9.00	31.274	730	55.968
Albezia procera	18.77	15.00	117.225	730	164.556
Albezia procera	12.15	7.50	25.034	730	48.382
Albezia procera	28.70	16.00	295.789	730	396.364
Albezia procera	21.25	13.50	125.262	730	179.919
Albezia procera	9.93	7.00	17.477	730	35.151
Albezia procera	8.59	6.00	12.305	730	26.808
Albezia procera	9.86	7.00	16.342	730	32.876
Albezia procera	29.11	13.00	277.790	730	411.656
Albezia procera	32.61	11.00	330.025	730	559.470
Albezia procera	10.66	10.00	41.928	730	72.978
Albezia procera	41.46	13.00	467.798	730	752.562
Albezia procera	26.89	11.10	186.932	730	301.075
Albezia procera	24.98	10.50	204.849	730	337.999

Albezia procera	25.14	7.50	161.928	730	352.825
Albezia procera	32.52	10.00	227.389	730	416.064
Albezia procera	18.23	10.50	150.310	730	242.481
Albezia procera	14.48	9.00	53.411	730	93.568
Albezia procera	46.13	13.00	562.703	730	938.795
Albezia procera	22.59	6.50	107.954	730	261.531
Albezia procera	33.25	9.00	276.820	730	562.424
Albezia procera	27.24	11.50	219.599	730	346.512
Albezia procera	23.54	10.50	151.088	730	247.181
Albezia procera	30.07	11.50	216.205	730	347.675
Albezia procera	18.29	9.50	89.063	730	151.560
Albezia procera	39.01	14.50	549.574	730	807.922
Albezia procera	15.11	9.00	49.923	730	87.346
Albezia procera	10.24	7.50	23.734	730	46.150
Albezia procera	24.98	11.50	202.145	730	315.186
Albezia procera	23.29	10.50	158.947	730	259.689
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albezia procera	15.69	9.00	107.688	730	188.320
Albezia procera	15.30	7.50	58.956	730	114.930
Albezia procera	30.23	10.50	248.359	730	427.130
Albezia procera	40.09	13.50	437.051	730	677.650
Albezia procera	70.03	21.50	1370.755	730	1872.119
Albizia rechardiana	42.95	24.00	818.118	580	977.500
Albizia rechardiana	40.09	18.00	556.538	580	733.902
Albizia rechardiana	17.82	15.00	85.152	580	120.523
Albizia rechardiana	22.11	16.00	130.487	580	176.134
Albizia rechardiana	20.04	13.00	120.999	580	176.977
Albizia rechardiana	9.61	10.00	11.575	580	20.520
Albizia rechardiana	25.77	15.00	225.247	580	308.967
Albizia rechardiana	21.00	14.00	129.966	580	184.265
Albizia rechardiana	26.25	16.00	210.416	580	281.533
Albizia rechardiana	26.73	16.00	247.747	580	331.469
Albizia rechardiana	20.27	14.00	118.395	580	168.338
Albizia rechardiana	17.21	11.00	71.669	580	113.405
Albizia rechardiana	29.81	18.00	350.556	580	450.028
Albizia rechardiana	41.36	19.00	434.850	580	562.697
Albizia rechardiana	29.34	18.00	272.279	580	349.460
Albizia rechardiana	36.59	21.00	557.200	580	685.300
Albizia rechardiana	27.90	17.00	255.138	580	333.921
Albizia rechardiana	32.29	17.50	295.709	580	384.899
Albizia rechardiana	29.30	22.00	280.880	580	340.267
Albizia rechardiana	15.91	13.00	60.152	580	90.370
Albizia rechardiana	34.20	16.00	326.573	580	444.344
Albizia rechardiana	28.35	18.00	279.971	580	359.320
Albizia rechardiana	17.66	12.00	88.870	580	135.426
Albizia rechardiana	15.43	15.00	69.797	580	101.575
Albizia rechardiana	14.76	13.50	65.504	580	98.698
Albizia rechardiana	16.61	15.00	95.844	580	137.394
Albizia rechardiana	19.25	16.00	125.009	580	171.737
Albizia rechardiana	31.34	24.00	350.412	580	414.816
Albizia rechardiana	24.56	17.00	183.486	580	241.054
Albizia rechardiana	33.25	17.00	391.657	580	517.027
Albizia rechardiana	41.84	24.50	645.372	580	764.776
Albizia rechardiana	27.94	19.50	310.075	580	388.497
Albizia rechardiana	24.82	20.50	255.180	580	318.551
Albizia rechardiana	20.68	17.00	146.577	580	196.068
Albizia rechardiana	18.39	15.00	106.142	580	149.463
Albizia rechardiana	33.57	19.00	331.562	580	419.595
Albizia rechardiana	25.80	16.00	182.513	580	244.246
Albizia rechardiana	32.71	19.00	327.600	580	414.017
Albizia rechardiana	23.54	16.50	215.057	580	286.006
Albizia rechardiana	31.31	23.00	396.228	580	473.681
Albizia rechardiana	43.59	22.50	638.753	580	780.295
Albizia rechardiana	31.50	19.50	314.864	580	394.014
Albizia rechardiana	29.91	17.00	294.622	580	386.179
Albizia rechardiana	41.68	17.00	466.657	580	636.898

Albizia rechardiana	34.43	18.00	392.453	580	507.764
Albizia rechardiana	21.32	17.00	145.362	580	193.630
Albizia rechardiana	32.13	21.00	320.970	580	392.852
Albizia rechardiana	15.84	15.50	80.394	580	115.476
Albizia rechardiana	29.02	21.00	356.363	580	436.948
Albizia rechardiana	13.04	15.00	42.644	580	64.575
Albizia rechardiana	31.28	19.50	377.863	580	472.790
Albizia rechardiana	31.02	17.00	252.424	580	331.464
Albizia rechardiana	15.91	16.00	87.754	580	125.078
Albizia rechardiana	38.18	22.00	548.435	580	666.541
Albizia rechardiana	33.41	19.00	375.318	580	474.840
Albizia rechardiana	27.04	17.50	219.894	580	285.044
Albizia rechardiana	21.22	17.00	161.614	580	215.407
Albizia rechardiana	14.41	8.00	41.936	580	78.252
Albizia rechardiana	18.45	9.50	78.226	580	133.168
Albizia rechardiana	14.16	8.00	44.386	580	82.797
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia rechardiana	41.84	25.00	450.613	580	530.988
Albizia rechardiana	29.75	20.00	214.248	580	266.028
Albizia rechardiana	14.64	14.50	44.244	580	65.640
Albizia rechardiana	21.95	9.50	101.035	580	174.805
Albizia rechardiana	18.14	9.00	61.575	580	108.151
Albizia rechardiana	37.54	22.00	360.796	580	437.997
Albizia rechardiana	18.45	12.00	82.288	580	124.956
Albizia rechardiana	5.82	5.50	4.682	580	10.656
Albizia rechardiana	55.36	30.00	843.235	580	971.567
Albizia rechardiana	9.07	7.50	16.266	580	31.915
Albizia rechardiana	11.33	8.00	23.881	580	44.816
Albizia rechardiana	9.10	6.00	15.103	580	32.934
Albizia rechardiana	10.50	7.00	20.941	580	42.055
Albizia rechardiana	6.68	6.00	7.674	580	16.791
Albizia rechardiana	8.91	9.00	18.383	580	33.981
Albizia rechardiana	13.04	10.00	39.972	580	67.507
Albizia rechardiana	11.77	9.50	34.313	580	59.828
Albizia rechardiana	11.77	9.00	31.618	580	56.262
Albizia rechardiana	7.48	5.00	8.563	580	20.557
Albizia rechardiana	6.59	4.50	6.701	580	16.966
Albizia rechardiana	13.04	9.50	34.031	580	58.629
Albizia rechardiana	18.45	11.50	76.819	580	118.757
Albizia rechardiana	30.54	18.00	222.546	580	285.862
Albizia rechardiana	30.70	21.00	213.115	580	260.887
Albizia rechardiana	13.36	9.00	33.661	580	59.226
Albizia rechardiana	11.14	8.00	24.923	580	46.826
Albizia rechardiana	13.55	8.00	32.167	580	59.988
Albizia rechardiana	24.50	20.00	146.848	580	184.632
Albizia rechardiana	11.77	10.50	28.051	580	47.310
Albizia rechardiana	24.98	22.00	182.425	580	224.127
Albizia rechardiana	31.18	25.00	227.438	580	266.969
Albizia rechardiana	14.41	13.50	53.811	580	81.471
Albizia rechardiana	23.86	20.00	149.589	580	188.664
Albizia rechardiana	44.93	25.00	437.796	580	518.981
Albizia rechardiana	20.36	14.00	87.553	580	124.435
Albizia rechardiana	17.98	10.00	69.938	580	115.668
Albizia rechardiana	30.23	18.50	240.872	580	306.426
Albizia rechardiana	42.95	20.00	462.764	580	589.492
Albizia rechardiana	80.50	27.00	1630.357	580	2064.444
Albizia rechardiana	56.00	25.00	729.851	580	890.106
Albizia rechardiana	34.68	22.00	267.502	580	323.533
Albizia rechardiana	23.23	17.00	147.863	580	195.091
Albizia rechardiana	6.36	5.00	5.472	580	13.021
Albizia rechardiana	7.95	6.00	11.594	580	25.259
Albizia rechardiana	8.91	6.00	13.248	580	28.876
Albizia rechardiana	14.32	10.00	43.694	580	73.046
Albizia rechardiana	16.07	10.50	53.101	580	86.131
Albizia rechardiana	17.50	12.00	69.320	580	105.724
Albizia rechardiana	18.14	12.00	74.773	580	113.690

