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Tree species diversity of the Kaptai National Park in Rangamati district, Bangladesh

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Abstract

The purpose of this study was to estimate the tree biodiversity in the Kaptai National Park. The total area of the Kaptai National Park is about 4,564 ha (11,273.08 acres) under the jurisdiction of Rangamati South Forest Division, Rangamati Hill Tracts district. The study was conducted through extensive survey only on the tree species composition in the Kaptai National Park. During the investigation, a total of 65 tree species belonging to 29 families were recorded from the park. Among the plant families, Mimosaceae possessed the highest number of species (7) followed by Meliaceae (6), Ancardiaceae (5), Moraceae (4), Verbenaceae (4), Combretaceae (4), Myrtaceae (4), Dipterocarpaceae (3), Fabaceae (3), Rubiaceae (2), Bombacaceae (2), Caesalpiniaceae (2), Dilleniaceae (2) and Bignoniaceae (2) respectively. There were 15 families which contained single species. Tree species belonging to the family Mimosaceae was dominated in respect to number of species and their population as well. The findings of the present investigation will contribute in the regeneration of tree species in this degraded forest ecosystem and in the protection, conservation and sustainable management of the Kaptai National Park.

Key words: Kaptai National park, native tree species, biodiversity.

INTRODUCTION

Bangladesh vegetation is a part of the Indo-Myanmar region, which is one of the most important hot spot areas for biodiversity (Mittermeir *et al*., 1980) and rich biological diversity due to its unique geophysical location (Hossain, 2001; Barua *et al*., 2001; Chowdhury 2001; Nishat *et al*., 2002). The country has a rich biological heritage containing about 3,611 species of angiosperms (Khan *et al*., 2007) of which 2,260 species were reported from Chattogram region alone (Heinig, 1925; Khan *et al*., 2007). The diversity of tree is fundamental to forest biodiversity, because tree provides resources and habitats for almost all other animals (Huston, 1994; Canon *et al*., 1998; Hall & Swaine, 1977). The extent of biodiversity loss in Bangladesh is not well known due to very poor data base and often based on scare information (Hossain *et al*., 2004). According to Rahman *et al*. (2000) and Hossain (2001) the depletion of native species is also accelerating at an alarming rate through rapid loss and degradation of forests in Bangladesh. Biodiversity survey is needed for the conservation and management of natural habitat (Pielou, 1995). Conserving biodiversity in an ecosystem is the most important for maintaining the normal function of ecosystem (Burton *et al*., 1992).

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Information on the composition of a forest is essential for its proper management in terms of economic value and regeneration potential (Wyatt-Smith, 1987), although very scanty information is available on the composition of protected hill forest tree species.

In Bangladesh, it is an urgent need to protect and manage the existing natural forests effectively for future generation (Hossain *et al*., 2017). Quantitative floristic inventories are fundamental to an understanding of the ecology of tropical forest and for development national forest management strategies (Campbell *et al*., 1986; Reddy *et al*., 2011). The Kaptai National Park is located in the southeastern region of Bangladesh comprising 5,464 ha, and is very important due to its proximity to Rangamati tourist spots. According to IUCN, the Kaptai National Park was declared as a Protected Area in 1980 under the section 23(II) of Bangladesh Wildlife Preservation Act 1974 of the Government of the People's Republic of Bangladesh. Therefore, the study attempted to assess the diversity and conservation status of tree species in the Kaptai National Park of Rangamati Hill Tracts district.

MATERIALS AND METHODS

The present study was carried out in the Kaptai National Park, which lies at $22^{0}27'0"$ to $22^{0}32'0"$ N latitudes and $92^{0}30"0$ to $92^{0}16'0"$ E longitudes. It is located at Kaptai Upzila and 24 km away from Rangamati Hill Tracts district in the southeast part of Bangladesh.

