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Floristic Composition and Vegetation Diversity Status of Khagrachari Sadar, Chattogram, Bangladesh

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ABSTRACT

Floristic diversity of Khagrachari Sadar of Khagrachari district, within Chittagong Hill Tracts of Bangladesh, has been investigated. A territory's vegetation type and diversity provide insight into the overall resources, their usage structures, and conservation status that are crucial to developing conservation plans and regulations. This analysis helps to portray the overall scenario of a region's plant biomass/vegetation diversity exquisitely. This study has revealed the occurrence of 369 vascular plant species belonging to 144 genera under 97 families from the study area. Out of these 32 are pteridophytes, 2 are gymnosperms and the rest of 335 are angiosperms. Based on habit distribution, herbs are represented by 150 species followed by shrubs (48), trees (108), climbers (47) and epiphytes by 16 species. Dicotyledonous (Magnoliopsida) group was dominant and represented by 254 species belonging to 73 genera under 62 families, followed by monocotyledonous (Liliopsida) with 81 species under 52 genera and 17 families. Among the dicotyledonous plants, Rubiaceae was found to be the largest family with 24 species, whereas with 17 species Orchidaceae is the largest family in monocotyledonous. It appears that Forested areas are dominated by *Melocanna baccifera,* with an IVI of 8.00 and have the scanty appearance of two herbs (*Spathoglottis plicata, Adiantum flabellaletum)* and one tree species *(Cycas pectinata)*. For effective conservation management and sustainable usage of the taxa, the status of occurrence has been determined where 304 species (82.23 percent) are considered as 'Common', 61 (16.53 percent) are considered 'Least Concern', 2 (0.54%) are considered 'Vulnerable' and 2 (0.54%), are considered 'Critically Endangered'. Several diversity indices, such as Margelef's richness, Shannon-Winer Index, Pielou's Evenness, and Simpson's Index values showed the substantial diversity status of the vascular plant in selected 4 sites. A considerable seasonal fluctuation was evident in the diversity indices at four different research locations where data reflected that the rainy season is more diverse than others.

Keywords: Diversity Index, Floristic composition, Khagrachari, Vegetation diversity.

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I. INTRODUCTION

World's prime deltaic plain, the Ganges-Brahmaputra delta, resides in Bangladesh, which is positioned between 20°34' and 26'38" north latitude, and 88°01' and 92°41' east longitude. Bangladesh has a subtropical monsoon climate with a majority of floodplains and has a handful of hilly areas with enormously diversified plants and animals (Islam, *et al.*, 2003). This country's 80% of its territory is low-lying and prone to flood, making it the biggest flood basin in South Asia. River alluvium from the Ganges, Brahmaputra and its tributaries makes up a substantial portion of the country's terrain (Sohel *et al.*, 2015). Geographically, the country proximity to the Indo-Burma region – one of the global biodiversity hot-spot and believed to have more than 7,000 endemic plant species (Mittermeier *et al*., 1998), whereas various literature studies ensured the presence of more than 5000 vascular plant species in a certain region of the country and warrant for thorough documentation study in throughout the country (Faruque *et al*., 2018; Faruque *et al*., 2019). Bangladesh, due to its unique geophysical location and the suitable climatic condition is exceptionally endowed with a rich variety of biodiversity (Nishat *et al.*, 2002).

To illustrate this, 80 percent of Bangladesh's forests are natural and 16 percent are plantations. The majority of natural forests are situated in Chittagong Hill Tracts (CHTs), which are accountable for a substantial amount of Bangladesh's biodiversity, and also about 12 ethnic groups dwell in the CHTs and their livelihoods are directly or indirectly reliant on this area's vegetation (Jannat *et al*., 2018). Several research studies have shown how these indigenous communities use their tribal heritage to treat various health problems, for cosmetics, cultural beliefs, and other purposes (Faruque & Uddin, 2014; Paul *et al*., 2019; Roy *et al.*, 2008). This brilliancy is also corroborated by many sophisticated modern scientific studies (Faruque *et al*., 2019; Rudra *et al*., 2020a; Shovo *et al*., 2021). As a mirror of their community-based forest management biodiversity richness, some shed of illumination should be found in prior studies (Kadir *et al*., 2012; Uddn *et al*., 2013; Uddin *et al*., 2014) which can give us an ideal notion of how they maintained their ancestral belief through operating their valuable botanical wealth

sustainably. Nevertheless, Bangladesh, like most other parts of the globe, went through a period in the previous several decades when the country's biodiversity, and ecology were severely harmed. Physiognomically, the whole of the country is almost slopping down from north to south, and intersected with several hundreds of rivers, and canals. It is bordered on the west, north and east by India, on the south-east by Myanmar and the south by the Bay of Bengal (Huq & Asaduzzaman, 1999). As with CHTs, this natural treasure of phytodiversity has been progressively lost over time owing to urbanization, jhum farming, over-exploitation, soil erosion, climate change, government policies, and other causes (Jashimuddin & Inoue, 2012). Therefore, a comprehensive list of flora including all lower plants along with their present conservation status and recovery plan is needed for proper conservation and management of biodiversity in reserves. Habitat monitoring is, therefore important in the assessment of national biodiversity sustainability (Nath *et al*., 2000). In the past ecologists, and taxonomists have been mostly concerned about the diversity of plants, animals and their interactions within ecosystems and landscapes (Magurran, 1988; Whittaker & Niering, 1975). Forests represent the storehouse of diversity. Thus, the conservation of its diversity is both a matter of insurance and investment to ensure sustainable improvement of agriculture, forestry, and fisheries production. Conservation of biodiversity also sustains different services of forest ecosystems; as a buffer against harmful environmental changes, as a source of raw material for scientific and industrial innovation, and as a matter of moral principle (Allen, 1980; IUCN, 2019). Several floristic inventories have been progressed throughout the country over the past few decades. Those had resulted in the compilation of a number of checklists (Khan *et al.*, 1969; Khan & Huq, 2001; Khan *et al.*, 1994; Rahman & Hassan, 1995; Rahman and Uddin, 1997; Uddin & Hassan, 2010; Uddin *et al.*, 2004; Uddin & Rahman, 1999). However, many regions of the country have been inadequately investigated or have not been explored at all up to this point in time. Floristic collections are essential for expanding the holdings from those under-represented areas to conserve the biodiversity of the country. But there is no comprehensive study on vegetation diversity and ecology of Khagrachari hill forest. So, an initiative was undertaken to the Khagrachari Sadar to prepare a comprehensive checklist of natural vascular plants with their structure, composition, distribution, and seasonal fluctuation as well as to assess the phyto-diversity status of this hilly area. This inventory of native species generates baseline information to monitor changes in species composition, to undertake conservation activity and prepare a plan for sustainable management and utilization of this natural forest resource in the future.

II. Materials and Methods

A. Study Sites

Hilly forest of Khagrachhari sadar upazila of Khagrachari district under Chattogram division were chosen for the current study (Fig. 1). Khagrachhari sadar upazila is located in the south-eastern part of Bangladesh in between 23°00' – 23°21' N and 91°55' – 92°00' E. It is a hot spot of wild flora with an area of 297.91 sq. km. (BBS, 2011). About 1,11,833 people dwell within the boundaries of Khagrachari sadar; that is bordered by Panchari upazila to the north, Mohalchari upazila to the south, Dighinalu, Langadhu and Matiranga upazilas to the east and Matiranga upazila to the west (BBS, 2011).

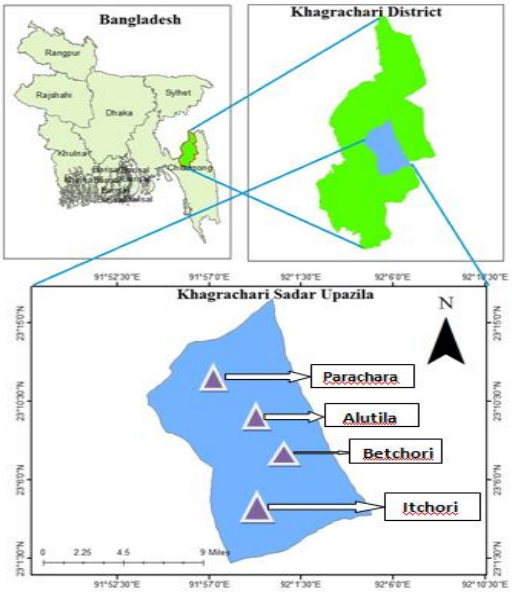

Fig. 1. Location of the study area.