Albizia rechardiana	6.52	5.00	6.493	580	15.467
Albizia rechardiana	21.64	19.00	133.078	580	172.145
Albizia rechardiana	23.96	18.00	171.747	580	222.316
Albizia rechardiana	20.36	17.00	85.123	580	114.126
Albizia rechardiana	22.59	19.00	157.211	580	202.083
Albizia rechardiana	30.29	22.00	285.164	580	344.981
Albizia rechardiana	41.27	22.00	635.377	580	777.432
Albizia rechardiana	29.69	16.00	249.053	580	334.300
Albizia rechardiana	23.13	15.50	151.215	580	205.504
Albizia rechardiana	41.33	25.00	576.858	580	679.173
Albizia rechardiana	33.79	24.00	438.073	580	517.742
Albizia rechardiana	14.09	12.00	52.139	580	81.887
Albizia rechardiana	34.52	18.00	349.334	580	452.090
Albizia rechardiana	32.52	16.00	292.967	580	396.222
Albizia rechardiana	30.89	21.00	326.074	580	399.135
Albizia rechardiana	10.18	7.50	21.573	580	41.963
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia rechardiana	26.50	19.00	221.928	580	280.827
Albizia rechardiana	22.81	15.00	149.539	580	205.727
Albizia rechardiana	28.54	16.00	256.006	580	342.979
Albizia rechardiana	42.89	24.00	579.867	580	692.740
Albizia rechardiana	44.54	18.00	627.052	580	842.740
Albizia rechardiana	34.04	24.00	431.706	580	510.205
Albizia rechardiana	33.57	24.00	353.981	580	418.373
Albizia rechardiana	27.52	14.50	214.825	580	299.618
Albizia rechardiana	15.59	8.00	50.887	580	95.258
Albizia rechardiana	28.19	16.00	243.228	580	325.720
Albizia rechardiana	37.23	20.00	457.341	580	572.698
Albizia rechardiana	30.29	18.50	371.106	580	472.120
Albizia rechardiana	21.22	12.00	131.078	580	198.052
Albizia rechardiana	18.77	12.00	79.635	580	120.790
Albizia rechardiana	17.24	11.00	75.721	580	119.801
Albizia rechardiana	19.19	9.00	75.383	580	133.017
Albizia rechardiana	16.07	9.50	53.289	580	90.581
Albizia rechardiana	19.82	12.00	95.485	580	144.448
Albizia rechardiana	15.81	10.00	54.554	580	90.525
Albizia rechardiana	23.51	12.00	142.279	580	215.598
Albizia rechardiana	26.69	14.00	188.042	580	266.046
Albizia rechardiana	10.50	8.00	19.695	580	37.170
Albizia rechardiana	19.09	18.00	83.075	580	111.148
Albizia rechardiana	24.82	18.00	218.194	580	281.599
Albizia rechardiana	39.61	23.00	543.131	580	652.899
Albizia rechardiana	47.09	29.00	920.966	580	1054.159
Albizia rechardiana	23.07	15.00	152.224	580	209.297
Albizia rechardiana	28.95	16.00	290.761	580	389.775
Albizia rechardiana	19.57	17.00	156.584	580	211.281
Albizia rechardiana	21.64	17.00	145.546	580	193.508
Albizia rechardiana	25.29	23.00	233.404	580	283.814
Albizia rechardiana	28.64	21.00	272.679	580	334.543
Albizia rechardiana	41.84	25.00	661.471	580	779.455
Albizia rechardiana	38.02	19.00	412.410	580	527.666
Albizia rechardiana	28.64	16.00	219.880	580	294.618
Albizia rechardiana	25.45	16.00	160.692	580	215.101
Albizia rechardiana	22.59	17.00	120.635	580	159.598
Albizia rechardiana	28.95	17.00	221.404	580	289.912
Albizia rechardiana	45.66	26.50	710.285	580	829.597
Albizia rechardiana	55.04	23.00	848.206	580	1064.325
Albizia rechardiana	34.52	13.00	279.082	580	426.866
Albizia rechardiana	49.63	26.00	686.356	580	812.841
Albizia rechardiana	42.86	23.50	577.307	580	694.085
Albizia rechardiana	35.28	13.00	270.542	580	415.951
Albizia rechardiana	28.48	13.00	210.353	580	310.808
Albizia rechardiana	42.51	21.50	594.920	580	736.178
Albizia rechardiana	34.74	13.00	279.660	580	428.391
Albizia rechardiana	37.29	13.50	278.399	580	423.368
Albizia rechardiana	32.77	13.50	224.970	580	332.590

Albizia rechardiana	28.03	12.50	207.826	580	313.258
Albizia rechardiana	29.34	26.00	423.975	580	496.009
Albizia rechardiana	42.67	28.50	731.270	580	835.253
Albizia rechardiana	26.09	13.50	174.593	580	250.959
Albizia rechardiana	44.86	12.50	460.015	580	783.857
Albizia rechardiana	32.17	15.50	224.054	580	307.127
Albizia rechardiana	12.50	10.00	37.403	580	63.518
Albizia rechardiana	36.43	24.50	402.802	580	473.999
Albizia rechardiana	25.90	24.50	234.358	580	280.857
Albizia rechardiana	8.11	11.50	14.743	580	26.291
Albizia rechardiana	32.48	20.00	425.314	580	528.354
Albizia rechardiana	23.58	25.00	256.209	580	310.537
Albizia rechardiana	8.75	11.50	17.821	580	31.240
Albizia rechardiana	25.14	27.00	366.373	580	434.367
Albizia rechardiana	35.79	17.50	417.604	580	548.837
Albizia rechardiana	26.41	20.00	251.606	580	314.127
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia rechardiana	20.39	25.00	189.681	580	236.915
Albizia rechardiana	27.04	25.50	232.360	580	275.056
Albizia rechardiana	29.02	27.00	436.515	580	507.893
Albizia rechardiana	25.93	18.50	266.810	580	340.625
Albizia rechardiana	32.42	26.00	546.486	580	635.284
Albizia rechardiana	10.12	11.50	24.958	580	42.353
Albizia rechardiana	12.41	9.50	37.784	580	65.451
Albizia rechardiana	12.38	10.50	43.422	580	72.638
Albizia rechardiana	10.98	9.50	30.616	580	53.901
Albizia rechardiana	11.17	10.50	32.527	580	55.365
Albizia rechardiana	27.08	26.00	352.465	580	415.823
Albizia rechardiana	23.23	24.50	293.713	580	358.041
Albizia rechardiana	28.16	26.00	314.897	580	369.845
Albizia rechardiana	33.88	16.00	420.111	580	570.923
Albizia rechardiana	24.94	15.00	191.278	580	262.376
Albizia rechardiana	42.95	18.00	601.630	580	802.891
Albizia rechardiana	36.11	16.50	379.299	580	512.482
Albizia rechardiana	19.57	12.00	67.436	580	102.067
Albizia rechardiana	17.50	10.50	66.791	580	107.852
Albizia rechardiana	26.09	12.00	170.919	580	261.333
Albizia rechardiana	39.26	21.00	463.584	580	573.460
Albizia rechardiana	28.25	16.00	219.728	580	294.272
Albizia rechardiana	19.85	12.00	80.214	580	121.339
Albizia rechardiana	30.07	26.00	355.733	580	415.346
Albizia rechardiana	14.79	20.00	65.846	580	92.163
Albizia rechardiana	38.63	18.00	484.354	580	635.142
Albizia rechardiana	45.98	24.50	708.984	580	847.581
Albizia rechardiana	36.75	26.00	519.643	580	603.036
Albizia rechardiana	36.43	19.50	377.292	580	475.892
Albizia rechardiana	26.89	16.00	191.246	580	255.882
Albizia rechardiana	14.79	6.00	75.028	580	172.602
Albizia rechardiana	15.91	10.00	85.717	580	142.190
Albizia rechardiana	32.29	18.00	226.254	580	291.347
Albizia rechardiana	23.67	11.50	338.537	580	525.105
Albizia rechardiana	15.11	11.00	96.969	580	155.250
Albizia rechardiana	13.20	9.00	8.541	580	15.040
Albizia rechardiana	14.06	11.00	62.462	580	100.931
Albizia rechardiana	12.25	9.50	48.305	580	83.804
Albizia rechardiana	17.34	7.00	26.770	580	55.918
Albizia rechardiana	12.57	9.50	75.650	580	130.854
Albizia rechardiana	8.43	6.00	31.485	580	68.587
Albizia rechardiana	47.57	21.50	432.911	580	544.227
Albizia rechardiana	29.11	12.50	220.494	580	334.216
Albizia rechardiana	11.93	10.50	97.310	580	163.753
Albizia rechardiana	18.58	12.00	34.312	580	52.079
Albizia rechardiana	56.32	32.50	1231.734	580	1394.392
Albizia rechardiana	28.64	14.00	311.271	580	442.747
Albizia rechardiana	46.77	25.50	445.649	580	527.358
Albizia rechardiana	31.82	14.00	377.176	580	543.558

Albizia rechardiana	12.09	6.50	9.441	580	19.866
Albizia rechardiana	9.86	7.00	25.516	580	51.332
Albizia rechardiana	10.34	7.50	12.491	580	24.276
Albizia rechardiana	12.73	7.50	16.523	580	31.933
Albizia rechardiana	10.44	7.50	27.749	580	53.899
Albizia rechardiana	10.98	7.00	20.176	580	40.497
Albizia rechardiana	11.14	7.00	18.483	580	37.097
Albizia rechardiana	29.65	14.00	233.449	580	333.274
Albizia rechardiana	30.23	14.00	215.085	580	307.763
Albizia rechardiana	44.23	23.00	711.977	580	864.791
Albizia rechardiana	36.75	25.50	442.373	580	515.660
Albizia rechardiana	34.52	24.50	403.285	580	474.276
Albizia rechardiana	41.68	20.00	510.315	580	647.288
Albizia rechardiana	28.95	16.00	211.629	580	283.696
Albizia rechardiana	60.45	23.50	954.745	580	1208.715
Albizia rechardiana	39.13	20.00	437.942	580	551.167
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia rechardiana	41.04	19.50	549.742	580	702.923
Albizia rechardiana	35.00	28.00	477.325	580	545.659
Albizia rechardiana	41.68	20.00	522.062	580	662.188
Albizia rechardiana	50.91	22.00	766.637	580	965.834
Albizia rechardiana	42.00	22.50	557.835	580	678.695
Albizia rechardiana	33.09	19.00	356.606	580	450.931
Albizia rechardiana	32.71	24.50	392.976	580	462.453
Albizia rechardiana	43.59	27.00	627.327	580	726.581
Albizia rechardiana	33.09	20.00	386.863	580	480.863
Albizia rechardiana	35.63	23.00	386.197	580	461.715
Albizia rechardiana	39.77	16.50	396.954	580	545.115
Albizia rechardiana	44.86	26.00	628.674	580	736.955
Albizia rechardiana	43.91	18.00	466.582	580	625.287
Albizia rechardiana	40.41	18.00	537.250	580	709.367
Albizia rechardiana	38.82	24.00	448.119	580	531.466
Albizia rechardiana	39.45	16.50	418.453	580	573.772
Albizia rechardiana	42.32	21.00	456.391	580	569.302
Albizia rechardiana	33.41	22.00	351.825	580	425.187
Albizia rechardiana	36.91	18.00	406.374	580	529.679
Albizia rechardiana	35.00	16.00	326.574	580	445.755
Albizia rechardiana	47.41	21.00	699.287	580	886.953
Albizia rechardiana	38.82	19.00	399.726	580	512.717
Albizia saman	44.2	16.5	690.300	590	969.430
Albizia saman	22.9	14	223.610	590	315.676
Albizia saman	26.2	15	233.640	590	320.546
Albizia saman	21.6	9	113.870	590	204.068
Albizia saman	36.9	14.5	378.190	590	549.063
Albizia saman	64	22	1147.550	590	1514.894
Albizia saman	52.5	25	955.210	590	1153.702
Albizia saman	37.9	15	348.100	590	498.429
Albizia saman	37.9	16	469.050	590	648.566
Albizia saman	29.6	10	231.870	590	411.928
Albizia saman	50.9	16	1004.770	590	1492.505
Albizia saman	42	18	702.690	590	933.928
Albizia saman	73.2	25	1752.890	590	2248.456
Albizia saman	41.4	15	417.720	590	610.356
Albizia saman	41.4	14.5	428.340	590	639.192
Albizia saman	63.7	16	988.840	590	1583.156
Albizia saman	56	12	775.850	590	1505.545
Albizia saman	71.1	20	1264.960	590	1807.513
Albizia saman	53.5	20	658.440	590	873.805
Albizia saman	69.6	16	1400.070	590	2318.191
Albizia saman	62.4	20	1162.300	590	1601.259
Albizia saman	43.2	13	470.820	590	767.689
Albizia saman	36	11	249.570	590	436.416
Albizia saman	17.5	5.5	37.170	590	97.606
Albizia saman	49	10	614.780	590	1345.299
Albizia saman	18.3	6.5	67.260	590	151.782
Albizia saman	40.9	9.5	372.880	590	786.987

