



## GROWING STOCK, DIAMETER AND HEIGHT CLASS DISTRIBUTION OF DIFFERENT SPECIES AT NATURAL FOREST OF KACCHAPIA BEAT UNDER COX'S BAZAR NORTH FOREST DIVISION OF BANGLADESH

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### ABSTRACT

The study showed the tree species composition on the basis of diameter at breast height (dbh) class at natural forest of Kacchapia beat under Cox's Bazar North Forest Division. A total of 506 individual stems of 76 tree species within 56 genera under 29 families were recorded from the sampled area. The percentage distribution of individual species in different dbh (cm) classes showed that most of the trees (49.41%) belongs to dbh range 10-19.9 cm. This was followed by 20-29.9 (19.57%), 30-39.9 (13.04%), 40-49.9 (8.50%), 60-69.9 (3.16%) and 70-79.9 (2.17%). Again 50-59.9 and 80-89.9 dbh (cm) classes showed the same number of stems per hectare (1.98%). The lowest percentage (0.02%) was represented by the largest dbh range (>90 cm). It was observed that the percentage of individuals decrease as the diameter increased except for dbh ranges 60-69.9 cm and 70-79.9 cm. The number of individual species was highest (51) in 10-19.9 cm dbh range followed by 20-29.9 cm (45) dbh range. Different dbh (cm) classes were found to be dominated by different tree species. *Quercus thomsoni* (3.56%), *Dipterocarpus turbinatus* (2.96%), *Glochidion lanceolarium* (2.77%), *Swintonia floribunda* (2.57%) and *Bursera serrata* (2.37%) were dominated in 10-19.9 cm dbh range. In 20-29.9 (45) cm dbh range, *Vitex peduncularis* (1.38%); *Bursera serrata*, *Glochidion lanceolarium* and *Clerodendrum squamatum* (1.19% each) were found dominating. *Dipterocarpus gracilis* (1.78%) was dominated in 30-39.9 cm dbh range followed by *Pterospermum acerifolium* (1.19%) and *Artocarpus chaplasha* (1.58%). In 40-49.9 cm dbh range *Syzygium grande* (1.38%), *Dillenia pentagyna* and *Bursera serrata* (0.99% each) were found dominating. *Artocarpus chaplasha* (1.19%) was found dominated in both 50-59.9 and 60-69.9 cm dbh range. *Dipterocarpus turbinatus* (0.79%) and *Artocarpus chaplasha* (0.99%) were found in 70-79.9 and 80-89.9 cm dbh range respectively. On the basis of this study it may be recommended that undesirable species or less economical species should not be allowed to occupy growing space which could otherwise be used by other economically important trees.

**Key words :** Natural forest, dbh, abundance, important value index and tree diversity.

### INTRODUCTION

The diversity manifested by the countless kinds of genetic materials, varied species and ecosystem types has enormous values. The variety of distinct microorganisms, plants, animals and habitats can influence the productivity and service derived from the ecosystem.

#### Importance of species composition

Species composition or species diversity may be assessed for four reasons (Burley, 1995):

- i) Comprehending ecosystem structure and function for understanding of ecosystems and evolution and as a basis for managing resources for their life support functions and productivity.
- ii) Conserving and developing germplasm for breeding and genetic improvement of planted forests.
- iii) Monitoring the impact of land management interventions and both natural and anthropogenic environmental changes on biodiversity.

- iv) Deciding areas of priority for conservation of biodiversity in its own right for reasons of ethics, aesthetics, religion, culture, scientific enquiry or future production including 'Biodiversity Prospecting' for food, drugs, pharmaceuticals, other chemical products and biological control agents. Plants and animals, like human beings, have an established right to existence. Therefore we should be concerned with their value and conserve their diversity (Smithinand, 1995).

The techniques used in the management of forest depend on the objectives, the type of forest, the available capacities and resources and the local conditions and constraints (FAO, 1993). The natural forest of Bangladesh is managed under different silvicultural systems according to their economic importance and ecological conditions (Das, 1980). The silvicultural system practiced in the hill forests is clear felling followed by artificial regeneration with valuable species (Anon, 1970). However, the clear felling of natural forests

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causes not only loss of seedlings and saplings but also disturbs the natural condition of the forest and hence the ecosystem (Haque *et al.*, 1988). Loss of biological resources, habitat degradation, and erosion of gene pool and narrowing of genetic diversity are of serious concern for future preservation of flora and fauna. As a result, natural forests lose their diversity and therefore, judicious removal is felt necessary. A forest management approach based on the selective felling of the mature crop in a single operation was introduced in Malaysia (Mok, 1992) where the system involved the selection of a management regime to optimize not only the objectives of efficient and economic harvesting, utilization, reforestation and sustained yield but, more importantly, to ensure that forest development is biologically diversified, ecologically and environmentally sustainable. So an attempt was made to find out species composition, their diameter and height class distribution at short class interval and stems per hectare in the natural forest of Cox's Bazar (North) Forest Division so that managerial decision for the forest can be taken. In other words, the present study is an initiative to suggest the suitable silvicultural system based on number of stems per ha, diameter (dbh) and height class distribution of existing trees.