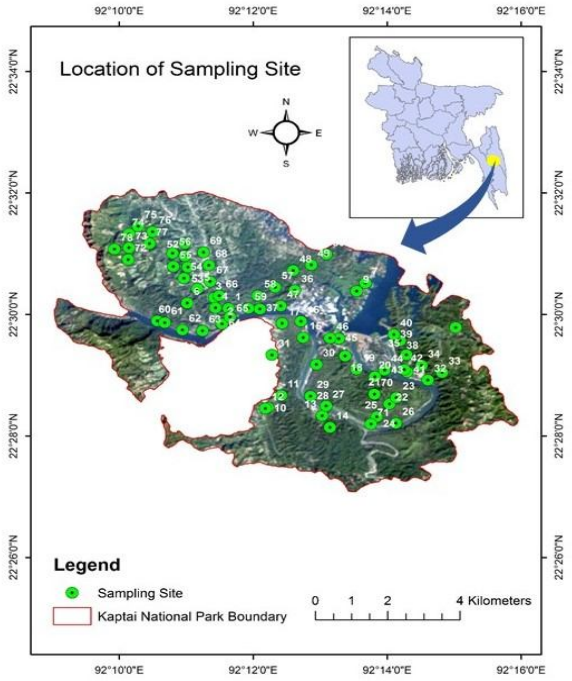

Fig. 1. Location of the study area in Kaptai National Park, Bangladesh

It encompasses an area of 5,464 ha within two forest ranges, namely Kaptai Range and Karnaphuly Range under the management of Chittagong Hill Tracts South Forest Division (Chowdhury *et al.*, 2001). Mean annual rainfall is about 2,513 mm; about 90% rainfall occurs during the rainy season (May to September). The maximum and minimum mean temperatures are 25.3^0C and 24.1^0C respectively (Source: Rangamati Weather Station, 2014). The maximum humidity is 84% in June and, the minimum humidity is 76% in January.

The study was based on field data collection and laboratory investigations from January 2014 to December 2016. For the convenience of the study, Kaptai National Park area was divided into seventy-seven tracks with the help of Global Positioning System (GPS); each track being 500 m apart from the other. The map of the location with the distribution of the tracks is shown in Figure 1. In each track, four sampling plots of 10 m radius each were laid at north-south and east-west directions at 100 m distances from the center of each track, as shown in Figure 2.

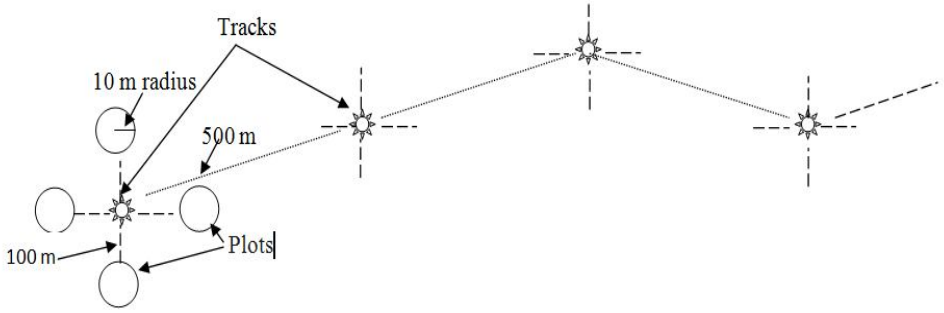

Fig. 2. Schematic representation of the design of sampling tracks and plots

The total number of sampling plots were 308; each having an area of 314 m^2. All the trees having >5cm dbh in each plot were counted, identified and marked for determination of the total numbers of trees in the park area. Trees on the border were included in a plot if >50% of their basal area fell within the plots and excluded if >50% of their basal area fell outside the plot.

Data analysis: Microsoft Excel program was used to process all collected data and preparing table, figures and graphs. SPSS (Statistical Package for Social Science) software version 21.00 was used for the estimation of the statistical data.

