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Research Article

Conspectus the Vascular Flora of Hazarikhil Wildlife Sanctuary in Chattogram, Bangladesh

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Abstract

This paper presents the vascular plants (Angiosperms, Gymnosperms and Pteridophyta) of Hazarikhil Wildlife Sanctuary (HWS) in Bangladesh, which is managed by the Chattogram North Forest Division, have been rediscovered. A total of 462 species belonging to 313 genera under 100 families has been documented from the HWS of about 1177.53 ha. Habit analysis of vascular plants that, 184 are trees (40%), 69 shrubs (15%), 148 herbs (32%) and 61 species are climbers (13%) and two epiphytes. Euphorbiaceae is the dominant family represented by 29 taxa, followed by Fabaceae, Rubiaceae and Poaceae (24 taxa each), Asteraceae and Moraceae (16 taxa each), Acanthaceae (15 taxa), Convolvulaceae, Mimosaceae, and Verbenaceae (13 taxa each), Caesalpiniaceae (10 taxa) Lamiaceae, Sterculiaceae and Arecaceae (9 taxa each), Malvaceae and Anacardiaceae (8 taxa each), Amaranthaceae, Apocynaceae, Lauraceae, Araceae Meliaceae, Myrtaceae, Cyperaceae (7 taxa each) and Vitaceae (6 taxa). The Most common species was found the Ficus genera from this sanctuary. The Gymnosperm species of Taxodium distichum (L.) Rich was first recorded in Bangladesh from the study area. Nineteen rare species have been found whereas their plant genetic resources of this sanctuary. The native and tall tree species of the stratum has been described. A list of native trees suitable for reforestation in the HWS has been provided. The species are enumerated with scientific name, family name, bangla name(s), habit and habitat. The HWS is conserved by management plan for execution of National Conservation Strategy.

সারসংক্ষেপ

চট্টগ্রাম উত্তর বন বিভাগের আওতাধীন হাজারিখীল বন্যপ্রাণী অভয়ারণ্য এলাকার ভাস্কুলার উদ্ভিদ (আবৃতবীজী, নগ্নবীজী ও টেরিডোফাইট) এর পুন:আবিষ্কার সম্পর্কে এই প্রবন্ধে উপস্থাপন করা হয়েছে। প্রায় ১১৭৭.৫৩ হে. আয়তনের বন্যপ্রানী এলাকা হতে ১০০টি পরিবার ও ৩১৩ গণের অন্তর্গত ৪৬২টি প্রজাতির উদ্ভিদ লিপিবদ্ধ করা হয়েছে। উক্ত বন্যপ্রাণী অভয়ারণ্য এর উদ্ভিদ বৈচিত্র্য হতে দেখা যায়, ১৮৪টি বৃক্ষ প্রজাতি (৪০%), গুল্ম ৬৯টি (১৫%), বীরুৎ ১৪৮টি (৩২%) এবং ৬১টি (১৩%) আরোহী জাতীয় প্রজাতি। ইউফরবিয়েসি পরিবারে সবচেয়ে বেশি প্রজাতি (২৯টি) রয়েছে। একইভাবে, ফেবাসি, রুবিয়েসি ও পোয়েসি পরিবার (২৪টি করে প্রজাতি), এসটেরাসি ও মোরেসি (১৬টি করে প্রজাতি), একানথেসি (১৫টি প্রজাতি), কনভলভলাসি, মাইমোসাসি ও ভারবিনেসি (১৩টি করে প্রজাতি), সিসালপিনিয়াসি (১০টি প্রজাতি), লেমিয়াসি, স্টারকিউলিয়াসি ও এরিকাসি (৯টি করে প্রজাতি), মালভেসি ও এনাকারডিয়েসি (৮টি করে প্রজাতি), এমারেনথেসি, এপোসাইনেসি, লরেসি, এরাসি, মিলিয়েসি, মাইরটাসি, সাইপিরাসি (৭টি করে প্রজাতি) এবং ভাইটেসি (৬টি প্রজাতি) ধারণ করে। অভয়ারণ্যে ডুমুর জাতীয় উদ্ভিদ সবচেয়ে বেশী পরিলক্ষিত হয়। গবেষণা এলাকা হতে Taxodium distichum (L.) Rich নামক নগ্নবীজী উদ্ভিদটি বাংলাদেশে প্রথম রেকর্ড করা হয়েছে। ১৯টি দুর্লভ প্রজাতির উদ্ভিদ পাওয়া গেছে, যাদের জেনেটিক রিসোর্স উক্ত অভয়ারণ্যে আছে। দেশীয় উঁচু বৃক্ষ প্রজাতির পাহাড়ের অনুভূমিক স্তর অনুযায়ী বর্ণনা দেয়া হয়েছে। তাছাড়া উক্ত অভয়ারণ্যে দেশীয় উদ্ভিদ প্রজাতি পুন:বনায়নের জন্য একটি তালিকা সরবরাহ করা হয়েছে। উদ্ভিদ প্রজাতিসমূহের বৈজ্ঞানিক নাম, পরিবার, বাংলা নাম, বাসস্থান ও স্বভাব উপস্থাপন করা হয়েছে। জাতীয় সংরক্ষণ কৌশল পরিকল্পনা অনুযায়ী হাজারিখীল বন্যপ্রাণী অভয়ারণ্যটির ব্যবস্থাপনা ও সংরক্ষণ করা হচ্ছে।

Keywords: *Assessment, Habit diversity, Hazarikhil Wildlife Sanctuary, Vascular flora.*

Introduction

Bangladesh is a small country of about 14.757 million hectares of land area with a large population. Out of the total land area 2.53 million hectares (17.5%) is forest land cover (BFD 2017). Bangladesh has a rich biological heritage containing about 3,723 species of angiosperms (Hossain *et al.* 2017). It is estimated that the forest cover is reducing at an annual rate of 3.3 percent (Hossain 2001). The rapid loss and degradation of forests in Bangladesh has brought about an alarming rate of forest biodiversity depletion. Because of the reduction in the total forest area and also the country's overall demand for timber, fuel, food and fodder and maintaining ecological balance of the country. Biodiversity in this country has been heavily disturbed during the past several decades due to rapid population growth, energy deficit, resource shortage, myopic planning, poor management and lack of motivation on the needs of biodiversity conservation, which has resulted in the loss of wild biodiversity (Hassan 1995). Bangladesh government has implemented and explored some alternative forest management strategies for the conservation of forests as well as biodiversity of the country (Abdullah *et al.* 2007). In the present, Bangladesh possesses a total of 55 Protected Areas (PAs) cover about 6,18,254 hectares covering 4.19% forest land of Bangladesh (BFD 2017).

The Hazarikhil Wildlife Sanctuary (HWS) is situated the 45 km north of Chattogram port in south-east Bangladesh. It has been declared as a Wildlife Sanctuary in 2010 for taking proper protection and biodiversity conservation management.The major aim of establishing HWS as PA was to strengthen the conservation of the existing flora and fauna of the area. It comprises an area of about 1177.53 ha and lies between $22^{0}40$- $22^{0}46$ North latitude and $91^{0}38$- $91^{0}42$ East longitude. It is located to Fatikchari Upazila of Chattogram district, under Ramgarh- Sitakundu forests of Chattogram North Forest Division. It is covered bytropical moist evergreen and semi-evergreen forest comprising of hills, hillocks and plain lands. HWS hills are made up of sand-storms and shale (Rahman 2017). The hilly forest of Hazarikhill is floristically and geographically more related to Indo-China than to any other part of the Indian sub-continent (Khan 1977). The vascular flora of this wildlife sanctuary is mostly evergreen and mixed evergreen type except some areas of deciduous type composed of *Tectona grandis* plantations. Natural patch mostly with indigenous trees are on the sporadic hills of low, medium and high elevations. Some of natural forest areas have been converted to *T. grandis* and recent *Acacia auriculiformis* plantations. Some perennial streams flow along the bottom of the ravines meeting in single larger stream as a *Kalapainna chara* and form the main water source of the sanctuary. The bank of the main stream, lying almost entirely in the Hazarikhill range has more well-preserved natural vegetation. It has a unique territory with mountains and beautiful landscapes. It also helps offers feeding, nesting sites and breeding ground of a large number of wild animals for the human being. A wildlife sanctuary is providing various opportunities of education, research, tourism and associates employment. But there is no systematic taxonomic study on the vascular flora of this sanctuary. The present investigation was explored to assess vascular plant diversity in the HWS aimed at justifying the declaration of WS in this natural forest. Also, it is comparable with government managed other protected areas vascular flora in the country. The present findings of the study will provide valuable information for the preparation of taxonomic report and the monitoring of vegetation dynamics of HWS.