## MATERIALS AND METHODS

Cox's Bazar Forest Division lies between 20°51' and 21°47' North Latitudes and between 91°54' and 92°19' East Longitudes (Figure 1). It is an area of low mountains of tertiary age separated by broad valleys of submeridional trend (Chowdhury, 1969). The natural forests have been managed since 1923 on standard forest management system of clear felling followed by artificial regeneration (Balmforth and Howlader, 1988). The condition of the forest in respect of species and growth revealed almost similar and well stocked everywhere (Haque and Alam, 1988). De Milde *et al.* (1985) carried out an inventory of high forest of Cox's Bazaar and Chittagong Forest Division and estimated the number of trees per hectare for diameter class 10-29 cm and 30 cm and above taking into account only 12 tree species.

Baghkhal Range is composed of four beats namely Baghkhal, Gilatoli, Kacchapia and Rajarkul having an area 4282.82 hectare (Chowdhury, 1969). The study was conducted at the natural forest of Kacchapia reserve forest of Kacchapia Beat under Baghkhal Range in Cox's Bazar (North) Forest Division. The forest lies between 21°23' and 21°27' North Latitudes, and 92°13' and 92°15' East Longitudes. The total area of this forest is 1055.46 hectares. A considerable portion of the forest has been converted to plantations, agricultural fields, ponds, canals, houses and roads. So the total productive forest area is reduced to 302 ha only.

Data were collected from three sites (Bhalukhaiya, Chata Janchari and Dakshin Kacchapia) under Kacchapia Beat of Baghkhal Range. Number of quadrates to be

taken for collection of information was decided after reconnaissance survey. Sampling points were first selected on the map and then identified in the field. Stratified sampling was used to represent each site. A total of 36 quadrates of 20 m x 20 m in size were taken randomly in three different slopes (i.e. Top hill, Midslope and Valley) in four different aspects (North, South, East and West) respectively. Quadrate size was determined by applying the species area curve (Moore and Chapman, 1986) and the sample size was found to be sufficient for the vegetation survey at 40% coefficient of variation with a standard error of  $\pm 10\%$  described by Avery (1987). From each quadrate, name and number of each trees species having dbh 10 cm and above were recorded. Trees of each species were tallied into dbh (cm) classes of 10.0 cm interval. Similarly, merchantable height of the species was also tallied. Local people working in the forest and forest staff of the beat helped to identify species and in field work. For any confusion, plant samples were collected, processed in the herbarium and identified by the taxonomists of the Institute of Forestry and Environmental Sciences, University of Chittagong. Data on stems/ha, basal area (BA) per ha were collected and presented (Table 1). Percentage distribution of each Individual species in different Dbh (cm) classes were estimated and presented in table 2. Similarly percentage distribution of individual species in different height (m) classes were estimated and presented in table 3. Then volume of individual species, abundance, relative density (RD), relative frequency (RF), relative dominance (Rdo) and important value index (IVI) were estimated and presented in table 1.

## RESULTS AND DISCUSSION

A total of 506 individual stems of 76 tree species of 56 genera under 29 families were recorded from the sampled area. Nine major species which has IVI more than 10 is presented by Figure 2. The percentage distribution of individual species in different dbh (cm) classes showed (Table-2) that most of the trees (49.41%) belongs to dbh range 10-19.9 cm. This was followed by 20-29.9 (19.57%), 30-39.9 (13.04%), 40-49.9 (8.50%), 60-69.9 (3.16%) and 70-79.9 (2.17%). Again 50-59.9 and 80-89.9 dbh (cm) classes show the same number of stems per hectare (1.98%). The lowest percentage (0.02%) was represented by the largest dbh range (>90 cm). It was observed that the percentage of individuals decreases as the diameter increases. The number of individual species was highest (51) in 10-19.9 cm dbh range followed by 20-29.9 cm (45) dbh range (Figure 3).

Different dbh (cm) classes were found to be dominated by different tree species (Table-2). *Quercus thomsoni* (3.56%), *Dipterocarpus turbinatus* (2.96%), *Glochidion lanceolarium* (2.77%), *Swintonia floribunda* (2.57%) and *Bursera serrata* (2.37%) were dominated in 10-19.9 cm dbh range. In 20-29.9 (45) cm dbh range, *Vitex peduncularis* (1.38%); *Bursera serrata*, *Glochidion lanceolarium* and *Clerodendrum squamatum* (1.19% each) were found dominating.