Albizia saman	15.6	10	66.080	590	109.737
Albizia saman	28.6	11	187.030	590	306.745
Albizia saman	34.3	7.5	205.320	590	514.785
Albizia saman	26.9	9	141.010	590	265.779
Albizia saman	40.6	8	295.000	590	751.552
Albizia saman	14.3	8	42.480	590	79.255
Albizia saman	16.3	10.5	51.330	590	83.177
Albizia saman	16.2	8	40.120	590	75.300
Albizia saman	28	11	187.030	590	305.389
Albizia saman	29.2	8.5	175.820	590	358.646
Albizia saman	49.3	15	486.160	590	746.494
Albizia saman	47.4	18	540.440	590	735.988
Albizia saman	34.7	11.5	230.100	590	383.994
Albizia saman	21.6	12	139.240	590	210.404
Albizia saman	9.1	6	12.390	590	27.018
Albizia saman	11.5	9	31.860	590	56.841
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia saman	41.4	12	329.220	590	563.122
Albizia saman	39.2	14	421.850	590	634.661
Albizia saman	55.7	15	706.820	590	1131.045
Albizia saman	21.4	14	134.520	590	190.482
Albizia saman	41.7	14	479.080	590	732.925
Albizia saman	37.6	13	362.260	590	566.170
Aphanamixis polystachya	21.6	10.5	109.120	620	176.959
Aphanamixis polystachya	13.5	5	31.000	620	82.384
Aphanamixis polystachya	5.1	4.5	3.720	620	9.242
Aphanamixis polystachya	15	8	63.860	620	119.314
Aphanamixis polystachya	11	6	27.900	620	61.448
Aphanamixis polystachya	9.3	3	11.780	620	47.694
Aphanamixis polystachya	24.8	8	114.080	620	232.689
Aphanamixis polystachya	25.5	10	164.920	620	282.483
Aphanamixis polystachya	15.6	12	52.080	620	80.508
Aphanamixis polystachya	24.8	14	140.740	620	198.594
Aphanamixis polystachya	39.8	22	513.360	620	625.979
Aphanamixis polystachya	29.6	10	231.260	620	410.844
Aphanamixis polystachya	9.5	6.5	14.260	620	29.795
Aphanamixis polystachya	8.3	6.5	11.780	620	24.693
Aphanamixis polystachya	6.4	7	4.960	620	10.308
Aphanamixis polystachya	7.6	6.5	10.540	620	22.184
Aphanamixis polystachya	6.4	5.5	4.340	620	9.866
Aphanamixis polystachya	25.1	16	164.920	620	220.844
Aphanamixis polystachya	21.6	11.5	217.620	620	335.829
Aphanamixis polystachya	27.4	13	212.040	620	311.906
Aphanamixis polystachya	38.6	13.5	318.060	620	488.030
Aphanamixis polystachya	34	21	435.240	620	533.328
Aphanamixis polystachya	38	21	533.200	620	657.643
Aphanamixis polystachya	18.5	10	64.480	620	106.677
Aphanamixis polystachya	23.1	13	182.900	620	266.444
Aphanamixis polystachya	14.8	9.5	65.720	620	112.080
Aphanamixis polystachya	30	14	262.880	620	375.805
Aphanamixis polystachya	10.9	9	33.480	620	60.117
Aphanamixis polystachya	9.3	7.5	26.660	620	52.197
Aphanamixis polystachya	7.8	8	16.740	620	32.657
Aphanamixis polystachya	5.4	5	6.820	620	16.166
Aphanamixis polystachya	15.4	9	67.580	620	118.200
Aphanamixis polystachya	29.2	12	204.600	620	318.107
Aphanamixis polystachya	23.7	11	172.980	620	275.279
Aphanamixis polystachya	5.9	5.5	3.100	620	7.054
Aphanamixis polystachya	8.1	6	13.020	620	28.363
Aphanamixis polystachya	14.8	8	45.880	620	85.678
Aphanamixis polystachya	14.3	12	48.360	620	75.765
Aphanamixis polystachya	23.7	10.5	117.800	620	192.885
Artocarpus heterophylus	8.2	4	10.440	580	29.902
Artocarpus heterophylus	10.8	6	11.600	580	25.510
Artocarpus heterophylus	21.5	14	142.100	580	201.158
Artocarpus heterophylus	8.4	4	10.440	580	30.077

Artocarpus heterophylus	22.8	11	106.140	580	168.294
Artocarpus heterophylus	12.6	6.5	41.760	580	88.168
Artocarpus heterophylus	8.8	5	12.180	580	29.699
Artocarpus heterophylus	10.7	5	18.560	580	46.635
Artocarpus heterophylus	32.1	6	187.340	580	598.825
Artocarpus heterophylus	19.3	9.5	92.220	580	157.397
Artocarpus heterophylus	16.9	6	52.780	580	125.545
Artocarpus heterophylus	42.5	11	347.420	580	646.901
Artocarpus heterophylus	13.8	9	38.280	580	67.216
Artocarpus heterophylus	13	10.5	86.420	580	143.498
Artocarpus heterophylus	15.7	9.5	62.640	580	106.544
Artocarpus heterophylus	19.3	10.5	95.700	580	154.393
Artocarpus heterophylus	22.6	10.5	156.600	580	254.995
Artocarpus heterophylus	28.6	11	155.440	580	254.935
Artocarpus heterophylus	22.3	10	108.460	580	181.790
Artocarpus heterophylus	10.5	6	16.820	580	36.914
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Artocarpus heterophylus	19.4	6	60.900	580	151.499
Artocarpus heterophylus	25.1	7.5	133.400	580	290.516
Artocarpus heterophylus	19.4	6	84.680	580	210.656
Artocarpus heterophylus	35.3	8.5	218.660	580	483.543
Artocarpus heterophylus	8.9	5	12.760	580	31.156
Artocarpus heterophylus	26.1	11	175.740	580	283.301
Artocarpus heterophylus	23.9	8	132.820	580	267.843
Artocarpus heterophylus	29.3	14	213.440	580	304.303
Artocarpus heterophylus	27.1	12	143.260	580	220.103
Artocarpus heterophylus	24.3	12	104.980	580	159.425
Artocarpus heterophylus	43.7	12.5	423.400	580	714.579
Artocarpus heterophylus	55.4	9	636.260	580	1687.048
Artocarpus heterophylus	30.9	8	109.040	580	241.881
Artocarpus heterophylus	30.9	8	158.340	580	351.242
Artocarpus heterophylus	7.8	5	8.700	580	20.956
Artocarpus heterophylus	39.5	12	375.840	580	632.441
Artocarpus heterophylus	36.4	11.5	320.160	580	542.239
Artocarpus heterophylus	29.4	12.5	281.300	580	427.058
Artocarpus heterophylus	27.2	12	212.860	580	327.203
Artocarpus heterophylus	13.2	4.5	37.120	580	109.082
Artocarpus heterophylus	21.6	10	91.640	580	153.045
Artocarpus heterophylus	15.9	8	48.140	580	90.229
Artocarpus heterophylus	15.9	8	48.140	580	90.229
Artocarpus heterophylus	37.9	12.5	294.060	580	473.550
Artocarpus heterophylus	11.1	4.5	15.080	580	41.950
Artocarpus heterophylus	21.1	8	85.840	580	167.574
Artocarpus heterophylus	23.6	14	144.420	580	203.764
Artocarpus heterophylus	18	10.5	73.660	580	118.854
Artocarpus heterophylus	5.9	3	4.060	580	13.742
Artocarpus heterophylus	8.6	3.5	8.700	580	28.661
Artocarpus heterophylus	22.9	7	81.200	580	183.190
Lannea coromandelica	38.2	9	385.270	495	832.678
Lannea coromandelica	15.7	7.5	98.530	495	192.545
Lannea coromandelica	33.1	9.5	282.610	495	544.623
Lannea coromandelica	30.9	8.5	276.710	495	577.073
Lannea coromandelica	15.9	6	31.860	495	74.545
Lannea coromandelica	19.5	9	92.040	495	162.677
Lannea coromandelica	28	11.5	233.050	495	369.482
Lannea coromandelica	22.3	10	123.310	495	206.680
Lannea coromandelica	30.9	9.5	299.130	495	562.367
Lannea coromandelica	29.3	13	240.720	495	357.045
Lannea coromandelica	12.1	9.5	27.730	495	48.181
Lannea coromandelica	16.3	12	79.060	495	121.512
Lannea coromandelica	22.9	10	125.670	495	211.365
Lannea coromandelica	33.3	8.5	217.710	495	468.721
Lannea coromandelica	27.1	8	145.140	495	305.236
Lannea coromandelica	20.7	7	83.190	495	181.565
Lannea coromandelica	28.5	11	173.460	495	284.276
Lannea coromandelica	26	13.5	145.730	495	209.429

Lannea coromandelica	19.1	10	85.550	495	141.659
Lannea coromandelica	14.9	10.5	58.410	495	95.362
Lannea coromandelica	13.1	8	32.450	495	60.535
Lannea coromandelica	9.4	5	14.160	495	34.825
Lannea coromandelica	16.9	8	43.070	495	81.140
Lannea coromandelica	10.8	6	17.110	495	37.628
Lannea coromandelica	21.5	8	98.530	495	193.177
Lannea coromandelica	11.1	8	14.750	495	27.719
Lannea coromandelica	16.6	6	39.530	495	93.554
Mengifera indica	62.7	14	682.560	540	1209.771
Mengifera indica	46.8	9	645.840	540	1551.187
Mengifera indica	43.9	9.5	464.400	540	1014.914
Mengifera indica	47.1	12	651.780	540	1171.653
Mengifera indica	22.2	9	116.100	540	209.053
Mengifera indica	17.8	8.5	56.160	540	102.127
Mengifera indica	29.3	12	239.220	540	372.165
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Mengifera indica	11.1	4.8	17.280	540	45.307
Mengifera indica	9.5	6	18.900	540	41.267
Mengifera indica	39.2	13.5	464.940	540	716.388
Mengifera indica	26.6	10	249.480	540	431.196
Mengifera indica	39.9	11	342.900	540	622.493
Mengifera indica	37.2	14	338.040	540	502.098
Mengifera indica	39.8	8	298.620	540	752.305
Mengifera indica	21.5	8	92.340	540	181.041
Mengifera indica	15.5	9	38.880	540	67.997
Mengifera indica	14.5	8	21.600	540	40.312
Mengifera indica	38.2	13	283.500	540	445.026
Mengifera indica	38.8	13	354.780	540	559.393
Mengifera indica	36.3	14	311.040	540	459.440
Mengifera indica	12.7	8.5	35.640	540	64.585
Mengifera indica	42.3	10	441.720	540	898.996
Mengifera indica	18.1	9	55.080	540	96.731
Mengifera indica	28	10	193.320	540	338.289
Mengifera indica	27.7	12	248.400	540	382.847
Mengifera indica	15.3	7	38.340	540	78.457
Mengifera indica	31	10.5	235.980	540	408.716
Mengifera indica	47.8	12	421.200	540	761.793
Mengifera indica	44.3	8	333.180	540	893.087
Mengifera indica	12.2	5	54.540	540	141.021
Mengifera indica	27.7	10	136.620	540	238.420
Mengifera indica	21	11.5	95.040	540	146.571
Mengifera indica	36.2	14	342.360	540	505.397
Mengifera indica	54.7	15	540.540	540	859.416
Mengifera indica	20.8	9.5	113.940	540	195.787
Mengifera indica	19.4	11	84.240	540	132.745
Mengifera indica	7.2	7.5	54.540	540	109.583
Mengifera indica	7.6	6.5	27.540	540	57.966
Mengifera indica	19.9	10	77.760	540	129.008
Mengifera indica	54.4	16	898.560	540	1362.510
Mengifera indica	13.4	6	27.000	540	60.946
Mengifera indica	41.3	13.5	345.600	540	540.518
Mengifera indica	33.1	14	280.800	540	407.289
Mengifera indica	14.3	6	31.320	540	71.545
Mengifera indica	27.1	10	236.520	540	410.563
Mengifera indica	35	10.5	325.620	540	586.221
Mengifera indica	38.2	15	279.720	540	401.186
Swietenia macrophylla	7.8	8.5	7.500	500	14.380
Swietenia macrophylla	24	13	117.500	500	171.301
Swietenia macrophylla	21.6	15	103.000	500	142.244
Swietenia macrophylla	14	10	33.000	500	55.289
Swietenia macrophylla	12.2	8.5	22.500	500	40.880
Swietenia macrophylla	9.5	8	15.000	500	28.580
Swietenia macrophylla	15.1	10	39.500	500	65.740
Swietenia macrophylla	30.2	18	237.000	500	304.334
Swietenia macrophylla	51.6	20	385.500	500	507.607