Materials and Methods

A systematic qualitative survey through transect walk followed by the field trips during July 2016- June 2019 in different seasons were conducted to cover the whole study area. Plant material and data were collected from study area on habit, habitat, ecology, occurrence and distribution of the vascular plant for identification. Plant species with fertile material were documented and identified in the field. Herbarium specimens of fertile plant materials were prepared for preservation at the Bangladesh Forest Research Institute Herbarium (BFRIH). Identification of unknown species has been made in the Herbarium of Bangladesh Forest Research Institute specimens and by consulting the pertinent literatures *viz.* Hooker (1872-1897); Prain (1903); Heinig (1925); Huq (1986); Das and Alam (2001); Kanjilal *et al.* (1934, 1938, 1940); Dey (1995) and Dey *et al.* (1999). An update nomenclature determination with current names and synonyms have been made consulting relevant literature, such as, Ahmed *et al.* (2009); Rashid and Rahman (2011, 2012) and Rahman (2013). The family names adapted followings Cronquist system of classification (Cronquist 1981). The present vascular floralist of this HWS is provided in the result. The plant families, genera and species under each family have been arranged alphabetically. Each species entry provides the scientific name, bangla name (s) and diversity of habit and habitat.

Results

Taxonomic diversity

The present investigation is carried out for collection, identification, update nomenclature and assessment of vascular plants (Angiosperms, Gymnosperms and Pteridophyta) for HWS in Chattogram. The present rediscovery records a total of 462 (Angiosperms, Gymnosperms and Pteridophyta) species belonging to 313 genera under 100 families (Table 1) within an area of 1177.53 ha.

Table 1. List of present record of the vascular plants of the Hazarikhil Wildlife Sanctuary.

(A) Angiospermae (Dicotyledoneae)

Family	Botanical name	Local name	Habit	Habitat
Acanthaceae	*Andrographis paniculata* (Burm. f.) Wall. *ex* Nees	Kalomegh	Herb	FM
	Barleria cristata L.	Janti	Shrub	FM
	B. prionitis L.	Kantajati	Shrub	FFr
	Eranthemum pulchellum Andrews	Shukhmurali	Shrub	FF
	Hygrophila polysperma (Roxb.) T. Anders	Alai kalai	Herb	FF
	Justicia adhatoda L.	Basak	Shrub	P
	J. japonica Thunb.	Jagotmadan	Herb	FM
	Lepidagathis incurve Buch.-Ham. *ex* D. Don	Karoggathis	Herb	MP
	Nelsonia canescens (Lam.) Spreng.	Paramul	Herb	FF
	Rungia pectinata (L.) Nees	Punakapundu	Herb	LS
	Staurogyne angustifolia T. Anders.	Angutigyne	Herb	MP
	S. argentea Wall.	Cheimdima	Herb	MP
	Strobilanthes auriculatus (Wall.) Nees	Kara	Herb	LS
	Thunbergia erecta (Benth.) T. Anders.	Nil ghanta	Climber	MS
	*T. grandiflora*Roxb.	Neel lata	Climber	MS
	Achyranthes aspera L.	Apang	Herb	FF
	Alternanthera philoxeroides (Mart.) Griseb.	Helencha	Herb	MP

Family	Botanical name	Local name	Habit	Habitat
Amaranthaceae	*A. sessilis* (L.) R. Br. *ex* Roem. &Schuil.	Chanchi	Herb	OP
	Amaranthus spinosus L.	kantamarish	Herb	OP
	A. viridis L.	Noteyshak	Herb	OP
	Celosia argentea L.	Moragh phul	Herb	P
	Cyathula prostrata (L.) Blume	Shyontula	Herb	MP
Anacardiaceae	*Anacardium occidentale* L.	Kajubadam	Tree	P
	Bouea oppositifolia (Roxb.) Maessn.	Maila aam	Tree	MS
	Holigarna longifolia Roxb.	Barola	Tree	MS
	Lannea coromandelica (Houtt.) Merr	Jiolbhadi, Jiga	Tree	LS
	Mangifera indica L.	Aam	Tree	P
	M. longipes Griff.	JongliAam	Tree	MS
	Spondias pinnata (L.f.) Kurz	Bon amra	Tree	HB
	Swintonia floribunda Griff.	Civit, Aamchundul	LT	HB
Annonaceae	*Desmos chinensis* Lour.	Epeyharang	WC	MS
	Fissistigma rubiginosum (A. DC.) Merr.	Rubi bheduli	WC	MS
	Uvaria cordata (Dunal) Alston	Bagh-ranga	WC	MS
Apiaceae	*Centella asiatica* (L.) Urban in Mart.	Thankuni	CR	
Apocynaceae	*Alstonia nerifolia* D.Don	Chatim	ST	US
	A. scholaris (L.) R. Br.	Chhatim, Chatian	Tree	LS
	Holarrhena antidysenterica (L.) Wall. *ex* Decne	Kurchi,Kuruj	Tree	MS
	Ichnocarpus frutescens (L.) R. Br.	Dudhilata	Climber	MS
	Rauvolfia serpentina (L.) Benth. *ex* Kurz	Sarpagandha	Shrub	HB
	Tabernaemontana crispa Roxb. *ex* Wall.	Bon togar	Shrub	MS
	Wrightia arborea (Dennst.) Mabb.	Dudh-korach	Tree	MS
Aralliaceae	*Brassaiopsis glomerulata* (Blume) Regel	Kurila	ST	LS
	Macropanax oreophillum Miq.	Pani- kesuri	Tree	LS
	Trevesia palmata Vis.	Bon pepe	Tree	LS
Aristolociaceae	*Aristolochia indica* L.	Ishwarmul	Climber	LS
	A. tagala Cham.	Ishwarmul	Climber	MS
	Gymnema acuminatum (Roxb.) Wall.	Khara lata	WC	US
Asclepiadaceae	*Calotropis gigantea* (L.) R. Br.	Akanda	Shrub	LS
	Hoya globusa Hook. f.	Golahoya	Herb	E
	Tylophora indica (Burm. f.) Merr.	Antamul	Climber	MS
Asteraceae	*Ageratum conyzoides* L.	Fulkuri	Herb	MP
	Blumea lacera (Burm. f.) DC.	Kukurshunga	Herb	FF
	B. lanceolaria (Roxb.) Druce	Barotoragaas	Herb	FF
	Chromolaena odorata (L.) King & Robinson	Assamlata	Herb	LS
	Eclipta alba (L.) Hassk.	Bhimraj	Herb	MP
	Elephantopus scaber L.	Gejiashak	Herb	FF
	Emilia sonchifolia (L.) DC.	Sadushi	Herb	FF
	Mikania cordata (Burm. f.) Robinson	Assamlata	Climber	LS
	Pseudoelephantopus spicatus (B. Juss. *ex* Aubl.) Gleason	Kukur gihba	Herb	FF
	Sonchus wightianus DC.	Ban palang	Herb	FF
	Spilanthes calva DC.	Marhatitiga	Herb	MP
	Synedrella nodiflora (L.) Gaertn.	Relanodi	Herb	FF
	Tridax procumbens L.	Tridhara	Herb	FF
	Vernonia cinerea (L.) Less.	Kukshima	Herb	LS
	Wedelia chinensis (Osbeck) Merr.	Mahabhringaraj, Bhimraj	Herb	MS
	Xanthium indicum Koenig *ex* Roxb.	Ghagra	Herb	LS
Bignoniaceae	*Fernandoa adenophylla* (Wall. *ex* G. Don) Blume	Barapata	Tree	MS
	Oroxylum indicum (L.) Kurz	Kanaidinga, Khona	ST	MS
	Stereospermum colais (Buch.- Ham. *ex* Dillw.) Mabberely	Dharmara	Tree	MS