*Dipterocarpus gracilis* (1.78%) was dominated in 30-39.9 cm dbh range followed by *Pterospermum acerifolium* (1.19%) and *Artocarpus chaplasha*, *Bursera serrata* (0.99% each) were found dominating. *Artocarpus chaplasha* (1.19%) was found dominated in both 50-59.9 and 60-69.9 cm dbh range. *Dipterocarpus turbinatus* (0.79%) and *Artocarpus chaplasha* (0.99%) were found in 70-79.9 and 80-89.9 cm dbh range respectively.

Summary of the percentage distribution of different species for height classes is presented in Figure-3. All the species are not economically equally important. Among the species in the present study, timber species in demand are Garjan, Gamar, Chapalish, Telsoor, Toon and other species used for house construction, agricultural implements, and plywood are Civit and Uriam (Chowdhury, 1991). Using one-way volume table (Latif *et al.*, 1986) the total volume per hectare of all these three classes were estimated at 43.82 m<sup>3</sup>. Average number of stems per hectare was estimated at 351 of dbh 10 cm and above. Total volume estimated as 752.98 m<sup>3</sup>. According to Pant (1990) Chapalish and Garjan are included in A class; Haldu, Jam and Pitraj in B class; and Chattim, Civit and Uriam in C class timber. Percentage distribution of species reported here is slightly different from earlier study on the same forest

division carried out by Hoque and Alam (1988). They reported that percentage distribution of Jam, Garjan, Civit, Batna and less valuable species as 38, 27, 21, 9 and 5 respectively. A separate study on the same forest, where 100% enumeration of marked trees in proposed clear felling coupe of 1989-90 was done (De Milde *et al.*, 1985), showed that there were 202 to 227 stems/ha of dbh 20 cm and above, and the percentage distribution of Jam, Garjan, Civit and Batna were 15, 10, 9 and 6 respectively. This variation in percentage distribution might be attributed to differences in samplings. De Milde *et al.* (1985) estimated total number of stems above 10 cm diameter as 217 in the large crowned (utilizable volume 90.2 m<sup>3</sup>/ha) forest and 252 in small crowned (utilizable volume 45.6 m<sup>3</sup>) forest. Howard and Valerio (1992) estimated 283 stems/ha of dbh greater than 10 cm in a well stocked natural forest of Costa Rica. They have suggested that undesirable species or species with poor form should not allow ed to occupy growing space which could otherwise be used by other trees. During the present study, it was observed that few slow growing and less economic important species like *Syzygium fruticosum* are occupying lot of space. These species should be removed so that more regeneration may occur and important young seedlings may develop freely.

**Table 1 :** Stems/ha, Basal Area (BA), Abundance, Relative density (RD), Relative frequency (RF), Relative dominance (Rdo) and Important Value Index (IVI) of different species of Kacchapia Beat.