Swietenia macrophylla	30.6	12.5	195.000	500	298.121
Swietenia macrophylla	38.4	14.5	300.000	500	439.406
Swietenia macrophylla	45.7	18	427.500	500	577.585
Swietenia macrophylla	40.1	17	291.000	500	394.263
Swietenia macrophylla	38.5	15	261.500	500	375.685
Swietenia macrophylla	31.7	15	195.000	500	271.071
Swietenia macrophylla	11.8	8.5	21.000	500	38.252
Swietenia macrophylla	10	6	8.500	500	18.601
Swietenia macrophylla	7.6	7	7.000	500	14.316
Swietenia macrophylla	9.3	11	20.000	500	34.896
Swietenia macrophylla	8.5	9.5	19.500	500	35.814
Swietenia macrophylla	5	8	4.500	500	9.340
Swietenia macrophylla	15	9.5	44.000	500	74.983
Swietenia macrophylla	15.1	12	55.000	500	85.424
Swietenia macrophylla	15.7	12	66.000	500	101.936
Swietenia macrophylla	8.6	9	16.000	500	29.744
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Swietenia macrophylla	7.4	6	11.000	500	23.993
Swietenia macrophylla	15.2	10	46.000	500	76.521
Swietenia macrophylla	10.4	8.5	25.500	500	47.026
Swietenia macrophylla	14.6	9.5	46.500	500	79.366
Swietenia macrophylla	32.8	13	264.000	500	399.327
Swietenia macrophylla	13.1	8	31.000	500	57.830
Swietenia macrophylla	34.2	16	237.500	500	323.145
Swietenia macrophylla	20.9	12.5	99.500	500	147.622
Swietenia macrophylla	18.9	12.5	78.000	500	116.329
Swietenia macrophylla	13.8	8.5	31.500	500	56.876
Swietenia macrophylla	13.5	8.5	18.000	500	32.524
Swietenia macrophylla	14.1	6.5	32.000	500	68.431
Swietenia macrophylla	10.8	5	16.500	500	41.533
Swietenia macrophylla	10.8	5.5	17.500	500	40.889
Swietenia macrophylla	12.7	6.5	22.500	500	47.538
Syzygium cumini	48.4	13	662.445	701	1125.052
Syzygium cumini	12.1	6	69.399	701	154.356
Syzygium cumini	23.9	7.5	174.549	701	373.626
Syzygium cumini	15.8	7.5	63.791	701	124.740
Syzygium cumini	11.1	6	32.246	701	71.076
Syzygium cumini	14.5	8	53.977	701	100.736
Syzygium cumini	18.4	8	95.336	701	181.478
Syzygium cumini	14.6	5.5	42.060	701	104.297
Syzygium cumini	15.3	7	56.080	701	114.759
Syzygium cumini	22.9	7.5	126.881	701	267.838
Syzygium cumini	13.4	5	37.854	701	100.380
Syzygium cumini	14	4.5	67.296	701	202.125
Syzygium cumini	23.9	9	175.951	701	321.602
Syzygium cumini	8	4.5	16.123	701	41.838
Syzygium cumini	33.7	11	406.580	701	695.996
Syzygium cumini	22.9	7	124.077	701	279.922
Syzygium cumini	17.8	7.5	105.851	701	210.358
Syzygium cumini	39.2	10	394.663	701	776.288
Syzygium cumini	25.1	8	208.197	701	426.309
Syzygium cumini	25.8	7.5	178.755	701	393.319
Syzygium cumini	23.9	9	138.798	701	253.694
Syzygium cumini	24.2	12.5	266.380	701	395.952
Syzygium cumini	31.4	11	353.304	701	592.663
Syzygium cumini	20.1	7.5	64.492	701	131.346
Syzygium cumini	28	12	235.536	701	363.622
Syzygium cumini	21.9	13	166.137	701	242.090
Syzygium cumini	40.7	17.5	685.578	701	918.307
Syzygium cumini	34.8	14.5	430.414	701	617.684
Syzygium cumini	49	10	549.584	701	1202.633
Syzygium cumini	15.6	7.5	73.605	701	143.746
Syzygium cumini	26.7	13.5	218.712	701	314.857
Syzygium cumini	53.2	13.5	738.854	701	1262.120
Syzygium cumini	7.5	5	9.113	701	21.884
Syzygium cumini	12.5	8.5	39.256	701	71.207

Syzygium cumini	28.4	15	267.081	701	367.585
Syzygium cumini	34.8	14	346.294	701	507.002
Syzygium cumini	17.7	10	74.306	701	122.890
Syzygium cumini	17.8	10.5	84.120	701	135.766
Syzygium cumini	11.8	7	32.246	701	64.756
Syzygium cumini	44.6	12.5	368.025	701	625.754
Syzygium cumini	29.9	15.5	288.111	701	392.210
Syzygium cumini	15.9	8	79.914	701	149.784
Syzygium cumini	24.1	12	166.838	701	253.211
Syzygium cumini	25.5	12	215.207	701	328.225
Syzygium cumini	9.9	5	23.834	701	59.077
Syzygium cumini	9	6	23.133	701	50.433
Syzygium cumini	17.4	10.5	76.409	701	123.406
Syzygium cumini	24.8	11	158.426	701	253.480
Syzygium cumini	28.6	14	222.217	701	316.041
Syzygium cumini	8.6	5	15.422	701	37.504
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Syzygium cumini	20.1	14	113.562	701	161.588
Syzygium cumini	47	16	676.465	701	982.285
Albezia procera	29.91	16.50	473.594	730	628.031
Albezia procera	17.50	9.50	82.376	730	139.996
Albezia procera	41.43	18.00	530.049	730	702.777
Albezia procera	35.06	18.00	459.180	730	595.123
Albezia procera	30.86	10.00	266.416	730	479.260
Albezia procera	45.18	18.50	668.270	730	888.763
Albezia procera	13.27	8.00	41.233	730	76.907
Albezia procera	41.04	21.00	774.090	730	962.058
Albezia procera	16.07	11.00	82.545	730	131.316
Albezia procera	9.93	6.00	14.413	730	31.529
Albezia procera	8.27	6.00	10.232	730	22.289
Albezia procera	19.60	13.00	119.213	730	174.640
Albezia procera	19.09	9.00	92.029	730	162.311
Albezia procera	20.68	7.00	92.804	730	202.490
Albezia procera	29.91	12.00	211.561	730	330.409
Albezia procera	16.45	7.50	59.728	730	117.336
Albezia procera	19.57	9.50	63.026	730	107.679
Albizia rechardiana	16.86	12.00	75.795	580	116.037
Albizia rechardiana	8.91	9.00	16.258	580	30.053
Albizia rechardiana	24.18	17.00	110.993	580	145.969
Albizia rechardiana	20.62	15.00	116.774	580	161.980
Albizia rechardiana	61.09	28.00	1323.925	580	1575.293
Albizia rechardiana	25.45	17.00	198.736	580	260.592
Albizia rechardiana	37.07	19.50	452.136	580	571.207
Albizia rechardiana	20.17	17.00	122.755	580	164.819
Albizia rechardiana	24.34	17.00	190.962	580	251.025
Albizia rechardiana	43.75	25.00	726.245	580	858.827
Albizia rechardiana	36.88	22.00	475.936	580	577.148
Albizia rechardiana	34.52	19.50	339.130	580	426.009
Albizia rechardiana	28.32	18.00	244.541	580	313.852
Albizia rechardiana	50.91	25.00	1050.760	580	1263.724
Albizia rechardiana	32.77	16.00	400.100	580	541.572
Albizia rechardiana	30.23	19.00	335.650	580	423.289
Albizia rechardiana	26.73	10.00	134.920	580	233.444
Albizia rechardiana	17.56	9.00	65.294	580	114.469
Albizia rechardiana	10.50	7.00	22.587	580	45.362
Albizia rechardiana	12.54	9.00	35.710	580	63.150
Albizia rechardiana	5.09	4.00	3.444	580	9.110
Albizia rechardiana	9.23	6.00	9.494	580	20.711
Albizia rechardiana	38.37	23.00	417.674	580	501.018
Albizia rechardiana	17.82	14.00	89.413	580	129.078
Albizia rechardiana	50.91	22.00	687.113	580	865.648
Albizia rechardiana	29.11	22.00	201.247	580	243.879
Albizia rechardiana	5.73	4.00	4.852	580	13.017
Albizia rechardiana	7.00	5.00	8.298	580	19.837
Albizia rechardiana	8.91	4.50	11.839	580	31.294
Albizia rechardiana	23.86	18.50	139.488	580	179.306

Albizia rechardiana	41.36	20.00	612.144	580	775.644
Albizia rechardiana	24.75	17.00	217.408	580	285.486
Albizia rechardiana	12.89	8.50	32.565	580	58.965
Albizia rechardiana	33.88	18.00	349.927	580	452.128
Albizia rechardiana	17.18	13.00	71.396	580	106.049
Albizia rechardiana	28.16	16.50	217.969	580	288.438
Albizia rechardiana	10.09	6.00	20.376	580	44.608
Albizia rechardiana	13.71	10.00	43.468	580	72.986
Albizia rechardiana	13.04	9.00	32.074	580	56.532
Albizia rechardiana	17.47	8.50	66.278	580	120.333
Albizia rechardiana	19.98	13.00	137.114	580	200.589
Albizia rechardiana	41.68	25.00	596.378	580	702.563
Albizia rechardiana	17.34	14.00	80.064	580	116.055
Albizia rechardiana	26.73	19.00	221.450	580	280.088
Albizia rechardiana	38.02	19.00	416.390	580	532.757
Albizia rechardiana	29.94	12.00	281.551	580	439.810
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Albizia rechardiana	37.73	13.00	359.396	580	562.245
Albizia rechardiana	30.73	12.50	234.546	580	358.876
Albizia rechardiana	44.51	26.00	505.494	580	592.167
Albizia rechardiana	23.23	26.00	250.197	580	302.381
Albizia rechardiana	22.18	24.50	166.036	580	204.189
Albizia rechardiana	22.05	25.00	164.542	580	202.009
Albizia rechardiana	11.61	9.50	27.253	580	47.603
Albizia rechardiana	12.57	13.50	51.345	580	80.118
Albizia rechardiana	11.71	9.50	30.366	580	52.983
Albizia rechardiana	8.30	10.00	16.154	580	29.445
Albizia rechardiana	42.35	23.50	752.215	580	903.350
Albizia rechardiana	11.07	10.00	26.872	580	46.476
Albizia rechardiana	24.98	16.00	193.058	580	258.564
Albizia rechardiana	44.23	18.00	605.726	580	812.914
Albizia rechardiana	40.88	27.00	572.374	580	660.550
Albizia rechardiana	31.94	18.00	334.574	580	430.569
Albizia rechardiana	17.44	14.00	75.028	580	108.663
Albizia rechardiana	7.45	6.00	61.503	580	134.130
Albizia rechardiana	12.73	9.00	31.328	580	55.328
Albizia rechardiana	19.25	9.00	104.075	580	183.704
Albizia rechardiana	45.98	31.00	830.819	580	935.691
Albizia rechardiana	37.23	14.00	231.603	580	344.060
Albizia rechardiana	8.75	6.50	17.061	580	35.699
Albizia rechardiana	12.41	8.00	29.292	580	54.721
Albizia rechardiana	33.88	25.00	357.140	580	418.117
Albizia rechardiana	39.77	30.00	645.818	580	728.358
Albizia rechardiana	37.54	22.00	468.972	580	569.319
Albizia rechardiana	38.50	26.50	437.322	580	505.779
Albizia rechardiana	35.63	18.00	332.806	580	432.051
Albizia saman	62.4	20	1012.440	590	1394.802
Albizia saman	30.2	10	206.500	590	369.024
Albizia saman	66.8	20	1381.190	590	1938.431
Albizia saman	39.9	13	447.220	590	710.979
Albizia saman	15.6	7.5	54.280	590	106.005
Albizia saman	31.2	9.5	224.200	590	422.901
Albizia saman	10.1	10	15.340	590	26.952
Albizia saman	36.9	16	360.490	590	496.130
Albizia saman	27.4	12	234.820	590	361.336
Albizia saman	23.6	12	147.500	590	223.558
Albizia saman	7.8	6	5.900	590	12.857
Albizia saman	42.7	16	624.220	590	884.762
Aphanamixis polystachya	29.6	6	138.880	620	422.767
Aphanamixis polystachya	12.8	7	26.660	620	53.689
Aphanamixis polystachya	12.1	6.5	32.860	620	69.151
Aphanamixis polystachya	17.5	12	96.100	620	146.566
Aphanamixis polystachya	14.6	8	34.100	620	63.652
Aphanamixis polystachya	30.6	15	280.240	620	388.043
Aphanamixis polystachya	43.9	26	604.500	620	707.358
Aphanamixis polystachya	29.4	14	344.100	620	490.769