B. Sampling Framework

Natural vascular plants were scrutinized employing a stratified random sampling method. There was a total of four sites were chosen based on the progressive changes in hill height/altitude. They are Site-A: Alutila Zone, Site-B: Betchori Zone, Site-I: Itchori Zone and Site-P: Parachora Zone (Fig. 1). Each site was divided into three sub-sites based on topography such as Sub-site-1: Upper-slope at the hilltop; Sub-site-2: Mid-slope at the hill and Sub-site-3: Lower-slope at the hill foot. Five plots were taken from each sub-site. Thus, a total of 60 plots were surveyed from the study area. The sample plot size was 10m X 10m (Rudra *et al*., 2020b). All plant specimens gathered from the research region were authenticated with the assistance of plant experts of Jahangirnagar University, and Chittagong University, by comparing them to the relevant voucher specimens preserved in Herbarium of Chittagong University (HCU), Bangladesh Forest Research Institute (BFRI) Herbarium and Bangladesh National Herbarium (DACB), through matching with taxonomic descriptions and keys available in the relevant literatures (Wu & Chang, 2003; Hooker, 1973; Prain, 1903; Siddiqui *et al.*, 2007a; Siddiqui *et al.*, 2007b; Ahmed *et al.* 2009; Ahmed *et al*., 2009a; Ahmed *et al*., 2009b; Ahmed *et al*. 2009c; Rashid *et al.*, 2018) and type images available in the websites of different international herbaria.

Taxonomical nomenclatures have been updated following "Dictionary of plant names of Bangladesh" (Pasha & Uddin, 2013) and the online source- http://www.theplantlist.org/. Three prominent seasons of a year were selected for conducting field survey and sample collection from July 2016-2018. These are Rainy season: July-October, Winter season: November-February, and Summer season: March-June.

TABLE I: SPECIFICATION OF PHYTOSOCIOLOGICAL PARAMETERS AND BIODIVERSITY INDICES

Attributes	Equations	Variable interpretation
Frequency (x)	$x=\frac{c}{b}$	a = Number of members of a certain species in each plot b = the total number of plots examined c=total number of plots where the species is found. n =A species' population size is in number N =total number of individuals of all the species P = n/N S = total number of species
Abundance (y)	$y=\frac{a}{c}$	
Relative Density (RD)	$RD = \frac{n}{N} \times 100$	
Relative Frequency (RF)	$RF = \frac{x_i}{\sum_{i=1}^{k}(x_i)} \times 100$	
Relative Abundance (RA)	$RA = \frac{y}{\sum_{i=1}^{k} y_i} \times 100$	
Importance Value Index (IVI)	IVI = RD + RF + RA	
Shannon-Weiner diversity index (H)	$H = -\sum_{i=1}^{n} P_i(\ln P_i)$	
Simpson diversity index (D)	$D = \sum_{i=1}^{n} P_i^2$	
Species evenness index (E)	$E = \frac{H}{\log(S)}$	
Margalef's Index of Species Richness:	$R=\frac{(S-1)}{\log N}$	
Pielou's Measure of Evenness:	$E = \frac{H}{\log(S)}$	

C. Quantitative Framework

Phytosociological attributes and diversity indices were calculated for all 60 plots from the study area. Major phytosociological status (relative density, relative frequency, relative abundance, and importance value index) of the recorded species were calculated by using formulae described as Shukla and Chandal (Shukla & Chandel, 2000). The Shannon-Wiener diversity index (H), Simpson's diversity index (D), Margalef's Index of Species Richness (R) and Pielou's Measure of Evenness (E) were also calculated. All the herbarium voucher specimens were collected and prepared following standard herbarium technique and deposited in Herbarium of Chittagong University (HCU). All the relevant formula of phytosociological characteristics and diversity indexes are enlisted in Table I.

III. RESULTS AND DISCUSSION

A. Plant Diversity and Their Conservation Status

From Khagrachari Sadar, this research lead to the existence of 369 vascular plant species corresponding to 144 genera and 97 families, which was concordant with prior studies conducted in Bangladesh's forest areas (Tutul *et al.*, 2010; Uddin *et al.*, 2017; Chowdhury *et al.*, 2018; Hossen & Hossain, 2018; Rahman, 2018; Hossain *et al.*, 2020). The plant information from the study region are arranged alphabetically by Family then by species names along with the Importance Value Index (IVI), habit, conservation status and accession number of the individual species (Table II). Out of the recorded species, 32 (8.67%) are pteridophytes, 2 (0.54%) are gymnosperms and rest of 335 (90.79%) are angiosperms i.e. Magnoliopsida and Liliopsida (Table II). Where, Pteridopyte flora was found to include 32 species (8.67%) in 17 genera and 16 families. On the other hand, out of the recorded angiospermic plant, dicotyledons (Magnoliopsida) group has been dominated by 254 (68.85%) species belonging to 73 genera under 62 families, whilst the monocotyledons (Liliopsida) group occupied 81 (21.95%) species under 52 genera and 17 families (Table II). In contrast to other studies, this one had a different conclusion (Hossain *et al.*, 2013; Rashid & Chowdhury, 2013; Sajib *et al.*, 2014; Nahar & Mahbubur, 2016; Rahman *et al.*, 2016).

It was noticed that dicotyledonous cluster had 62 families preceded by monocotyledonous, pteridophytes and gymnosperms having 17, 16, and 2 families respectively. It's occurred as a response of their blossoming and fruiting cycles; dicots have a diversity that is approximately three-fold larger than monocots. The number of species in the reported families ranged from one to twenty-four, with 32 families containing just single species (Table II).

In dicotyledonous group, Rubiaceae appeared to be the largest family comprised of 24 species under 16 genera, followed by Fabaceae with 24 species under 13 genera, Euphorbiaceae (22), Asteraceae (11), Moraceae (11), Urticaceae (9), Verbenaceae (8), Rutaceae (7), Mimosaceae (7) and Anacardiaceae (6).

In monocotyledonous group, Orchidaceae is the largest family having 17 species under 14 genera trailed by Poaceae (10), Zingiberaceae (10), Araceae (8), Liliaceae (6), Commelinaceae (5), Dioscoreaceae (6), Adiantaceae (5), Agavaceae (3) and Musaceae (4). Among the recorded 94 families, Rubiaceae Fabaceae, Euphorbiaceae, Asteraceae, Orchidaceae, Moraceae, Poaceae, Zingiberaceae, Urticaceae, Araceae and Verbenaceae was the most dominant respectively. Because of comparable environmental and ecological variables, this Rubiaceae family prevalence also found in neighboring country India (Jamir & Pandey, 2003; Mishra *et al*., 2004; Gritto *et al.*, 2015).

In terms of genus dominancy, *Ficus* and *Spermacoce* are the largest dicotyledons genera, with eight and six species, led by *Albizia*, *Dalbergia*, *Desmodium*, and *Phyllanthus*, each one with four species; whereas *Dioscorea* and *Bambusa* are the biggest monocotyledons genera that have six and four species respectively, and the *Alpinia*, *Commelina*, *Curcuma*, *Dracaena*, *Musa* and *Smilax* each consisted of three species.

In the current study area, *Melocanna baccifera* having an IVI value of 8.00% is mostly important and dominant plant species in the forest area, backed by some co-dominant species are *Thysanolaena maxima* (4.19%), *Molineria capitulate* (4.07%), *Urena lobata* (3.91%), *Saccharum spontanenum* (3.32%), *Saccharum arundinaceum* (2.97%), *Spilanthes acmella* (2.96%), *Panicum incomtum* (2.95%), *Leea indica* (2.89%), *Musa ornata* (2.71%) and *Chromolaena odorata* (2.64%) accordingly. The common species are *Alstonia sccholaris*, *Swintonia floribunda*, *Desmos dunali*, *Dillenia*

indica, *Dalbergia volubilis*, *Actinodaphne obovata*, *Piper chaba*, *Bambusa tulda*, *Ageratum conyzoides*, *Euphorbia hirta* and *Urena lobata*. With an IVI value of 0.14, the research region includes scanty presence of following plant species in study field such as *Spathoglottis plicata*, *Cycas pectinata*, and *Adiantum flabellaletum* that have a lower dominancy. In more concrete terms, this IVI value denoted that the regenerative competency of trees in the study site had been on the decline in comparison to other plant types.

Smilax zeylanica, *Vitis pentagona*, *Protium serratum*, *Tinospora crispa*, *Tinospora cordifolia*and *Passiflora foetida*are rarely found in the study area. The number of these species is decreasing day by day. *Tinospora crispa* is a threatened species (Khan & Huq, 2001). which is a popular medicinal plant used by the local people. Status of occurrence has been recorded for proper conservation management and sustainable utilization of the taxa which show 304 (82.23%) to be common, 61 (16.53%) as least concern, 2 (0.54%) as vulnerable and 2 (0.54%) as critically endangered in the study area (Table II). Most importantly this finding also urges, two critically endangered species namely *Gastrochilus calceolaris* orchids and *Bombax insigne*, as well as two vulnerable species, *Dipterocarpus turbinatus* and *Cycas pectinata*, should be promptly conserved based on IUCN global status since their populations are rapidly declining due to their medicinal properties and timber value (Progress of Medical Science, 1865; Chowdhury *et al.*, 2013; Aslam *et al.*, 2015; Tareq *et al.*, 2020).