Name of Species	Local Name	Stems /ha	BA (m <sup>2</sup> )	Vol (m <sup>3</sup> )	Abundance	RD %	RF %	Rdo %	IVI
<i>Acacia nilotica</i>	Babla	1.39	0.02	0.12	1.00	0.40	0.50	0.05	0.95
<i>Acanthus illicifolius</i>	Hargoza	2.78	0.09	1.00	1.00	0.79	1.01	0.21	2.01
<i>Adiha sessilifolia</i>	Khom	0.69	0.03	0.47	1.00	0.20	0.25	0.07	0.52
<i>Adina cordifolia</i>	Haldu	3.47	0.06	0.36	1.00	0.99	1.26	0.14	2.39
<i>Albizia chinensis</i>	Chakuakoroi	1.39	0.24	3.18	1.00	0.40	0.50	0.56	1.46
<i>Albizia lebbek</i>	Kalokoroi	2.78	0.25	3.81	1.00	0.79	1.01	0.58	2.38
<i>Albizia odoratissima</i>	Tetuyakoroi	2.08	0.06	0.33	1.00	0.59	0.76	0.14	1.49
<i>Albizia procera</i>	Silkoroi	2.78	0.38	11.12	1.00	0.79	1.01	0.88	2.68
<i>Alstonia scholaris</i>	Chattim	2.78	0.38	4.88	1.00	0.79	1.01	0.88	2.68
<i>Anthocephalus chinensis</i>	Kadam	2.08	0.05	0.36	1.00	0.59	0.76	0.12	1.46
<i>Antidesma ghaesembilla</i>	Elena	0.69	0.04	0.63	1.00	0.20	0.25	0.09	0.54
<i>Aphanamixis polystachya</i>	Pitraj	3.47	0.21	2.37	1.00	0.99	1.26	0.49	2.73
<i>Aporusa dioica</i>	Karoola	0.69	0.02	0.15	1.00	0.20	0.25	0.05	0.50
<i>Artocarpus chaplasha</i>	Chapalish	26.39	9.12	184.25	1.52	7.51	6.30	21.13	34.94
<i>Artocarpus heterophyllus</i>	Kanthal	3.47	0.23	3.98	1.25	0.99	1.01	0.53	2.53
<i>Artocarpus lakucha</i>	Barta	6.94	0.21	2.27	1.11	1.98	2.27	0.49	4.73
<i>Bauhinia acuminata</i>	Kanchan	0.69	0.04	0.31	1.00	0.20	0.25	0.09	0.54
<i>Bischofia javanica</i>	Kanjai	2.08	0.10	1.33	1.50	0.59	0.50	0.23	1.33
<i>Bischofia javanica</i>	Kanjai	4.17	0.06	0.48	1.20	1.19	1.26	0.14	2.58
<i>Bursera serrata</i>	Gutgutiya	20.14	2.64	46.21	1.81	5.73	4.03	6.12	15.88
<i>Calendula officinalis</i>	Calendula	2.08	0.09	0.72	1.00	0.59	0.76	0.21	1.56
<i>Callicarpa arborea</i>	Painnamala	0.69	0.08	1.06	1.00	0.20	0.25	0.19	0.63
<i>Canarium resiniferum</i>	Dhup	0.69	0.01	0.05	1.00	0.20	0.25	0.02	0.47
<i>Cassia nodosa</i>	Bandarlati	1.39	0.16	1.37	1.00	0.40	0.50	0.37	1.27
<i>Chickrassia tabularis</i>	Chickrassi	1.39	0.05	0.68	1.00	0.40	0.50	0.12	1.01
<i>Cinnamomum iners</i>	Cinnamomum	0.69	0.04	0.53	1.00	0.20	0.25	0.09	0.54
<i>Clerodendrum squamatum</i>	Lalbatna	4.17	0.32	1.70	1.00	1.19	1.51	0.74	3.44

Contd....