Aphanamixis polystachya	14.8	9.5	63.860	620	108.908
Artocarpus heterophyllus	24.8	9	147.320	580	271.628
Artocarpus heterophyllus	29.6	10	146.160	580	259.660
Artocarpus heterophyllus	26.1	8.5	163.560	580	321.008
Artocarpus heterophyllus	46	9	330.600	580	786.472
Artocarpus heterophyllus	27.1	10	154.280	580	267.807
Artocarpus heterophyllus	25.1	7.5	143.840	580	313.252
Artocarpus heterophyllus	23.2	9	126.440	580	229.627
Artocarpus heterophyllus	10.9	6	18.560	580	40.847
Artocarpus heterophyllus	34.1	12	317.840	580	511.610
Artocarpus heterophyllus	21.6	10.5	100.340	580	162.721
Artocarpus heterophyllus	15.8	10	52.780	580	87.585
Artocarpus heterophyllus	29.9	13	212.280	580	315.810
Artocarpus heterophyllus	26.9	10	132.820	580	230.155
Lannea coromandelica	18.1	7.6	75.520	495	148.983
Lannea coromandelica	31.8	7.5	254.880	495	614.764
Species	DBH (cm)	Total height (m)	Oven-dry biomass of stem (kg)	Wood density (Kg/m3)	Total above-ground (kg)
Lannea coromandelica	36.3	15	394.710	495	560.334
Lannea coromandelica	14.9	10.5	58.410	495	95.362
Lannea coromandelica	16.6	10.5	64.900	495	105.049
Lannea coromandelica	9.2	5	12.390	495	30.382
Lannea coromandelica	8.3	6.5	10.030	495	21.024
Mengifera indica	60.5	15	889.920	540	1468.384
Mengifera indica	41.1	8	391.500	540	1004.367
Mengifera indica	23.8	13	203.580	540	296.725
Mengifera indica	21	9.5	104.760	540	180.209
Mengifera indica	27.5	12	170.100	540	261.885
Mengifera indica	33.1	8.5	180.360	540	387.272
Mengifera indica	31.2	7.2	175.500	540	439.324
Mengifera indica	17.7	6.5	96.120	540	214.983
Mengifera indica	12.8	8.5	65.340	540	118.353
Mengifera indica	16.9	10	76.680	540	126.900
Mengifera indica	35	9	250.560	540	520.279
Mengifera indica	40.7	15	460.080	540	669.446
Swietenia macrophylla	16.6	13	64.000	500	95.523
Swietenia macrophylla	29	14	234.000	500	333.255
Swietenia macrophylla	39.5	20	415.500	500	523.472
Swietenia macrophylla	27.4	16	183.500	500	245.570
Swietenia macrophylla	44.2	16	389.000	500	555.953
Swietenia macrophylla	4.8	8	3.500	500	7.305
Swietenia macrophylla	13.1	7	24.000	500	48.394
Swietenia macrophylla	14	11	40.000	500	64.675
Swietenia macrophylla	11.6	6	14.000	500	30.990
Syzygium cumini	21.6	9	193.476	701	346.731
Syzygium cumini	17.8	7	93.233	701	195.797
Syzygium cumini	21.6	9.5	143.705	701	248.075
Syzygium cumini	18.5	6	103.047	701	252.119
Syzygium cumini	20.7	7.5	141.602	701	290.478
Syzygium cumini	22.3	11	254.463	701	402.784
Syzygium cumini	44.2	10	475.278	701	987.619
Syzygium cumini	39.8	13.5	598.654	701	926.318
Syzygium cumini	14	11	52.575	701	85.008
Syzygium cumini	43.2	12.5	496.308	701	834.184
Syzygium cumini	21	10	117.768	701	196.150
Syzygium cumini	14.7	9.5	40.658	701	69.366
Syzygium cumini	13.8	6	49.070	701	111.334

Annex 4: Processed biomass data of the Sundarbans zone

Species	DBH (cm)	TH (m)	WD (kg/m ³)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
S. casuaralis	14.6	10.5	389	2.243134	20.85876	33.69837	56.80026	27.49982
S. casuaralis	16.4	10.1	389	4.741459	58.19409	39.01898	101.9545	48.99987
S. casuaralis	16	10.5	389	2.773525	37.51384	32.0524	72.33977	34.85418
S. casuaralis	5.3	6	389	0.305372	2.002055	2.766712	5.074139	2.449538
S. casuaralis	18.4	10.7	389	6.04314	81.6137	51.57057	139.2274	66.89972
S. casuaralis	6.5	6.4	389	0.474834	3.661138	3.904086	8.040058	3.874032
S. casuaralis	14	9.5	389	2.311742	30.52338	25.67788	58.513	28.18623
S. casuaralis	7.5	7.6	389	0.495917	5.391247	5.841968	11.72913	5.659996
S. casuaralis	16.4	12.2	389	2.739206	34.23	46.11196	83.08116	40.19029
S. casuaralis	22.8	13.1	389	5.95175	81.849	90.33757	178.1383	86.03667
S. casuaralis	12.5	11.6	389	1.569118	15.74156	24.17921	41.48989	20.08257
A. cuculata	6.7	5.9	600	0.577209	2.719293	7.526722	10.82322	5.298538
A. cuculata	10.6	9.6	600	1.953021	8.818475	29.20974	39.98124	19.60754
A. cuculata	5.4	6.6	600	0.599672	2.394423	3.902801	6.896896	3.350758
A. cuculata	10.8	8.2	600	1.743964	9.292479	30.14855	41.18499	20.20736
A. cuculata	15.5	11.2	600	3.510792	29.11217	65.37606	97.99902	47.97108
A. cuculata	10	10.3	600	1.82684	10.03725	28.55908	40.42317	19.80867
A. cuculata	10.2	8.6	600	1.560628	7.746502	24.5515	33.85863	16.60394
A. cuculata	9.7	7.4	600	1.614519	9.368458	21.98937	32.97235	16.12667
A. cuculata	6.6	7.2	600	0.960756	4.174578	8.446957	13.58229	6.621297
A. cuculata	5	7.1	600	0.519068	2.166789	5.417033	8.10289	3.959603
A. cuculata	13	9.3	600	3.240255	21.13629	44.23503	68.61157	33.52986
A. cuculata	4.1	4.8	600	0.367179	0.901966	3.057634	4.326779	2.114992
A. cuculata	3.2	4.2	600	0.213505	0.328706	2.076396	2.618607	1.284957
B. sexangula	18.3	10.5	764	9.29027	74.13856	134.7498	218.1786	108.2961
B. sexangula	4.7	5.2	764	0.805188	2.672345	4.35989	7.837423	3.86586
B. sexangula	4.3	4.1	764	0.6934	2.586928	2.743733	6.02406	2.954803
B. sexangula	26.4	14.4	764	13.78886	134.9431	378.156	526.888	263.0295
B. sexangula	16.6	15	764	5.301724	26.03614	147.0451	178.383	89.49033
B. sexangula	6.7	5	764	1.177752	4.759417	10.3695	16.30667	8.088063
B. sexangula	3	4.4	764	0.213648	0.5809	1.781071	2.575619	1.280186
B. sexangula	5.2	7.4	764	1.687088	5.100159	6.185102	12.97235	6.364307
B. sexangula	18	7.2	764	10.35965	65.30911	56.40389	132.0727	64.82338
B. sexangula	9.3	5.6	764	3.359789	13.44319	17.87275	34.67573	17.07554
B. sexangula	30.3	11.7	764	16.77082	175.9067	365.5857	558.2632	277.7916
B. sexangula	16.2	8.9	764	7.542557	38.46531	94.41417	140.422	69.8425
B. sexangula	4.5	5.7	764	0.225848	0.66445	5.260829	6.151126	3.089265
B. sexangula	25.1	10.5	764	15.98152	112.5405	227.4133	355.9353	176.8332
B. sexangula	28.4	11.3	764	14.47341	119.2584	293.2638	426.9956	212.7554
B. sexangula	25.7	9.67	764	22.79732	148.2608	214.1237	385.1818	190.4461
B. sexangula	12.8	7.2	764	3.490398	19.37251	49.60424	72.46715	36.07545
B. sexangula	22	11.9	764	6.880362	71.87534	184.3731	263.1288	131.2501
L. racemosa	8.5	5.1	710	1.734893	8.298006	11.19913	21.23203	10.16551
L. racemosa	7	4.8	710	1.11827	5.140965	9.337755	15.59699	7.51151
L. racemosa	7.7	5.1	710	0.968949	4.068956	11.14791	16.18582	7.852837
L. racemosa	3.9	4.8	710	0.135494	0.438921	2.442152	3.016567	1.477996
L. racemosa	11	5.3	710	3.138447	14.68272	27.2299	45.05107	21.70653
L. racemosa	4.7	5.6	710	0.335025	1.184959	3.903345	5.423329	2.638051