B. Habitat Diversity

Among the vascular plants' herbs represented by 150 (41%) species in 104 genera and 53 family, shrubs account for 48 (13%) species under 32 genera and 20 family, trees for 108 (29%) species classified to 70 genera and 40 family, climbers have 47 (13%) species under 30 genera and 22 family and 16 (4%) species for epiphytes under 14 genera and 3 family respectively. This findings evidently indicates that there is a clear dominance of herbaceous plants compared to shrubs, trees and climbers in the habit diversity (Fig. 2) as also observed by others (Jashimuddin & Inoue, 2012; Uddin *et al.*, 2015; Faruque *et al.*, 2018; Malik *et al.*, 2018; Gumisiriza *et al.*, 2019).The dominant vascular plant families with respect to number of species and genera were Rubiaceae, Fabaceae, Euphorbiaceae, Orchidaceae, Asteraceae, Poaceae, Verbenaceae, Rutaceae, Urticaceae and Zingiberaceae correspondingly (Table II). In Magnoliopsida, Rubiaceae appears to be the largest family having 24 species and 17 genera; whereas in Liliopsida, Orchidaceae appears to be the largest family having 16 species and 11 genera. But according to Flora of Bangladesh, Poaceae is the 1st largest family followed by Fabaceae, Rubiaceae, Asteraceae and Euphorbiaceae. In line with the Bangladesh Flora also represented 217 species and 68 genera in Rubiaceae family and 242 species and 90 genera under Orchidaceae family (Pasha & Uddin, 2013).

C. Diversity Indices and Seasonal Variation

The calculated magnitude of Shanon-Wiener index of this study was 5.07 indicating the presence of diverse vascular plants in comparable magnitudes of other studies conducted in community managed VCFs of Beganasori and Bamer Bagechori in Rangamati and exhibit greater diversity of vegetation than other two VCFs as well as and government managed forests in Bangladesh (Table III). Contrariwise, lower Simpson's index of 0.099 was also one of the key indicators of presence of considerably diverse vegetation in the study areas which close to the result for other reported VCFs and one government managed forest (Table III). Species evenness index was computed as 0.99 indicating that all species were almost evenly distributed. This outcome also homogenous to Beganasori and Bamer Bagechori VCF in Rangamati and markedly heterogenous to other two VCFs and BFD managed forest as demonstrated in Table III. Phytosociological attributes and diversity indices showed elevated results compared to other studies reported from the BFD managed forests and community managed forest (Nath *et al.*, 2016a; Nath *et al.*, 2016b) which indicated that community induced forest management approach is more effective than the government managed forests. This variation in diversity indices among different forest type is attributable to alterations in species biomass, perturbations, and topographical factors. The community works in a collaborative way for the sustainable management of VCF and helps to grow stewardship among the community members. However, the population density in CHTs is very low compared to other parts of the country and this may be why they exist in rich diverse forest patches.

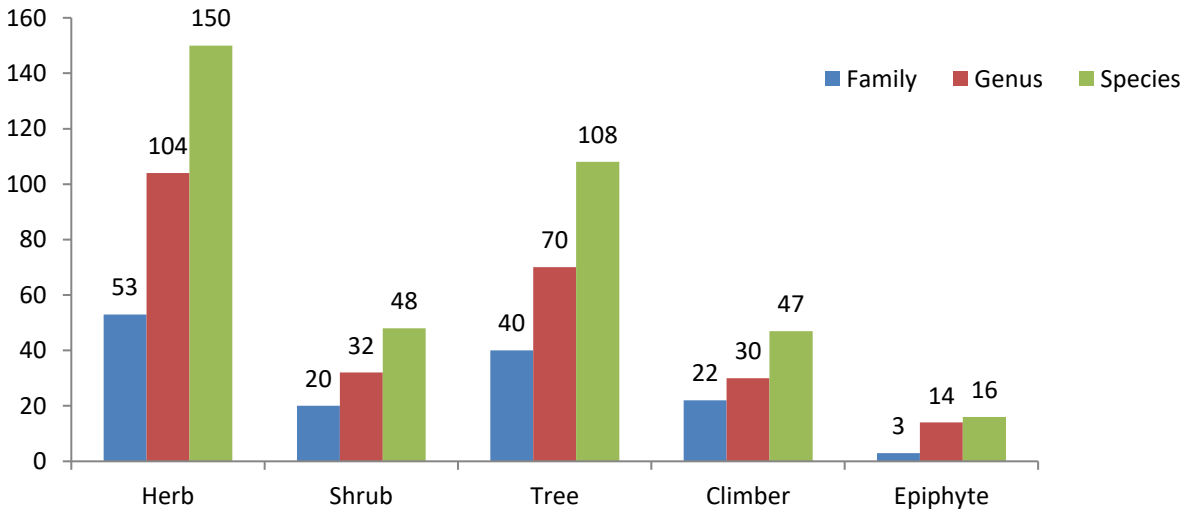

Fig. 2. Habit diversity of vascular plants of Khagrachari Sadar.

