



Floristic composition and biodiversity patterns in the surroundings of Karanphuli river areas of Bangladesh



CrossMark

Faruque, Mohammad Omar^{(1)*}; Rudra, Sajib⁽²⁾; Rahman, Md. Khondakar Raziur⁽²⁾; Hossen, Imam⁽²⁾; Hossain, Md. Arif⁽²⁾; Mustakim, Md.⁽³⁾; Barman, Sanatan Chandra⁽³⁾; Hasan, Md. Ikramul⁽³⁾; Nahin, Sanjana Chowdhury⁽³⁾; Uddin, Shaikh Bokhtear⁽³⁾

⁽¹⁾Department of Botany, University of Chittagong, Bangladesh; ⁽²⁾Effective Creation on Human Opinion (ECHO), Chattogram, Bangladesh; ⁽³⁾Ethnobotany and Pharmacognosy Lab, Department of Botany, University of Chittagong, Chattogram 4331, Bangladesh

PLANTS are an important part of urban ecosystems because they help maintain the balance of nature and the health of the environment. The goal of the current study was to explore the vegetation in the Karnaphuli riverside using conventional biodiversity matrices, including the distribution of species and several diversity indices, like the Shannon-Winer Index, Pielou's Evenness Index, and Simpson's Index. A total of 528 plant species belonging to 376 genera under 115 families are documented for the first time in the studied area, among them 355 were medicinal plant species. Of them, 0.57% are bryophytes, 5.21% are pteridophytes, 0.19% are gymnosperms, and the rest, 95.95%, are angiosperms. Furthermore, Shannon-Winer, Pielou's Evenness, and Simpson's Diversity Index picturesque the presence of moderate level of diversity among evenly distributed individuals while confronting substantial risk. From the study areas, 6 threatened species have been recorded, which include 1 endangered species (EN), 2 nearly threatened species (NT), and 3 vulnerable species (VU). This study provides intrinsic potential resources to the environmental planners, herbalists, ecologists, taxonomists, ethnobotanists, pharmacists, phytochemists, and local administration. It would help to plan for future green infrastructure and maintain ecosystem function, providing long-term benefits for the dwellers around the Karnaphuli River.

Keywords: Karnaphuli River, biodiversity, river pollution, threatened plants, ecosystem.

1. Introduction

Karnaphuli is one of the significant urban water bodies surrounding Chattogram city, Bangladesh. It originated in the Lushai Hills of Assam in India and eventually flows into the Bay of Bengal ocean along Bangladesh's south-eastern coast (O'Mallery, 1908). This estuary is crucial for a variety of purposes, including navigation, port operations, transit, fishing, docking yards, ship building, and the industrial use of river water, all of which contribute significantly as a lifeline to Bangladesh's economic development (Siddique & Aktar, 2012; Dey *et al.*, 2015). The wildlife and vegetation in this river are diverse. However, the outrageous rise in pollution caused by sewage, industrial effluences, and solid waste contaminating water is a result of anthropogenic factors (Hossain *et al.*, 2005). Over 1000 large and small oil refineries,

fertilizer plants, and shipbreaking industries circumscribe across the both shorelines of Karnaphuli river. In addition, movement of more than 10,000 vessels per year; their wastes, and inhabitation of 6 million residents, producing 2500 metric tons of garbage, tainting the Karnaphuli river to a great extent. Consequently, a 2–7 m layer of river basin was constituted by the accumulation of microplastics that eventually pinpointed the desiderate absolute waste management practice and worsening scenario of ecological dynamics (Rakib *et al.*, 2022). Besides, huge amounts of toxic pollutants in the river and Bay of Bengal are threatening aquatic life, including wildlife, cattle, fish, and the riverine vegetation. Cabalistic dolphin deaths owing to these preceding pernicious events were the colossal aftermath thereof. The International Union for Conservation of Nature

*Corresponding author emails: omf@cu.ac.bd

Received: 28/04/2023; Accepted: 01/03/2024

DOI: 10.21608/ejbo.2024.207753.2318

Edited by: Prof. Dr. Monier M. Abd El-Ghani, Faculty of Science, Cairo University, Giza 12613, Egypt.

©2024 National Information and Documentation Center (NIDOC)

(IUCN) has already categorized the dolphin as an endangered species. Our preliminary findings about the Boalkhali channel indicate that it is still a better signatory harbor for the dolphin than Sikholbaha, which is presently outlined with many promiscuous industries (data unpublished). The Karnaphuli region between Kalurghat and Patenga has the highest levels of pollution as a result of the numerous chemical, fertilizer, iron and steel, leather, paint, clothing, food, cosmetics, toiletry, and pharmaceutical industries located on the river's banks or in the region's periphery (Hossen *et al.*, 2019). On the other hand, the riverine vegetation has yet to be explored.

Despite the fact that the Karnaphuli River's heavy metals and water quality have both received a lot of attention (Sarwar, *et al.*, 1970; Alam, 2013; Dey *et al.*, 2017; Das *et al.*, 2018), the literature is largely bereft on plant diversity. Only one study documented the vascular flora of the Karnaphuli River in the Rangamati district, but did not cover the majority of the riverine areas and largely skipped polluted areas (Islam *et al.*, 2018). Keeping this as an insight, the present study sought to investigate the riverine vegetation's ecological, taxonomic, and therapeutic value; to identify the most polluted areas and causes of pollution. To the best of our knowledge, this would be a pioneering work to harness a new arena in the fields of environmental pollution and natural products research with Karnaphuli. Our findings will be useful towards the development of a national policy to reduce the pollution in order to conserve rare and endangered species and to keep the whole ecosystem of the river in balance for the current and future generations.

2. Materials and methods

2.1 Study area

Karnaphuli River is a major water source in the Chittagong region of Bangladesh. Rising in the Lushai Hills of Mizoram state, northeastern India, it flows towards the south and southwest through the southeastern arm of Bangladesh to empty into the Bay of Bengal, 12 miles (19 km) south of the city of Chittagong. In the Chittagong Hill Tracts area, it is known as the Kynsa Khyoung. We studied the surroundings of the Karnaphuli River to accumulate data on the floristic composition. We have studied 89 areas around the Karnaphuli (Table 3), which is located between 22°19'28"N and 91°49'48"E to 22°30'00"E and 91°12'46"E. The average altitude of the plains typical height is 7 m above sea level. It has hot, humid summers and moderately cold winters due to tropical monsoons. Maximum

summer temperature of the study area is 32.3°C, while minimum winter temperature is 13°C. The region receives 2400–3000 mm of rain annually (Hassan and Nazem, 2016). The World Air Quality Index 2020 showed that Bangladesh is a highly polluted country, with an annual mean PM2.5 of 77.1 $\mu\text{g m}^{-3}$, where Dhaka, Chattogram, Narayanganj, Khulna, and our study area had the highest atmospheric particulate matters (PM) concentrations (Begum and Hopke, 2018). On the other hand, pollution in Karnaphuli River is increasing day by day due to heavy industrialization. Other main sources of pollution, which threaten human health, are domestic trash, industrial and medical waste, burning oil, construction, and anthropogenic activities. For example, Ahmed and Reazuddin (2000) revealed that heavy metals in Karnaphuli river water directly affect fish physiology and human health through ingestion. Maps of the studied areas are presented in supplementary figure-1.

Table 1. Statistical formula for phytosociological characteristics determinants and diversity indices.

Attributes	Equations	Citations	Variable interpretation
Frequency (x)	$x = \frac{c}{b}$	(Rudra <i>et al.</i> , 2021)	a= Number of members of a certain species in each plot
Abundance (y)	$y = \frac{a}{c}$	(Rudra <i>et al.</i> , 2021)	b = the total number of plots examined
Relative Density (RD)	$RD = \frac{n}{N} \times 100$	(Dallmeier <i>et al.</i> , 1992)	c=total number of plots where the species is found.
Relative Frequency (RF)	$RF = \frac{x_i}{\sum x_i} \times 100$	(Dallmeier <i>et al.</i> , 1992)	n=A species' population size is in number
Relative Abundance (RA)	$RA = \frac{y_i}{\sum y_i} \times 100$	(Shukla and Chand el, 2000)	N=total number of individuals of all the species
Importance Value Index (IVI)	$IVI = RD + RF + RA$	(Rudra <i>et al.</i> , 2021)	P = n/N
Shannon-Weiner diversity index (H)	$H = - \sum P_i (\ln P_i)$	(Hill, 1973)	S = total number of species
Simpson diversity index (D)	$D = \sum P_i^2$	(Colwell, 2014)	

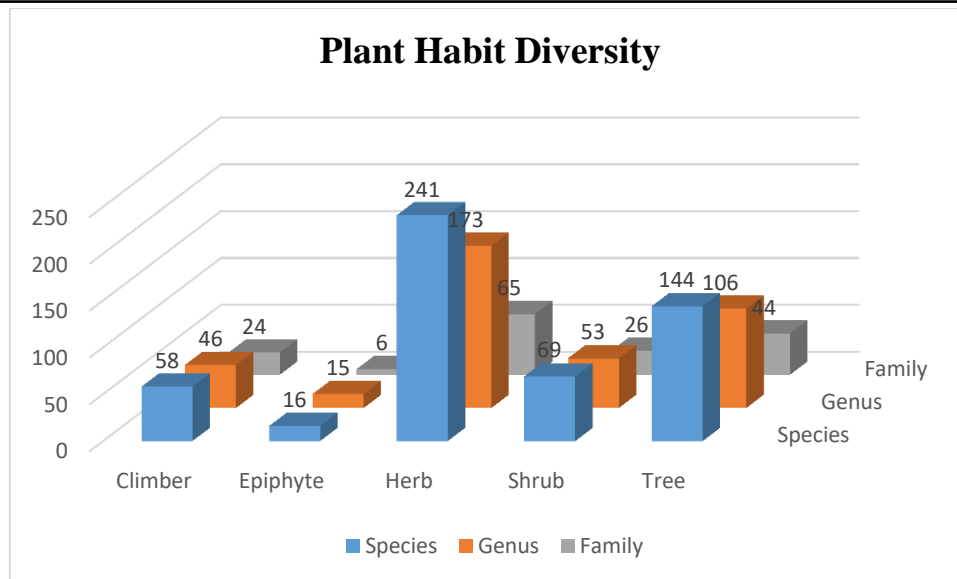


Fig. 1. Plant Habit diversity of the documented plant species.

2.2 Documentation and collection of plant species

Many field studies were conducted from Patenga Point to Kaptai Area and along various channels (Sikolbaha, Kalurghat, Boalkhali, etc.) in three different seasons—summer, rainy season, and winter—to record the composition of the plants. Samples were taken from river banks, swamps, forest floors, forest edges, plains, streams, and rivers in the chosen areas. Collected plant specimens were processed for preparing herbarium specimens after being properly identified. The current nomenclature of each species was verified using online resources and a fundamental book published by Pasha and Uddin (Pasha & Uddin, 2013). Voucher specimens were prepared following standard herbarium technique and preserved at the Chittagong University Herbarium with an accession number. The field work was conducted between February 2021 and March 2022.