L. racemosa	15.7	7.2	710	6.817676	36.134	55.94874	98.90041	47.49757
L. racemosa	3.5	4	710	0.163144	0.64233	1.752918	2.558393	1.240932
L. racemosa	9.2	4.8	710	1.422129	6.340876	10.95849	18.72149	9.006616
R. apiculata	11.1	8.3	814	6.413029	33.8605	21.1854	61.45893	29.87264
R. apiculata	12.4	8.3	814	3.906322	17.62159	16.66069	38.18859	18.66536
R. apiculata	13.5	7.8	814	5.878575	26.66658	28.10115	60.6463	29.69942
R. apiculata	7.2	6.4	814	1.068476	3.157895	5.221662	9.448033	4.646546
R. apiculata	9	6.7	814	2.874547	9.500373	9.117898	21.49282	10.47677
A. marina	4.4	4.3	648	0.16257	0.647493	2.64602	3.456082	1.699077
A. marina	13.5	8.9	648	4.622141	27.50805	40.08388	72.21408	35.15834
A. marina	7	6.1	648	0.809182	4.178175	8.06341	13.05077	6.370763
A. marina	11.6	8.4	648	2.897613	17.53582	29.00298	49.43641	24.10996
A. marina	7.5	7.2	648	0.383685	1.635327	37.87084	39.88985	19.81422
A. marina	4.1	4.2	648	0.229976	1.045997	2.318213	3.594186	1.756083
A. marina	3.7	4.6	648	0.099664	0.340632	0.78399	1.224286	0.597167
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
A. marina	5.7	5.2	648	0.649984	3.293938	4.222455	8.166377	3.964585
A. marina	17.9	9.8	648	9.259314	69.84684	84.60451	163.7107	79.63563
A. marina	7.7	8	648	0.591449	2.729504	10.9068	14.22775	6.99818
A. marina	7.8	7.1	648	0.881805	4.451122	10.54161	15.87454	7.76759
A. marina	12.8	7.9	648	4.607641	32.48435	32.03421	69.1262	33.52561
A. marina	11.5	8.5	648	3.94281	25.79624	29.66742	59.40647	28.85338
A. marina	7.5	6.3	648	1.49191	8.402361	10.19604	20.09031	9.754204
B. gymnorhiza	7	5	764	4.533619	15.45361	9.991036	29.97826	14.47475
B. gymnorhiza	10.8	11.6	764	2.332154	15.6519	56.42126	74.40531	37.21136
B. gymnorhiza	14	8.2	764	5.412198	18.71912	55.62365	79.75497	39.66683
B. gymnorhiza	17	6.8	764	8.053008	44.78428	69.58992	122.4272	60.31748
X. moluccensis	17	7.5	730	3.638722	67.6563	62.23269	133.5277	63.89964
X. moluccensis	16.2	6.1	730	1.778905	38.4847	41.52231	81.78591	39.19817
X. moluccensis	22.3	8.2	730	4.875258	104.9744	117.7917	227.6414	109.1303
X. moluccensis	24.4	6.6	730	4.262094	93.64103	141.5974	239.5005	116.672
X. moluccensis	11.2	6	730	0.453716	4.173154	27.10669	31.73356	15.64613
X. moluccensis	11	5	730	1.120014	19.02003	16.60466	36.74471	17.76326
X. moluccensis	28	7.3	730	6.84049	145.2018	142.8818	294.9241	142.9004
X. moluccensis	12	6.7	730	0.838583	10.31236	26.05489	37.20583	18.20303
X. moluccensis	17.4	6.4	730	2.926849	57.79818	61.65559	122.3806	59.34387
X. moluccensis	29.2	8.4	730	5.182463	157.2934	186.9978	349.4736	169.8766
X. moluccensis	22.5	9.2	730	6.634149	135.0794	144.4391	286.1527	138.7765
X. moluccensis	27.6	8.3	730	4.50233	93.27453	190.8427	288.6196	141.0736
X. moluccensis	16.5	5.5	730	2.290764	45.86879	46.89204	95.0516	46.06913
X. moluccensis	11.2	2.8	730	0.932253	17.02462	15.33629	33.29316	16.10558
X. moluccensis	32.3	9	730	8.449406	232.7437	304.2148	545.4079	265.3674
X. moluccensis	41.8	14.3	730	17.28316	589.6339	569.2745	1176.192	570.4431
X. moluccensis	10.2	7.5	730	0.503398	5.437003	21.55618	27.49658	13.5091
X. moluccensis	31.5	9.6	730	10.29519	235.7826	265.9318	512.0096	248.5606
X. moluccensis	6.3	6.2	730	0.22143	1.897685	8.624936	10.74405	5.281585
X. moluccensis	5.3	6.8	730	0.154423	1.063582	7.250466	8.468472	4.173876
X. moluccensis	33	10.9	730	6.655457	177.2626	310.3528	494.2708	241.2942
A. officinalis	16.9	10.4	605	8.974862	44.17952	82.05307	135.2075	66.64811
A. officinalis	73.5	12.4	605	53.34157	569.3037	1705.385	2328.03	1160.203
A. officinalis	10.8	8	605	4.44354	16.90512	22.13608	43.48474	21.24777
A. officinalis	33.9	9.7	605	16.27367	106.72	304.5771	427.5707	212.5706
A. officinalis	35.5	6.4	605	25.58344	289.2162	192.2243	507.0239	246.8835
A. officinalis	15.5	8.5	605	8.282784	37.8446	47.76353	93.89092	45.92971
A. officinalis	56.3	9.3	605	66.99179	993.36	550.5907	1610.942	783.2335
A. officinalis	54.8	10.3	605	48.12895	508.1138	689.0318	1245.275	613.2872
A. officinalis	21.1	10.2	605	13.04349	82.53169	107.8651	203.4403	99.84552
A. officinalis	20.8	9.3	605	8.191089	78.96297	85.4799	172.634	84.66604
A. officinalis	15.6	8.4	605	7.931357	42.8412	38.24933	89.02189	43.33922
A. officinalis	28.8	10.6	605	21.57613	172.0169	168.2733	361.8663	176.9756
A. officinalis	19	11.2	605	12.45652	72.64613	101.3733	186.476	91.57249
A. officinalis	25.2	12.8	605	11.598	68.08529	135.3887	215.072	106.2665
A. officinalis	17.4	9.7	605	10.1476	52.11267	79.42429	141.6846	69.61926
A. officinalis	15.9	9.2	605	8.651554	37.72733	64.30432	110.6832	54.4228
A. officinalis	22.5	12.1	605	9.374123	64.3285	114.451	188.1537	92.88096
R. mucronata	10	7.2	843	6.656155	14.60039	26.30175	47.5583	23.21036

R. mucronata	6.9	6.7	843	2.338474	5.338146	12.46022	20.13684	9.881351
R. mucronata	8.7	6.7	843	1.717287	4.485556	13.92347	20.12631	9.938633
R. mucronata	22	11.2	843	15.1235	50.13849	147.7538	213.0158	105.2974
R. mucronata	21	7.7	843	22.00073	92.21157	41.32167	155.534	74.5944
R. mucronata	14.5	9.4	843	5.048519	14.11228	48.85454	68.01534	33.66323
R. mucronata	17.5	9.1	843	8.97848	27.51308	54.70637	91.19793	44.75218
R. mucronata	25.1	13.5	843	19.43238	58.15792	216.4391	294.0294	145.7541
R. mucronata	31.5	12.9	843	26.1703	125.3252	251.8636	403.3591	198.65
R. mucronata	27.6	9.6	843	24.33935	108.7715	200.3505	333.4614	163.9112
S. apetalata	45.9	26	529	23.97532	147.291	1071.681	1242.948	621.02
S. apetalata	41	25	529	13.43436	77.28929	757.685	848.4087	424.5542
S. apetalata	32	18.4	529	13.19623	57.99334	492.6433	563.8328	281.7219
S. apetalata	59	12.3	529	25.77459	439.0998	717.141	1182.015	584.5081
S. apetalata	50.4	14.9	529	7.142181	71.24704	657.9646	736.3538	368.7133
S. apetalata	35.2	10.2	529	14.12112	145.2571	211.3023	370.6805	182.7336
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
S. apetalata	6.3	6.9	529	0.901029	3.130507	5.596124	9.627661	4.721532
S. apetalata	25.2	11.6	529	11.90685	97.73329	38.50575	148.1459	71.81754
S. apetalata	10.5	11.2	529	1.859161	6.867427	23.80515	32.53174	16.10923
S. apetalata	9.4	11.5	529	1.622392	7.277813	17.33551	26.23572	12.94887
S. apetalata	78	18	529	36.44625	610.5454	1661.499	2308.491	1147.36
S. apetalata	25.6	13.3	529	13.8354	141.3188	158.1401	313.2943	153.9482
S. apetalata	5.5	6.3	529	1.021289	3.285944	3.929776	8.23701	4.010201
S. apetalata	5	7.2	529	0.634661	1.976136	3.75403	6.364826	3.120513
S. apetalata	3.3	5.2	529	0.384183	1.181942	1.048058	2.614183	1.265813
S. apetalata	39.5	16.8	529	20.64728	199.981	397.8935	618.5217	305.9453
x. granatum	4.2	4.5	567	0.323092	1.35336	1.934139	3.610591	1.75
x. granatum	11.5	6.9	567	1.701552	10.91547	22.69377	35.31079	17.26401
x. granatum	6.7	6.3	567	0.850457	5.791615	7.31328	13.95535	6.782425
x. granatum	8.6	8.3	567	1.222155	7.924705	15.36557	24.51243	11.97505
x. granatum	18.6	7.3	567	5.06914	49.6781	59.59138	114.3386	55.66599
X. granatum	15.3	7.3	567	1.729815	14.36995	37.29773	53.39749	26.20815
X. granatum	19.4	8.7	567	3.398913	71.98488	84.09687	159.4807	77.86005
X. granatum	18.7	6.7	567	5.52887	59.6259	45.03217	110.1869	53.37818
X. granatum	24.5	6.2	567	3.479796	67.91946	74.36068	145.7599	71.09453
X. granatum	11.5	7.5	567	1.553345	11.52203	23.48644	36.56182	17.88671
X. granatum	18.5	8.2	567	3.346167	35.42761	55.31752	94.0913	45.97052
X. granatum	10.3	7.1	567	2.226361	15.63293	18.8747	36.73399	17.84668
X. granatum	19.5	7.6	567	7.650793	74.97968	53.8008	136.4313	66.01173
X. granatum	16.3	7.5	567	4.546767	45.36422	52.31127	102.2223	49.74827
X. granatum	15.2	7.1	567	3.178974	33.22063	31.38643	67.78603	32.91866
X. granatum	12	6.1	567	1.909267	15.14088	17.77611	34.82626	16.9285
X. granatum	14.2	6.5	567	2.530761	34.04718	33.26657	69.84451	33.97587
X. granatum	19.5	6.3	567	5.443845	53.84533	61.70507	120.9942	58.87666
X. granatum	16.9	5.6	567	3.536928	34.81351	40.66453	79.01497	38.45711
H. fomes	25.6	16.1	810	17.4544	131.9096	336.296	485.66	236.5038
H. fomes	17.5	13.8	810	6.395993	32.78813	134.2509	173.435	84.76306
H. fomes	21	14	810	9.485757	51.67431	175.5757	236.7358	115.5369
H. fomes	15	12	810	5.351839	34.12504	72.37928	111.8562	54.3651
H. fomes	27	14	810	11.16172	85.87506	268.8459	365.8827	178.5036
H. fomes	10.8	9.8	810	2.242745	9.071901	43.12421	54.43886	26.62769
H. fomes	7.3	10	810	1.067178	4.108541	13.14923	18.32495	8.934648
H. fomes	5.4	6.7	810	0.607523	2.249769	6.318738	9.17603	4.468397
H. fomes	4.6	7	810	0.717087	2.49875	3.442069	6.657906	3.218257
H. fomes	13.1	11.5	810	2.457799	13.42011	59.13828	75.01619	36.68501
H. fomes	14.9	12.6	810	4.401502	27.81547	84.27226	116.4892	56.80534
H. fomes	19.8	13	810	8.551999	62.11877	147.5112	218.182	106.1739
H. fomes	19.2	14	810	6.961395	42.69937	149.3323	198.993	97.15207
H. fomes	17.5	13	810	10.47438	62.91476	99.5538	172.9429	83.79462
H. fomes	9.1	11.7	810	1.246256	4.72629	28.42141	34.39395	16.848
H. fomes	32	16	810	23.00353	121.2188	554.2021	698.4244	341.6269
H. fomes	21.3	14	810	7.663198	34.59347	232.8471	275.1038	134.8736
H. fomes	23.9	13.9	810	8.917747	50.53335	214.4117	273.8628	133.8945
H. fomes	6.8	8.3	810	1.499984	4.974425	10.14099	16.6154	8.064102
H. fomes	5.1	7.2	810	0.683672	2.140708	5.16256	7.98694	3.882471
H. fomes	34	19.5	810	16.10747	132.2429	615.1772	763.5276	373.65