TABLE II: COMPREHENSIVE CHECKLIST OF PLANT DIVERSITY RECORDED FROM KHAGRACHARI SADAR

Family	Local Name	Scientific Name	IVI	IUCN Status	Habit	Accession No.
Acanthaceae	Linagathis	*Lepidagathis incurva* Buch.-Ham. ex D.Don	0.87	NE	H	DKB1520
	Khaskhasabila	*Strobilanthes scaber* Nees	0.54	NE	H	DKB1270
	Bans lata	*Thunbergia grandiflora* Roxb.	1.55	NE	C	DKB1493
Actinidiaceae	Bhola kadam	*Saurauia roxburghii* Wall.	0.33	NE	T	DKB1431
Adiantaceae	Biddapata	*Adiantum caudatum* L.	0.82	NE	H	DKB1391
	Mayurshikha	*Adiantum flabellaletum* L	0.14	NE	H	DKB1187
	Bara Pakha	*Adiantum latifolium*	0.23	NE	H	DKB1180
	Goyalata	*Adiantum lunulatum* Bum.f.	0.15	NE	H	DKB1191
	Kalijhat	*Adiantum philippense* L.	2.1	NE	H	DKB1411
Agavaceae	Chikna drakan	*Dracaena angustifolia* (Medik.) Roxb.	0.51	NE	H	DKB1449
	Kado drakan	*Dracaena spicata* Roxb.	2.12	NE	H	DKB1482
	Chandroketu drakan	*Dracaena terniflora* Roxb.	0.97	NE	H	DKB1467
Amaranthaceae	Apang	*Achyranthes aspera* L.	1.76	NE	H	DKB1300
	Shyontula	*Cyathula prostrata* (L.) Blume	0.55	NE	H	DKB1331
Anacardiaceae	Uriam	*Bouea oppositifolia* (Roxb.) Adelb	0.33	NE	T	DKB0061
	Jhawa	*Holigarna longifolia* Buch.Ham. ex Roxb.	1.13	NE	T	DKB1291
	Bhadi	*Lannea coromandelica* (Houtt.) Merr.	0.56	NE	T	DKB1261
	Aam	*Mangifera indica* L.	0.19	DD	T	DKB1488
	Bonan	*Mangifera sylvatica* Roxb.	0.27	LC	T	DKB1435
	Bon amra	*Spondias pinnata* (L.f.) Kurz	0.39	LC	T	DKB1350
	Civit	*Swintonia floribunda* Griff.	0.27	NE	T	DKB1327
Annonaceae	Gandhochapa	*Artabotrys suaveolens* (Blume) Blume	0.49	NE	T	DKB1369
	Sotoyalang	*Desmos chinensis* Lour.	1.21	NE	T	DKB1312
	Dunayalang	*Desmos dunalii* (Wall.) Saff.	0.46	NE	T	DKB1363
Apiaceae	Thankuni	*Centella asiatica* (L.) Urban	0.51	LC	H	DKB1182
Apocynaceae	Chattim	*Alstonia scholaris* (L.) R.Br.	0.39	LC	T	DKB1196
	Kurchi	*Holarrhena antidysenterica* (Roxb. ex Fleming) Wall. ex A.DC.	0.66	NE	T	DKB1315
	Shamlata	*Ichnocarpus frutescens* (L.) R.Br.	0.59	NE	C	DKB1404
	Tagar	*Tabernaemontana divericata* (L.) R.Br. ex Roemer & JSchult.	0.48	NE	S	DKB1409
	Dudhkurush	*Wrightia arborea* (Dennst.) Mabb.	0.52	NE	T	DKB1277
Araceae	Nimahook	*Aglaonema hookerianum* Schott.	2.34	NE	H	DKB1400
	Pata bokakachu	*Alocasia acuminata* Schott	0.47	NE	H	DKB1255
	Kochu	*Colocasia esculenta* (L.) Schott	0.88	LC	H	DKB1330
	Gandhobi kochu	*Homalomena aromatica* (Spreng.) Schott	0.99	NE	H	DKB1259
	Ghondodula kochu	*Homalomena pendula* (Blume) Bakh.f.	1.68	NE	H	DKB1245
	Hatilata	*Pothos scandens* L.	0.54	NE	E	DKB1227
	Fidosiva	*Rhaphidophora decursiva* (Roxb.) Schott	0.49	NE	H	DKB1503
	kachu	*Steudnera gagei* C.Krauce.	0.51	NE	H	DKB1220
Araliaceae	Dahina scefler	*Schefflera elliptica* (Blume) Harms	0.51	NE	T	DKB1453
	Argoja	*Trevesia palmata* (Roxb. ex Lindl.) Vis.	2.2	NE	S	DKB1480
Arecaceae	Jalibet	*Calamus guruba* Buch.-Ham.	0.97	NE	C	DKB1257
	Gracifuli	*Didymosperma gracilis* Hook.f.	1.99	NE	H	DKB1395
Aristolochiaceae	Iswararmul	*Aristolochia tagala* Cham.	0.75	NE	C	DKB1335
Asclepiadaceae	Anantamul	*Hemidesmus indicus* (L.) R.Br.	0.98	NE	C	DKB1345
Asteraceae	Fulkuri	*Ageratum conyzoides* (L.) L.	2.4	LC	H	DKB1388
	Bidenlosa	*Bidens pilosa* L.	0.21	NE	H	DKB1271
	Kakronda	*Blumea balsamifera* DC.	0.75	NE	S	DKB1340
	Kukurshinga	*Blumea lacera* (Burm.f.) DC.	2.05	NE	H	DKB1200
	Assamlata	*Chromolaena odorata* (L.) R.M. King & H. Rob.	2.64	NE	S	DKB1221
	Helencha	*Enhydra fluctuans* Lour.	0.57	NE	H	DKB1419
	Toofainna lata	*Mikania micrantha* Kunth	2.41	NE	C	DKB1491
	Fulkuri	*Mikania scandens*	0.4	NE	C	DKB1500
	Surjo kannya	*Spilanthes acmella* (L.) L.	2.96	NE	H	DKB1364
	Relanodi	*Synedrella nodiflora* (L.) Gaertn.	0.94	NE	H	DKB1352
	Dondo kolosh	*Vernonia patula* (Dryand.) Merr.	0.36	NE	H	DKB1296
Begoniaceae	Gonirakto	*Begonia roxburghii* (Miq.) A.DC.	1.75	NE	H	DKB1282
Bignoniaceae	Thona	*Oroxylum indicum* (L.) Kurz	0.64	NE	S	DKB1276
	Dharmara	*Stereospermum colais* (Buch.-Ham. ex Dillw) Mabb	0.59	NE	T	DKB1219
Bixaceae	Latkan	*Bixa orellana* L.	0.66	NE	T	DKB1283
Blechnaceae	Liane fern	*Stenochlaena palustris* (Burm.f.) Bedd.	0.75	NE	H	DKB1214
Bombacaceae	Shimul	*Bombax ceiba* L.	0.34	NE	T	DKB1201
	Bon shimul	*Bombax insigne* Wall.	0.55	CR	T	DKB1402
Burseraceae	Gutgutya	*Protium serratum* (Wall. ex Coelbr.) Engl.	0.5	NE	T	DKB1237
Caesalpiniaceae	Natakula	*Caesalpinia cucullata* Roxb.	0.19	NE	C	DKB1198
	Kochoi	*Caesalpinia digyna* Rottler	0.33	NE	C	DKB1284
	Panshi ashok	*Saraca indica* L.	0.21	NE	H	DKB1470
	Gandhosena	*Senna hirsuta* (L.) H.S.Irwin & Barneby	1.44	NE	H	DKB1476

TABLE II: COMPREHENSIVE CHECKLIST OF PLANT DIVERSITY RECORDED FROM KHAGRACHARI SADAR *(CONT)*

Family	Local Name	Scientific Name	IVI	IUCN Status	Habit	Accession No.
Combretaceae	Phul jhumuri	*Anogeissus lanceolata* (Wall. ex C.B.Clarke) Prain	0.94	NE	T	DKB1389
	Sada guicha	*Combretum album* Pers.	0.19	NE	S	DKB1272
	Asasuslata	*Combretum punctatum* Blume subsp. squamosum (Roxb. ex G.Don) Excell	0.17	NE	C	DKB1253
	Goachelata	*Getonia floribunda* Roxb.	2.51	NE	S	DKB1211
	Arjun	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	0.17	NE	T	DKB1215
	Bohera	*Terminalia bellirica* (Gaertn.) Roxb.	0.75	NE	T	DKB1242
Commelinaceae	Molisima	*Amischotolype mollissima* (Blume) Hassk.	1.78	NE	H	DKB1279
	Dholpata	*Commelina benghalensis* L.	0.49	LC	H	DKB1229
	Monayna Kanshira	*Commelina diffusa* Burm.f.	0.64	LC	H	DKB1183
	Jata kanchira	*Commelina erecta* L.	0.55	LC	H	DKB1273
	Khara gaith	*Floscopa scandens* Lour.	0.89	LC	H	DKB1231
Convolvulaceae	Guguli	*Argyreia nervosa* (Burm.f.) Bojer	0.4	NE	C	DKB1329
	Chottorupatola	*Argyreia splendens* (Roxb.) Sweet	1.21	NE	C	DKB1305
	Langulilata Kalmi	*Ipomoea pes-tigridis* L.	1.25	NE	C	DKB1376
	Montilata	*Jacquemontia paniculata* (Burm.f.) Hallier f.	0.23	NE	C	DKB1317
Costaceae	Kemak	*Cheilocostus speciosus* (J. König) C.Specht	2.19	NE	H	DKB1228
Cucurbitaceae	Agmkhi	*Mukia maderaspatana* (L.) M. Roem.	0.3	NE	C	DKB1429
Cyatheaceae	Baro brikkha fern	*Cyathea gigantea* (Wall. ex Hook.) Holttum	0.47	NE	H	DKB1342
Cycadaceae	Moniraj	*Cycas pectinata*Buch.-Ham.	0.14	VU	T	DKB1587
Cyperaceae	Mraaw	*Cyperus digitatus Roxb.*	1.96	LC	H	DKB1287
	Mutha	*Cyperus rotandus* L.	1.61	NE	H	DKB1343
Dilleniaceae	Chalta	*Dillenia indica* L.	0.36	NE	T	DKB1418
	Ajugi	*Dillenia pentagyna* Roxb.	0.17	NE	T	DKB1385
Dioscoreaceae	Jointa alu	*Dioscorea aculeata* L.	0.21	NE	C	DKB1344
	Mete alu	*Dioscorea alata* L.	1.13	NE	C	DKB1313
	Shora alu	*Dioscorea belophylla* (Prain) Voigt ex Haines	1.63	NE	C	DKB1307
	Banalu	*Dioscorea bulbifera* L.	1.75	NE	C	DKB1461
	Erabera alu	*Dioscorea kamoonensis* Kunth	0.27	NE	C	DKB1456
	Jum alu	*Dioscorea pentaphylla* L.	0.79	NE	C	DKB1448
Dipterocarpaceae	Kata garjan	*Dipterocarpus tuberculatus* Roxb.	0.61	NT	T	DKB1420
	Teli garjan	*Dipterocarpus turbinatus* Gaertn	0.33	VU	T	DKB1433
Dryopteridaceae	Chattagrami tari dheki	*Tectaria chattagramica* (C.B. Clarke) Ching	0.66	NE	H	DKB1522
	Grifitari dheki	*Tectaria griffithi*i (Baker) C.Chr.	0.82	NE	H	DKB1410
	Carpatari dheki	*Tectaria heterocarpa* (Bedd.) Morton	0.27	NE	H	DKB1521
	Baro bandortola (Ch)	*Tectaria vasta* (Blume) Copel	0.66	NE	H	DKB1192
Ebenaceae	Gab	*Diospyros malabarica* (Desr.) Kostel	0.19	NE	T	DKB1474
Elaeocarpaceae	jalpai	*Elaeocarpus floribundus* Blume	0.23	NE	T	DKB1332
	Tekopai	*Elaeocarpus tectorius* (Lour.) Poir.	0.51	NE	T	DKB1289
Euphorbiaceae	Lalsa	*Actephila excelsa* (Dalzell) Müll.Arg.	0.96	NE	H	DKB1308
	Multa	*Antidesma acidum* Retz.	0.55	LC	S	DKB1392
	Shialbuka	*Antidesma montanum* Blume var. montanum	0.92	LC	S	DKB1417
	Pashmi salishiabuka	*Antidesma velutinosum* Blume	0.72	NE	S	DKB1401
	Singha gaas	*Aporosa microstachya* (Tul.) Müll.Arg.	0.39	NE	T	DKB1367
	Kokra	*Aporosa wallichii* Hook.f.	0.3	NE	T	DKB1390
	Kantokushi	*Bridelia retusa* (L.) A. Juss.	1.43	LC	S	DKB1413
	Harinhara	*Bridelia stipularis* (L.) Blume	1.12	NE	T	DKB1301
	Serai	*Bridelia tomentosa* Blume	0.42	LC	T	DKB1407
	Bondhone	*Crotan bonplandium* Baill	0.42	NE	H	DKB1525
	Ghaopata	*Euphorbia hirta* L.	0.79	NE	H	DKB1438
	Ashami kachua	*Glochidion assamicum* (Müll.Arg.) Hook.f.	0.42	NE	H	DKB1223
	Koishtuma	*Glochidion multiloculare* (Rottler ex Willd.) Voigt	1.41	NE	S	DKB1233
	Dati bura	*Macaranga denticulata* (Blume) Müll.Arg.	0.34	LC	T	DKB1473
	Pelta bura	*Macaranga peltata* (Roxb.) Muell.-Arg	0.78	NE	T	DKB1523
	Nimputeli	Mallotus tetracoccus (Roxb.) Kurz	0.46	NE	T	DKB1451
	Kasava	*Manihot esculenta* Crantz	1.54	DD	S	DKB1439
	Amloki	*Phyllanthus emblica* L.	0.19	NE	T	DKB1397
	Vuiamla	*Phyllanthus niruri* L.	0.75	NE	H	DKB1406
	Panjuli	*Phyllanthus reticulatus* Poir.	1.48	NE	H	DKB1398
	Dudania	*Phyllanthus urinaria* L.	1.61	NE	T	DKB1387
	Ban-naranga	*Suregada multiflora* (A. Juss.) Baill.	0.66	NE	T	DKB1298
Fabaceae	Bansan	*Crotalaria verrucosa* L.	0.68	NE	H	DKB1209
	Ketkini	*Dalbergia ovata* Benth.	0.17	LC	T	DKB1394
	Shishoo	*Dalbergia sissoo* DC.	0.25	NE	T	DKB1202
	Dadbari	*Dalbergia stipulacea* Roxb.	0.9	NE	T	DKB1371
	Ankilata	*Dalbergia volubilis* Roxb.	0.47	NE	T	DKB1362
	Mithilata	*Derris mitis* (L.) Kurz	0.53	NE	C	DKB1288
	Koroi	*Derris robusta* (DC.) Benth.	0,36	NE	T	DKB1224
	Kamirialata	*Derris scandens* (Roxb.) Benth.	0.62	LC	C	DKB1244