Family	Botanical name	Local name	Habit	Habitat
Bombacaceae	*Bombax ceiba* L.	Simul	LT	P
	B. insigne Wall.	Bon simul	LT	HB
Boraginaceae	*Cordia serrata* Roxb.	Koratsora	ST	HB
	Heliotropium indicum L.	Hatisur	Herb	LS
	Ehretia serrata Roxb.	Kaluza	ST	HB
Brassicaceae	*Lepidium sativum* L.	Halimshak	Herb	MP
Buddlejaceae	*Buddleja asiatica* Lour.	Neemda	Shrub	LS
Burseraceae	*Canarium resiniferum* Brace *ex* King	Dhup	ST	HB
	Protium serratum (Wall. *ex* Colebr.) Engl.	Guitguitta	Tree	MS
Caesalpiniaceae	*Caesalpinia digyna* Rotter	Kochi	WC	MS
	Cassia fistula L.	Sonalu	Tree	MS
	C.nodosa Buch. – Ham. *ex* Roxb.	Bon sonalu	MT	MS
	Saraca asoca (Roxb.) de Wild.	Ashok	ST	MS
	Senna alata (L.) Roxb.	Dadmordan	Shrub	LS
	S. occidentalis (L.) Link	Bara-Kalkasunda	Herb	MP
	S. siamea (Lamk.) Irwin & Barneby	Minjiri	Tree	P
	S. sophera (L.) Roxb.	Choottokolkasunde	Shrub	LS
	S. tora (L.) Roxb.	Hurhurey	Shrub	LS
	Tamarindus indica L.	Tentul	Tree	P
Capparaceae	*Cleome gynandra* DC.	Sadahurhurey	Herb	FF
	C. rutidosperma DC.	Hurhurey	Herb	FF
	Crateva manga (Lour.) DC.	Barun, Gota baruna	ST	LS
Casuarinaceae	*Casuarina equisetifolia* Forst.	Jhau	ST	P
Chenopodiaceae	*Chenopodium album* L.	Betuashak, Vathua-shak	Herb	LS
Clusiaceae	*Calophyllum inophyllum* L.	Puinal	MT	HB
	Mesua ferrea L.	Nageshwar	Tree	HB
	*Garcinia cowa*Roxb. *ex* DC.	Kaogola	ST	HB
	*G. lanceaefolia*Roxb.	Ban kao	MT	MS
	G. xanthocymens Hook. f. *ex* T. Anders.	Tamal	ST	MS
Combretaceae	*Anogeissus acuminate* (Roxb. *ex* DC.) Guill. & Perr.	Itchri	MT	US
	Calycopteris floribunda (Roxb.) Lamk.	Goichalata	WC	MS
	Terminalia bellirica (Gaertn.) Roxb.	Boyra, Bohera	Tree	MS
	T. chebula Retz	Horitaki	ST	MS
Convolvulaceae	*Argyria argentea* (Roxb.) Chosy.	Chotto-biztarak	Climber	FF
	Evolvulus nummularius (L.) L.	Buiokra	CH	FF
	Hewittia sublobata (L. f.) Kuntze	Jarad kalmi	Climber	OP
	Ipomoea alba L.	Dhudikalmi	Climber	FFr
	I. attenua Forsk.	Kalmishak	Herb	MP
	I. batatas (L.) Lamk.	Misti Aloo	Climber	OP
	I. fistulosa Mart. *ex* Choisy	Dholkalmi	Shrub	FFr
	I. hederifolia L.	Neela kalmi	Climber	FFr
	I. pestigridis L.	Langulilata	Climber	FFr
	Merremia attenuata (L.) Halleer	Sada kalmi	Herb	MP
	M. emarginata (Burm. f.) Hallier. f.	Indurkanipana	Climber	FF
	M. umbellata (L.) Hallier. f.	Kommolata	Climber	FF
	Operculina turpethum (L.) S. Marso.	DudhKalmi	Herb	FF
Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad.	Indrayan	Climber	OP
	Coccinia grandis (L.) Voigt	Telakucha	Climber	LS
	Hodgsonia macrocarpa (Blume) Cogn.	Gular, Pathligular	Climber	FF
	Trichosanthes cordata Roxb.	Bhuikakra	Climber	FFr
Cuscutaceae	*Cuscuta reflexa* Roxb.	Swarnalata	Climber	MS
Crypteroniaceae	*Crypteronia paniculata* Blume	Goru mara	Tree	US
Datiscaceae	*Tetrameles nodiflora* R. Br.	Chundul	Tree	HB
Dilleniaceae	*Dillenia indica* L.	Chalta	Tree	MS

Family	Botanical name	Local name	Habit	Habitat
	D. pentagyna Roxb.	Hargeja	Tree	LS
Dipterocarpaceae	*Anisoptera scaphula* (Roxb.) Pierre	Boilam	Tree	US
	Dipterocarpus alatus Roxb. *ex* G. Don.	Dholi Garjon	Tree	HB
	D. costatus Gaertn.	BaittyaGarjon	Tree	HB
	D. turbinatus Gaertn.	TellyaGarjon	Tree	HB
	Hopea odorata Roxb.	Telsur	Tree	HB
	Shorea robusta Roxb. *ex* Gaertn. f.	Shal	Tree	MS
Ebenaceae	*Diospyros malabarica* (Desr.) Koste.	Gab, Deshi gab	Tree	LS
	D. peregrina Guerke	Deshi gab	ST	LS
	D. pilosula Wall.	Khalta	ST	MS
Elaeocarpaceae	*Elaeocarpus floribundus* Blume	Jolpai	Tree	HB
	Elaeocarpus rugusus Roxb. *ex* G.Don	Belpoi	LT	HB
Euphorbiaceae	*Antidesma bunius* (L.) Spreng	Elena	ST	US
	A. ghaesembilla Gaertn.	Chotkigola	ST	US
	Aporosa dioica (Roxb.) Muell.- Arg.	Kechua	ST	US
	A. oblanga Muell.- Arg.	Kastoma, Kharulla	ST	MS
	A. wallichii Hook.f.	Kakra	ST	MS
	Baccaurea ramiflora Lour.	Latkon	Tree	MS
	Bischofia javanica Blume	Kanjolbhadi	Tree	LS
	Breynia retusa (Dennst.) Alston.	Silpati	Shrub	LS
	Bridelia stipularis (L.) Blume	Pat koi	Shrub	LS
	Chaetocarpus castanicarpa (Roxb.) Thw.	Atthalia	ST	MS
	Croton bonplandianus Baill.	Bondhone	Herb	FF
	C. caudatus Geisel.	Nanbhanti	Shrub	LS
	C. lobetus L.	Crotongach	Herb	FFr
	Euphorbia hirta L.	Dudiya	Herb	FF
	Glochidion multiloculare (Roxb. *ex* Willd.) Muell.-Arg.	Keotomi	Shrub	MS
	Glochidion sp.	----	Shrub	MS
	Macaranga denticulata (Blume) Muell.Arg.	Bura, Burna	ST	LS
	Mallotus tetracoccus (Roxb.) Kurz	Moin bura	ST	LS
	M. philippensis (Lamk.) Muell. – Arg.	Sinduri	Tree	MS
	M. repandus (Willd.) Muell.- Arg.	Gunti	WS	MS
	M. roxburghianus Muell. - Arg.	Nimputeli	Tree	FFr
	Phyllanthus emblica L.	Amloki	ST	MS
	P. niruri L.	Bhuiamla	Herb	MP
	P. reticulatus Poir.	Citki	Shrub	FFr
	Ricinus communis L.	Bherenda	Shrub	OF
	Sapium baccatum Roxb.	Campata, boloch	Tree	HB
	Suregada multiflora (A. Juss.) Baill.	Moricha	ST	MS
	Tragia involucrata L.	Bichuti	Herb	S
	Trewia nudiflora L.	Pitali, pitagola	Tree	LS
Fabaceae	*Abrus precatorius* L.	Kunch	Climber	HS
	Butea monosperma (Lam.) Kuntze	Palash	Tree	P
	Crotalaria acicularis Buch.-Ham. *ex* Benth.	Kata jhunjhuni	Herb	FF
	C. pallida Aiton	Jhun jhuni	Herb	FFr
	C. tetragona Roxb. *ex* Anders.	Gona jhunjhuni	Herb	FF
	C. verrucosa L.	Jhanjhana	Shrub	FFr
	Dalbergia confertiflora Benth.	Toloarsheem	Climber	FFr
	D.lanceolaria L. f.	Chakemdia	ST	MS
	D. sissoo Roxb.	Sisoogacc	Tree	MS
	D. spinosa Roxb.	Chulikanta, Anantakanta	Shrub	FFr
	D. stipulacea Roxb.	Dadbari	Shrub	FFr
	D. volubilis Roxb.	Ankilata	Climber	US
	Derris robusta (Roxb. *ex* DC.) Benth.	Jamarjakoroi	Tree	US