RESULTS AND DISCUSSION

Inventory of tree species diversity of the Kaptai National Park was conducted during the present research. A total of 65 tree species belonging to 29 families were recorded from the study area (Table 1). Mimosaceae family possessed the highest species (7) followed

by Meliaceae (6), Ancardiaceae (5), Moraceae (4), Verbenaceae (4), Combretaceae (4), Myrtaceae (4), Dipterocarpaceae (3), Fabaceae (3), Rubiaceae (2), Bombacaceae (2), Caesalpiniaceae (2), Bignoniaceae (2) and Dilleniaceae (2) respectively. There were 15 families which contained less than two species in number and included of other families (Figure 3). The present study revealed the Kaptai National Park as diverse natural forest being represented by 65 tree species. The species richness of the Kaptai National Park (65 species under 29 families) was quite low compared to 85 tree species reported from Ramu reserve forest of Cox's Bazar (Hossain *et al*., 2004); 92 tree species from the Chunati Wildlife sanctuary (Rahman and Hossain *et al*., 2002); 102 tree species from Boroitoli forest (Rahman *et al*., 2004); 62 tree species from the Tankawati Natural forest (Motaleb and Hossain, 2011); 77 tree species from the Dudhpukuria Natural forest (Hossain *et al*., 2012). Moreover, it was quite lower in comparison to the 153 tree species reported from the tropical forests of Eastern Ghats, India (Reddy *et al*., 2011); 162 tree species from the primary forests of Garo Hills, India (Kumar *et al.*, 2006).

Table 1. List of recorded tree species in the Kaptai National Park

	Local name	Scientific name	Family
1	Khair	*Acacia catechu* (L. f.) Willd.	Mimosaceae
2	Mangium	*Acacia mangium* Willd.	
3	Babla	*Acacia nilotica* (L.) Del.	
4	Chakuakoroi	*Albizia chinensis* (Osbeck) Merr.	
5	Sada koroi	*Albizia procera* (Roxb.) Benth	
6	Lohakath	*Xylia xylocarpa* (Roxb.) Taub.	
7	Raintree	*Samanea saman* (Jacq.) Merr.	
8	Chapalish	*Artocarpus chama* Buch.-Ham.	Moraceae
9	Kanthal	*Artocarpus heterophyllus* Lam.	
10	Deua	*Artocarpus lachucha* Buch.-Ham.	
11	Dumur	*Ficus hispida* L. f.	
12	Ghoraneem	*Melia azederach* L.	Meliaceae
13	Chickrassi	*Chukrasia tabularis* A. Juss.	
14	Neem	*Azadirachta indica* A. Juss.	
15	Mahogany	*Swietenia macrophylla* King	
16	Toon	*Toona ciliata* Roemer	
17	Pitraj	*Aphanamixis polystachya* (Wall.) R. Parker	
18	Akashmoni	*Acacia auriculiformis* Benth.	Fabaceae
19	Mandar	*Erythrina variegata* L.	
20	Kerung	*Pongamia pinnata* (L.) Pierre	
21	Chhatim	*Alstonia scholaris* (L.) R.Br.	Apocynaceae
22	Boilam	*Anisoptera scaphula* (Roxb.) Pierre	Dipterocarpace
23	Telsur	*Hopea odorata* Roxb.	ae
24	Garjon	*Dipterocarpus turbinatus* Gaertn	
25	Kadam	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae
26	Haldo	*Haldina cordifolia* Roxb.	
27	Agar	*Aquilaria malaccensis* Roxb.	Thymelaeaceae
28	Shimul	*Bombax ceiba* L.	Bombacaceae
29	Bonshimul	*Bombax insigne* Wall.	