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Family	Local Name	Scientific Name	IVI	IUCN Status	Habit	Accession No.
Fabaceae	Kalilata	*Derris trifoliata* Lour.	0.66	NE	C	DKB0094
	Chalani	*Desmodium* gangeticum (L.) DC.	1.22	NE	S	DKB1210
	Karpo modi	*Desmodium heterocarpon* (L.) DC.	0.42	NE	S	DKB1184
	Loncharal	*Desmodium motorium* (Houtt.) Merr.	1.21	NE	S	DKB1280
	Kodaliya	*Desmodium triflorum* (L.) DC.	0.58	NE	S	DKB1190
	Baro madar	*Erythrina arborescens* Roxb.	0.39	NE	T	DKB1423
	Mandar	*Erythrina variegata* L. var. variegate	0.5	LC	T	DKB1434
	Bara-salphan	*Flemingia macrophylla* (Willd.) Merr.	0.38	NE	H	DKB1290
	Charchara phan	*Flemingia stricta* Roxb.	1.08	NE	S	DKB1258
	Para kali	*Paracalyx scariosus* (Roxb.) Ali	0.21	NE	S	DKB1263
	Kartashim	*Phaseolus calcaratus* Roxb.	0.19	NE	C	DKB1386
	Jutasalpani	*Phyllodium pulchellum* (L.) Desv.	1.14	LC	H	DKB1381
	Koronja	*Pongamia pinnata* (L.) Pierre	0.38	LC	T	DKB1236
	Pendun kunch(B).	*Pueraria peduncularis* (Benth.) Benth	0.27	NE	C	DKB1511
	Gola kunch	*Pueraria tuberosa* (Willd.) DC.	1.56	NE	C	DKB1515
	Sonamoog	*Vigna radiata* (L.) Wilczek	0.21	LC	H	DKB1526
	Batna	*Quercus oxyodon* Miq.	0.19	NE	T	DKB1514
Flacourtiaceae	Paniamala	*Flacourtia jangomas* (Lour.) Raeusch.	0.17	NE	T	DKB1314
Gesneriaceae	Hooklata	*Aeschynanthus hookeri* C.B. Clarke	0.23	NE	C	DKB1360
	Choedhima	*Rhynchotechum ellipticum* (Wall. ex D.Dietr.) A.DC.	0.86	NE	H	DKB1506
Gleichniaceae	Khashi lata	*Dicranopteris linearis* (Burm. F.) Underw.	0.33	LC	E	DKB1195
Gnetaceae	Chorapati netum	*Gnetum latifolium* Blume	0.21	NE	C	DKB1403
Lamiaceae	Gol Tokma	Hyptis brevipes Poit.	0.75	NE	H	DKB1316
	Tokma	*Hyptis suaveolens* (L.) Poit.	1.33	NE	S	DKB1375
	Shetodron	*Leucas aspera* (Roth) Spreng.	0.58	NE	H	DKB1421
Lauraceae	Modon mosta	*Actinodaphne angustifolia* Nees	0.63	NE	T	DKB1339
	Kula pata	*Actinodaphne obovata* (Nees) Blume	0.47	NE	T	DKB1353
	Kuba horia	*Litsea cubeba* (Lour.) Pers.	0.19	NE	T	DKB1292
	Kukorcita	*Litsea glutinosa* (Lour.) C.B.Rob.	0.19	LC	T	DKB1347
	Mendaphuri	*Litsea monopetala* (Roxb.) Pers.	0.44	NE	T	DKB1516
Leeaceae	Phupharia	*Leea acuminata* Wall.	0.42	NE	S	DKB1225
	Kakjonghla	*Leea aequata* L.	0.75	NE	S	DKB1234
	Kukurjhibba	*Leea indica* Merr.	2.89	LC	S	DKB1246
Liliaceae	Kalamusli	*Curculigo orchioides* Gaertn.	1.7	NE	H	DKB1189
	Ulotchandol	*Gloriosa superba* L.	0.32	LC	S	DKB1275
	Satipata	*Molineria capitulata* (Lour.) H.	4.07	NE	H	DKB1489
	Napigach	*Peliosanthes teta* Andrews subsp. Teta	0.19	NE	H	DKB1212
Lomariopsidaceae	Kita bolbi	*Bolbitis heteroclita* (C. Presl) Ching ex C.Chr	0.75	NE	H	DKB1527
Malvaceae	Mushakdana	*Abelmoschus moschatus* Medik.	0.6	NE	S	DKB1204
	Ban Methi	*Sida acuta* Burm.f.	2.37	NE	S	DKB1479
	Bala	*Sida cordifolia* L.	1.4	NE	H	DKB1436
	Lalberela	*Sida rhombifolia* L.	0.42	NE	S	DKB1207
	Batapuran	*Urena lobata* L.	3.91	NE	S	DKB1490
	Atapuran	*Urena sinuata* L.	0.29	NE	S	DKB1528
Marantaceae	Pitulipata	*Phrynium imbricatum* Roxb.	0.49	NE	H	DKB1377
	Gaiyamram	*Stachyphrynium placentarium* (Lour.) Clausager & Borchs.	0.73	NE	H	DKB1323
	Raj dheki	*Angiopteris helferiana* C. Presl	1.24	NE	H	DKB1366
	Deshi raj dheki	*Angiopteris indica* Desv.	0.58	NE	H	DKB1334
Melastomaceae	Bon tejpata	*Melastoma malabathricum* L.	1.73	NE	S	DKB1484
	Chokha	*Oxyspora cernua* Hook.f. & Thomson ex Triana	0.21	NE	H	DKB1293
Meliaceae	Pitraj	*Aphanamixis polystachya* (Wall.) R. Parker	0.85	LC	T	DKB1393
Menispermaceae	Sonatola	*Diploclisia glaucescens* (Blume) Diels	1.01	NE	C	DKB1472
	Akundi	*Stephania japonica* (Thunb.) Miers	0.9	NE	C	DKB1218
	Guloncho	*Tinospora cordifolia* (Willd.) Miers	0.66	NE	C	DKB1454
	Baka guloncho	*Tinospora crispa* (L.) Hook.f. & Thomson	0.5	NE	C	DKB1432
Mimosaceae	Babla	*Acacia nilotica* (L.) Del. subsp. *indica* (Benth.) Brenan	0.3	LC	T	DKB1240
	Chakua koroi	*Albizia chinensis* (Osbeck) Merr.	0.5	NE	T	DKB1412
	Titulya koroi	*Albizia myriophylla* Benth.	0.25	NE	T	DKB1354
	Kalo koroi	*Albizia odoratissima* (L.f.) Benth.	0.25	LC	T	DKB1328
	Koroi	*Albizia procera* (Roxb.) Benth.	0.23	LC	T	DKB1333
	Gila	*Entada rheedii* Spreng.	0.27	NE	C	DKB1430
	Lajjabati	*Mimosa pudica* L.	1.77	LC	H	DKB1475
Moraceae	chapalish	*Artocarpus chama* Buch.-Ham. ex Wall.	0.25	NE	T	DKB1199
	Barta	*Artocarpus lacucha* Buch.-Ham.	0.73	NE	T	DKB1370
	Kani-bot	*Ficus auriculata* Lour.	0.5	LC	T	DKB1440
	Bot	*Ficus benghalensis* L.	0.37	NE	T	DKB1450