2.3 Sampling Methods

A stratified random sampling method was used for the survey of the vascular plants; each site was divided into three zones based on topography (top, middle, and bottom slope). A total of 801 plots were taken from 89 different areas, with 3 plots from each zone. The sample plot size was 10m × 10m. All habit types of plant populations in each quadrat were recorded. The plot size and identification procedure followed the methods described at Rudra *et al.* (2021).

2.4. Quantitative Framework

Primer V6 software was used to find the diversity indices and phytosociological characteristics of all the plots in the area being studied. Table 1 shows how a formula was used to figure out Shannon-Wiener's diversity index, Simpson's diversity index,

and species evenness index, along with other important phytosociological values like relative density, relative frequency, relative abundance, and importance value index.

3. Result

3.1 Floristic composition

In this study, 89 places (Table-3) in the studied area were looked at for the presence of 525 vascular plant species from 373 genera and 113 families, as well as 3 non-vascular plant species from 3 genera and 2 families. Table 2 provides an inclusive summary of the identified plant species in the research region, including family, scientific name, local name, habit, medicinal or non-medicinal properties, importance value index (IVI), accession number, and conservation status. The existing 497 species (95.95%) are angiosperms; aside from that, this composition evidently glorifies diverse bryophytic, pteridiophytic, and gymnospermic plant associations. The bryophytic flora indicated the presence of 3 (0.57%) species under 3 genera and 2 families, and 27 (5.21%) species under 19 genera and 14 families in pteridophytes, with the prevalence of single gymnosperm species. In Pteridophytes, Adiantaceae is the biggest family, with 5 species in 1 genus, followed by Pteridaceae, Dryopteridaceae, Dennstaedtiaceae, and so on, which consequently elucidated the homolog propensity in genus dominance in families, noticeably *Adiantum*, *Pteris* (3 species), *Lygodium* (2 species), *Dryopteris* (2 species), and so on (Table-5). On the other hand, only three species under three genera in two families—Anthocerotaceae and Marchantiaceae—were documented in Bryophytes, wherein Anthocerotaceae has two species under two genera (*Anthoceros* and *Dumortiera*), and Marchantiaceae contains one species under one genus (*Marchantia*).

Of that angiosperms, most dominant plant types were dicots occupied 379 (71.78%) species belonging to 270 genera over monocots 118 (22.35%) species under 22 genera and 83 families. In particular, Asteraceae, Euphorbiaceae, and Fabaceae visualized more interspecific and intraspecific plant variation within dicots, and Poaceae, Araceae, and Orchidaceae in monocots (Table 4). This antecedent multivariate diversify family adjuvant precedence is found throughout Bangladesh (Hossain *et al.*, 2019; Ara *et al.*, 2021; Jain *et al.*, 2021; Rahman, 2021). *Ficus* is the largest genus in the dicotyledons group, with ten species. *Albizia* (six species), *Desmodium* (six species), *Solanum*, *Senna* and *Amaranthus* are the next largest genera (five species each). However, the genus *Cyperus*, on the other hand, appears to be the biggest in the monocotyledon group, with ten species, followed by *Dioscorea* (five species), *Colocasia*, *Alocasia*, *Musa*, *Saccharum*, and *Curcuma* (three species from each).

In the sampling sites, the vegetation is dominated by *Axonopus compressus*, with an IVI value of 3.15%; other co-dominant species include *Cuscuta reflexa* (2.92%), *Alternanthera paronychioides* (2.55%), *Pistia stariotes* (2.28%), *Cynodon dactylon* (2.27%), *Centella asiatica* (2.20%), *Cyathula prostrata* (2.03%), and *Acanthus*

ilicifolius (2.01%). Whose most frequent species in the studied regions are herb species, such as *Acanthus ilicifolius*, *Wedelia biflora*, *Acalypha indica*, *Actinocarpus grossus*, and *Cynodon dactylon* (Table 7), in contrast to *Aidia cochinchinensis*, *Amaranthus blitum* subsp. *oleraceus*, *Amaranthus tenuifolius*, *Amorphophallus bulbifer*, and *Ampelopteris prolifera*, which are comparatively rare (Table 8).

3.2 Karnaphuli Riverside Vegetation's Diversity of Plant Habits

Plant habit diversity shows that herbaceous plants have the most impact on ecosystems, with shrubs, trees, and climbers coming in second, third, and fourth, respectively (Figure-1). Whereas, in this context of botanical species, herbs make up 241 (45.64%) species under 173 genera and 65 families, shrubs make up 69 (13.1%), trees make up 144 (27.27%) under 106 genera and 44 families, climbers make up 58 (11%), under 46 genera and 24 families, and epiphytes make up 16 (3.03%) species under 15 genera and 6 families, respectively.

Table 2. Comprehensive checklist of plant diversity recorded from Karnaphuli area.

SL NO	Family	Scientific name	Local Name	Habit	MV	IVI	ACCN. NO.	IUCN Category
1	ACANTHACEAE	<i>Nelsonia canescens</i> (Lam.) Spreng.	Paramu	Herb	Yes	1.52	SUF 001	LC
2		<i>Justicia gendarussa</i> Burm.f.	Nilnishinda	Herb	Yes	0.2	SUF 002	NE
3		<i>Acanthus ilicifolius</i> L.	Hargoza	Shrub	Yes	2.01	SUF 003	LC
4		<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Kalomegh	Herb	Yes	0.38	SUF 004	NE
5		<i>Asystasia gangetica</i> (L.) T.Anderson	Gangatara	Herb	No	0.61	SUF 005	NE
6		<i>Barleria lupulina</i> Lindl	Bishalla	Shrub	Yes	0.12	SUF 006	NE
7		<i>Lepidagathis incurva</i> Buch.-Ham. ex D.Don	Karoggathis	Herb	No	0.42	SUF 007	NE
8		<i>Rungia pectinata</i> (L.) Nees	Pindi	Herb	No	0.94	SUF 008	NE
9		<i>Thunbergia grandiflora</i> (Roxb. ex Rottl.) Roxb.	Neel lata	Shrub	Yes	0.38	SUF 009	NE
10	ADIANTACEAE	<i>Adiantum capillus-veneris</i> L.	Venichadda	Herb	Yes	1.14	SUF 010	LC
11		<i>Adiantum philippense</i> L.	Kalijhat	Herb	Yes	1.21	SUF 011	NE
12		<i>Adiantum caudatum</i> L.	Biddapata	Herb	Yes	0.66	SUF 012	NE
13		<i>Adiantum flabellulatum</i> L.	China pakha	Herb	No	0.58	SUF 013	NE
14		<i>Adiantum tenerum</i> Sw.	Halka pakha	Herb	Yes	0.54	SUF 014	NE
15	AGAVACEAE	<i>Sansevieria trifasciata</i> Prain	Sapahara	Herb	Yes	0.32	SUF 015	NE

16	AMARANTH ACEAE	<i>Achyranthes aspera</i> L	Apang	Herb	Yes	1.66	SUF 016	NE
17		<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Helencha, Hinchashak, Harahcho, Malancha shak.	Herb	No	2	SUF 017	NE
18		<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Haicha	Herb	Yes	1.88	SUF 018	LC
19		<i>Amaranthus spinosus</i> L	Kantanotey	Herb	Yes	1.23	SUF 019	NE
20		<i>Amaranthus tricolor</i> L	Notey shak	Herb	Yes	3.75	SUF 020	NE
21		<i>Amaranthus viridis</i> L	Notey	Herb	Yes	1.76	SUF 021	NE
22		<i>Aerva sanguinolenta</i> (L.) Blume	Nuriya	Herb	No	0.79	SUF 022	NE
23		<i>Alternanthera paronychioides</i> A. St.-Hil.	Jhuli khata	Herb	Yes	2.55	SUF 023	NE
24		<i>Amaranthus blitum</i> subsp. <i>oleraceus</i> (L.) Costea	Natiasag	Herb	Yes	0.71	SUF 024	NE
25		<i>Amaranthus tenuifolius</i> Willd.	Data shak	Herb	Yes	0.06	SUF 025	NE
26	AMARYLLID ACEAE	<i>Hymenocallis littoralis</i> (Jacq.) Salisb	Upakallis	Herb	No	0.58	SUF 026	NE
27	ANACARDIA CEAE	<i>Lannea coromandelica</i> (Houtt.) Merr	Bhadi	Tree	Yes	0.35	SUF 027	LC
28		<i>Mangifera indica</i> L	Aam	Tree	Yes	0.8	SUF 028	DD
29		<i>Spondias purpurea</i> L.	Deshi amra, Amra.	Tree	No	0.12	SUF 029	LC
30	ANNONACE AE	<i>Ammona reticulata</i> L	Nona ata	Tree	No	0.19	SUF 030	LC
31		<i>Polyalthia longifolia</i> (Sonn.) Thwaites	Debdaru	Tree	Yes	0.48	SUF 031	NE
32	ANTHOCERO TACEAE	<i>Anthoceros crispulus</i> (Mont.) Douin	Unknown	Herb	No	0.31	SUF 032	NE
33	APIACEAE	<i>Eryngium foetidum</i> L.	Bilati-dhone	Herb	Yes	1.02	SUF 033	NE
34		<i>Centella asiatica</i> (L.) Urban	Thankuni	Herb	Yes	2.2	SUF 034	LC
35	APOCYNACE AE	<i>Allamanda cathartica</i> L	Ghonta fhul	Shrub	Yes	0.32	SUF 035	NE
36		<i>Alstonia neriifolia</i> D.Don	Soto chhatim	Tree	No	0.27	SUF 036	NE
37		<i>Alstonia scholaris</i> (L.) R.Br	Chattim	Tree	Yes	0.21	SUF 037	LC
38		<i>Holarrhena antidysenterica</i> (Roxb. ex Fleming) Wall. ex A.DC.	Kuruj	Tree	Yes	0.23	SUF 038	NE
39		<i>Ichnocarpus frutescens</i> (L.) R.Br	Shamlata	Climber	Yes	0.58	SUF 039	NE
40		<i>Plumeria alba</i> L	Kat golap	Tree	Yes	0.06	SUF 040	NE
41		<i>Plumeria rubra</i> L	Katgolap	Tree	Yes	0.09	SUF 041	LC
42		<i>Tabernaemontana abbreviata</i> (J.F.Morales) A.O.Simões & M.E.Endress	Togarphul	Shrub	Yes	0.49	SUF 042	NE
43		<i>Thevetia peruviana</i> (Pers.) K.Schum	Kolkeful	Tree	Yes	0.28	SUF 043	NE
44	ARACEAE	<i>Alocasia acuminata</i> Schott	Pata bokakachu	Herb	Yes	0.85	SUF 044	NE
45		<i>Alocasia cucullata</i> (Lour.) G.Don	Bishkachu	Herb	No	0.57	SUF 045	NE