H. fomes	28.6	18	810	18.35352	112.7665	450.4937	581.6138	284.2514
H. fomes	34	18	810	15.14946	139.5673	569.8341	724.5509	354.2758
H. fomes	22.8	17	810	15.40269	81.7213	287.0412	384.1652	187.5343
H. fomes	7.4	9.1	810	2.432893	8.31941	12.16866	22.92096	11.08616
H. fomes	12.7	9	810	2.609468	14.80623	29.94518	47.36088	23.00442
H. fomes	20.1	11	810	15.07801	108.5022	139.0912	262.6714	127.0075
H. fomes	6.9	8.8	810	1.328636	4.512596	12.07341	17.91464	8.718478
H. fomes	4.1	7.3	810	0.28979	0.96211	3.184338	4.436238	2.163063
H. fomes	4.1	7.1	810	0.351783	0.952275	2.604937	3.908995	1.901896
H. fomes	4.2	7.4	810	0.309247	0.735716	3.751105	4.796068	2.345135
H. fomes	3.7	6.8	810	0.306405	0.905009	2.97916	4.190574	2.042738
H. fomes	3.1	5.7	810	0.134086	0.354955	1.310767	1.799808	0.878013
H. fomes	23.7	13	810	14.53226	90.52965	215.5604	320.6223	156.0032
H. fomes	17.5	12.5	810	6.915991	40.81124	104.5695	152.2967	74.14888
H. fomes	13.3	9.2	810	2.723225	15.24525	46.79012	64.75859	31.57858
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
H. fomes	12.5	8.5	810	4.497416	21.45706	34.20055	60.15502	29.13928
H. fomes	38.9	18	810	18.09116	200.7778	789.7568	1008.626	493.0945
H. fomes	30.6	20.4	810	11.66626	122.0795	479.7693	613.5151	299.9222
H. fomes	31.5	19.5	810	14.45344	155.2753	490.9779	660.7067	322.4443
H. fomes	33.5	19.6	810	16.07231	157.2323	525.2019	698.5065	341.0255
H. fomes	28.2	16.5	810	13.12241	191.2989	401.9921	606.4134	294.9015
H. fomes	27	18.6	810	12.64079	109.8944	333.2923	455.8275	222.3467
H. fomes	40	16.5	810	21.15296	189.0341	903.3656	1113.553	545.07
H. fomes	37.1	19	810	23.93365	208.4809	747.7726	980.1871	478.7829
H. fomes	35.4	19	810	22.14109	192.5805	606.6367	821.3582	400.7769
H. fomes	25.6	14	810	12.71798	88.36979	278.8271	379.9148	185.3451
H. fomes	19.8	11	810	8.973655	66.97642	141.5349	217.485	105.7175
H. fomes	8.9	10	810	1.508164	7.362077	25.25719	34.12743	16.6548
H. fomes	4.3	7	810	0.086993	0.228698	3.600148	3.915839	1.925888
H. fomes	22.3	15.3	810	6.057428	41.59779	231.5079	279.1632	136.757
H. fomes	4.8	7	810	0.500513	1.334815	3.509139	5.344468	2.599237
H. fomes	13.8	10.8	810	3.604	19.01644	66.01285	88.63329	43.26284
H. fomes	16	12.7	810	5.802832	34.90104	100.3167	141.0205	68.73242
H. fomes	14.1	11.5	810	4.804136	25.94059	76.05999	106.8047	52.05864
H. fomes	9.4	7.5	810	1.278511	4.423177	22.07769	27.77938	13.58961
H. fomes	25.5	14.7	810	8.188326	56.86447	224.7543	289.8071	141.6408
H. fomes	16.9	13	810	4.058245	25.65625	115.7232	145.4377	71.1444
H. fomes	5.1	5	810	0.430711	1.290692	5.308237	7.02964	3.433151
H. fomes	4.2	4.8	810	0.685332	2.305922	2.768501	5.759756	2.779772
H. fomes	13.5	10.5	810	3.977335	22.50104	70.20751	96.68588	47.15474
H. fomes	23.1	13.8	810	12.19612	73.20877	208.5854	293.9903	143.2773
H. fomes	19.1	10.6	810	9.001693	57.49577	120.8217	187.3191	91.03391
H. fomes	13.5	9.1	810	4.190477	20.52835	49.4422	74.16103	36.07707
H. fomes	7.5	5.5	810	1.24196	4.517942	12.29225	18.05216	8.787882
H. fomes	6.3	5	810	1.466724	5.408452	7.931818	14.80699	7.162955
H. fomes	3.2	5	810	0.117879	0.301817	1.609243	2.028938	0.992541
H. fomes	15.2	7.5	810	5.901556	51.21974	37.83522	94.95652	45.6471
H. fomes	10.5	6.8	810	2.475935	12.71097	26.31128	41.49819	20.15878
H. fomes	7.9	7.3	810	0.62365	2.397032	15.02157	18.04225	8.840402
H. fomes	13.6	8	810	10.30327	62.98118	51.49474	124.7792	60.02764
H. fomes	11	6.8	810	3.915159	19.88199	29.49837	53.29552	25.79909
H. fomes	12.3	7.7	810	3.325357	16.66458	37.98779	57.97773	28.19021
H. fomes	6.8	5.4	810	1.79735	8.577089	9.400239	19.77468	9.540066
H. fomes	2.5	4.7	810	0.057996	0.152465	0.781427	0.991887	0.485111
H. fomes	4.8	6.4	810	0.375166	1.791565	5.277791	7.444522	3.628188
H. fomes	16.5	10.1	810	5.680174	31.59863	80.68295	117.9618	57.42626
E. agallocha	2.1	2.94	405	0.09	0.11	0.709516	0.92	0.439237
E. agallocha	3.02	3.9	405	0.08	0.20	1.372922	1.65	0.797371
E. agallocha	4	3.9	405	0.12	0.43	1.914641	2.47	1.18595
E. agallocha	4.4	4.82	405	0.13	0.48	2.887504	3.50	1.689564
E. agallocha	11.6	5	405	0.58	8.34	21.31925	30.24	14.49774
E. agallocha	2.3	3.18	405	0.04	0.21	0.82607	1.08	0.517208
E. agallocha	4.6	4.37	405	0.10	0.76	2.647632	3.51	1.686432
E. agallocha	4.4	4.7	405	0.03	0.35	2.405925	2.79	1.351073
E. agallocha	3.8	4.4	405	0.04	0.25	2.047521	2.34	1.13428

E. agallocha	6	5.5	405	0.19	0.75	4.59579	5.53	2.672507
E. agallocha	7.3	7.8	405	0.36	1.72	10.29063	12.36	5.97368
E. agallocha	7.2	6.2	405	0.23	1.13	7.928459	9.29	4.49419
E. agallocha	21	10.8	405	3.49	22.29	92.29165	118.07	56.85699
E. agallocha	13.2	7.6	405	0.34	4.96	32.64599	37.95	18.38687
E. agallocha	11	5.1	405	0.54	5.44	21.34979	27.33	13.16814
E. agallocha	7	5.3	405	0.28	1.56	9.272214	11.11	5.370737
E. agallocha	6.9	5.66	405	0.22	1.54	6.637738	8.40	4.048187
E. agallocha	18.4	9.1	405	2.50	30.81	51.0829	84.39	40.17638
E. agallocha	21.3	8.2	405	1.96	26.27	68.25648	96.48	46.26282
E. agallocha	9.3	8.37	405	0.53	5.53	16.25727	22.32	10.71489
E. agallocha	9.4	6.23	405	0.30	3.20	13.80558	17.31	8.348458
E. agallocha	9.3	8.15	405	0.34	2.68	16.17116	19.19	9.284336
E. agallocha	15.8	11	405	0.82	8.84	51.99358	61.64	29.82979
E. agallocha	21.6	12	405	1.82	14.27	96.87078	112.97	54.70508
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
E. agallocha	17.4	10.6	405	1.45	15.82	61.83381	79.10	38.11636
E. agallocha	17	9	405	0.82	15.37	53.98926	70.18	33.80169
S. casuaris	13.3	9.7	389	2.705113	30.62944	26.06421	59.39876	28.60177
S. casuaris	10.7	11	389	0.794446	8.189154	16.32469	25.30829	12.28005
S. casuaris	4	4	389	0.175745	1.264691	1.312972	2.753408	1.325919
S. casuaris	10.4	8.5	389	1.17558	14.5346	14.24273	29.95291	14.44618
S. casuaris	21.3	13.4	389	4.419308	74.4988	78.73125	157.6494	76.14805
A. cuculata	7.5	6.5	600	1.214333	7.05508	9.487688	17.7571	8.62558
A. cuculata	9.6	9.1	600	1.547122	7.155774	25.841	34.54389	16.95779
A. cuculata	11.2	10.2	600	2.698432	14.70455	32.77049	50.17348	24.51795
A. cuculata	7.7	8.5	600	1.06488	4.242491	14.14381	19.45118	9.534302
A. cuculata	3.5	5	600	0.16618	0.319956	2.104741	2.590877	1.27378
A. cuculata	4.2	6.4	600	0.381823	1.130077	3.327088	4.838988	2.36434
B. sexangula	18	12.3	764	4.588349	22.88314	110.6171	138.0886	69.18535
B. sexangula	14.3	12.7	764	5.892571	33.5195	107.4942	146.9063	73.33126
B. sexangula	20.6	14.4	764	6.740791	51.17559	239.6199	297.5363	149.1883
B. sexangula	16.8	9.4	764	6.289354	36.44374	86.74661	129.4797	64.4107
B. sexangula	7.5	8.5	764	2.461216	8.285704	15.81954	26.56646	13.13635
B. sexangula	27.6	12	764	16.99589	162.135	312.8874	492.0183	244.5443
B. sexangula	7.7	9.5	764	1.51396	4.944634	20.21558	26.67417	13.31962
B. sexangula	11.8	7.6	764	2.420458	9.553206	38.98035	50.95401	25.46519
L. racemosa	11	5.2	710	3.842307	19.93249	20.84166	44.61646	21.25408
L. racemosa	3.7	3.8	710	0.204049	0.7392	2.166013	3.109262	1.509595
L. racemosa	6.8	4.4	710	0.902782	3.471612	6.449301	10.82369	5.212112
L. racemosa	7.6	5.7	710	1.196061	5.990566	8.512542	15.69917	7.525365
R. apiculata	12.8	7.5	814	5.072952	23.01744	15.74209	43.83248	21.30811
A. marina	12.4	8.1	648	3.603491	28.51108	36.94969	69.06426	33.6326
A. marina	5.5	5.5	648	0.394692	1.746028	5.060523	7.201243	3.529221
A. marina	11.1	7.8	648	3.324992	20.93079	20.7391	44.99488	21.80626
A. marina	10.2	7.5	648	2.06062	11.82462	22.4843	36.36954	17.76232
A. marina	9.3	7.3	648	2.924044	16.42081	17.38079	36.72565	17.79852
B. gymnorhiza	4	5.7	764	0.702162	2.106495	2.677187	5.485844	2.681651
X. moluccensis	33.6	10.1	730	6.966993	196.5301	350.6866	554.1837	266.5959
X. moluccensis	11.5	5.8	730	1.02261	13.34522	32.03584	46.40367	22.69439
X. moluccensis	15.8	4.9	730	2.789925	55.8391	36.15819	94.78721	45.68299
X. moluccensis	21.2	6	730	2.743684	69.51612	77.16979	149.4296	72.54702
X. moluccensis	18	8	730	3.035531	53.40298	70.50298	126.9415	61.69765
X. moluccensis	6.9	4.5	730	0.578452	8.559361	8.961601	18.09941	8.765187
A. officinalis	31.5	11.2	605	13.82	103.1287	226.101	343.0497	169.9859
A. officinalis	10.4	6.4	605	2.94817	10.35776	22.29856	35.60449	17.54711
A. officinalis	48.8	11.2	605	45.25021	462.0598	473.7612	981.0712	480.8551
A. officinalis	16.5	12	605	4.262803	22.32821	72.93891	99.52993	49.52253
A. officinalis	9.9	8.9	605	3.456027	13.10555	16.17847	32.74005	15.97891
A. officinalis	17.9	10.2	605	4.646724	21.60806	61.20436	87.45915	43.3957
R. mucronata	15	8.1	843	11.56477	32.21337	42.73414	86.51229	42.08935
R. mucronata	16.8	8.9	843	12.67059	33.6052	80.13614	126.4119	62.15086
S. apetala	19.4	9.9	529	5.141851	30.6247	60.5643	96.33085	47.5252
S. apetala	20	12.3	529	9.609258	62.15509	79.64283	151.4072	74.31619
S. apetala	8.9	9.8	529	2.063056	8.253327	13.42157	23.73795	11.64196
S. apetala	7.5	7.8	529	0.943976	3.700602	8.074977	12.71956	6.263519