Name of Species	Local Name	Stems /ha	BA (m <sup>2</sup> )	Vol (m <sup>3</sup> )	Abun-Dance	RD %	RF %	Rdo %	IVI
<i>Dehassia kurzii</i>	Modonmosta	2.08	0.03	0.2	1.00	0.59	0.76	0.07	1.42
<i>Dillenia pentagyna</i>	Argeza	9.03	0.82	12.04	1.44	2.57	2.27	1.90	6.74
<i>Diospyros oposia</i>	Gab	1.39	0.28	4.20	1.00	0.40	0.50	0.65	1.55
<i>Dipterocarpus gracilis</i>	Dhuligarjan	6.25	0.87	13.26	1.50	1.78	1.51	2.02	5.31
<i>Dipterocarpus turbinatus</i>	Telygarjan	22.92	7.81	137.66	1.74	6.52	4.79	18.10	29.40
<i>Elaeocarpus robustus</i>	Jalpai	3.47	0.15	2.39	1.25	0.99	1.01	0.35	2.34
<i>Emblica officinalis</i>	Amloki	6.94	0.12	1.35	1.11	1.98	2.27	0.28	4.52
<i>Engelhardtia spicata</i>	Kisserabhadi	2.78	0.23	2.97	1.33	0.79	0.76	0.53	2.08
<i>Erioglossum rubiginosum</i>	Kannaliful	0.69	0.03	0.17	1.00	0.20	0.25	0.07	0.52
<i>Erythrina variegata</i>	Mandar	0.69	0.01	0.14	1.00	0.20	0.25	0.02	0.47
<i>Ficus nervosa</i>	Painnadumur	1.39	0.16	2.03	1.00	0.40	0.50	0.37	1.27
<i>Ficus racemosa</i>	Bordumur	7.64	0.54	6.42	1.38	2.17	2.02	1.25	5.44
<i>Ficus retusa</i>	Jalpai	3.47	0.32	4.07	1.00	0.99	1.26	0.74	2.99
<i>Glochidion lanceolarium</i>	Kechua	16.67	0.77	7.85	1.50	4.74	4.03	1.78	10.56
<i>Gmelina arborea</i>	Gamar	7.64	1.74	40.3	1.10	2.17	2.52	4.03	8.72
<i>Holarrhena antidysenterica</i>	Kuruz	1.39	0.04	0.24	1.00	0.40	0.50	0.09	0.99
<i>Holigarna longifolia</i>	Barola	4.17	0.12	1.33	1.00	1.19	1.51	0.28	2.98
<i>Hopea odorata</i>	Telsur	8.33	2.27	55.67	1.09	2.37	2.77	5.26	10.40
<i>Lannea coromandelica</i>	Silbhadi	3.47	0.29	3.37	1.00	0.99	1.26	0.67	2.92
<i>Macaranga denticulate</i>	Bura	0.69	0.02	0.14	1.00	0.20	0.25	0.05	0.50
<i>Mallotus phillippinensis</i>	Panitori	4.17	0.83	14.01	1.20	1.19	1.26	1.92	4.37
<i>Mangifera sylvatica</i>	Uriam	6.94	1.42	29.54	1.00	1.98	2.52	3.29	7.79
<i>Microcos peniculata</i>	Aillachua	1.39	0.11	1.52	1.00	0.40	0.50	0.25	1.15
<i>Olea dioica</i>	Kao	9.03	0.19	1.18	1.30	2.57	2.52	0.44	5.53
<i>Pterospermum acerifolium</i>	Moos	13.89	0.92	11.84	1.67	3.95	3.02	2.13	9.11
<i>Quercus acuminata</i>	Kalibatna	2.08	0.15	2.24	1.00	0.59	0.76	0.35	1.70
<i>Quercus spicata</i>	Barbatna	2.78	0.09	0.54	2.00	0.79	0.50	0.21	1.50
<i>Quercus thomsoni</i>	Dholibatna	14.58	0.39	4.17	1.40	4.15	3.78	0.90	8.83
<i>Schima wallichii</i>	Kanak	1.39	0.31	5.36	1.00	0.40	0.50	0.72	1.62
<i>Sterculia colorata</i>	Faissaudal	0.69	0.01	0.04	1.00	0.20	0.25	0.02	0.47
<i>Swietenia mahagoni</i>	Mahagoni	2.78	0.15	1.99	1.33	0.79	0.76	0.35	1.89
<i>Swintonia floribunda</i>	Civit	12.50	1.60	35.6	1.29	3.56	3.53	3.71	10.79
<i>Syzygium cerasioides</i>	Dhepajam	4.86	0.08	0.38	1.00	1.38	1.76	0.19	3.33
<i>Syzygium cumini</i>	Kaloram	3.47	0.12	1.58	1.25	0.99	1.01	0.28	2.27
<i>Syzygium fruticosum</i>	Putijam	6.94	1.08	17.93	1.67	1.98	1.51	2.50	5.99
<i>Syzygium grande</i>	Dhakijam	13.89	1.82	24.07	1.82	3.95	2.77	4.22	10.94
<i>Tephrosia purpurea</i>	Lohamori	0.69	0.01	0.04	1.00	0.20	0.25	0.02	0.47
<i>Terminalia belerica</i>	Bohera	0.69	0.04	0.47	1.00	0.20	0.25	0.09	0.54
<i>Terminalia catappa</i>	Katbadam	1.39	0.11	1.15	1.00	0.40	0.50	0.25	1.15
<i>Terminalia chebula</i>	Haritaki	1.39	0.04	0.28	1.00	0.40	0.50	0.09	0.99
<i>Toona ciliata</i>	Toon	0.69	0.19	3.11	1.00	0.20	0.25	0.44	0.89
<i>Trewia polycarpa</i>	Pitali	0.69	0.02	0.17	1.00	0.20	0.25	0.05	0.50
<i>Vitex glabrata</i>	Horina	6.94	0.20	1.83	1.00	1.98	2.52	0.46	4.96
<i>Vitex peduncularis</i>	Arsol	13.19	0.67	7.81	1.19	3.75	4.03	1.55	9.34
<i>Vitis glabrata</i>	Bargoda	6.94	0.78	14.27	1.00	1.98	2.52	1.81	6.30
<i>Wyra acuminata</i>	Lapet	0.69	0.05	0.34	1.00	0.20	0.25	0.12	0.57
<i>Xeromphis spinosa</i>	Monkata	0.69	0.04	0.38	1.00	0.20	0.25	0.09	0.54
<i>Zanthoxylum rhetsa</i>	Basbaruna	1.39	0.12	1.52	1.00	0.40	0.50	0.28	1.18
<i>Zizyphus oenoplea</i>	Gutboroi	1.39	0.02	0.10	1.00	0.40	0.50	0.05	0.95
Total	76 Species	351.39	43.16	752.98	86.94	100.00	100.00	100.00	300.00

Table 2 : Percentage distribution of individual species in different dbh (cm) classes