46		<i>Alocasia macrorrhizos</i> (L.) G.Don	Mankochu	Herb	Yes	0.42	SUF 046	NE
47		<i>Amorphophallus bulbifer</i> (Roxb.) Blume	Jangli_ol	Herb	Yes	0.12	SUF 047	NE
48		<i>Colocasia esculenta</i> (L.) Schott	Kochu	Herb	Yes	0.49	SUF 048	LC
49		<i>Colocasia gigantea</i> (Blume) Hook.f.	Salad-kachu.	Herb	No	0.36	SUF 049	NE
50		<i>Colocasia mannii</i> Hook.f	Manikachu	Herb	No	0.28	SUF 050	NE
51		<i>Epipremnum aureum</i> (Linden & André) G.S.Bunting	Money plant	Climber	No	0.35	SUF 051	NE
52		<i>Epipremnum pinnatum</i> (L.) Engl	Premnum	Climber	Yes	0.33	SUF 052	NE
53		<i>Lasia spinosa</i> (L.) Thwaites	Kattosh	Herb	Yes	0.49	SUF 053	LC
54		<i>Pistia stratiotes</i> L.	Topapana	Herb	Yes	2.28	SUF 054	LC
55		<i>Pothos chinensis</i> (Raf.) Merr.	Chinalata	Climber	Yes	0.4	SUF 055	NE
56		<i>Pothos scandens</i> L.	Hatilata	Epiphytes	Yes	0.48	SUF 056	NE
57		<i>Scindapsus officinalis</i> (Roxb.) Schott	Goj pipul	Climber	Yes	0.38	SUF 057	NE
58		<i>Stuednera colocasiifolia</i> K.Koch	Bishkachu	Herb	Yes	0.55	SUF 058	NE
59		<i>Syngonium macrophyllum</i> Engl.	Baroslatakachu	Climber	No	0.58	SUF 059	NE
60		<i>Syngonium podophyllum</i> Schott	Podolatakachu	Herb	Yes	0.69	SUF 060	NE
61		<i>Typhonium trilobatum</i> (L.) Schott	Ghikochu	Herb	Yes	0.66	SUF 061	NE
62		<i>Xanthosoma sagittifolium</i> (L.) Schott	Dudhkachu	Herb	No	0.38	SUF 062	NE
63	ARALIACEAE	<i>Schefflera elliptica</i> (Blume) Harms	Dahina scefler	Shrub	Yes	0.06	SUF 063	LC
64		<i>Trevesia palmata</i> (Roxb. ex Lindl.) Vis.	Argoja	Tree	Yes	0.06	SUF 064	LC
65	ARAUCARIA CEAE	<i>Araucaria araucana</i> (Molina) K.Koch	Chrismass tree	Tree	No	0.18	SUF 065	EN
66	ARECACEAE	<i>Areca catechu</i> L.	Supari	Herb	Yes	0.45	SUF 066	NE
67		<i>Borassus flabellifer</i> L.	Tal	Herb	Yes	0.33	SUF 067	NE
68		<i>Calamus floribundus</i> Griff.	Fulibet	Tree	No	0.41	SUF 068	NE
69		<i>Calamus tenuis</i> Roxb	Bet	Tree	Yes	0.43	SUF 069	LC
70		<i>Caryota mitis</i> Lour.	Mithagota	Herb	No	0.58	SUF 070	LC
71		<i>Cocos nucifera</i> L.	Narikel	Herb	Yes	0.72	SUF 071	NE
72		<i>Livistona chinensis</i> (Jacq.) R.Br. ex Mart	China tokopata	Herb	No	0.06	SUF 072	NE
73		<i>Phoenix sylvestris</i> (L.) Roxb	Khajur	Herb	Yes	0.51	SUF 073	NE
74		<i>Calamus viminalis</i> Willd.	Jatbet	Climber	No	0.39	SUF 074	NE
75	ARISTOLOCHIA CEAE	<i>Aristolochia indica</i> L.	Isharmul	Climber	Yes	0.12	SUF 075	NE
76	ASCLEPIADACEAE	<i>Asclepias curassavica</i> L.	Kakturi	Herb	No	0.65	SUF 076	NE
77		<i>Calotropis gigantea</i> (L.) Ait.f	Akanda	Shrub	Yes	0.37	SUF 077	NE
78		<i>Hoya parasitica</i> (Roxb.) Wall.	Serapatahoy	Epiph	Yes	0.3	SUF	NE

		ex Wight	a, Chera pata (Raj- Khul).	ytes			078	
79		Hemidesmus indicus (L.) R. Br. ex Schult.	Anantamu	Climber	No	0.67	SUF 079	NE
80	ASTERACEA E	<i>Ageratum conyzoides</i> (L.) L	Fulkuri	Herb	Yes	1.35	SUF 080	NE
81		<i>Blumea lacera</i> (Burm.f.) DC	Kuksunga	Herb	Yes	0.74	SUF 081	NE
82		<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob	Assamlata	Herb	Yes	1.25	SUF 082	NE
83		<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	Duubbecrep i	Herb	Yes	0.86	SUF 083	NE
84		<i>Cyanthillium patulum</i> (Dryand. ex Dryand.) H.Rob	kukshim	Herb	No	0.44	SUF 084	NE
85		<i>Eclipta prostrata</i> (L.) L	Kalokeshi	Herb	No	0.71	SUF 085	LC
86		<i>Emilia sonchifolia</i> (L.) DC. ex DC	Sadimudi	Herb	Yes	1.25	SUF 086	NE
87		<i>Enhydra fluctuans</i> Lour	Helencha	Herb	No	1.83	SUF 087	NE
88		<i>Helianthus annuus</i> L	Surjomukhi	Herb	No	0.54	SUF 088	LC
89		<i>Mikania micrantha</i> Kunth	Toofainna lata	Climber	Yes	1.45	SUF 089	NE
90		<i>Spilanthes acmella</i> (L.) L.	Marhatitiga	Herb	Yes	1.4	SUF 090	NE
91		<i>Synedrella nodiflora</i> (L.) Gaertn	Relanodi	Herb	Yes	0.5	SUF 091	NE
92		<i>Tagetes erecta</i> L	Gendaphul	Herb	Yes	0.78	SUF 092	NE
93		<i>Tridax procumbens</i> (L.) L	Tridhara	Herb	Yes	1.39	SUF 093	NE
94		<i>Vernonia patula</i> (Dryand.) Merr.	Shialmutra, Sada Debi.	Herb	Yes	1.08	SUF 094	NE
95		<i>Wedelia montana</i> (Blume) Boerl.	Wadella	Herb	Yes	0.6	SUF 095	NE
96		<i>Xanthium indicum</i> J.König. ex Roxb	Ghagra	Herb	Yes	0.63	SUF 096	NE
97		<i>Grangea maderaspatana</i> (L.) Poir.	Nemuti	Herb	No	0.43	SUF 097	LC
98		<i>Pseudelephantopus spicatus</i> (Jus s. ex Aubl.) Rohr	Dog`s tongue	Herb	Yes	1.26	SUF 098	DD
99		<i>Sphaeranthus indicus</i> L.	Murmoria	Herb	No	0.17	SUF 099	LC
100		<i>Wedelia biflora</i> (L.) DC.	Wadella	Herb	Yes	2.01	SUF 100	DD
101	BASELLACE AE	<i>Basella rubra</i> L.	Puishak	Climber	Yes	0.49	SUF 101	NE
102	BIGNONIACE AE	<i>Fernandoa adenophylla</i> (Wall. ex G.Don) Steenis	Dakrum	Tree	No	0.06	SUF 102	NE
103		<i>Oroxylum indicum</i> (L.) Kurz	Thona	Tree	Yes	0.22	SUF 103	NE
104		<i>Stereospermum colais</i> (Buch.- Ham. ex Dillw) Mabb	Dharmara	Tree	Yes	0.06	SUF 104	NE
105	BLECHNACE AE	<i>Blechnum orientale</i> L.	Oxi blekh	Herb	NO	0.49	SUF 105	NE
106	BOMBACAC EAE	<i>Bombax ceiba</i> L.	Simul	Tree	Yes	0.52	SUF 106	LC
107		<i>Bombax insigne</i> Wall.	Bon shimul	Tree	Yes	0.51	SUF 107	NE
108	BORAGINAC EAE	<i>Ehretia acuminata</i> R.Br.	Punia, Punyam konda.	Tree	No	0.35	SUF 108	LC
109		<i>Heliotropium indicum</i> L	Hatishur	Herb	Yes	0.58	SUF 109	NE