Family	Botanical name	Local name	Habit	Habitat
	Desmodium gangeticum (L.) DC.	Salpani	Shrub	OF
	D. heterocarpon (L.) DC.	Karpo modi	Shrub	OF
	D. motorium (Houtt.) Merr.	Gorachan	Shrub	OF
	D. pulchellum (L.) Benth.	Jat -salpani	Shrub	OF
	D. triflorum (L.) DC.	Kadaliya	Herb	OF
	D. triquetrum (L.) DC.	Kalaliya	Herb	OF
	Erythrina indica L.	Mandar	Tree	LS
	E. stricta Roxb.	Pahari mandar	ST	LS
	Flemingia macrophylla (Willd.) O. Kuntze *ex* Merr.	Bara salphan	Shrub	OF
	F. strobilifera (L.) R. Br.	Bon sim	Shrub	FFr.
	Mucuna monosperma DC.	Nata alkushi	Climber	US
	M. pruriens (L.) DC.	Al-kushi	Climber	US
	Psophocarpus tetragonolobus (L.) DC.	Kamranga shim	Climber	US
	Pterocarpus indicus Willd.	Padauk, Padak	LT	P
	Tephrosia purpurea (L.) Pers.	Bon-neel	Herb	FFr.
	Uraria sp.	Belai leja	Shrub	FF
Fagaceae	*Castanopsis lancifolia* (Kurz) Hickel & A. Camus	Jat Batna	Tree	US
	Lithocarpus elegens (Blume) Hatus	Rai batna	Tree	MS
Flacourtiaceae	*Flacourtia jangomus* (Lour.) Racusch	Painnagota, lukluki	ST	MS
	Hydnocarpus kurzii (King.) Warb.	Chaulmugra	ST	HB
Gesneriaceae	*Rhynchotechum ellipticum* (Diet.) DC.	Dub mormoijja	Shrub	LS
Juglandaceae	*Engelhardtia spicata* Lesch *ex* Blume	Kaichrabhadi, Jhumkabhadi	ST	MS
Lamiaceae	*Anisomeles indica* (L.) Kuntze	Gubura	Herb	LS
	Hyptis brevipes Poir.	Gol tokma	Shrub	FFr
	H. suaveolens Poir.	Tokma	Shrub	FFr
	Leonurus sibiricus L.	Roktodron	Herb	MP
	Leucas aspera (Willd) Link	Choto halkusa	Herb	FFr.
	L. indica (L.) R. Br. *ex* Vatke	Shetodron	Herb	FFr.
	Ocimum americanum L.	Bon-tulshi	Herb	FF
	O. sanctum L.	Tulshi	Herb	FF
	Pogostemon auricularius (L.) Hassk.	Aripachuli	Herb	OF
Lauraceae	*Actinodaphne angustifolia* Nees	Modonmosta	Tree	MS
	Cinnamomum iners Reinw. *ex* Blume	Tejbohu	ST	MS
	Cryptocarya amygdalina Nees	Bhuiya gachh	Tree	HB
	Litsea glutinosa (Lour.) Robinson	Karjiukimenda	ST	MS
	L. monopetala (Roxb.) Pers.	Menda	Tree	LS
	*Persea bombycina (*K. & H.) Kosterm.	Nalaomshi	ST	MS
	Phoebe pallida (Nees) Nees	Dulia	ST	MS
Lecythidaceae	*Baringtonia acutangula* (L.) Gaertn.	Hijal	Tree	LS
Leeaceae	*Leea aequata* L.	Kakjangha	Shrub	LS
	L. crispa L.	Banchalita	Shrub	LS
	L. indica (Burm. f.) Merr.	Kurkurjihwa	S. tree	MS
Loranthaceae	*Dendrophthoe pentandra* (L.) Miq.	Pharulla	Shrub	E
	Scurrula parasitica L.	Parula	Shrub	E
Lythraceae	*Lagerstroemia parviflora* Roxb.	Sidhalarul	Tree	P
	L. speciosa (L.) Pers.	Jarul	Tree	P
	Woodfordia fruticosa (L.) Kurz	Dhaiphul	Shrub	FFr
Magnoliaceae	*Michelia champaca* L.	Champa	Tree	P
Malvaceae	*Abelmoschus moschatus* Medic.	Mushakdana	Shrub	LS
	Hibiscus surattensis L.	Ram bhindi	Herb	OP
	Sida acuta Burm.	Kureta	Shrub	OP
	S. cordata (Burm.f.) Borss.	Pitberela, Junka	Herb	OP
	S. cordifolia L.	Berela	Shrub	OP
	S.mysorensis Wight & Arn.	Chatchata	Shrub	OP

Family	Botanical name	Local name	Habit	Habitat
	S. rhombifolia L.	Lal berela	Shrub	OP
	Urena lobata L.	Ban-okhra	Shrub	OP
Melastomataceae	*Melastoma malabathricum* L.	Datranga, Lutki	Shrub	FFr.
	Osbeckia chinensis L.	Choigachi	Shrub	FF
Meliaceae	*Aphanamixi spolystachya* (Wallich) R.N. Parker	Pitraj, royna	Tree	P
	Azadirachta indica A. Juss.	Neem gacch	Tree	P
	Chukrasia tabularis A. Juss.	Chikrassi	Tree	P
	Dysoxylum binectariferum (Roxb.) Hook.f. *ex* Beddome	Rata, rangirata	Tree	HB
	Melia azadirachta L.	Gora nim	Tree	P
	Swietenia mahagoni (L.) Jacq.	Mehogoni	Tree	P
	Toona ciliata J. Roem.	Toon	Tree	P
Menispermaceae	*Stephania japonica* (Thunb.) Miers	Raj Pathda	Climber	MS
	Tinospora crispa (L.) Hook. f. & Thom.	Gulancha	Climber	US
	T. cordifolia (Willd.) Hook. f.	Gulonchalata	Climber	US
Menyanthaceae	*Nymphoides hydrophylla* (Lour.) O. Kuntze	Panchulli	Herb	A
Mimosaceae	*Acacia auriculiformis* A. Cunn. *ex* Benth.	Akasmoni	Tree	P
	A. caesia (L.) Willd.	Ailai	Tree	P
	A. mangium Willd.	Mangium	Tree	P
	Albizia lucidior (Steud.) Nielson. *ex* Hara	Sil koroi	Tree	P
	A. chinensis (Osb.) Merr.	Chakuakoroi	Tree	P
	A. lebbeck (L.) Benth.	Kala koroi,Sirish	Tree	P
	A. odorssima (L. f.) Benth.	Tetuyakoroi	Tree	P
	A. procera (Roxb.) Benth.	Jat koroi	Tree	P
	Calliandra umbrosa (Wall.) Benth.	ChottoBetmara	ST	MS
	Entada rheedii Spreng.	Gila lata	WC	US
	Mimosa pudica L.	Lajja bati	Herb	FF
	Samanea saman (Jacq.) Merr.	Rain tree	Tree	LS
	Xylia xylocarpa (Roxb.) Taub.	Lohakat	LT	HB
Moraceae	*Artocarpus chama* Buch. - Ham. *ex* Wall.	Chapalish	LT	LS
	A. heterophyllus Lamk.	Khanthal	Tree	P
	A. lacucha Buch. -Ham.	Barta, dewa	Tree	LS
	Ficus auriculata Lour.	Bara dumur	Tree	MS
	F. benghalensis L.	Bot gacch	Tree	HB
	F. benjamina L.	Dumur	Tree	HB
	F. fistulosa Reinw. *ex* Blume	Fapa- dumur	Tree	LS
	F. gibbosa Blume	Bot	Tree	HB
	F. hispida L. f.	Kakdumur	ST	LS
	Ficusheteropleura Blume	Paraboha	ST	HB
	F. laevis Blume	Dumurlata	Climber	FF
	F. nervosa Heyne *ex* Roth	Panidumur	ST	MS
	F. racemosa L.	Jogyadumur	Tree	HB
	F. religiosa L.	Panibot,Ashwath	MT	MS
	F. semicordata Buch.-Ham. *ex* Smith.	Jaggyadumur	Tree	HS
	Streblus asper Lour.	Sheora, harba	Tree	HB
Myristicaceae	*Knema clarkeana* Warburg	Kina barala	ST	AS
	Myristica linifolia Roxb.	Barella	ST	MS
Myrsinaceae	*Ardisia solanacea* Roxb.	Ban-jam	Shrub	LS
	Maesa attenua A. DC.	Narichagach	Shrub	MS
	M. indica (Roxb.) DC.	Sirkhi	ST	HB
	M. ramantacea Wall.	Noa moricha	ST	US
Myrtaceae	*Cleistocalyx nervosum* (DC.) Kosterm	Bhutijam,Godajam	Tree	MS
	Euclalyptus citrodora Hook.	Eucalyptus	Tree	P
	Syzygium cumini (L.) Skeels	Kalajam	Tree	P
	S. formosum (Wall.) Masamune	Paniya jam	Tree	P