Name of Species	Dbh (cm) classes									Total
	10.0-19.9	20.0-29.9	30.0-39.9	40.0-49.9	50.0-59.9	60.0-69.9	70.0-79.9	80.0-89.9	>90	
<i>Acacia nilotica</i>	0.40									0.40
<i>Acanthus illicifolius</i>	0.40	0.40								0.79
<i>Adiha sessilifolia</i>	0.20		0.20							0.20
<i>Adina cordifolia</i>	0.99									0.99
<i>Albizia chinensis</i>			0.40							0.40
<i>Albizia lebbek</i>	0.40	0.20		0.20						0.79
<i>Albizia odoratissima</i>	0.59									0.59
<i>Albizia procera</i>	0.59					0.20				0.79
<i>Alstonia scholaris</i>			0.79							0.79
<i>Anthocephalus chinensis</i>	0.59									0.59
<i>Antidesma ghaesembilla</i>	0.20									0.20
<i>Aphanamixis polystachya</i>	0.59	0.20	0.20							0.99
<i>Aporusa dioica</i>	0.20									0.20
<i>Artocarpus chaplasha</i>	0.99	0.20	1.58	0.79	1.19	1.19	0.59	0.99		7.51
<i>Artocarpus heterophyllus</i>	0.79			0.20						0.99
<i>Artocarpus lakucha</i>	1.58	0.20								1.78
<i>Bauhinia acuminata</i>		0.20								0.20
<i>Bischofia javanica</i>	0.40	0.20								0.59
<i>Bischofia javanica</i>	1.19									1.19
<i>Bursera serrata</i>	2.37	1.19	0.59	0.99		0.59				5.73
<i>Calendula officinalis</i>		0.59								0.59
<i>Callicarpa arborea</i>			0.20							0.00
<i>Canarium resiniferum</i>	0.20									0.20
<i>Cassia nodosa</i>			0.40							0.40
<i>Chickrassia tabularis</i>	0.20	0.20								0.40
<i>Cinnamomum iners</i>		0.20								0.20
<i>Clerodendrum squamatum</i>		1.19								1.19
<i>Dehassia kurzii</i>	0.20	0.40								0.59
<i>Dillenia pentagyna</i>	1.19	0.20	0.20	0.99						2.57
<i>Diospyros oposia</i>				0.40						0.40
<i>Dipterocarpus gracilis</i>			1.78							1.78
<i>Dipterocarpus turbinatus</i>	2.96	0.99		0.99		0.59	0.79		0.20	6.52
<i>Elaeocarpus robustus</i>	0.59	0.40								0.99
<i>Emblica officinalis</i>	1.98									1.98
<i>Engelhardtia spicata</i>	0.20	0.20	0.40							0.79
<i>Erioglossum rubiginosum</i>		0.20								0.20
<i>Erythrina variegata</i>		0.20								0.20
<i>Ficus nervosa</i>		0.20	0.20							0.59
<i>Ficus racemosa</i>	0.79	0.79	0.59							2.17
<i>Ficus retusa</i>	0.40	0.20	0.20	0.20						0.99
<i>Glochidion lanceolarium</i>	2.77	1.19	0.59							4.74
<i>Gmelina arborea</i>	0.99	0.20	0.40			0.20	0.20	0.20		2.17
<i>Holarrhena antidysenterica</i>	0.40									0.40
<i>Holigarna longifolia</i>	0.99	0.40		0.40						1.78
<i>Hopea odorata</i>	1.19	0.40				0.20	0.20	0.40		2.37
<i>Lannea coromandelica</i>	0.40		0.59							0.99
<i>Macaranga denticulata</i>	0.20									0.20
<i>Mallotus philippinensis</i>			0.59	0.59						1.19
<i>Mangifera sylvatica</i>	0.99	0.40				0.20	0.40			1.98
<i>Microcos peniculata</i>		0.20	0.20							0.40
<i>Olea dioica</i>	2.57									2.57
<i>Pterospermum acerifolium</i>	1.78	0.99	1.19							3.95
<i>Quercus acuminata</i>		0.40	0.20							0.59
<i>Quercus spicata</i>	0.79									0.79

Contd....