110		<i>Cordia dichotoma</i> G.Forst.	Bohul	Tree	Yes	0.06	SUF 110	LC
111	BRASSICACEAE	<i>Rorippa indica</i> (L.) Hiern	Bansarisha	Herb	Yes	0.28	SUF 111	NE
112		<i>Rorippa dubia</i> (Pers.) H.Hara	Dubasarisha	Herb	Yes	0.27	SUF 112	NE
113	BROMELIACEAE	<i>Ananus comosus</i> (L.) Merr.	Anaros	Herb	No	0.92	SUF 113	NE
114	BURSERACEAE	<i>Protium serratum</i> (Wall. ex Coelbr.) Engl	Heru	Tree	No	0.06	SUF 114	NE
115	CAESALPINIACEAE	<i>Bauhinia acuminata</i> L	Sada kanchan	Shrub	Yes	0.15	SUF 115	LC
116		<i>Caesalpinia bonduc</i> (L.) Roxb.	Natai	Shrub	No	0.42	SUF 116	LC
117		<i>Caesalpinia digyna</i> Rottler	Kochoi	Climber	Yes	0.41	SUF 117	NE
118		<i>Cassia fistula</i> L	Shonalu	Tree	Yes	0.37	SUF 118	LC
119		<i>Cassia javanica</i> L.	Lalsonalu	Tree	Yes	0.48	SUF 119	LC
120		<i>Delonix regia</i> (Hook.) Raf.	Krishnachura	Tree	Yes	0.26	SUF 120	LC
121		<i>Peltophorum pterocarpum</i> (DC.) K.Heyne	Holud krishnachura	Tree	No	0.22	SUF 121	NE
122		<i>Saraca asoca</i> (Roxb.) Willd	Asok	Tree	Yes	0.26	SUF 122	VU
123		<i>Senna alata</i> (L.) Roxb.	Halud sena, Dadmardhan, Delongpata.	Shrub	Yes	0.58	SUF 123	LC
124		<i>Senna hirsuta</i> (L.) H.S.Irwin & Barneby	Gandhosena	Herb	Yes	0.71	SUF 124	NE
125		<i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby	Minjiri	Tree	Yes	0.42	SUF 125	LC
126		<i>Senna sophora</i> (L.) Roxb	Kalkeshunda	Shrub	Yes	0.71	SUF 126	NE
127	<i>Senna tora</i> (L.) Roxb	Terasena	Herb	Yes	0.99	SUF 127	NE	
128	<i>Tamarindus indica</i> L.	Tentul	Tree	Yes	0.4	SUF 128	LC	
129	<i>Chamaecrista mimosoides</i> (L.) Greene	Lazzobotio chaksu	Herb	No	1.28	SUF 129	LC	
130	CANNABACEAE	<i>Cannabis sativa</i> L.	Bhang	Herb	Yes	0.15	SUF 130	NE
131	CAPPARACEAE	<i>Cleome ruidosperma</i> DC.	Begunehurhurey	Herb	No	0.67	SUF 131	NE
132		<i>Cleome viscosa</i> L.	Athahurhuria	Herb	Yes	0.75	SUF 132	NE
133		<i>Crateva magna</i> (Lour.) DC	Barun	Tree	Yes	0.37	SUF 133	NE
134	CARICACEAE	<i>Carica papaya</i> L.	Pepe	Herb	Yes	0.46	SUF 134	DD
135	CARYOPHYLLACEAE	<i>Polycarpon prostratum</i> (Forssk.) Asch. & Schweinf	Gimashak	Herb	Yes	1.51	SUF 135	LC
136	CASUARINACEAE	<i>Casuarina equisetifolia</i> L	Jhau	Tree	Yes	0.35	SUF 136	LC
137	CHENOPODIACEAE	<i>Chenopodium album</i> L	Betoshok	Herb	No	0.68	SUF 137	NE
138	COMBRETACEAE	<i>Combretum indicum</i> (L.) De Filippis	Madhabi Lata	Climber	No	0.43	SUF 138	NE
139		<i>Getonia floribunda</i> Roxb	Geton lata	Climber	Yes	0.67	SUF 139	NE
140		<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Arjun	Tree	Yes	0.31	SUF 140	NE

141		<i>Terminalia bellirica</i> (Gaertn.) Roxb	Bohera, Boira, Boragach.	Tree	Yes	0.09	SUF 141	NE
142		<i>Terminalia catappa</i> L.	Katbadam	Tree	Yes	0.38	SUF 142	LC
143		<i>Anogeissus lanceolata</i> (Wall. ex C.B. Clarke) Prain	Phul jhumuri gaas	Tree	No	1.14	SUF 143	NE
144	COMMELINA CEAE	<i>Amischotolype mollissima</i> (Blume) Hassk	Molisima	Herb	Yes	0.15	SUF 144	NE
145		<i>Commelina benghalensis</i> L.	Dholpata	Herb	Yes	1.25	SUF 145	LC
146		<i>Commelina diffusa</i> Burm.f.	Monayna kanshira	Herb	Yes	0.97	SUF 146	LC
147		<i>Floscopa scandens</i> Lour	Khara gaith	Herb	Yes	0.56	SUF 147	LC
148	CONVOLVULACEAE	<i>Ipomoea aquatica</i> Forssk	Kalmi	Herb	Yes	0.6	SUF 148	LC
149		<i>Ipomoea batatas</i> (L.) Poir	Misti alu	Climber	No	0.99	SUF 149	DD
150		<i>Ipomoea fistulosa</i> Mart. ex Choisy	Dholkalmi	Herb	No	0.84	SUF 150	NE
151		<i>Ipomoea pes-caprae</i> (L.) R.Br.	Chhagol kuri kalmi	Climber	Yes	0.711	SUF 151	NE
152		<i>Merremia vitifolia</i> (Burm.f.) Hallier f	Kormolata	Climber	Yes	0.59	SUF 152	NE
153		<i>Jacquemontia pentantha</i> G.Don	Montiantha	Climber	Yes	0.56	SUF 153	NE
154	COSTACEAE	<i>Cheilocostus speciosus</i> (J.König) C.Specht	Banduki	Herb	Yes	0.49	SUF 154	LC
155	CUCURBITACEAE	<i>Benincasa hispida</i> (Thunb.) Cogn.	Chalkumra	Climber	Yes	0.15	SUF 155	NE
156		<i>Coccinia grandis</i> (L.) Voigt	Telakucha	Shrub	Yes	0.35	SUF 156	NE
157		<i>Gymnopetalum chinense</i> (Lour.) Merr.	Bati jhinga	Climber	Yes	0.38	SUF 157	NE
158		<i>Momordica charantia</i> L.	Korolla	Climber	Yes	0.26	SUF 158	NE
159		<i>Trichosanthes cucumerina</i> L.	Bon chichinga	Climber	No	0.36	SUF 159	NE
160		<i>Cucurbita maxima</i> Duchesne	Mistikumra	Climber	Yes	0.29	SUF 160	NE
161		<i>Lagenaria siceraria</i> (Molina) Standl.	Lau	Climber	Yes	0.18	SUF 161	NE
162		<i>Momordica cochinchinensis</i> (Lour.)	Kakrol	Climber	Yes	0.26	SUF 162	NE
163	CUSCUTACEAE	<i>Cuscuta reflexa</i> Roxb.	Tarulata	Climber	Yes	2.92	SUF 163	NE
164	CYATHEACEAE	<i>Cyathea manniana</i> Hook.	Silver fern	Herb	No	1.29	SUF 164	LC
165	CYPERACEAE	<i>Actinoscirpus grossus</i> (L.f.) Goetgh. & D.A.Simpson	Shipra	Herb	Yes	1.43	SUF 165	LC
166		<i>Cyperus compactus</i> Retz.	Bandorghasi	Herb	No	0.46	SUF 166	LC
167		<i>Cyperus corymbosus</i> Rottb.	Gola methi	Herb	No	0.5	SUF 167	NE
168		<i>Cyperus difformis</i> L.	Behua ghasi	Herb	No	0.61	SUF 168	LC
169		<i>Cyperus digitatus</i> Roxb.	Hath ghasi	Herb	No	0.61	SUF 169	LC
170		<i>Cyperus exaltatus</i> Retz.	Tata ghasi	Herb	No	0.7	SUF 170	LC
171		<i>Cyperus imbricatus</i> Retz	Barachucha ghas	Herb	No	0.64	SUF 171	LC
172		<i>Cyperus iria</i> L.	Iri ghasi	Herb	Yes	0.61	SUF 172	NE

173		<i>Cyperus kyllingiella</i> Larridon	Gothubi	Herb	No	0.69	SUF 173	LC
174		<i>Cyperus laxus</i> Lam.	Dhila ghasi	Herb	Yes	0.79	SUF 174	NE
175		<i>Cyperus rotandus</i> L	Mutha	Herb	Yes	1.25	SUF 175	NE
176		<i>Fimbristylis quinquangularis</i> (Vahl) Kunth	Joyna	Herb	No	0.73	SUF 176	LC
177		<i>Kyllinga nemoralis</i> (J.R.Forst. & G.Forst.) Dandy ex Hutch. & Dalziel	Subasinirbisa	Herb	Yes	0.67	SUF 177	LC
178	DENNSTAEDIACEAE	<i>Hypolepis punctata</i> (Thunb.) Mett.	Hypoly fern	Herb	No	0.67	SUF 178	NE
179		<i>Microlepia speluncae</i> (L.) T.Moore	Fita dheki	Herb	No	0.49	SUF 179	NE
180	DILLENACEAE	<i>Dillenia indica</i> L	Chalta	Tree	Yes	0.4	SUF 180	LC
181	DIOSCOREACEAE	<i>Dioscorea alata</i> L.	Chupri alu	Climber	Yes	0.36	SUF 181	NE
182		<i>Dioscorea belophylla</i> (Prain) Voigt ex Haines	Shora alu	Climber	Yes	0.42	SUF 182	NE
183		<i>Dioscorea bulbifera</i> L.	Banalu	Climber	Yes	0.54	SUF 183	NE
184		<i>Dioscorea esculenta</i> (Lour.) Burkill	Maitta alu	Climber	No	0.59	SUF 184	NE
185		<i>Dioscorea pentaphylla</i> L	Jum alu	Climber	Yes	0.38	SUF 185	NE
186	DIPTERocarpaceae	<i>Dipterocarpus turbinatus</i> Gaertn	Telia gorjan	Tree	Yes	0.25	SUF 186	VU
187		<i>Hopea odorata</i> Roxb.	Telsur	Tree	Yes	0.25	SUF 187	VU
188	DRYOPTERIDACEAE	<i>Dryopteris chrysocoma</i> (Christ) C.Chr	Kriso fern	Herb	No	0.86	SUF 188	NE
189		<i>Dryopteris abbreviata</i> Newman	Raj dheki	Herb	Yes	0.84	SUF 189	NE
190		<i>Tectaria chattagramica</i> (C.B.Clarke) Ching	Chattagrami tari dheki	Herb	No	0.67	SUF 190	NE
191	EBENACEAE	<i>Diospyros blancoi</i> A.DC	Beelati gab	Tree	No	0.28	SUF 191	NE
192		<i>Diospyros malabarica</i> (Desr.) Kostel	Gab	Tree	Yes	0.41	SUF 192	NE
193	ELAEOCARPACEAE	<i>Elaeocarpus floribundus</i> Blume	Jalpai	Tree	Yes	0.06	SUF 193	NE
194	EUPHORBIAACEAE	<i>Acalypha indica</i> L.	Biralhatchi, Muktajhuri, Salik kushhom.	Herb	Yes	0.76	SUF 194	NE
195		<i>Actephila excelsa</i> (Dalzell) Müll.Arg.	Lalsa	Shrub	Yes	0.61	SUF 195	LC
196		<i>Antidesma velutinsum</i> Blume	Pashmi salishiabuka	Shrub	Yes	0.17	SUF 196	NE
197		<i>Aporosa octandra</i> (Buch.-Ham. ex D.Don) A.R.Vickery	Choto kechua	Tree	No	0.17	SUF 197	LC
198		<i>Astraea lobata</i> (L.) Klotzsch	Aa-sthuneey	Herb	No	0.51	SUF 198	NE
199		<i>Bischofia javanica</i> Blume	Kanjai	Tree	Yes	0.12	SUF 199	LC
200		<i>Breynia vitis-idaea</i> (Burm.f.) C.E.C.Fisch.	Vita salpoti	Shrub	No	0.27	SUF 200	LC
201		<i>Bridelia retusa</i> (L.) A.Juss	Kantokushi, Kamkoi, Kantakoi, Heza.	Tree	Yes	0.38	SUF 201	LC