Family	Botanical name	Local name	Habit	Habitat
	S. fruticosum DC.	Puti jam,Kakjam	Tree	FFr
	S. jambos (L.) Alston	Gulab jam	Tree	P
	S. praecox (Roxb.) Rathakr. & N. C. Nair	Kharkarajam	Tree	P
Nympheaceae	*Nymphaea nouchali* Brum. f.	Sada Sapla	Herb	A
Oleaceae	*Jasminum sambac* (L.) Aiton	Beli	WC	MS
	J. scandens Vahl.	Jongli jui	WC	MS
	Ligustrum robustum (Roxb.) Blume	Ligubus	WC	MS
	Myxopyrum smilacifolium (Wall.) Blume	Chiknabizi	Shrub	HS
Onagraceae	*Ludwigia hyssopifolia* (G. Don) ex A. & R. Fern.	Mulsi	Herb	MP
	L. prostrate Roxb.	Shayan kura	Herb	MP
Oxalidaceae	*Oxalis corniculata* L.	Amrul	Herb	MP
Passifloraceae	*Adenia trilobata* (Roxb.) Eng.	Akandaphal	Climber	FF
	Passiflora foetida L.	Jomkalata	Climber	FF
Piperaceae	*Peperomia attenuata* (L.) Kunth.	Peperomea	Herb	LS
	Piper longum L.	Pipul	Herb	LS
	*P. sylvaticum*Roxb.	Ban Pan	CH	MP
Polygalaceae	*Salomonia ciliata* (L.) DC.	Salmonisil	Herb	LS
Polygonaceae	*Ampelygonum chinense* (L.) Lindl.	Mohicharanshak	Herb	LS
	Persicaria orientalis (L.) Spach.	Bara panimarich	Herb	LS
	P. hydropiper (L.) Spach.	Pakurmul	Herb	LS
	P. viscosa (Buch. – Ham. *ex* D. Don) Nakai	Biskatali	Herb	LS
Rhamnaceae	*Ziziphus mauritiana* Lamk.	Boroi, Kul	Tree	HB
	Z. oenoplia (L.) Mill.	Bon boroi	Shrub	MS
Rubiaceae	*Aidia micrantha* (K. Schum.) Bullock *ex* F. white	Aimira	Shrub	MS
	Canthium angustifolium Roxb.	Katalichapa	Shrub	HB
	Chasalia curviflora Thw. *var. ophioxyloides* (Wall. *ex*Roxb.) Deb. & Krishna	Hel gaas	Shrub	MS
	Dentella repens (L.) Forst. & G. Frost.	Bhuipat	Herb	OP
	Gardenia coronaria Buch.- Ham.	Konnayri	Tree	MS
	Hedyotis corymbosa (L.) Lamk.	Panki	Herb	OP
	H. scandens Roxb. - Roxb.	Pankiraj	Shrub	OP
	Hymenodictyon orixensis (Roxb.) Mabberley	Bhui kadam	ST	US
	Ixora cuneifolia Roxb.	Beophul	Shrub	FF
	I. nigricans R. Br. *ex* Wight & Arn.	Nikrangachuillya	ST	MS
	Knoxia sumatrensis (Retz) DC.	Sumatra noxi	Herb	LS
	Mitracarpus hirtus (L.) DC.	Tupi kadam	Herb	FF
	Morinda angustifolia Roxb.	Banamali	ST	LS
	M. citrifolia L.	Banach	Shrub	LS
	M. umbellate L.	Gassalata	Shrub	MS
	Mussaenda roxburghii Hook.f.	Silchauri	Shrub	HB
	Ophiorrhiza mungos L.	Gandhanakuli	Herb	MP
	Paederia foetida L.	Gandha-badali	Climber	FF
	Pavetta indica L.	Banamali	Shrub	LS
	Psychotria adenophylla Wall.	Baro sudma	Shrub	LS
	P. symplocifolia Kurz	Sim bhuta	Shrub	LS
	Spermacoce articularis L. f.	Ahtharogia	Herb	Ffr.
	Wendlandia tinctoria ssp.*Orientalis* Cowan	Rong ghitya	ST	MS
Rutaceae	*Clausena excavata* Burm. f.	Dulia maricha	ST	MS
	C. heptaphylla (Roxb.) Wight & Arn.	Karanphul	Shrub	MS
	Glyocosmis pentaphylla (Retz.) Corr.	Motkila	ST	HB
Sapindaceae	*Allophylus cobbe* (L.) Raeuschel var. *serratus* (Roxb.) Prain	Chita	ST	LS
	Allophylus cobbe (L.) Raeuschel var. *villosus* (Roxb.) Prain	Rakhalchita	ST	LS
	Cardiospermum helicacabum L.	Phutka	Climber	FF

Family	Botanical name	Local name	Habit	Habitat
	Lepisanthes rubiginosa (Roxb.) Leenh.	Barohorina	ST	MS
	Palaquium polyanthum Engl.	Tali	MT	P
Sapotaceae	*Mimusops elengi* L.	Bakul	ST	P
Scrophulariaceae	*Adenosma indianum* (Lour.) Merr.	Kesuti	Herb	MP
	Lindernia antipoda (L.) Alston	Choto helencha	Herb	MP
	Scoparia dulcis L.	Bandhaney	Herb	FF
	Torenia asiatica L.	Asiantoren	Herb	MP
	T. diffusa D. Don	Ushatoren	Herb	MP
Solanaceae	*Physalis minima* L.	Futka	Herb	OP
	Solanum nigrum L.	Gurkhi begun	Herb	FF
	S. sisymbrifolium Lamk.	Kanta begun	Herb	FF
	S. torvum Sw.	Gott begun	Shrub	LS
	S. virginianum L.	Kantakari	Herb	LS
Sonneratiaceae	*Duabunga grandiflora* (Roxb. *ex* DC.) Walp.	Bandarhulla	Tree	AS
Sphenocleaceae	*Sphenoclea zeylanica* Gaertn.	Jhillmarich	Herb	AS
Sterculiaceae	*Abroma augusta* (L.) L. f.	Ulatkambal	ST	HB
	Byttneria aspera Colebr.	Nil bhutta	WC	US
	B. pilosa Roxb.	Harbanga-lata	WC	US
	Firmiana colorata (Roxb.) R. Br.	Jongliudal, Naichichaudal	Tree	HB
	Pterospermum acerifolium (L.) Willd.	Muskanda, Kanakchampa	ST	US
	P. semisagittatum Buch.-Ham.	Laonaassar	ST	MS
	Sterculia foetida L.	Jonglibadam	Tree	US
	*S. villosa*Roxb. *ex* Smith.	Udal	Tree	US
	Harpullia cupanoides Roxb.	Har pulli	Tree	MS
Styracaceae	*Styrax serrulatus* Roxb.	Fulkat	Tree	US
Theaceae	*Eurya attenuata* DC.	Sagolerbori	ST	HB
	Schima wallichii (DC.) Korth.	Kanak	Tree	MS
Tiliaceae	*Corchorus aestuans* L.	Titapat	Herb	LS
	Grewia nervosa (Lour.) Panigr.	Assar	ST	MS
	Triumfetta rhomboidea Jacq.	Ban-okra	Herb	LS
Ulmaceae	*Trema orientalis* (L.) Blume	Jibon	ST	LS
Urticaceae	*Boehmeria glomerulifera* Miq.	Borthurthuri	ST	LS
	Pouzolzia zeylanica (L.) Benn.	Kullaruki	Herb	MP
Verbenaceae	*Callicarpa arborea* Roxb.	Barmala	Tree	MS
	C. macrophylla Vahl.	Khoja	ST	MS
	Clerodendrum indicum (L.) Kuntze	Bamunhati	Shrub	MS
	C. viscosum Vent.	Bhant	Shrub	LS
	Gmelina arborea Roxb.	Gamari	Tree	P
	Lantana camara L.	Lantana	Shrub	MS
	Lippia alba Mill. N. E. Br. *ex* Brit. & Wilson	Pichas-lakr	Shrub	LS
	Phyla nodiflora (L.) Greene	Bhuiokra	Herb	LS
	Premna esculenta Roxb.	Lalana	Shrub	LS
	Tectona grandis L. f.	Shegun	Tree	P
	Vitex negundo L.	Nishinda	ST	LS
	V. peduncularis Wall. *ex* Schauer	Goda	Tree	MS
	Vitex pinnata L.	Awal	Tree	HB
Vitaceae	*Ampelocissus barbata* (Wall.) Planch.	Jarila-lahari	Climber	FFr.
	Cayratia japonica (Thunb.) Gagnep.	Japanigoalilata	Climber	FFr.
	Cissus assamica (Laws.) Craib	Amasha lata	Climber	FFr.
	C. elongate Roxb.	Dhemna	Climber	LS
	Tetrastigma angustifolia (Roxb.) Deb	Nekungriubi	Climber	MS
	T. leucostaphylum (Dennst.) Alston	Jarul lata	WC	MS