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Family	Local Name	Scientific Name	IVI	IUCN Status	Habit	Accession No.
	Ang	*Ficus glaberrima* Blume	0.19	LC	T	DKB1463
	Dumur	*Ficus hispida* L.f.	1.08	LC	T	DKB1458
	Lata dumur	*Ficus pumila* L.	0.21	NE	T	DKB1442
	Assawath	*Ficus religiosa* L.	0.49	NE	T	DKB1477
	Jhula bot	*Ficus rumphii* Blume	0.17	NE	T	DKB1495
	Sadimadi dumur	*Ficus semicordata* Buch.-Ham. ex J.E.Sm.	0.51	LC	T	DKB1356
	Shaora	*Streblus asper* Lour.	0.5	LC	T	DKB1243
Musacease	Atikola (B),	*Musa acuminata Colla*	1.17	NE	H	DKB1531
	AtiKola	*Musa itinerans* Cheesman	0.68	NE	H	DKB1530
	Ramkola	*Musa ornata* Roxb.	2.71	NE	H	DKB1508
	Anagi kola (B	*Musa paradisiaca* L.	0.17	NE	H	DKB1529
Myristacaceae	Am barela	*Myristica linifolia* Roxb.	0.17	NE	T	DKB1510
	Sayatika	*Ardisia elliptica* Thunb.	2.13	NE	H	DKB1368
	Ramjoni	Maesa indica (Roxb.) A.DC.	1.84	LC	S	DKB1445
	Noamoricha	*Maesa ramentacea* (Roxb.) A.DC.	0.75	LC	S	DKB0075
Myrtaceae	Kalojam	*Syzygium cumini* (L.) Skeels	0.25	LC	T	DKB1380
	Dhaki jam	*Syzygium grande* (Wight.) Walp.	0.75	NE	T	DKB1399
	Banjam	*Syzygium fruticosum* (Roxb.) DC.	0.3	NE	T	DKB1378
Onagraceae	Panilong	*Ludwigia hyssopifolia* (G.Don) Exell.	0.86	LC	H	DKB1405
	Amorkura	*Ludwigia prostrata* Roxb.	0.66	NE	H	DKB1517
Ophioglossaceae	Krimi fern	*Helminthostachys zeylanica* (L.) Hook. (NM)	1.17	NE	H	DKB1239
Orchidaceae	Rashna	*Acampe praemorsa* (Roxb.) Blatt. & McCann	0.32	NE	E	DKB1268
	Sukhphul	*Aerides odorata* Lour.	1.42	NE	E	DKB1365
	Bulburi	*Bulbophyllum auricomum* Lindl.	0.75	NE	E	DKB1181
	Bulbolobi	*Bulbophyllum lobbii* Lindl.	0.53	NE	E	DKB1194
	Ghanofuli calanthe (B).	*Calanthe densiflora* Lindl.	0.86	NE	E	DKB1533
	Tosabak	*Cymbidium aloifolium* (L.) Sw.	0.6	NE	E	DKB1286
	Fasiariam	*Dendrobium aphyllum* (Roxb.) C.E.C. Fischer	0.68	LC	E	DKB1297
	Fimbiriam	*Dendrobium fimbriatum* Hook.	0.86	NE	E	DKB1351
	Baikali pranda(B).	*Eulophia bicallosa* (D. Don) P.F. Hunt & Summerh.	0.53	NE	E	DKB1534
	Thotamota	*Gastrochilus calceolaris* (Buch. Ham. ex Sm.) D. Don	0.69	CR	E	DKB1185
	Ghanofuli bhuifor (B).	*Geodorum densiflorum* (Lam.) Schltr.	1.07	NE	H	DKB1536
	Nayagaine orchid(B).	*Neogyna gardneriana* (Lindl.) Rchb.f.	0.86	NE	E	DKB1535
	Bhuidera orchid	*Peristylus goodyeroides* (D.Don) Lindl.	0.53	NE	E	DKB1321
	Fox tail orchid	*Rhynchostylis retusa* (L.) Blume	0.69	NE	E	DKB1382
	Kantaglottis	*Spathoglottis plicata* Blume	0.68	NE	H	DKB1267
	Pubeglottis	*Spathoglottis pubescens* Lindl	0.14	NE	H	DKB1532
	Rasna	*Vanda tessellata* (Roxb.) Hook.f. ex G. Don	0.19	LC	E	DKB1324
Orobanchaceae	Sorishabanda	*Orobanche cernua* Loefl. var. desertorum G.Beck	0.21	NE	H	DKB1459
Pandanaceae	Keyakata	*Pandanus foetidus* Roxb.	0.34	NE	H	DKB1203
	Kasiakata	*Pandanus furcatus* Roxb.	2.18	NE	H	DKB1357
Parkeriaceae	Pani letuce	*Ceratopteris thalictroides* (L.) Brongn.	0.8	LC	H	DKB1537
Passifloraceae	Pindopata	*Adenia cardiophylla* (Mast.) Engl.	0.43	NE	T	DKB1359
	Jumkolata	*Passiflora foetida* L.	0.8	NE	C	DKB1235
Piperaceae	Luchipata	*Peperomia pellucida* (L.) Kunth	0.69	NE	H	DKB1264
	Chaba	*Piper chaba* Hunter.	1.28	NE	H	DKB1294
Poaceae	Borakbash	*Bambusa balcooa* Roxb.	2.12	NE	H	DKB1355
	Kanta bans	*Bambusa bambos* (L.) Voss	2.52	NE	H	DKB1336
	Parua	*Bambusa polymorpha* Munro	1.81	NE	H	DKB1197
	Mitinga	*Bambusa tulda* Roxb.	0.9	NE	H	DKB1281
	Durbaghass	*Cynodon dactylon* (L.) Pers.	2.38	NE	H	DKB1274
	Mulibash	*Melocanna baccifera* (Roxb.) Kurz	8	NE	H	DKB1504
	Panick ghas	*Panicum incomtum* Trin.	2.95	NE	H	DKB1304
	Tenga ghas	*Saccharum arundinaceum* Retz.	2.97	NE	H	DKB1499
	Chan ghas	*Saccharum spontaneum* L.	3.32	NE	H	DKB1502
	Jharu phul	*Thysanolaena maxima* (Roxb.) Kuntze	4.19	NE	H	DKB1471
Polygonaceae	Biskatali	*Persicaria hydropiper* L.	0.66	LC	H	DKB1358
Polypodiaceae	Pankhiraj	*Drynaria quercifolia* (L.) J. Sm.	1.81	NE	T	DKB1338
Pteridaceae	Kechor	*Monochoria hastata* (L.) Solms.	0.51	LC	H	DKB1446
	Silver fern	*Aleuritopteris bicolour* (Roxb.) Freser-Jenk	0.36	NE	H	DKB1309
	Tenifoli fern	*Cheilanthes tenuifolia* (Burm.f.) Sw	0.27	NE	H	DKB1538
	Ensiteris	*Pteris ensiformis* Burm.f.	0.33	NE	H	DKB1541
	Gemiteris	*Pteris geminata* Wall. ex J. Agardh	1.07	NE	H	DKB1539
	Luciteris	*Pteris pellucida* C. Presl	0.86	NE	H	DKB1540
	Vitateris	*Pteris vittata* L. subsp. Vittata	0.96	LC	H	DKB1481
Rhamnaceae	Bon-boguri	*Ziziphus funiculosa* Buch.-Ham. ex Wall.	0.69	NE	T	DKB0141
	Boroi	*Ziziphus mauritiana* Lam.	0.33	LC	T	DKB1545
	Bonboroi	*Ziziphus oenoplia* (L.) Mill. var. oenoplia	0.62	LC	T	DKB1213