202		<i>Croton bonplandianus</i> Baill	Bankhira	Herb	Yes	0.5	SUF 202	NE
203		<i>Euphorbia hirta</i> L	Ghaopata	Herb	Yes	1.92	SUF 203	NE
204		<i>Euphorbia thymifolia</i> L	Swetkerui	Herb	No	1.24	SUF 204	NE
205		<i>Flueggea virosa</i> (Roxb. ex Willd.) Royle	Khaukra	Shrub	No	0.47	SUF 205	LC
206		<i>Glochidion multiloculare</i> (Rottler ex Willd.) Voigt	Koishtuma	Shrub	No	0.38	SUF 206	NE
207		<i>Jatropha gossypifolia</i> L	Lal bherenda	Shrub	Yes	0.6	SUF 207	NE
208		<i>Macaranga denticulata</i> (Blume) Müll.Arg	Bura	Tree	Yes	0.49	SUF 208	LC
209		<i>Macaranga peltata</i> (Roxb.) Müll.Arg	Pelta bura	Tree	No	0.49	SUF 209	NE
210		<i>Mallotus nudiflorus</i> (L.) Kulju & Welzen	Medda	Tree	Yes	0.63	SUF 210	LC
211		<i>Mallotus repandus</i> (Willd.) Müll.Arg	Gunti	Tree	No	0.18	SUF 211	NE
212		<i>Manihot esculenta</i> Crantz	Kasava	Shrub	Yes	0.38	SUF 212	NE
213		<i>Phyllanthus emblica</i> L	Amloki	Tree	Yes	0.18	SUF 213	LC
214		<i>Phyllanthus niruri</i> L	Vuiamla	Herb	Yes	0.58	SUF 214	NE
215		<i>Phyllanthus reticulatus</i> Poir	Chitki	Shrub	Yes	0.4	SUF 215	LC
216		<i>Phyllanthus sikkimensis</i> Müll.Arg.	Sikimamla	Shrub	No	0.19	SUF 216	NE
217		<i>Ricinus communis</i> L	Verenda	Shrub	Yes	0.38	SUF 217	NE
218		<i>Suregada multiflora</i> (A.Juss.) Baill	Ban-naringa	Tree	Yes	0.06	SUF 218	NE
219		<i>Bridelia stipularis</i> (L.) Blume	Harinhara	Climber	Yes	0.51	SUF 219	LC
220		<i>Mallotus roxburghianus</i> Müll.Arg.	Nishputoli	Shrub	Yes	0.12	SUF 220	NE
221		<i>Shirakiopsis indica</i> (Willd.) Esser	Harua	Tree	No	0.06	SUF 221	LC
222	FABACEAE	<i>Mucuna monosperma</i> Wight	Nata alkushi	Climber	Yes	0.06	SUF 222	NE
223		<i>Butea monosperma</i> (Lam.) Taub	Palas	Tree	Yes	0.34	SUF 223	LC
224		<i>Cajanus cajan</i> (L.) Millsp	Arhhar	Shrub	Yes	0.28	SUF 224	NE
225		<i>Clitoria ternatea</i> L	Aparajita	Climber	Yes	0.12	SUF 225	NE
226		<i>Crotalaria juncea</i> L.	Shonpat	Herb	Yes	0.47	SUF 226	NE
227		<i>Crotalaria pallida</i> Aiton	Jhunjhuni	Herb	Yes	0.4	SUF 227	NE
228		<i>Crotalaria verrucosa</i> L	Varu jhanjhani	Herb	Yes	0.27	SUF 228	NE
229		<i>Dalbergia sissoo</i> DC	Shishoo	Tree	Yes	0.3	SUF 229	LC
230		<i>Dalbergia stipulacea</i> Roxb	Dadbari	Tree	Yes	0.3	SUF 230	LC
231		<i>Dalbergia volubilis</i> Roxb	Ankilata	Tree	Yes	0.26	SUF 231	NE
232		<i>Derris trifoliata</i> Lour	Kalilata	Climber	Yes	0.57	SUF 232	NE
233		<i>Desmodium concinnum</i> DC	Konsi modi	Shrub	No	0.45	SUF 233	NE
234		<i>Desmodium dichotomum</i> (Willd.) DC	Daghno modi	Herb	No	0.51	SUF 234	NE

235		<i>Desmodium gangeticum</i> (L.) DC	Chalan	Shrub	Yes	0.4	SUF 235	NE
236		<i>Desmodium heterocarpon</i> (L.) DC.	Karpo modi.	Herb	Yes	0.49	SUF 236	NE
237		<i>Desmodium heterophyllum</i> (Willd.) DC	Bon-motorsuti	Shrub	No	0.49	SUF 237	NE
238		<i>Desmodium triflorum</i> (L.) DC	Kalaliya	Herb	Yes	0.67	SUF 238	NE
239		<i>Erythrina fusca</i> Lour	Kanta mandar	Tree	No	0.76	SUF 239	LC
240		<i>Flemingia stricta</i> Roxb.	Charchara phan	Herb	Yes	0.44	SUF 240	NE
241		<i>Lablab purpureus</i> (L.) Sweet subsp. <i>purpureus</i>	Shim	Climber	Yes	0.35	SUF 241	NE
242		<i>Sesbania bispinosa</i> (Jacq.) W.Wight	Dhounja	Herb	No	0.15	SUF 242	LC
243		<i>Tephrosia purpurea</i> (L.) Pers	Sarpunkha	Shrub	Yes	0.35	SUF 243	NE
244		<i>Pongamia pinnata</i> (L.) Pierre	Koronja	Tree	Yes	0.89	SUF 244	LC
245		<i>Erythrina variegata</i> L.	Mandar	Tree	No	0.65	SUF 245	LC
246		<i>Pueraria phaseoloides</i> (Roxb.) Benth.	Bon shim	Climber	Yes	0.06	SUF 246	NE
247		<i>Pueraria tuberosa</i> (Willd.) DC.	Botrajineem	Climber	Yes	0.06	SUF 247	NE
248		<i>Vigna mungo</i> (L.) Hepper	Maskalay	Herb	Yes	0.85	SUF 248	DD
249		<i>Vigna unguiculata</i> (L.) Walp.	Barbati	Climber	Yes	0.48	SUF 249	DD
250	FAGACEAE	<i>Quercus oxyodon</i> Miq.	Batna	Tree	No	0.06	SUF 250	LC
251		<i>Castanopsis tribuloides</i> (Sm.) A.DC.	Batna	Tree	No	0.31	SUF 251	NE
252	LAMIACEAE	<i>Anisomeles indica</i> (L.) Kuntze	Gobura	Herb	Yes	0.2	SUF 252	NE
253		<i>Hyptis brevipes</i> Poit.	Gol tokma	Shrub	Yes	0.52	SUF 253	NE
254		<i>Hyptis suaveolens</i> (L.) Poit	Tokma	Herb	Yes	0.88	SUF 254	NE
255		<i>Leucas aspera</i> (Roth) Spreng	Shetodron	Herb	Yes	0.83	SUF 255	NE
256		<i>Ocimum sanctum</i> L	Tulshi	Herb	Yes	0.25	SUF 256	NE
257		<i>Plectranthus amboinicus</i> (Lour.) Spreng	Patharchur	Herb	Yes	0.38	SUF 257	NE
258		<i>Pogostemon auricularius</i> (L.) Hassk.	Aripachuli	Herb	Yes	0.37	SUF 258	NE
259	LAURACEAE	<i>Actinodaphne gullavara</i> (Buch.-Ham. ex Nees) M.R.Almeida	Modon mosta	Tree	No	0.38	SUF 259	LC
260		<i>Litsea monopetala</i> (Roxb.) Pers	Bara kukurchita	Tree	Yes	0.23	SUF 260	LC
261		<i>Litsea salicifolia</i> (Roxb. ex Nees) Hook.f	Borosialbuk a	Shrub	No	0.06	SUF 261	LC
262	LECYTHIDACEAE	<i>Barringtonia acutangula</i> (L.) Gaertn	Hijal	Tree	No	0.57	SUF 262	LC
263	LEEACEAE	<i>Leea indica</i> Merr.	Kukurjhibba	Shrub	Yes	0.4	SUF 263	LC
264		<i>Leea macrophylla</i> Roxb. ex Hornem.	Hostikormo	Shrub	No	0.36	SUF 264	NE
265	LILIACEAE	<i>Crinum asiaticum</i> L	Barakanur	Herb	Yes	0.26	SUF 265	NE
266		<i>Curculigo racemosa</i> Ridl.	Talamuli	Herb	No	0.47	SUF 266	NE
267		<i>Molineria capitulata</i> (Lour.)	Satipata	Herb	Yes	0.48	SUF	NE

		Herb					267	
268		<i>Pancreatium maritimum</i> L.	Bon rasun	Herb	Yes	0.38	SUF 268	LC
269	LIMNOCHARITACEAE	<i>Limnocharis flava</i> (L.) Buchenau	Letuce pana	Herb	No	0.68	SUF 269	NE
270	LINDSAEACEAE	<i>Sphenomeris chinensis</i> (L.) Maxon		Herb	No	0.85	SUF 270	NE
271	LORANTHACEAE	<i>Scurrula gracilifolia</i> (Schult.) Danser	Porgacha	Epiphyte	Yes	0.06	SUF 271	NE
272	LYTHRACEAE	<i>Lagerstroemia speciosa</i> (L.) Pers	Jarul	Tree	Yes	0.43	SUF 272	NE
273		<i>Lawsonia inermis</i> L	Mendi	Shrub	Yes	0.12	SUF 273	LC
274		<i>Woodfordia fruticosa</i> (L.) Kurz	Dhaiphul	Shrub	Yes	0.17	SUF 274	LC
275	MAGNOLIACEAE	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Chapa, Champobon, Shornochapa, Champa.	Tree	Yes	0.3	SUF 275	LC
276		<i>Michelia champaca</i> L.	champa	Tree	Yes	0.31	SUF 276	LC
277	MALPIGHIACEAE	<i>Hiptage benghalensis</i> (L.) Kurz	Madhobilata, Madubhlata.	Climber	No	0.47	SUF 277	LC
278	MALVACEAE	<i>Abelmoschus esculentus</i> (L.) Moench	Bhendi	Herb	Yes	0.65	SUF 278	NE
279		<i>Abelmoschus manihot</i> (L.) Medik.	Bankarpas	Herb	No	0.43	SUF 279	NE
280		<i>Abelmoschus moschatus</i> Medik	Kalokasturi	Herb	Yes	0.31	SUF 280	NE
281		<i>Hibiscus rosa-sinensis</i> L	Joba	Shrub	Yes	0.42	SUF 281	NE
282		<i>Hibiscus sabdariffa</i> L. var. <i>sabdariffa</i>	Mesta	Shrub	Yes	0.39	SUF 282	NE
283		<i>Malvaviscus penduliflorus</i> DC.	Duli joba	Shrub	No	0.38	SUF 283	NE
284		<i>Sida acuta</i> Burm.f	Ban Methi	Shrub	Yes	0.49	SUF 284	NE
285		<i>Sida cordata</i> (Burm.f.) Waalkes	Zunka	Shrub	Yes	0.39	SUF 285	NE
286		<i>Sida cordifolia</i> L	Shet-berela	Shrub	Yes	0.4	SUF 286	NE
287		<i>Urena lobata</i> L	Banokra	Shrub	Yes	0.59	SUF 287	LC
288		<i>Urena sinuata</i> L	Atapuran	Shrub	Yes	0.48	SUF 288	NE
289		<i>Hibiscus tiliaceus</i> var. <i>abutiloides</i> (Willd.) Hochr.	Bhola	Tree	Yes	0.06	SUF 289	NE
290	MARANTACEAE	<i>Schumannianthus dichotomus</i> (Roxb.) Gagnep.	Pati-pata	Herb	Yes	1.54	SUF 290	NE
291	MARCHANTIACEAE	<i>Dumortiera hirsuta</i> (Sw.) Nees	Unknown	Herb	No	0.52	SUF 291	NE
292		<i>Marchantia palmata</i> Reinw., Nees & Blume	Unknown	Herb	No	0.6	SUF 292	NE
293	MARSILEACEAE	<i>Marsilea minuta</i> L	Susni sak	Herb	No	1.14	SUF 293	LC
294	MELASTOMATACEAE	<i>Melastoma malabathricum</i> L	Bontejpata	Shrub	Yes	0.76	SUF 294	NE
295	MELIACEAE	<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Pitraj	Tree	Yes	0.33	SUF 295	LC
296		<i>Azadirachta indica</i> A.Juss	Nim	Tree	Yes	0.3	SUF 296	LC
297		<i>Chukrasia tabularis</i> A.Juss	Chikrassi	Tree	Yes	0.33	SUF	LC