(B) Monocotyledonae

Family	Botanical name	Local name	Habit	Habitat
Amaryllidaceae	*Curculigo orchioides* Gaertn.	Talamuli	Herb	OM
Araceae	*Alocasia cucullata* (Lour.) G. Don	Bish kachu	Herb	SP
	A. macrorrhizos (L.) G. Don	Mankachu	Herb	LS
	Caladium bicolor Vent.	Diranga kachu	Herb	SP
	Colocasia esculenta (L.) Schott	Kachu	Herb	LS
	C. oresbia A. Hay	Sada kachu	Herb	FH
	Pothos scandens L.	Hatilata, sundad	CH	OT
	Typhonium trilobatum (L.) Schott	Ghet -kachu	Herb	FR
Arecaceae	*Calamus erectus* Roxb.	Kadam bet	WC	MS
	C. flagellum Griff.	Bhudum bet	WC	MS
	C. floribundus Griff.	Fuli bet	WC	LS
	C. gracilis Roxb.	Mapuri, kiring bet	WC	LS
	C. latifolius Roxb.	Karak, budum bet	WC	MS
	C. viminalis Willd.	Bara bet	WC	MS
	Caryota urens L.	Bansupari, chaur	Tree	US
	Daemonorops jenkinsiana (Griff.) Martius	Golla bet	Shrub	HB
	Phoenix sylvestris Roxb.	Khejur	Tree	US
Commelinaceae	*Commelina benghalensis* L.	Kanchira	Herb	FF
	C. diffusa Burm.f.	Monaynakanchira	Herb	FF
	C. sikkimensis C.B. Clarke	Batbaithia shak	Herb	FF
	Murdannia nudiflora (L.) Brenan	Kureli, kanduli	Herb	FF
Cyperaceae	*Cyperus compressus* L.	Chanca	Herb	FF
	C. cuspidatus Kunth in Humb.	Sagarmukhimethi	Herb	FT
	C. cyperoides (L.) O.Ktze.	Kusha, kucha	Herb	FM
	C. rotundus L.	Mutha grass	Herb	SP
	Kyllinga brevifolia Rottb.	Bindimuthi	Herb	R
	K. nemoralis (J.R.Forst.) Dandy *ex* Hut	Nirbishi	Herb	HS
	Scleria levis Retz.	Chas gashi	Herb	MP
Dioscoreaceae	*Dioscorea bulbifera* L. var. *sativa* (Hook.f.) Prain	Amdalata, Rata alu	Climber	FFr.
	Dioscorea pentaphylla L.	Ban alu, jhum	Climber	FFr.
	D. prazeri Prain &Burkill	Jhum alu	Climber	FFr.
Musaceae	*Musa paradisiaca* L.	Aitta kola	Herb	FF
Pandanaceae	*Pandanus foetidus* Roxb.	Keyakanta	Shrub	FFr.
Poaceae	*Bambusa tulda* Roxb.	Mitinga, Talla	Tree	HB
	B. vulgaris Schrad. *ex* Wendl.	Bajjya bans	Tree	HB
	Cynodon dactylon (L.) Pers.	Durbaghas	Herb	FF
	Cyrtococcum accrescens (Trin.) Stapf	Cyrtococcum	Herb	FF
	C. oxyphyllum (Steud.) Stapf	Oxycocca ghas	Herb	FFr.
	C. patens (L.) A. Camus	Pat coccaghas	Herb	FFr.
	Dactyloctenium aegyptium (L.) P. Beauv.	Makra		HB
	Digitaria setigera Roth *ex* Roem. & Schult.	Shetighas	Herb	FF
	Eleusine indica (L.) Gaertn.	Malanga kuri	Herb	HS
	Eragrostis ciliaris (L.) R. Br.	Lomkoni	Herb	US
	E. tenella (L.) P. Beauv. *ex* Roem.	Koni ghas	Herb	FFr.
	E. unioloides (Retz.) Nees *ex* Steud.	Kuni ghas	Herb	FFr.
	Gigantochloa andamanica (Kurz) Kurz	Kali bans	Tree	MS
	Imperata cylindrica (L.) Beauv.	Ulu, Chon	Herb	OP
	Melocanna baccifera (Roxb.) Kurz	Muli bans	Tree	MS
	Oplismenus burmanni (Retz.) P. Beauv.	Gohur	Herb	OP
	O. compositus (L.) P. Beauv.	Gohur	Herb	OP
	Panicum brevifolium L.	Panibrevighas	Herb	LS
	P. notatum Retz.	Panita ghas	Herb	LS
	Paspalum scrobiculatum L.	Goicha, kedoadhan	Herb	MS
	Pogonatherum crinitum (Thunb.) Kunth	Nitu bansh	Herb	HS
	P. paniceum (Lamk.) Hack.	Khudibansh	Herb	HS
	Schizostachyum dullooa (Gamble) R. Majumdar	Dolu bans	Tree	FF
	Thysanolaena maxima (Roxb.) O. Kuntze	Phuljharu	Herb	HS

(C) Gymnosperms

Family	Botanical name	Local name	Habit	Habitat
Podocarpaceae	*Podocarpus nerifolius* D. Don	Banspata	Tree	P
Cupressaceae	*Taxodium distichum* (L.) Rich	Swamp cypress (Eng)	Tree	P

(D) Pteridophyta

Family	Botanical name	Local name	Habit	Habitat
Acrostichaceae	*Pteris vittata* L.	Dhakia	Herb	MP
Athyriaceae	*Diplazium esculentum* (Retz.) Sw.	Dhekiashak	Herb	MP
	D. polypodioides Bl.	Dhekia	Herb	MP
Acrostichaceae	*Pteris vittata* L.	Dhekia	Herb	MP
Cyatheaceae	*Cyathea gigantea* (Wall. *ex* Hook.) Holtt.	Gach dhekia	ST	AS
Helminthostachyaceae	*Helminthostachys zeylanica* (L.) Hook.	Sada dhekia	Herb	LS
Lygodiaceae	*Lygodium flexuosum* (L.) Sw.	Latadhekia	CH	LS
Polypodiaceae	*Drynaria quercifolia* (L.) J. Sm.	Pankhiraj	EH	E
	Microsorum pteropus (Bl.) Copel.	Tripatradhekia	Herb	FF
	Pyrrosia nuda (Gies.) Ching	Nudarossi	Herb	FF
Pteridaceae	*Pteris quadriaurtia* Retz.	Dhekia	Herb	FFr
Schizaeaceae	*Dicranopteris linearis* (Burm.f.) Underw.	Lomba dhekia	Herb	HB
Thelypteriaceae	*Ampelopteris prolifera* (Retz.) Copel.	Dhekiashak	Herb	SP

[Here, LT- Large tree, MT- Medium tree, ST- Small tree, CR- Creeping herb, EH- Erect herb, WC- Woody climber, FM- Forest mergin, FFr- Forest frindge, FF- Forest floor, MP- Moist places, SP- Shady places, HB- Hill Base, MS- Middle slope, LS- Lower slope, P- Planted, HS- Hill slope, US – Upper slope, R-Road side, AS- Along the stream, E- Epiphyte, OF- Open fallows, A- Aquatic, FT- Foot trail, OP- Open places, S- Scrubs]

The Gymnosperms are represented by only 2 species under 2 genera in 2 families (according to Boerhost 1971). The Pteridophytes are represented by 13 species in twelve genera distributed under ten families (according to Siddiqui *et al.* 2007). The analysis of the taxa revealed that 11 families are represented by more than 5 species. Among the taxa, Euphorbiaceae having 29 species ranks top followed by Fabaceae (28 spp.), Rubiaceae and Poaceae (24 spp.), Moraceae and Asteraceae (16 spp.), Acanthaceae (15 spp.), Convolvulaceae and Verbenaceae (13 spp.) and Caesalpiniaceae (10 spp.). Other families are belonging to 2-9 species in the study area. Thirty- two families are represented by single genus having single species each in the study area. Out of 313 genera enumerated, *Ficus* is the largest genus having 12 species. *Ipomoea, Dalbergia, Desmodium* and *Calamus* are represented by 6 species. The genus of *Senna, Sida, Albizia* and *Syzygium* are represented by 5 species. The rest of genera come to the next position having 2 to 4 species. All species in Araceae, Zingiberaceae, Gesneriaceae, Lecythidaceae, Polygalaceae, Polygonaceae, Ulmaceae and Urticaceae families are growing the moist places with herbaceous in nature. The rest of species are occurring the forest floor, forest margin, forest frindge, hill slope and hill

Table 2. Synopsis of vascular plant taxa enumerated in the Sanctuary.