Name of Species	Dbh (cm) classes									Total
	10.0-19.9	20.0-29.9	30.0-39.9	40.0-49.9	50.0-59.9	60.0-69.9	70.0-79.9	80.0-89.9	>90	
<i>Quercus thomsoni</i>	3.56	0.59							4.15	
<i>Schima wallichii</i>		0.20		0.20	0.00				0.40	
<i>Sterculia colorata</i>	0.20								0.20	
<i>Swietenia mahagoni</i>		0.79							0.79	
<i>Swintonia floribunda</i>	2.57	0.40		0.20				0.40		3.56
<i>Syzygium cerasioides</i>	1.38								1.38	
<i>Syzygium cumini</i>	0.40	0.59							0.99	
<i>Syzygium fruticosum</i>	0.99			0.40	0.59					1.98
<i>Syzygium grande</i>	1.58	0.20	0.79	1.38						3.95
<i>Tephrosia purpurea</i>	0.20								0.20	
<i>Terminalia belerica</i>		0.20							0.20	
<i>Terminalia catappa</i>		0.40							0.40	
<i>Terminalia chebula</i>	0.40	0.00							0.40	
<i>Toona ciliata</i>	0.20								0.20	
<i>Trewia polycarpa</i>	0.20								0.20	
<i>Vitex glabrata</i>	1.58	0.40							1.98	
<i>Vitex peduncularis</i>	1.58	1.38	0.79						3.75	
<i>Vitis glabrata</i>	0.40	0.59		0.59						1.58
<i>Wyra acuminata</i>		0.20							0.20	
<i>Xeromphis spinosa</i>		0.20							0.20	
<i>Zanthoxylum rhetsa</i>		0.40							0.40	
<i>Zizyphus oenoplea</i>	0.40								0.40	
Total	49.41	19.57	13.04	8.50	1.98	3.16	2.17	1.98	0.20	

Table 3 : Percentage distribution of individual species in different height (m) classes

Name of Species	height (m) classes					
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	>25	Total
<i>Acacia nilotica</i>	0.40					0.40
<i>Acanthus illicifolius</i>	0.40	0.40				0.79
<i>Adiha sessilifolia</i>			0.20			0.20
<i>Adina cordifolia</i>	0.99					0.99
<i>Albizia chinensis</i>		0.40				0.40
<i>Albizia lebbek</i>	0.40	0.20	0.20			0.79
<i>Albizia odoratissima</i>	0.59					0.59
<i>Albizia procera</i>		0.59			0.20	0.79
<i>Alstonia scholaris</i>		0.79				0.79
<i>Anthocephalus chinensis</i>	0.59					0.59
<i>Antidesma ghaesembilla</i>			0.20			0.20
<i>Aphanamixis polystachya</i>	0.59	0.40				0.99
<i>Aporosa dioica</i>	0.20					0.20
<i>Artocarpus chaplasha</i>	1.38	1.38	2.37	1.38	0.99	7.51
<i>Artocarpus heterophyllus</i>	0.79			0.20		0.99
<i>Artocarpus lakucha</i>	1.38	0.59				1.98
<i>Bauhinia acuminata</i>	0.20					0.20
<i>Bischofia javanica</i>	0.40		0.20			0.59
<i>Bischofia javanica</i>	1.19					1.19
<i>Bursera serrata</i>	3.16	0.99	0.79	0.79		5.73
<i>Calendula officinalis</i>	0.59					0.59
<i>Callicarpa arborea</i>		0.20				0.20
<i>Canarium resiniferum</i>	0.20	0.00				0.20
<i>Cassia nodosa</i>			0.40			0.40
<i>Chickrassia tabularis</i>		0.40				0.40
<i>Cinnamomum iners</i>		0.20				0.20
<i>Clerodendrum squamatum</i>		1.19				1.19
<i>Dehassia kurzii</i>	0.59					0.59

Name of Species	height (m) classes					
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	>25	Total
<i>Dillenia pentagyna</i>	1.19	0.40	0.99			2.57
<i>Diospyros oposia</i>		0.40			0.40	0.80
<i>Dipterocarpus gracilis</i>		1.19	0.59			1.78
<i>Dipterocarpus turbinatus</i>	3.95	0.59	0.40			4.94
<i>Elaeocarpus robustus</i>		0.59	0.40			0.99
<i>Embllica officinalis</i>	0.99	0.99			1.98	3.96
<i>Engelhardtia spicata</i>	0.20	0.59			0.79	1.58
<i>Erioglossum rubiginosum</i>	0.20					0.20
<i>Erythrina variegata</i>	0.20					0.20
<i>Ficus nervosa</i>		0.40			0.40	0.80
<i>Ficus racemosa</i>	1.38	0.59	0.20			2.17
<i>Ficus retusa</i>	0.59	0.40			0.99	1.98
<i>Glochidion lanceolarium</i>	4.74					4.74
<i>Gmelina arborea</i>	0.99	0.40	0.20	0.20	0.40	1.99
<i>Holarrhena antidysenterica</i>	0.40					0.40
<i>Holigarna longifolia</i>	0.99		0.20			1.19
<i>Hopea odorata</i>	1.19	0.40		0.20	0.59	2.37
<i>Lannea coromandelica</i>	0.40	0.59			0.99	1.98
<i>Macaranga denticulata</i>	0.20					0.20
<i>Mallotus philippinensis</i>			0.99	0.20		1.19
<i>Mangifera sylvatica</i>	0.99	0.40		0.59		1.98
<i>Microcos peniculata</i>		0.20	0.20			0.40
<i>Olea dioica</i>	2.57					2.57
<i>Pterospermum acerifolium</i>	1.78	1.98	0.20			3.95
<i>Quercus acuminata</i>		0.40	0.20			0.59
<i>Quercus spicata</i>	0.79					0.79
<i>Quercus thomsoni</i>	2.96	1.19			4.15	8.30