							297		
298		<i>Swietenia mahagoni</i> (L.) Jacq.	Mehgini	Tree	No	0.57	SUF 298	NT	
299		<i>Toona ciliata</i> M.Roem.	Toon	Tree	Yes	0.06	SUF 299	LC	
300	MENISPERMACEAE	<i>Diploclisia glaucescens</i> (Blume) Diels	Sonatola	Climber	Yes	0.61	SUF 300	NE	
301		<i>Stephania japonica</i> (Thunb.) Miers	Akandi manik	Climber	Yes	0.59	SUF 301	NE	
302		<i>Tinospora cordifolia</i> (Willd.) Miers	Guloncho	Climber	Yes	0.48	SUF 302	NE	
303		<i>Tinospora crispa</i> (L.) Hook.f. & Thomson	Baka guloncho	Climber	Yes	0.4	SUF 303	NE	
304		<i>Stephania glabra</i> (Roxb.) Miers	Thanda manik	Climber	Yes	0.25	SUF 304	NE	
305		MIMOSACEAE	<i>Acacia auriculiformis</i> Benth	Akashmoni	Tree	No	0.65	SUF 305	LC
306	<i>Acacia mangium</i> Willd		Mangium	Tree	No	0.55	SUF 306	LC	
307	<i>Acacia nilotica</i> (L.) Del. subsp. <i>indica</i> (Benth.) Brenan		Babla	Tree	Yes	0.53	SUF 307	LC	
308	<i>Albizia chinensis</i> (Osbeck) Merr.		Chakua koro	Tree	Yes	1.81	SUF 308	NE	
309	<i>Albizia lucidior</i> (Steud.) I.C.Nielsen		Sil-koro	Tree	Yes	0.32	SUF 309	NE	
310	<i>Albizia myriophylla</i> Benth		Titulya koro	Tree	No	0.2	SUF 310	NE	
311	<i>Albizia procera</i> (Roxb.) Benth		Koro	Tree	Yes	0.38	SUF 311	LC	
312	<i>Albizia richardiana</i> (Voigt) King & Prain		Sada koro	Tree	No	0.19	SUF 312	NE	
313	<i>Albizia saman</i> (Jacq.) Merr		Raintree	Tree	No	0.38	SUF 313	NE	
314	<i>Entada rheedii</i> Spreng		Gila	Climber	No	0.06	SUF 314	NE	
315	<i>Leucaena leucocephala</i> (Lam.) de Wit		Epil-epil	Tree	No	0.22	SUF 315	NE	
316	<i>Mimosa diplotricha</i> Sauvalle		Shada lajurikher	Herb	Yes	1.31	SUF 316	NE	
317	<i>Mimosa pudica</i> L		Lajjabati	Herb	Yes	1.67	SUF 317	LC	
318	<i>Pithecellobium dulce</i> (Roxb.) Benth.		Khoibabla	Tree	Yes	0.15	SUF 318	LC	
319	MORACEAE		<i>Ficus ischnopoda</i> Miq.	Poda-dumur	Shrub	No	0.37	SUF 319	LC
320			<i>Artocarpus chama</i> Buch.-Ham. ex Wall	Chapalish	Tree	No	0.29	SUF 320	NE
321			<i>Artocarpus heterophyllus</i> Lam	Kanthal	Tree	Yes	0.47	SUF 321	NE
322			<i>Artocarpus lacucha</i> Buch.-Ham	Deua	Tree	No	0.29	SUF 322	NE
323		<i>Ficus benghalensis</i> L	Bot, Bangla-bot, Jhuribot.	Tree	Yes	0.17	SUF 323	NE	
324		<i>Ficus benjamina</i> L	Pakur	Tree	Yes	0.06	SUF 324	LC	
325		<i>Ficus elastica</i> Roxb. ex Hornem	Para Rubber	Tree	No	0.28	SUF 325	NE	
326		<i>Ficus hispida</i> L.f	kak dumur	Tree	Yes	0.53	SUF 326	LC	
327		<i>Ficus pumila</i> L	Lata dumur	Tree	Yes	0.28	SUF 327	NE	
328		<i>Ficus racemosa</i> L. var. <i>racemosa</i>	Jaga dumur	Tree	Yes	0.27	SUF 328	LC	

329		<i>Ficus religiosa</i> L.	Pan bot	Tree	Yes	0.34	SUF 329	NE
330		<i>Ficus rumphii</i> Blume	Jhula bot	Herb	Yes	0.31	SUF 330	NE
331		<i>Ficus semicordata</i> Buch.-Ham. ex J.E.Sm	Sadimadi dumur	Tree	Yes	0.48	SUF 331	LC
332		<i>Streblus asper</i> Lour	Shaora	Tree	Yes	0.63	SUF 332	LC
333	MORINGACE AE	<i>Moringa oleifera</i> Lam	Sajna	Tree	Yes	0.32	SUF 333	LC
334	MUSACEAE	<i>Musa itinerans</i> Cheesman	Atikola	Herb	No	0.09	SUF 334	LC
335		<i>Musa ornata</i> Roxb	Ramkola, Pahari Kola, Ramanigi- kela.	Herb	Yes	0.2	SUF 335	LC
336		<i>Musa paradisiaca</i> L.	Bichi kola	Herb	Yes	0.26	SUF 336	NE
337	MYRSINACE AE	<i>Ardisia colorata</i> Roxb	Bangla oak	Epiph ytes	No	0.29	SUF 337	NE
338		<i>Maesa indica</i> (Roxb.) A.DC	Deshiuni	Shrub	Yes	0.25	SUF 338	LC
339		<i>Maesa ramentacea</i> (Roxb.) A. DC	Moricha	Shrub	Yes	0.21	SUF 339	LC
340	MYRTACEAE	<i>Corymbia citriodora</i> (Hook.) K.D.Hill & L.A.S.Johnson	Eucalyptus	Tree	Yes	0.36	SUF 340	LC
341		<i>Eucalyptus alba</i> Reinw	Eucalptus	Tree	No	0.55	SUF 341	LC
342		<i>Melaleuca leucadendron</i> (L.) L	Caju puti	Tree	No	0.4	SUF 342	NE
343		<i>Psidium guajava</i> L	Peyara	Tree	Yes	0.4	SUF 343	LC
344		<i>Syzygium amplexicaule</i> (DC.) N.P.Balacr.	Gutijam	Tree	No	0.12	SUF 344	NE
345		<i>Syzygium balsameum</i> (Wight) Wall. ex Walp	Butijam	Tree	No	0.21	SUF 345	NE
346		<i>Syzygium cumini</i> (L.) Skeels	Jam	Tree	Yes	0.33	SUF 346	LC
347		<i>Syzygium fruticosum</i> (Roxb.) DC	Futijam	Tree	Yes	0.28	SUF 347	NE
348	NYCTAGINA CEAE	<i>Bougainvillea spectabilis</i> Willd	Kagojphul gach	Tree	No	0.17	SUF 348	NE
349	ONAGRACEA E	<i>Ludwigia adscendens</i> (L.) Hara	Keshordam	Herb	No	1.18	SUF 349	LC
350		<i>Ludwigia hyssopifolia</i> (G.Don) Exell	Zaikura	Herb	Yes	1.15	SUF 350	LC
351	OPHIOGLOSS ACEAE	<i>Helminthostachys zeylanica</i> (L.) Hook.	Krimi fern	Herb	No	0.41	SUF 351	NE
352	ORCHIDACE AE	<i>Acampe praemorsa</i> (Roxb.) Blatt. & McCann	Kandori phol	Epiph ytes	Yes	0.31	SUF 352	NE
353		<i>Cymbidium aloifolium</i> (L.) Sw	Tosabak	Epiph ytes	Yes	0.23	SUF 353	NE
354		<i>Dendrobium aphyllum</i> (Roxb.) C.E.C.Fisch.	Fasiariam.	Epiph ytes	Yes	0.29	SUF 354	LC
355		<i>Rhynchostylis retusa</i> (L.) Blume	Shial leza orchid	Epiph ytes	No	0.26	SUF 355	NE
356		<i>Acampe ochracea</i> (Lindl.) Hochr.	Kampera	Epiph yte	Yes	0.36	SUF 356	NE
357		<i>Arundina graminifolia</i> (D.Don) Hochr.	Ghasphul	Herb	Yes	0.46	SUF 357	NE
358		<i>Bulbophyllum lilacinum</i> Ridl.	Bulboliso	Epiph yte	Yes	0.28	SUF 358	NE
359		<i>Geodorum densiflorum</i> (Lam.) Schltr.	Ghanofuli bhuifor	Epiph yte	Yes	0.26	SUF 359	NE
360		<i>Papilionanthe teres</i> (Roxb.) Schltr.	Paphoteri orchid	Epiph yte	No	0.25	SUF 360	NE