Plant group	Family	Genus	Species
Angiosperms	88	299	447
Pteridophyta	10	12	13
Gymnosperms	2	2	2
Total	100	313	462

base of the study area. The synopsis of the vascular plants taxa has been enumerated in the following table (Table 2).

Habit diversity

The vascular plants of the HWS are classified as trees, shrubs, herbs and climber on the basis of habit. According to the habit diversity, trees occupy the highest position, comprising 184 species which constitutes 40% of taxa, followed by shrubs comprising 69 species (15%), herb comprises 149 species (32%) and 61 (13%) are climberspecies. In 2017, flowers of *Elaeocarpus rugosus* and fruits of *Aphanamixis polystachya* were collected from HWS as a threatened species and preserved at Bangladesh Forest research Institute Herbarium shown in Fig. 1 & Fig. 2.

Figure 1. *Elaeocarpus rugosus* is a lagre native tree in HWS.

Figure 2. Fruits of *Aphanamixis polystachya*.

Occurrence of the species according to stratum

Hazarikhil Wildlife Sanctuary presents diverse habitat including hills and hills base, valleys, gullies, some water streams and covered mainly by secondary degreded forests. Along the beginning forest hill base are planted with *Xylia xylocarpa* (Lohakat), *Calophyllum inophyllum* (Kamdev), *Palaquium polyanthum* (Tali) and *Pterocarpus indicus* (Padok) etc. A few individuals of *Anisoptera scaphula* (Boilam), *Swintonia floribunda* (Civit), *Mangifera longipes* (Jongli Aam), *Pterospermum acerifolium* (Lana Assar) are still as characteristic elements of the forest. One of the unique features of this forest is the occurrence of three indigenous angiosperm species, *Firmiana colorata*, *Elaeocarpus rugosus* and *Cryptocarya amygdalina*. The forest has occufied the tall trees like *Dipterocarpus turbinatus, D. alatus, Vitex peduncularis, Anoguesus acuminata, Stereospermum colais, Bombax insigne, Artocarpus lacucha, A. chama, Spondias pinnata, Protium serratum, Tetramelesn odiflora*. The second storey consists of *Holarrhena antidysenterica, Hymenodictyono rixensis, Glochidion multiloculare, Trevesia palmata, Streblus asper, Macropanax oreophilum, Fernandoa adenophylla, Cordia serrata, Dillenia indica, D. pentagyna, Shorea robusta, Aporosa dioica, Hydnocarpus kurzii, Ficus spp., Podocarpus nerifolia, Palaquium polyanthum, Aphanamixis polystachya*, Some denuded and abandoned areas are covered with *Globba marantina, Staurogyne angustifolia, Ixora cuneifolia* and various species of rattan, bamboos and grasses. The other barren areas of the lower hill slopes are mostly covered with *Impreta cylindrica* and *Thysanolaena maximas* species. The present

Table 3. List of rare species are native inHazarikhil Wildlife Sanctuary

Family	Endangered species	Local name	Occurrence
Anacardiaceae	*Mangifera sylvatica*	Jongliaam	MS
	Swintonia floribunda	Civit	HS
Apocynaceae	*Alstonia nerifolia*	Chatim	US
Araliaceae	*Macropanex oreophillum*	Pani-kesuri	AS
Bueseraceae	*Protium serratum*	Gutguti	MS
Clausiaceae	*Calophyllum inophyllum*	Kamdev, Puinal	HB
Ebenaceae	*Diospyros pilosula*	Khalta	MS
Elaeocarpaceae	*Elaeocarpus rugosus*	Belpoi	HB
Fabaceae	*Pterocarpus indicus*	Padauk, Padak	Planted
Fagaceae	*Castanopsis castanicarpa*	Kanta batna	US
Lauraceae	*Cryptocarya amygdalina*	Bhuiya gachh	HB
Meliaceae	*Dysoxylum binectariferum*	Rata, rangirata	LS
Sapindaceae	*Palaquium polyanthum*	Tali	Planted
Sterculiaceae	*Firmiana colorata*	NaichichaUdal	HB
	Pterospermum semisagittatum	Laonaassar	MS
	Sterculia foetida	Jonglibadam	US
Styracaceae	*Styrax serrulatus*	Fulkat	US
Vitaceae	*Cissus assamica*	Amasha lata	FFr.
	Tetrastigma angustifolia	Nekungriubi	MS

[Here, FFr- Forest Frindge, HS- Hill slope, HB- Hill Base, US- Upper slope, MS- Middle slope, LS Lower slope, AS- Along the stream]

study reveales that the Fatikchari forest beat has fairly some natural forest cover rich species diversity with native tall trees occur in the HWS. And some patches are composed of native plant with a good vegetation structure.

These threatened species in this wildlife sanctuary are likely to be under conservation management. The present study also resulted with the while exploring in HWS under Chattogram district, Bangladesh for collection of plant genetic resources, the scientists of Forest Botany Division, BFRI collected a Gymnosperm specimen, which was previously not recorded for Bangladesh. After critical study at Bangladesh Forest Research Institute (BFRI) Herbarium the specimen was identified as *T. distichum* (L.) Rich by referring to the details of the specimen can be seen online in Kew's Herbarium Catalogue. This taxon was not reported from the area now falling under the political boundaries of Bangladesh by any of the previous literature of this region viz. Ahmed *et al.* (2008); Backer (1976); Kurz (1877); Prain (1897, 1903); Brandis (1906); Heinig (1925), Hooker (1980), Cowan (1926), Kanjilal *et al.* (1938); Raizada (1941); Sinclair (1955); Mia and Khan (1995) being recorded here for the first time from Bangladesh.

Discussion

It has been reported that in Bangladesh there are a total of 3,611 species of angiosperms belonging to 198 families. Vascular plants species composition of HWS revealed in this study that a total of 462 species belonging to 313 genera under 100 families recorded

covering the study area. It seems to be very encouraging. It was found that the number of the species composition of 1177.53 ha. is higher than that of same area, e.g. 478 plant species under 305 genera with in an area of 2908.5 ha. reported by Rahman (2017). Also, 184 tree species were found in this study and higher in composition to other greater Chattogram forest areas, i. e. 179 tree species in Barayadhala National Park area by Rashid *et al.* (2018), 183 tree species reported from the Dudhpukuria- Dhopachari Wildlife Sanctuary (Hossain *et al.* 2013), 36 tree species in Sitakunda area by Heinig (1925) and 38 tree species in Ukhiarange of Cox'sBazar (Ahmed and Haque 1993). On the other hand, the tree species composition is comparatively lower than 189 tree species reported from the same area (Rahman 2017) and 238 tree species reported from the Bangladesh Forest Research Institute Campus (Alam *et al.* 2015). However, considering the results of these related studies, it can be attendant that the Hazarikhil area possesses moderately well diversified with higher number of indigenous tree species in comparison to other natural forests of the country. A very few plant taxonomists were done on herb and shruby flora richness in the HWS. It was found that, the herbaceous and shruby vegetation on the natural patches were showed good diversity in the hill slope and hill base of the study area. As a result, the vascular flora has been changed the HWS after over the time. There are some proposals recommended here may be classified as meant for long term planning for sustainable utilization of the natural resources of the forest. There are restore the natural environment and reforestation should be undertaken by planting the native trees to the HWS, instead of planting the exotic species viz; *Alstonia nerifolia* , *Anisoptera scaphula, Bouea oppositifolia, Canarium resiniferum, Castanopsis lancifolia, Dipterocarpus costatus, D. turbinatus, Dysoxylumbi nectariferum, Elaeocarpus rugosus, Engelhardtia spicata, Fernandoa adenophylla, Garcinia xanthocymens, Pterospermum acerifolium, Pterospermum semisagittatum, Swintonia floribunda, Vitex peduncularis* and *Wrightia arborea*. These native to forest whose flowers and fruits will provide fodder for the birds and mammals. And native trees should be planted expansively in the forest to attack wildlife which in revolvebrings about cross pollination, effective seed spreading, increased yields and sustainable development. The dead and hollow trees will not be removed from the sanctuary as the trees are suitable for biodiversity conservation of Moraceae family.