Name of Species	height (m) classes					Total
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	>25	
<i>Sterculia colorata</i>	0.20					0.20
<i>Swietenia mahagoni</i>	0.20	0.59				0.79
<i>Swintonia floribunda</i>	2.57	0.20	0.40		0.40	3.56
<i>Syzygium cerasioideum</i>	1.38					1.38
<i>Syzygium cumini</i>	0.20	0.59	0.20			0.99
<i>Syzygium fruticosum</i>	0.99	0.40	0.59			1.98
<i>Syzygium grande</i>	1.58	2.17	0.20			3.95
<i>Tephrosia purpurea</i>	0.20					0.20
<i>Terminalia belerica</i>		0.20				0.20
<i>Terminalia catappa</i>	0.20	0.20				0.40
<i>Terminalia chebula</i>	0.40					0.40

Name of Species	height (m) classes					Total
	5.0-9.9	10.0-14.9	15.0-19.9	20.0-24.9	>25	
<i>Toona ciliata</i>			0.20			0.20
<i>Trewia polycarpa</i>	0.20					0.20
<i>Vitex glabrata</i>	1.58	0.40				1.98
<i>Vitex peduncularis</i>	2.57	0.99	0.20			3.75
<i>Vitis glabrata</i>	0.99	0.20	0.79			1.98
<i>Wyra acuminata</i>	0.20					0.20
<i>Xeromphis spinosa</i>	0.20					0.20
<i>Zanthoxylum rhetsa</i>		0.40				0.40
<i>Zizyphus oenoplea</i>	0.40					0.40
Total	55.93	24.90	11.46	3.56	4.15	100



Fig 1. Map of Bangladesh, Showing the study area (in box).

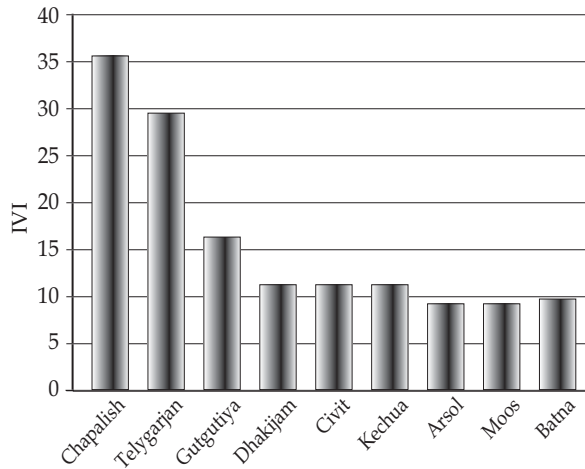


Fig. 2. IVI of major species

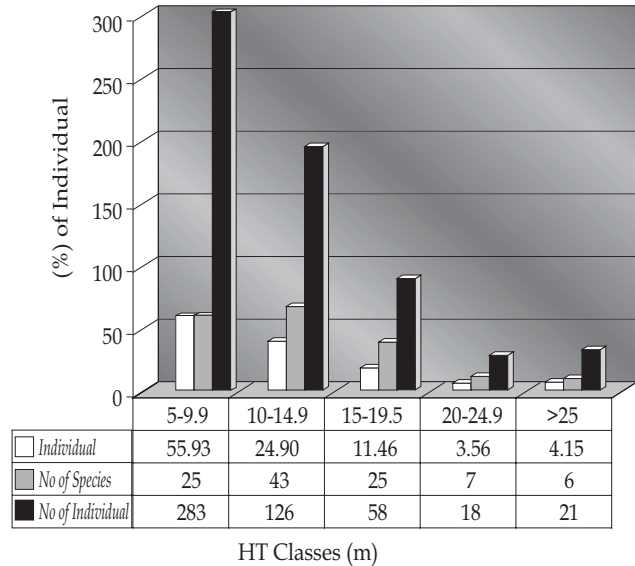


Fig. 3 : Percentage distribution of each individual tree species in different height (m) classes.

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