361		<i>Pholidota imbricata</i> Lindl.	Folidota	Epiphyte	Yes	0.06	SUF 361	NE
362		<i>Staurochilus ramosus</i> (Lindl.) Seidenf.	Torochi orchid	Epiphyte	No	0.25	SUF 362	NE
363	OXALIDACEAE	<i>Averrhoa bilimbi</i> L.	Bilimbi	Tree	Yes	0.17	SUF 363	NE
364		<i>Averrhoa carambola</i> L.	Kamranga	Tree	Yes	0.15	SUF 364	NE
365	PANDANACEAE	<i>Pandanus odorifer</i> (Forssk.) Kuntze	Keya	Shrub	Yes	0.42	SUF 365	LC
366	PAPAVERACEAE	<i>Argemone aenea</i> Ownbey	Shialkanta	Herb	Yes	0.26	SUF 366	NE
367	PASSIFLORACEAE	<i>Passiflora foetida</i> L.	Jumkolata	Climber	Yes	0.49	SUF 367	NE
368	PEDALIACEAE	<i>Sesamum indicum</i> L.	Jonglital	Herb	No	0.28	SUF 368	NE
369	PIPERACEAE	<i>Peperomia pellucida</i> (L.) Kunth	Peperomia	Herb	Yes	0.38	SUF 369	NE
370		<i>Piper sylvaticum</i> Roxb.	Bon pan	Climber	Yes	0.2	SUF 370	NE
371	POACEAE	<i>Acroceras tonkinense</i> (Balansa) C.E.Hubb. ex Bor	Cerastonki	Herb	No	0.82	SUF 371	NE
372		<i>Alloteropsis cimicina</i> (L.) Stapf	Alotaracina	Herb	No	0.93	SUF 372	NE
373		<i>Axonopus compressus</i> (Sw.) P.Beauv	Carpet ghas	Herb	Yes	3.15	SUF 373	NE
374		<i>Bambusa bambos</i> (L.) Voss	Ban bans	Herb	Yes	0.57	SUF 374	NE
375		<i>Bambusa tulda</i> Roxb.	Baijja	Herb	Yes	0.4	SUF 375	NE
376		<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	Gandha Gourana	Herb	No	0.78	SUF 376	NE
377		<i>Bothriochloa pertusa</i> (L.) A.Camus	Barboda Ghas	Herb	No	0.85	SUF 377	NE
378		<i>Brachiaria reptans</i> (L.) C.A.Gardner & C.E.Hubb	Peraghas	Herb	No	1.02	SUF 378	LC
379		<i>Chloris barbata</i> Sw.	Bata ghas	Herb	No	1.12	SUF 379	NE
380		<i>Coix aquatica</i> Roxb.	Dhanga gurgar	Herb	No	0.36	SUF 380	NE
381		<i>Cynodon dactylon</i> (L.) Pers	Durbaghass	Herb	Yes	2.27	SUF 381	NE
382		<i>Cyrtococcum patens</i> (L.) A.Camus var. <i>patens</i>	Patcocca ghas	Herb	No	0.64	SUF 382	NE
383		<i>Dichanthium caricosum</i> (L.) A.Camus	Detara	Herb	No	0.84	SUF 383	NE
384		<i>Digitaria ischaemum</i> (Schreb.) Muhl.	Khude anguli ghas	Herb	No	0.58	SUF 384	NE
385		<i>Digitaria ternata</i> (A.Rich.) Stapf	Nata ghas	Herb	No	0.49	SUF 385	LC
386		<i>Imperata cylindrica</i> (L.) Raeusch.	Chhon	Herb	Yes	1.21	SUF 386	NE
387		<i>Melocanna baccifera</i> (Roxb.) Kurz	Mulibash	Herb	No	0.25	SUF 387	NE
388		<i>Oplismenus compositus</i> (L.) P.Beauv.	Gohur durba	Herb	No	1.33	SUF 388	NE
389		<i>Panicum repens</i> L.	Baranda ghas	Harb	No	0.67	SUF 389	NE
390		<i>Paspalum conjugatum</i> P.J.Bergius	Moisshya ghas	Harb	No	0.76	SUF 390	LC
391		<i>Pogonatherum panicum</i> (Lam.) Hack.	Khudi bans	Herb	No	0.36	SUF 391	LC

392		<i>Saccharum officinarum</i> L.	Akh	Herb	Yes	0.38	SUF 392	NE
393		<i>Saccharum procerum</i> Roxb.	sirasawn	Herb	No	0.68	SUF 393	NE
394		<i>Setaria glauca</i> (L.) P.Beauv.	Bonospoti ghas	Herb	No	0.44	SUF 394	NE
395		<i>Thysanolaena maxima</i> (Roxb.) Kuntze	Phuljharu	Herb	Yes	1.36	SUF 395	NE
396		<i>Zea mays</i> L.	Bhutta	Herb	Yes	0.52	SUF 396	LC
397		<i>Andropogon fastigiatus</i> Sw.	Premkata	Herb	No	1.57	SUF 397	NE
398		<i>Oryza sativa</i> L.	Dhan	Herb	Yes	4.37	SUF 398	NE
399		<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Khakra ghas	Herb	Yes	1.15	SUF 399	LC
400		<i>Saccharum arundinaceum</i> Retz.	Tenga ghas	Herb	Yes	0.67	SUF 400	NE
401		<i>Setaria italica</i> (L.) P.Beauv.	Kawn	Herb	Yes	0.62	SUF 401	NE
402	POLYGONAC EAE	<i>Rumex maritimus</i> L.	Datipalong	Herb	No	0.38	SUF 402	NE
403		<i>Persicaria chinensis</i> (L.) H. Gross	Chinese bishkatali	Herb	Yes	1.27	SUF 403	NE
404		<i>Persicaria hydropiper</i> L.	Biskatali	Herb	Yes	1.66	SUF 404	LC
405		<i>Persicaria orientalis</i> (L.) Spach	Bara panimarich	Herb	Yes	1.96	SUF 405	NE
406		<i>Polygonum plebeium</i> R.Br	Chemti sag	Herb	No	0.61	SUF 406	LC
407		<i>Rumex dentatus</i> L	Bon-palong	Herb	No	0.35	SUF 407	NE
408		<i>Persicaria lapathifolia</i> (L.) Delarbre	Lomosh- bishkatali	Herb	Yes	1.17	SUF 408	LC
409	POLYPODIA CEAE	<i>Pyrrosia nuda</i> (Giesenh.) Ching	Nudarossi	Epiph ytes	No	0.65	SUF 409	NE
410		<i>Drynaria quercifolia</i> (L.) J.Sm	Pankhiraj	Epiph ytes	No	0.68	SUF 410	NE
411	PONTEDERIA CEAE	<i>Eichhornia crassipes</i> (Mart.) Solms	Kochuripan a	Herb	Yes	1.5	SUF 411	NE
412		<i>Monochoria hastata</i> (L.) Solms	Bara nukha, Kechor, Boro pani kochu.	Herb	Yes	1.18	SUF 412	LC
413	PORTULACA CEAE	<i>Portulaca oleracea</i> L.	Borolunia	Herb	Yes	0.12	SUF 413	LC
414	POTAMOGET ONACEAE	<i>Potamogeton crispus</i> L.	Pata zhanchi	Herb	No	0.58	SUF 414	LC
415	PTERIDACEA E	<i>Pteris vittata</i> L.	vitateris	Herb	Yes	1.05	SUF 415	LC
416		<i>Acrostichum aureum</i> L	Tiger fern	Herb	Yes	1.01	SUF 416	LC
417		<i>Pteris ensiformis</i> Burm.f	Ensiteris	Herb	No	0.68	SUF 417	NE
418		<i>Pteris pellucida</i> C.Presl	Luciteris	Herb	No	0.58	SUF 418	NE
419	RHAMNACE AE	<i>Ziziphus mauritiana</i> Lam.	Boroi	Tree	Yes	0.28	SUF 419	LC
420		<i>Ziziphus oenopolia</i> (L.) Mill.	Bonboroi	Tree	No	0.47	SUF 420	LC
421	ROSACEAE	<i>Rosa chinensis</i> Jacq.	Kanta golap	Shrub	No	0.26	SUF 421	NE

422	RUBIACEAE	<i>Aidia cochinchinensis</i> Lour.	Aidasi	Tree	Yes	0.06	SUF 422	LC
423		<i>Dentella repens</i> (L.) J.R.Forst & G.Forst.	Bhuipat	Herb	No	0.17	SUF 423	LC
424		<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Bangka	Tree	Yes	0.25	SUF 424	NE
425		<i>Hedyotis scandens</i> Roxb	Bish lata	Herb	Yes	0.37	SUF 425	NE
426		<i>Ixora nigricans</i> R.Br. ex Wight & Arn	Kuthi rangan	Shrub	Yes	0.4	SUF 426	NE
427		<i>Mussaenda roxburghii</i> Hook.f	Silchaonri	Shrub	Yes	0.79	SUF 427	NE
428		<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Kadam	Tree	Yes	0.36	SUF 428	NE
429		<i>Ophiorrhiza mungos</i> L	Ghandhanak uli	Herb	Yes	0.59	SUF 429	NE
430		<i>Paederia foetida</i> L	Gandhabhad uli	Climber	Yes	0.58	SUF 430	NE
431		<i>Randia dumetorum</i> (Retz.) Lam.	Mon kata	Herb	No	0.06	SUF 431	NE
432		<i>Spermacoce hispida</i> L	Pidajil	Herb	No	1.13	SUF 432	NE
433		<i>Lasianthus constrictus</i> Wight	Ati lasian	Shrub	No	0.06	SUF 433	NE
434		<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Kelikadam	Tree	Yes	0.26	SUF 434	NE
435		<i>Spermacoce ocymoides</i> Burm.f.	Unknown	Herb	Yes	1.25	SUF 435	NE
436		RUTACEAE	<i>Aegle marmelos</i> (L.) Corr.	Bel	Tree	Yes	0.31	SUF 436
437	<i>Citrus maxima</i> (Burm.f.) Merr.		Jambura	Tree	Yes	0.26	SUF 437	LC
438	<i>Clausena heptaphylla</i> (Roxb.) Wight & Arn. ex Steud		Pan mouri	Tree	Yes	0.3	SUF 438	NE
439	<i>Glycosmis pentaphylla</i> (Retz.) A.DC.		Ahsaora	Shrub	Yes	0.47	SUF 439	LC
440	<i>Limonia acidissima</i> L		Koethbel	Tree	Yes	0.06	SUF 440	NE
441	<i>Murraya koenigii</i> (L.) Spreng		Chotokamin i	Tree	Yes	0.12	SUF 441	NE
442	<i>Murraya paniculata</i> (L.) Jack		Kamini	Tree	Yes	0.2	SUF 442	NE
443	<i>Paramignya scandens</i> (Griff.) Craib		Bannebu	Tree	No	0.06	SUF 443	NE
444	<i>Micromelum minutum</i> Wight & Arn.		Koroiphula	Tree	Yes	0.06	SUF 444	LC
445	SAPINDACEAE		<i>Allophylus cobbe</i> L.	Chita	Shrub	Yes	0.17	SUF 445
446		<i>Allophylus villosus</i> (Roxb.) Blume	Pashomchit a	Shrub	Yes	0.14	SUF 446	NE
447		<i>Cyathula prostrata</i> (L.) Blume	Shyontula	Herb	No	2.03	SUF 447	NE
448		<i>Lepisanthes senegalensis</i> (Poir.) Leenh	SAPINDACEAE	Tree	Yes	0.35	SUF 448	NE
449		<i>Litchi chinensis</i> Sonn.	Lichu	Tree	Yes	0.29	SUF 449	NE
450		<i>Cardiospermum halicacabum</i> L.	Phutka	Climber	Yes	0.47	SUF 450	LC
451		<i>Erioglossum alliaceum</i> Zipp. ex Span.	Ritha	Tree	No	0.06	SUF 451	NE
452		SAPOTACEAE	<i>Madhuca longifolia</i> (J.König ex L.) J.F.Macbr. var. <i>longifolia</i>	Mohua	Tree	Yes	0.09	SUF 452
453	<i>Mimusops elengi</i> L		Bokul	Tree	Yes	0.18	SUF 453	LC
454	SCHIZAEACE	<i>Lygodium flexuosum</i> (L.) Sw.	Saralata fern	Climb	Yes	0.53	SUF	NE