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Rubiaceae	Bhuipat	*Dentella repens* (L.) J.R. Forst & G. Forst.	0.68	LC	H	DKB1311
	Sitagach	Gardenia coronaria Buch.-Ham.	0.21	NE	T	DKB1372
	Haldu	*Haldina cordifolia* (Roxb.) Ridsdale	0.34	NE	T	DKB1374
	Bhuikadam	*Hymenodictyon orixensis* (Roxb.) Mabb.	0.25	NE	H	DKB1260
	Kuthi rangan	*Ixora nigricans* R.Br. ex Wight & Arn.	2.25	NE	H	DKB1346
	Phul-kadam	*Mitragyna diversifolia* (Wall. ex G. Don) Havil.	0.21	LC	T	DKB1487
	Banach	*Morinda citrifolia* L.	0.42	NE	H	DKB1447
	Silchauri	*Mussaenda roxburghii* Hook.f.	1.67	NE	H	DKB1415
	Mycetelon	*Mycetia longifolia* (Wall.) Kuntze	0.32	NE	H	DKB1509
	Mycetelon	*Mycetia mukergiana* Deb & Dutta.	0.3	NE	S	DKB1492
	Mycetelon	*Mycetia stipulata* (Hook.f.). O. Ktze. Subsp. Mecrostachya.	0.3	NE	S	DKB1469
	Kadam	*Neolamarckia cadamba* (Roxb.) Bosser	0.17	NE	T	DKB1226
	Gandhali	*Ophiorrhiza mungo*s L.	1.24	NE	H	DKB1247
	Nakbhaduli	*Paederia lanuginosa* Wall.	0.19	NE	C	DKB1348
	Baro bhuta	*Psychotria adenophylla* Wall.	1.28	NE	H	DKB1295
	Gol bhuta	*Psychotria sphaerocarpa* Wall.	1.64	NE	H	DKB1349
	Mon kata	*Randia dumetorum* (Retz.) Lam.	0.66	NE	S	DKB1498
	Atharogia	*Spermacoce articularis* L.f.	1.2	NE	H	DKB1266
	Butamphul	*Spermacoce exilis* (L.O. Williams) C.D. Adams ex W.C. Burger & C.M. Taylor	0.86	NE	H	DKB1437
	Pidajil	*Spermacoce hispida* L.	0.9	NE	H	DKB1486
	Arunpata	*Spermacoce ocymoides* Burm.f.	0.27	NE	H	DKB1505
	Bishmijil	*Spermacoce stricta* L.f.	1.49	NE	H	DKB1513
	Tenijil	*Spermacoce tenuior* L.	1.51	NE	H	DKB1512
	Badali	*Paederia foetida* L.	0.21	NE	C	DKB1319
Rutaceae	Pan mouri	*Clausena heptaphylla* (Roxb.) Wight & Arn. ex Steud.	0.54	NE	H	DKB1379
	Clusarfac	*Clausena suffruticosa* (Roxb.) Wight & Arn.	0.9	NE	T	DKB1384
	Ghaskhasa	*Micromelum hirsutum* Oliver	0.46	NE	T	DKB1518
	Dulia	*Micromelum minutum* (J.G. Forster) Wight & Arn.	0.19	NE	T	DKB1496
	Kelikadam	*Mitragyna parvifolia* (Roxb.) Korth	0.81	NE	T	DKB1497
	Chotokamini	*Murraya koenigii* (L.) Spreng.	0.85	NE	T	DKB1318
	Bannebu	*Paramignya scandens* (Griff.) Craib	0.25	NE	S	DKB1320
Sapindaceae	Chita	*Allophylus cobbe* var. *villosus* (Roxb.) Prain	1.62	NE	S	DKB1278
	Pashomchita	*Allophylus villosus* (Roxb.) Blume	1.61	NE	S	DKB1310
	Banlichu	*Lepisanthes senegalensis* (Poir.) Leenh.	0.17	NE	T	DKB1424
	Kusum	*Schleichera oleosa* (Lour.) Merr.	0.19	LC	T	DKB1464
Sapotaceae	Mohua	*Madhuca longifolia* (J. König ex L.) J.F.Macbr. var. longifolia	0.17	NE	T	DKB1428
Schizaeaceae	Saralata fern	*Lygodium flexuosum* (L.) Sw.	2.41	NE	C	DKB1468
Scrophulariaceae	Zai ghas	*Lindernia antipoda* (L.) Alston	1.05	LC	H	DKB1426
	Bandhuni	*Scoparia dulcis* L.	1.2	NE	H	DKB1478
Selaginellaceae	Lataginella	*Selaginella delicatula* (Desv. ex Poir.) Alston	1.92	NE	H	DKB1465
	Bidishagenella	*Sellaginella inaequalifolia* (Hook. & Grev.) Spring	0.92	NE	H	DKB1460
Smilacaceae	Roxychini	*Smilax ferox* Wall. ex Kunth	0.53	NE	C	DKB1186
	Kumari lata	*Smilax ovalifolia* Roxb. ex D.Don	1.06	NE	C	DKB1179
	Lonica lata	*Smilax zeylanica* L.	0.68	NE	C	DKB1443
Solanaceae	Bon begun	*Solanum indicum* L.	0.68	NE	H	DKB0107
	Tit begun (B),	*Solanum nigrum* L	1.07	NE	H	DKB0079
	Gothbegun	*Solanum torvum* Sw.	1.05	NE	S	DKB1466
Sonneraciaceae	Bandorhola	*Duabanga grandiflora* (Roxb. ex DC.) Walp.	0.34	LC	T	DKB1483
Sterculiaceae	Ulatkambol	*Abroma augusta* (L.) L.f.	0.55	NE	S	DKB1217
	Harjora lata	*Byttneria pilosa* Roxb.	1.72	NE	C	DKB1519
	Moochkunda	*Pterospermum acerifolium* (L.) Willd.	0.17	NE	T	DKB1485
	Bara asar	*Pterospermum semisagittatum* Buch.-Ham. ex Roxb	0.19	NE	T	DKB1501
	Jonglibadam	*Sterculia foetida* L.	0.32	NE	T	DKB1241
	Loma udal	*Sterculia villosa* Roxb.	0.84	NE	T	DKB1216
Taccaceae	Bara hikand	*Tacca integrifolia* Ker Gawl.	1.4	NE	H	DKB1416
	Bonak	*Schima wallichii* Choisy	0.23	LC	T	DKB1457
Thelypteridaceae	Lombo dheki shak	*Ampelopteris prolifera* (Retz.) Copel.	0.32	NE	H	DKB1178
	Evotila	*Chistella evolita* (Clarke & Baker) Holttum (NM)	0.24	NE	H	DKB1325
Tiliaceae	Titapat	*Corchorus aestuans* L.	1.29	NE	H	DKB1254
	Janglipat	*Corchorus fascicularis* Lam.	0.58	NE	H	DKB1222
	Asar	*Grewia nervosa* (Lour.) Panigrahi	0.77	NE	T	DKB1414
	Kasha phal	*Microcos paniculata* L.	0.17	LC	T	DKB1507
	Bonokra	*Triumfetta rhomboidea* Jacq.	2.03	NE	H	DKB1494
Trapaceae	Panifol	*Trapa bispinosa* Roxb.	0.3	NE	H	DKB1455
Ulmaceae	Chikan	*Trema orientalis* (L.) Blume	0.79	LC	T	DKB1441