Conclusion

The HWS exists still remnant of natural forest of the Chottogram north forest division. It is one of the important habitat key places for *in situ* conservation of Bangladesh. The plant diversity of HWS has been changed after its establishment in 2010. The vascular plant species from an area of about 1177.53 ha WS at Hazarikhil seems to be in comparison to other protected areas from the region. A large number of indigenous plants are naturally growing in this sanctuary. Occurrence of 462 species in this area seems to have a good number of vascular species diversity which is comparable with other protected area in the country. The present findings will provide the valuable information on vascular plant distribution and vegetation structure, which will helpful the future conservation and in developing a conservation management plan of this sanctuary. One day this result will also work as a seed source. It is included that the present investigation more possible the way for further study to investigate of regeneration behavior in the study area. More particularly,

the rare and threatened species along with their degraded habitats to be protected by taking proper conservation management programme. Local enthusiasts have to be involved in the conservation programmes and to create public awareness regarding the sustainable development through posters, photographs, graphics and pamphlets.

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References

Abdullah, R.M.; Noguchi, T. and Mohammad, N. 2007. Impact of participatory forest management (PFM) on socio-economic development in Bangladesh: a case study in the Madhupur Sal Forest. *Journal of Forest Economics* 53(1): 46-56.

Ahmed, G.U. and Haque, S.M.S. 1993. Percentage distribution of species and diameter class in natural forest of Bangladesh. *The Chittagong University Studies*, Part II, 17 (1): 109-113.

Ahmed, Z.U.; Begum, Z.N.T.; Hassan, M.A.; Khondker, M.; Kabir, S.M.H.; Ahmad, M.; Ahmed, A.T.A.; Rahman, A.K.A. and Haque, E.U. (eds.). 2008. Encyclopedia of Flora and Fauna of Bangladesh. Vol. 6-12. *Asiatic Society of Bangladesh*, Dhaka.

Alam, S.; Alam, M.K.; Basak, S.R. and Mohiuddin, M. 2015. Plant diversity in Bangladesh Forest Research Institute Campus, Chittagong, Bangladesh. 52 p.

Ara, H.; Khan, B. and Uddin, S.N. 2013. Red data book of vascular plants of Bangladesh. Vol. 2. Bangladesh National Herbarium, Dhaka. 1-280 pp.

Backer, J.G. 1976. Leguminosae. *In:* Hookers, J.D. (ed.). *Flora of British India* 2: 151-152. Bishen Singh Mahendra Pal Singh, Dehradun, India.

BFD (Bangladesh Forest Department). 2017. Management and conservation-legal forest land: district wise forest land information. Bangladesh Forest Department. http://bforest.gov.bd/site/page/837e6966-0fce-4274-a0d0bcdfa49ce492/Legal-forest-land. Accessed 23 September 2018.

Brandis, D. 1906. Indian trees. Bishen Singh Mahendra Pal Singh, Dehradun, India. 767 p.

Cowan, J.N. 1926. The flora of Chakaria Sundarbans. Records of the *Botanical Survey of India.* 12 (2): 197-225.

Cronquist, A. 1981. An integrated system of classification of flowering plants. Columbia University Press, New York. 248-250 pp.

Das, D.K. and Alam, M.K. 2001. Trees of Bangladesh. Bangladesh Forest Research Institute, Chittagong. 1-342 pp.

Dey, C.K.; Rahman, M.A. and Wilcock, C.C. 1999. An enumeration of tree species of Chittagong. Biodiversity Bulletin Bangladesh. 1: 1- 81.

Dey, T.K. 1995. Useful plants of Bangladesh. Chittagong. 1-1055 p.

Hassan, M.M. 1995. Biodiversity conversation and management in Bangladesh: a state of the art, review paper, ICIMOD, Kathmandu, Nepal 59 pp.

Heinig, R.L. 1925. List of plants of the Chittagong collectorate and hill tracts. The Bengal Government Branch Press, Darjeeling, India. 1-78 pp.

Hooker, J.D. 1872-1897. The flora of British India. Vols. 1-7. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Hossain, M.A.; Hossain, M.K.; Salam, M.A and Rahman, S. 2013. Composition and diversity of tree species in Dudhpukuria-Dhopachari Wildlife Sanctuary of Chittagong (South) Forest Division, Bangladesh. *Research Journal of Pharmaceutical, Biological and Chemical Science* 4 (2): 1447-1457.

Hossain, M.K. 2001. A review of forest biodiversity conservation in Bangladesh. *Journal of Forestry and Environment.* 1(1): 102-110.

Hossain, M.K.; Alam, M.S. and Hossain, M.A. 2017. Conservation of threatened tree species in Chittagong University Campus. Arannayk Foundation, Dhaka, Bangladesh 183 p.

Huq, A.M. 1986. Plant names of Bangladesh. Bangladesh National Herbarium, Dhaka. 289 p.

Kanjilal, U.N.; Das, A.; Kanjilal, P.C. and De. R.N. 1934, 1938, 1940 (Reprint 1982). Flora of Assam, vols. 1-7, A Von Book, Delhi, India.

Khan, M.S. 1977. Flora of Bangladesh. Vol. 4. Bangladesh National Herbarium, Dhaka.

Khan, M.S.; Rahman, M. M. and Ali, M. A. (eds.). 2001. Red data book of vascular plants of Bangladesh. Bangladesh National Herbarium, Dhaka. 1-179 pp.

Kurz, S. 1877. Forest flora of British Burma, vols. 1-2. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Mia, M.M.K. and Khan, B. 1995. First list of Angiospermic taxa of Bangladesh not included in Hooker's 'Flora of British India' and 'Prain's Bengal Plant's. *Bangladesh Journal of Plant Taxonomy* 2: 25-45.

Prain, D. 1903. (Reprint 1981). Bengal plants, vol. 1-II. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Rahman, M.A. 2017. Plant diversity in Hazarikhil Wildlife Sanctuary of Chittagong and its conservation management. *Journal of Biodiversity Conservation and Bioresource Management* 3(2): 43-56.

Rahman, M.A. (ed.). 2013. IUCN red list categories of plants: red data book of flowering plants of Bangladesh, Vol. 1. Chittagong. 1-256 pp.

Rashid, M.E. and Rahman, M.A. 2011. Updated nomenclature and taxonomic status of the plants of Bangladesh included in Hook. f., The flora of British India: Volume I. *Bangladesh Journal of Plant Taxonomy* 18(2): 177-197.

Rashid, M.E. and Rahman, M. A. 2012. Updated nomenclature and taxonomic status of the plants of Bangladesh included in Hook.f., The flora of British India: Volume II. *Bangladesh Journal of Plant Taxonomy* 19(2): 173-190.

Rashid, M.H.; Islam, S. and Kashem, S.B. 2018. Floristic diversity (Magnoliids and Eudicots) of Barayadhala National Park, Chittagong, Bangladesh. *Bangladesh Journal of Plant Taxonomy* 25(2): 273-288.

Raizada, M.B. 1941. On the flora of Chittagong. *Indian Forester* 67: 245-254.

Sinclair, J. 1955. The flora of Cox'sbazar, East Pakistan. *Bulletin of Botanical Society of Bengal* 9(2): 84-118.

Siddiqui, K.U.; Islam, M.A.; Ahmed, Z.U.; Begum, Z.N.T.; Hassan, M.A.; Khondker, M.; Rahman, M.M.; Kabir, S.M.H.; Ahmad, M.; Ahmed, A.T.A.; Rahman, A.K.A. and Haque, E.U. (eds.). 2007. *Encyclopedia of Flora and Fauna of Bangladesh,* Vol. 11. *Angiosperms: (Agavaceae–Najadaceae),* Asiatic Society of Bangladesh, Dhaka. 399 pp.