30	Moss	*Brownlowia elata* Roxb.	Tiliaceae
31	Bormala	*Calicarpa macrophylla* Vahl.	Verbenaceae
32	Gamar	*Gmelina arborea* Roxb.	
33	Guda	*Vitex peduncularis* Wall.	
34	Segun	*Tectona grandis* L. f.	
35	Minjiri	*Cassia siamea* Lam.	Caesalpiniacea
36	Tentul	*Tamarindus indica* L.	e
37	Asal	*Terminalia alata Roth*	Combretaceae
38	Arjun	*Terminalia arjuna* (Roxb.ex DC.) Wight & Arn.	
39	Bohera	*Terminalia bellirica* (Gaertn.) Roxb.	
40	Horitoki	*Terminalia chebula* (Gaertn) Retz.	
41	Baruna	*Crataeva magna* (Lour.) DC.	Capparaceae
42	Chalta	*Dillenia indica* L.	Dilleniaceae
43	Hargaza	*Dillenia pentagyna* Roxb.	
44	Jiga	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae
45	Aam	*Mangifera indica* L.	
46	Uri-aam	*Mangifera sylvestris* Roxb.	
47	Amra	*Spondias mangifera* (L. f.) Kurz.	
48	Civit	*Swietenia floribunda* Griff.	
49	Kendu	*Diospyros melanoxylon* Roxb.	Ebenaceae
50	Banderhola	*Duabanga grandiflora* (Roxb. *ex* DC.)	Sonneratiaceae
51	Eucalyptus	*Eucalyptus camaldulensis* Dehnn.	Myrtaceae
52	Putijam	*Syzygium fruticosum* (Roxb.) DC.	
53	Dhakijam	*Syzygium grande* (Wight.) walp.	
54	Chaltajam	*Syzygium megacarpum* (Craib.) Rathakr.	
55	Jarul	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae
56	Dholibatna	*Lithocarpus thomsonii* (Miq.)Rehder	Fagaceae
57	Nageshwar	*Mesua ferrea* L.	Clusiaceae
58	Champa	*Michelia champaca* L.	Magnoliaceae
59	Khana	*Oroxylum indicum* (L.) Vent.	Bignoniaceae
60	Dharmara	*Stereospermum colais* (Buch.-Ham. *ex* Dillw)	
61	Gutgutia	*Protium serratum* (Wall. *ex* Colebr.)	Burseraceae
62	Pitali	*Trewia nudiflora* L.	Euphorbiaceae
63	Udal	*Sterculia villosa* Roxb.	Sterculiaceae
64	Moynakata	*Tetrameles nudiflora R.Br.*	Datiscaceae
65	Boroi	*Ziziphus mauritiana* Lam.	Rhamnaceae