TABLE II: COMPREHENSIVE CHECKLIST OF PLANT DIVERSITY RECORDED FROM KHAGRACHARI SADAR *(CONT)*

Family	Local Name	Scientific Name	IVI	IUCN Status	Habit	Accession No.
Urticaceae	Borthurthuri	*Boehmeria glomerulifera* Miq.	2.44	NE	S	DKB1361
	Barokurzi	*Boehmeria kurzi*i Hook.f.	1	NE	S	DKB1383
	Kankhura	*Boehmeria nivea* (L.) Gaud.	2	NE	S	DKB1205
	Silajhara	*Elatostema papillosum* Wedd.	2.11	NE	H	DKB1462
	Seskijhara	*Elatostema sesquifolium* (Blume) Hassk.	1.17	NE	H	DKB1444
	Sessijhara	*Elatostema sesssile* J.R.Forst. & J.G.Forst.	1.73	NE	H	DKB1427
	Horhutta	*Oreocnide integrifolia* (Gaud.) Miq.	0.37	NE	T	DKB1262
	Latamaricha	*Pilea microphylla* (L.) Liebm.	1.59	NE	S	DKB1322
	Korobi	*Sarcochlamys pulcherrima* Gaudich.	0.57	NE	S	DKB1452
Verbenaceae	Bormala	*Callicarpa arborea* Roxb.	0.58	LC	T	DKB1252
	Bamunhatti	*Clerodendrum indicum* (L.) Kuntze	0.55	NE	S	DKB1341
	Nata bhat	*Clerodendrum nutans* Wall.	0.8	NE	S	DKB1303
	Bhat	*Clerodendrum viscosum* Vent.	2	NE	S	DKB1306
	Gamari	*Gmelina arborea* Roxb.	0.37	LC	T	DKB1373
	Lalana	*Premna esculenta* Roxb.	0.87	NE	H	DKB1206
	Segun	*Tectona grandis* L.f.	0.54	NE	T	DKB1408
	Goda	*Vitex peduncularis* Wall. ex Schauer	1.04	NE	T	DKB1238
Vitaceae	Vatia lata	*Cissus adnata* Roxb.	1.35	NE	C	DKB1302
	Amasha lata	*Cissus assamica* (Lawson) Craib	0.25	NE	C	DKB1299
	Panchkona lata	*Cissus pentagona* (Roxb.) Lawson	1	NE	C	DKB1326
	Horina lata	*Tetrastigma leucostaphyllum* (Dennst.) Alston ex Mabb.	1	NE	C	DKB1269
	Panchkona-lata	*Vitis pentagona* (Roxb.) Lowson	0.71	NE	C	DKB1248
Woodsicaceae	Babushak	*Diplazium esculentum* (Retz.) Sw.	0.42	LC	H	DKB1188
	Poly plazi	*Diplazium polypodioides* Blume	1.04	NE	H	DKB1546
	Sukh plazi	*Diplazium spectabile* (Wall. ex Mett.) Ching	0.87	NE	H	DKB1547
Zingiberaceae	Konchi elachi	*Alpinia conchigera* Griff.	2.35	NE	H	DKB1249
	Deotara	*Alpinia malaccensis* (Burm.f.) Roscoe	0.19	LC	H	DKB1193
	Jongli ada	*Alpinia nigra* (Gaertn.) B.L. Burtt	0.79	LC	H	DKB1250
	Alachi	*Amomum aromaticum* Roxb.	1.56	NE	H	DKB1251
	Barolock	Amomum subulatum *Roxb.*	1.77	DD	H	DKB1208
	Jongle-ol	*Amorphophallus bulbifer* (Roxb.) Blume	0.55	NE	H	DKB1256
	Tikkur halud	*Curcuma angustifolia* Roxb.	0.25	NE	H	DKB1230
	Bon holud	*Curcuma aromatica* Salisb.	0.42	NE	H	DKB1285
	Holud	*Curcuma longa* L.	1	DD	H	DKB1337
	Rahmani globba	*Globba rahmanii* Yusuf	0.21	NE	H	DKB1232

TABLE III: COMPARISON OF DIVERSITY INDICES IN THIS STUDY WITH COMMUNITY MANAGED VILLAGE COMMUNITY FORESTS (VCF) AND BANGLADESH FOREST DEPARTMENT (BFD) MANAGED FORESTS

Diversity indices	This Study	Other studies	Study sites	Managing authority
Simpson index (D)	5.07	5.04(Rudra *et al.*, 2020b)	Beganasori and Bamer Bagechori VCF, Rangamati	Solely managed by indigenous community
		3.22 (Chowdhury *et al.*, 2018)	Komolchori VCF, Khagrachori	Solely managed by indigenous community
		4.01 (Jannat *et al.*, 2020)	Renikhayong para VCF, Bandarban	Solely managed by indigenous community
		0.9 (Rahman *et al.*, 2016)	Kaptai National Park, Rangamati	Managed by BFD
		3.25 (Nath *et al.*, 2016b)	Chunati Wildlife Sanctuary, Chattogram	Managed by BFD
	0.099	0.09 (Rudra *et al.*, 2020b)	Beganasori and Bamer Bagechori VCF, Rangamati	Solely managed by indigenous community
		0.07 (Chowdhury *et al.*, 2018)	Komolchori VCF, Khagrachori	Solely managed by indigenous community
		0.03 (Jannat *et al*., 2020)	Renikhayong para VCF, Bandarban	Solely managed by indigenous community
		0.37 (Rahman *et al*., 2016)	Kaptai National Park, Rangamati	Managed by BFD
		0.09 (Nath *et al*., 2016b)	Chunati Wildlife Sanctuary, Chattogram	Managed by BFD
Species evenness index (E)	0.99	0.99 (Rudra *et al*., 2020b)	Beganasori and Bamer Bagechori VCF, Rangamati	Solely managed by indigenous community
		0.47 (Chowdhury *et al*., 2018)	Komolchori VCF, Khagrachori	Solely managed by indigenous community
		0.09 (Jannat *et al.*, 2020)	Renikhayong para VCF, Bandarban	Solely managed by indigenous community
		0.62 (Rahman *et al*., 2016)	Kaptai National Park, Rangamati	Managed by BFD
		0.72 (Nath *et al*., 2016b)	Chunati Wildlife Sanctuary, Chattogram	Managed by BFD

TABLE IV: SEASONAL VARIATION OF DIFFERENT SITE OF THE STUDY AREA

SEASON	Site	Phytodiversity Index			
		Shanon-Weiner diversity index	Simpson diversity index	Margalef's Index of Species Richness	Pielou's Measure of Evenness
Winter	A	4.14	0.082	17.85	0.8207
	B	4.51	0.096	19.69	0.8708
	I	3.88	0.072	15.16	0.8052
	P	4.31	0.085	17.69	0.8413
	Total	4.96	0.094	32.45	0.87
Rainy	A	4.21	0.085	18.61	0.8554
	B	4.68	0.098	22.20	0.8905
	I	4.12	0.078	15.69	0.8083
	P	4.46	0.089	18.89	0.8685
	Total	5.08	0.099	34.96	0.93
Summer	A	4.07	0.079	17.23	0.8122
	B	4.32	0.091	18.96	0.8571
	I	3.57	0.066	14.54	0.7822
	P	4.19	0.082	16.76	0.8003
	Total	4.89	0.097	30.79	0.81

A substantial seasonal change in diversity indices was also found in 4 of the research locations. We found that in every site, rainy season had the highest diversity index, preceded by winter and summer season (Table IV). The Shannon-Weiner's diversity indices, Simpson's diversity indices, Margalef's Index of Species Richness, and Pielou's Measure of Evenness in the present study area varied from 4.89 to 5.08, 0.097 to 0.099, 30.79 to 34.96 and 0.81 to 0.93 respectively (Table IV). The highest values of Shannon-Weiner's diversity index (4.68), Simpson's diversity index (0.098), Margalef's Index of Species Richness (22.20) and Pielou's Measure of Evenness (0.8905) were observed in site B during rainy season (Table IV) whereas the lowest values 3.57, 0.066, 14.54 and 0.7822 were in site I during summer season. There is now more evidence to support earlier research that seasonal diversity and rainfall intensity are more important to plant regeneration compared to average annual precipitation (Muldavin *et al.*, 2008; Robinson *et al*., 2013; Islam *et al.*, 2016; Zhang *et al*., 2020).

Aforementioned statistical analysis indicates that current research field namely Khagrachari hilly areas are still occupied with diversified vegetation and trees but yet there has been significant risk of degrading this diversity due to over growing population pressure, urbanization practices, advent of modern technology, shifting cultivation, unplanned forest management practice without involving local peoples, climate change, traditional values are being shattered and other factors. To maintain the current plant species variety, the extant plant species diversity richness should be protected by establishing an effective monitoring system and implementing a conservation strategy that is ecologically viable. Moreover, flora holds a pivotal role amongst each geographical area's natural wealth affluence. Thereby, plant biomass of any place delivers a concise illusion of floristic richness, that either may be convenient for formulating sustainable conservation and management strategies of biodiversity. So, this research should be beneficial in the forthcoming strategy for the sustainable protection of plant resources and the management of the forest ecosystem, and we hope that it will be!

IV. CONCLUSION

This study provides comprehensive documentation of all wild vascular plants available in community managed natural tropical forest and natural forest patches in CHTs. It revealed diversity of vascular plants as well as their seasonal variation in study area of Khagrachori in CHTs. It also unveiled phytosociological attributes, seasonal variations and diversity indices along with conservation status. Biodiversity monitoring study also needed to check the diversity status and to take measures accordingly. The findings of the study will help to monitor diversity status in future. However, conservation of these vascular plants will be challenging in near future as forests are degrading day by day. In-situ conservation strategy involving local communities has been suggested for sustainable management of study area.

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CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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