x. granatum	13	6.7	567	2.699849	26.24572	43.01629	71.96187	35.16433
x. granatum	10.3	7.2	567	1.522174	11.00403	16.44547	28.97168	14.11725
X. granatum	23.9	7.4	567	8.619416	105.5512	81.32675	195.4974	94.79634
X. granatum	7.8	6.3	567	0.83117	5.204815	10.22835	16.26434	7.945136
X. granatum	9.7	6.3	567	2.066585	18.07317	20.70252	40.84227	19.85941
H. fomes	20.8	14.6	810	10.00654	68.63213	190.1898	268.8285	131.0001
H. fomes	25.4	15	810	17.66346	165.5453	243.2228	426.4315	206.5474
H. fomes	7.7	9.8	810	1.271653	4.480864	16.46304	22.21556	10.84275
H. fomes	23.3	13.3	810	16.01095	119.1837	222.2112	357.4059	173.5116
H. fomes	12	12.1	810	2.353642	12.20509	43.17147	57.7302	28.18249
H. fomes	16.1	14	810	3.655509	14.94516	95.21642	113.8171	55.77759
H. fomes	13.8	10.6	810	5.039365	28.00952	60.46347	93.51235	45.44989
H. fomes	20.2	11.5	810	7.911506	52.79224	166.7877	227.4915	110.9809
H. fomes	12.5	9.4	810	4.054751	19.14002	57.24317	80.43794	39.20717
H. fomes	36	16	810	20.33069	166.4994	630.4528	817.2828	399.361
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
H. fomes	13.6	12.5	810	3.102698	18.78897	62.43176	84.32343	41.15039
H. fomes	16.7	11.5	810	7.075753	40.89247	114.751	162.7192	79.28759
H. fomes	3.9	4.6	810	0.494796	1.657505	1.991717	4.144018	1.999986
H. fomes	20.5	12.8	810	5.66606	36.71689	180.436	222.8189	109.0635
H. fomes	16.2	9.9	810	5.825425	35.33137	91.53436	132.6912	64.61219
H. fomes	26.1	13	810	8.455533	47.90886	255.9397	312.3041	152.9305
H. fomes	12.2	8.8	810	2.988608	14.69832	44.30517	61.99209	30.22
H. fomes	6.3	6.1	810	1.077714	3.656343	7.035857	11.76991	5.709257
H. fomes	8.9	6.1	810	1.354565	6.66956	16.87025	24.89437	12.11611
H. fomes	5.2	5.1	810	0.330898	1.476601	4.455678	6.263177	3.052811
E. agallocha	3.17	3.74	405	0.03	0.25	1.526472	1.81	0.873921
E. agallocha	2.5	3.6	405	0.05	0.19	0.900788	1.14	0.54882
E. agallocha	3.1	3.2	405	0.02	0.21	1.158025	1.39	0.671296
E. agallocha	16	7.87	405	1.49	10.84	43.78472	56.11	27.02243
E. agallocha	12.6	6	405	0.49	7.17	23.46204	31.12	14.97039
E. agallocha	10.1	6.1	405	0.66	4.86	14.18522	19.71	9.451165
E. agallocha	14.1	7.06	405	1.22	7.66	32.52527	41.40	19.94214
E. agallocha	15.5	8.6	405	0.51	14.55	46.81094	61.87	29.78082
E. agallocha	16.1	9.9	405	0.95	11.23	49.36533	61.55	29.70313

Annex 5: Processed biomass data of the Sundarbans zone

Species	DBH (cm)	TH (m)	WD (kg/m ³)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
S. apetala	38.4	20.8	529	15.6629	131.8528	550.8067	698.3224	347.7912
S. apetala	31.1	16.9	529	10.65883	81.895	307.7119	400.2658	199.1068
S. apetala	29.2	20.2	529	7.499261	46.66014	331.573	385.7324	192.7026
S. apetala	23	17.3	529	6.504869	51.6386	182.5384	240.6819	119.6703
S. apetala	21.4	17	529	3.52631	20.01102	152.3686	175.906	87.89583
S. apetala	18.7	15.3	529	3.916183	27.84724	93.80488	125.5683	62.38016
S. apetala	17	12.9	529	2.570539	13.72291	60.37081	76.66426	38.13724
S. apetala	32.8	19.1	529	10.26687	83.67882	404.79	498.7357	248.659
S. apetala	28.3	19.2	529	9.421344	86.11162	294.9744	390.5074	194.1988
S. apetala	33.5	21.9	529	9.611568	111.8131	524.6783	646.1029	322.3231
S. apetala	20	16.8	529	2.541594	11.94042	129.0057	143.4877	71.80643
S. apetala	17.5	15.2	529	2.53503	15.31793	95.47815	113.3311	56.56288
S. apetala	18.2	15	529	2.661094	16.44566	110.9164	130.0232	64.93311
S. apetala	22.8	13.8	529	6.57045	59.68296	159.4815	225.7349	111.9853
S. apetala	24.4	16.7	529	5.338653	38.90441	224.6732	268.9163	134.2115
S. apetala	28.2	19.2	529	6.073208	51.81317	290.236	348.1224	173.7718
S. apetala	29.7	17.5	529	4.175969	27.54489	268.7318	300.4527	150.3873
S. apetala	32.3	15.6	529	12.59167	83.52445	317.6075	413.7236	205.7136
S. apetala	42.4	19.3	529	16.15025	105.4639	563.8774	685.4916	341.8168
S. apetala	20.2	17.5	529	3.492943	23.94604	141.049	168.488	84.08754
S. apetala	17.3	15.7	529	2.784803	19.68977	89.87299	112.3476	55.96479
S. apetala	4.5	4.9	529	0.643578	1.806092	2.825857	5.275528	2.574981
S. apetala	15.9	8.5	529	3.695808	26.13983	45.89979	75.73544	37.34808
S. apetala	10.8	5.3	529	4.178417	18.34249	18.40486	40.92577	19.94761
S. apetala	10	5.2	529	2.144922	8.015172	14.80655	24.96665	12.25933
S. apetala	9.3	5.3	529	1.767532	6.804215	12.91714	21.48888	10.55897
S. apetala	6.5	5.4	529	1.307628	4.186139	5.511118	11.00488	5.365699
S. apetala	9.8	5.7	529	1.663426	6.289991	16.67169	24.6251	12.15476
S. apetala	6.4	5.3	529	0.902011	2.476875	6.603487	9.982372	4.912801
S. apetala	7.8	5.8	529	1.144384	3.770452	6.801585	11.71642	5.743325
S. apetala	10.5	6.6	529	2.280816	9.194237	11.80886	23.28391	11.37984
S. apetala	14.3	7.4	529	6.220321	27.73332	34.1174	68.07105	33.28365
S. apetala	11.4	6.9	529	2.633031	9.940659	23.27027	35.84396	17.66217
S. apetala	11.8	5.9	529	3.811478	18.26922	18.70932	40.79003	19.90626
S. apetala	6.5	6.7	529	1.024057	3.143817	6.581861	10.74973	5.277448
S. apetala	11.8	8.1	529	2.987623	12.66678	26.396	42.0504	20.70776
S. apetala	13.5	9.1	529	3.68251	16.38819	38.3989	58.4696	28.85024
S. apetala	13	8.3	529	4.692265	21.22701	34.50982	60.4291	29.67133
S. apetala	14.5	9.3	529	5.024975	26.66979	42.03384	73.72861	36.23514
S. apetala	13.8	8.6	529	4.248104	20.40933	45.91525	70.57269	34.82354
S. apetala	20.4	17.3	529	3.074829	20.60851	174.8892	198.5726	99.32364
S. apetala	25.4	20.1	529	7.113585	47.58846	286.7279	341.4299	170.4138

S. apetala	35.7	25.5	529	5.699227	58.99693	639.1677	703.8639	352.7017
S. apetala	17	16.2	529	3.326314	15.05342	111.0502	129.4299	64.6155
S. apetala	26.2	14.6	529	8.948603	59.17477	200.9703	269.0937	133.6522
S. apetala	19.8	12.7	529	4.580458	24.64247	110.8705	140.0934	69.70723
S. apetala	22.5	14.6	529	4.895365	28.32382	159.1573	192.3765	95.92722
S. apetala	22.1	11.7	529	6.284932	40.29401	120.036	166.6149	82.6301
S. apetala	18.6	13	529	2.384258	14.7974	106.2875	123.4692	61.68605
S. apetala	10.3	6.3	529	0.818443	2.923933	19.26689	23.00927	11.46629
S. apetala	16.5	10.8	529	1.857616	9.337857	85.05613	96.2516	48.13112
S. apetala	14.4	12.1	529	1.456113	8.514234	60.69118	70.66153	35.29572
S. apetala	28.7	15.3	529	7.004732	44.30616	215.1055	266.4164	132.7314
S. apetala	18.8	14.6	529	2.832358	15.05027	113.2279	131.1105	65.49582
S. apetala	6.1	3.7	529	3.077939	10.18342	4.601393	17.86275	8.576504
Species	DBH (cm)	TH (m)	WD (kg/m3)	Leaf biomass (kg)	Branch biomass (kg)	Stem biomass (kg)	TAGB (kg)	C_TAGB (kg)
S. apetala	4.4	3.3	529	1.410405	4.885788	2.979583	9.275777	4.474573
S. apetala	5.8	4.6	529	1.13735	3.559946	4.312346	9.009643	4.385619
S. apetala	7.3	5.1	529	3.245688	14.72357	10.18368	28.15294	13.65489
S. apetala	7.1	4.6	529	0.902902	3.355594	5.893522	10.15202	4.980899
S. apetala	8.3	4.5	529	1.96716	7.225066	7.610994	16.80322	8.178535