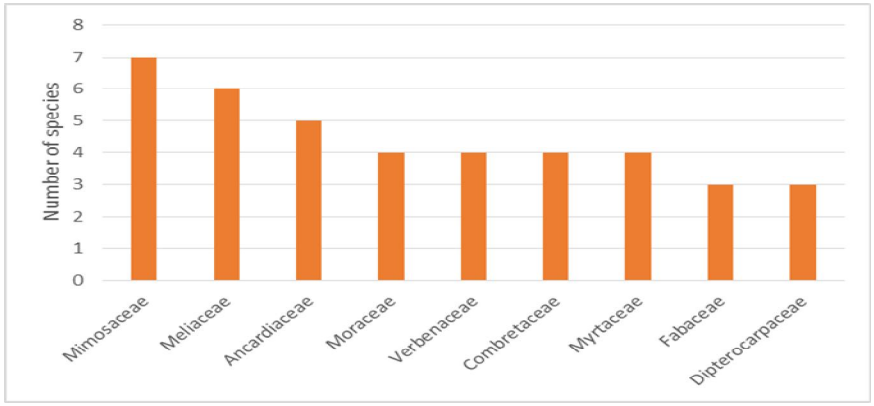

Fig. 3. Top nine plant families in the Kaptai National Park

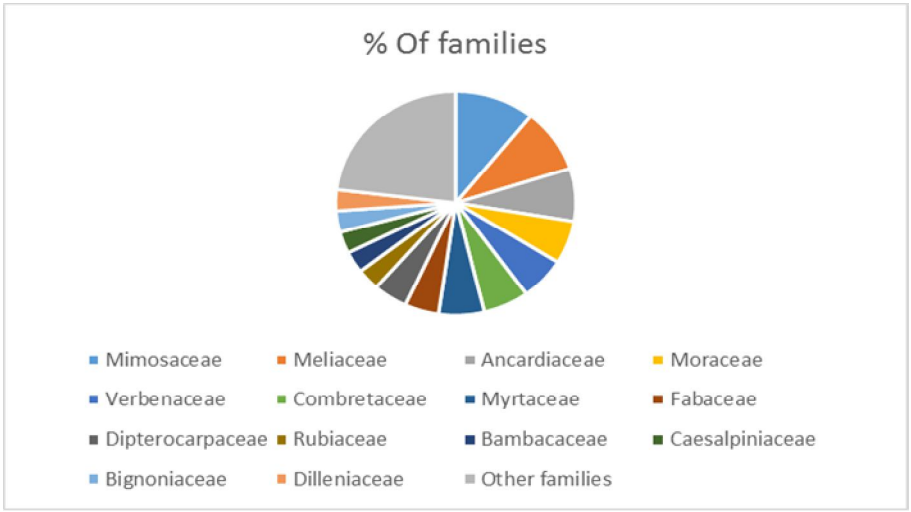

Fig. 4. Percentage of the recorded Plant families in the Kaptai National Park

Mimosaceae family possessed the highest percent of species (10.77%) followed by Meliaceae (9.23%), Ancardiaceae (7.69%), Moraceae (6.15%), Verbenaceae (6.15%), Combretaceae (6.15%), Myrtaceae (6.15%), Dipterocarpaceae (4.62%), Fabaceae (4.62%), Rubiaceae (3.08%), Bombacaceae (3.08%), Caesalpiniaceae (3.08 %), Bignoniaceae (3.08 %) and Dilleniaceae (3.08 %) respectively (Figure 4). There were 15 families (Apocynaceae, Thymelaeaceae, Tiliaceae, Capparaceae, Ebenaceae, Sonneratiaceae, Lythraceae, Fagaceae, Clusiaceae, Magnoliaceae, Burseraceae, Sterculiaceae, Datiscaceae, Euphorbiaceae and Rhamnaceae) which contained less than two species number and included of other families (23.08%).

The extraction of all kinds of forest products and trespassing, that disturbs the natural habitat, are prohibited in the Kaptai National Park. Community Forest Workers and

Integrated Protected Area Co-management are also helping the Forest Department personnel in patrolling forest resources from all illegal activities and extraction. As a results, the surrounding people who are generally used to cut and collect timber, fuel wood, bamboos, fence posts, agricultural implements and house posts from the forests are not allowed to do the same by their own community. However, the existing threats to biodiversity of the Kaptai National Park are also immense.

The main issues in the loss of tree diversity in the Kaptai National Park are degraded of habitat, e.g. change inland use, conversion of forest lands to agricultural lands, haphazard introduction and priority of alien invasive species, expansion of road networks and other anthropogenic activities that have damaged most of the forest resources of the Kaptai National Park. Over exploitation of resources, e.g. collection of resources, fire hazard, illicit felling, encroachment, indiscriminate harvesting of tree species and non-timber forest products exerts a significant negative impact on the biodiversity of the Kaptai National Park. The process of conserving tree species can be divided into three phases: i) identification-determining which species are in danger of extinction, ii) protection-determining and implementing the short term measures necessary to halt species from extinction, iii) recovery-determining and implementing the long-term measures necessary to rebuild the population of the species to the point at which it is no longer in danger of extinction.

Although some natural regeneration was coming up, the cutting of seedlings and saplings particularly by fuel wood collectors and betel leaf cultivators impose threats on new recruitments. Many local people living in and around the National Park area are dependent on the forest resources for their livelihood. Conflicts regarding land need to be resolved to protect trees and natural regeneration. At the same time periodic monitoring is needed to identify what changes are taking place on the composition, structure and diversity of tree species. Finally, it can be noted that the condition of the forest is poor, but still there is some hope as shown by the rich regeneration and potential of rehabilitation in the remnant natural forest. If it is possible to protect this National Park with effective measures of diverting the forest dependent people towards non forest related livelihood alternatives or reducing dependency on the forest, there is a greater possibility of this forest to develop into a better quality forest ecosystem with native tree species.

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