	AE			er			454	
455		<i>Lygodium microphyllum</i> (Cav.) R.Br.	Patilata fern	Climber	Yes	0.45	SUF 455	LC
456	SCROPHULARIACEAE	<i>Bacopa monnieri</i> (L.) Pennell	Brahmishak	Herb	No	1.29	SUF 456	LC
457		<i>Lindenbergia indica</i> (L.) Vatke	Basonti	Herb	Yes	0.52	SUF 457	LC
458		<i>Lindernia antipoda</i> (L.) Alston	Zai ghas	Herb	No	1.62	SUF 458	LC
459		<i>Lindernia crustacea</i> (L.) F.Muell	Chapra ghas	Herb	No	1.42	SUF 459	LC
460		<i>Scoparia dulcis</i> L.	Bandhone	Herb	Yes	1.48	SUF 460	NE
461		<i>Torenia asiatica</i> L.	Asiantoren.	Herb	Yes	1.31	SUF 461	NE
462		<i>Limnophila rugosa</i> (Roth) Merr.	Bandha keshori	Herb	Yes	0.58	SUF 462	LC
463	SELAGINELLACEAE	<i>Selaginella ciliaris</i> (Ritz.) Spring	Katagenella	Herb	No	0.6	SUF 463	NE
464	SMILACACEAE	<i>Smilax zeylanica</i> L.	Lonica lata	climber	Yes	0.26	SUF 464	NE
465	SOLANACEAE	<i>Capsicum annum</i> L. var. annum	Kachamarich	Herb	No	0.67	SUF 465	LC
466		<i>Datura metel</i> L.	Dhutra	Shrub	Yes	0.4	SUF 466	NE
467		<i>Physalis minima</i> L.	Phutka	Herb	Yes	0.49	SUF 467	NE
468		<i>Solanum capsicoides</i> All	Loma begun	Shrub	No	0.4	SUF 468	NE
469		<i>Solanum melongena</i> L.	Bagun	Shrub	Yes	0.52	SUF 469	NE
470		<i>Solanum nigrum</i> L.	Futibegun	Herb	Yes	0.73	SUF 470	NE
471		<i>Solanum torvum</i> Sw.	Tit begun	Shrub	Yes	0.61	SUF 471	NE
472		<i>Solanum xanthocarpum</i>	kata begun	Shrub	No	0.7	SUF 472	NE
473		<i>Solanum lycopersicum</i> L.	Tomato	Herb	Yes	0.5	SUF 473	NE
474	SONNERATIACEAE	<i>Sonneratia apetala</i> Buch.-Ham.	Petakeora	Tree	No	0.62	SUF 474	LC
475		<i>Duabanga grandiflora</i> (DC.) Walp.	Bandorhola	Tree	Yes	0.06	SUF 475	LC
476	STERCULIACEAE	<i>Abroma augusta</i> (L.) L.f	Ulatkambol	Shrub	Yes	0.22	SUF 476	NE
477		<i>Byttneria aspera</i> Colebr.	Nilbhutta	Climber	No	0.41	SUF 477	NE
478		<i>Sterculia foetida</i> L.	Udal	Tree	Yes	0.2	SUF 478	NE
479		<i>Sterculia villosa</i> Roxb.	Loma udal, Udal, Chala, Chandul.	Tree	Yes	0.09	SUF 479	NE
480		<i>Pterygota alata</i> (Roxb.) R.Br.	Narikelibadam	Tree	No	0.06	SUF 480	NE
481	STYRACACEAE	<i>Styrax serrulatus</i> var. <i>vestitus</i> Hemsl.	Gham gach	Tree	NO	0.06	SUF 481	NE
482	THEACEAE	<i>Camellia sinensis</i> (L.) Kuntze	Cha	Tree	Yes	0.71	SUF 482	DD
483		<i>Schima wallichii</i> Choisy	Bonak	Tree	Yes	0.06	SUF 483	LC
484	THELYPTERIDACEAE	<i>Ampelopteris prolifera</i> (Retz.) Copel.	Lombo dheki shak	Herb	Yes	0.12	SUF 484	NE
485		<i>Christella arida</i> (D.Don)	Aritila	Herb	No	0.4	SUF	NE

		Holttum					485	
486	THYMELAEACEAE	<i>Aquilaria agallocha</i> Roxb.	Agar	Tree	Yes	0.12	SUF 486	NE
487	TILIACEAE	<i>Corchorus aestuans</i> L	Ban-pat	Herb	Yes	0.32	SUF 487	NE
488		<i>Grewia nervosa</i> (Lour.) Panigrahi	Asar	Tree	Yes	0.49	SUF 488	NE
489		<i>Grewia serrulata</i> DC	Pichandi	Tree	Yes	0.47	SUF 489	NE
490		<i>Triumfetta rhomboidea</i> Jacq	Bonokra	Shrub	Yes	0.67	SUF 490	NE
491		<i>Corchorus capsularis</i> L.	Pat	Herb	Yes	1.41	SUF 491	NE
492	TYPHACEAE	<i>Typha domingensis</i> Pers.	Chogla	Herb	Yes	1.97	SUF 492	LC
493	ULMACEAE	<i>Trema orientalis</i> (L.) Blume	Chikan	Tree	Yes	0.41	SUF 493	LC
494		<i>Trema tomentosa</i> (Roxb.) H. Hara	Jiban	Tree	Yes	0.28	SUF 494	LC
495	URTICACEAE	<i>Boehmeria glomerulifera</i> Miq.	Borthurhuri	Herb	Yes	0.33	SUF 495	NE
496		<i>Elatostema papillosum</i> Wedd	Silajhara	Herb	No	0.06	SUF 496	NE
497		<i>Elatostema sessile</i> J.R.Forst. & J.G.Forst.	Sessijhara	Herb	No	0.06	SUF 497	NE
498		<i>Laportea interrupta</i> (L.) Chew	Bichuti, Chutra, Labichuti.	Herb	No	0.57	SUF 498	NE
499		<i>Pilea melastomoides</i> (Poir.) Wedd.	Unknown	Shrub	No	0.29	SUF 499	NE
500		<i>Pouzolzia hirta</i> (Blume) Hassk.	Hirazolzi	Herb	Yes	0.37	SUF 500	NE
501		<i>Pouzolzia zeylanica</i> (L.) Benn	Kullaruki	Herb	Yes	0.92	SUF 501	NE
502		<i>Sarcochlamys pulcherrima</i> Gaudich	Korobi	Shrub	Yes	0.38	SUF 502	NE
503		<i>Boehmeria penduliflora</i> Wedd. ex D.G.Long	Baroduli	Herb	Yes	0.38	SUF 503	NE
504		<i>Pilea microphylla</i> (L.) Liebm.	Latamaricha	Herb	No	0.06	SUF 504	NE
505	VERBENACEAE	<i>Callicarpa arborea</i> Roxb	Bormala	Tree	Yes	0.06	SUF 505	LC
506		<i>Clerodendrum indicum</i> (L.) Kuntze	Bamunhatti	Herb	Yes	0.59	SUF 506	NE
507		<i>Clerodendrum inerme</i> (L.) Gaertn.	Kundali bhant	Shrub	Yes	0.47	SUF 507	NE
508		<i>Clerodendrum paniculatum</i> L	Panyin bhat	Shrub	No	0.38	SUF 508	NE
509		<i>Clerodendrum viscosum</i> Vent	Bhat	Shrub	Yes	1.16	SUF 509	NE
510		<i>Duranta erecta</i> L	Duranto	Shrub	No	0.38	SUF 510	LC
511		<i>Gmelina arborea</i> Roxb	Gamari, Gamri, Gamar, Gambari.	Tree	Yes	0.41	SUF 511	LC
512		<i>Lantana camara</i> L	Lantana	Shrub	Yes	0.68	SUF 512	NE
513		<i>Lippia alba</i> (P.Mill.) N.E.Br. ex Britt. & Wilson	Vui okra	Shrub	No	1.94	SUF 513	NE
514		<i>Phyla nodiflora</i> (L.) Greene	Vuiokra	Herb	Yes	0.37	SUF 514	LC
515		<i>Premna esculenta</i> Roxb	Lalana	Tree	Yes	0.27	SUF 515	NE

516		<i>Tectona grandis</i> L.f	Segun	Tree	Yes	0.67	SUF 516	NE
517		<i>Lippia nodiflora</i> (L.) Michx.		Herb	Yes	1.43	SUF 517	LC
518	VITACEAE	<i>Ampelocissus barbata</i> (Wall.) Planch	Jarila-lahari	Climber	Yes	0.25	SUF 518	NE
519		<i>Cissus adnata</i> Roxb	Aliangalata	Climber	Yes	0.2	SUF 519	NE
520		<i>Cissus pentagona</i> Roxb.	Panchkonalata	Climber	Yes	0.26	SUF 520	NE
521		<i>Tetrastigma angustifolium</i> (Roxb.) Planch.	Sarupati lata	Climber	Yes	0.28	SUF 521	NE
522	WOODSIACEAE	<i>Diplazium esculentum</i> (Retz.) Sw	Dheki shak	Herb	No	0.67	SUF 522	LC
523	ZINGIBERACEAE	<i>Alpinia calcarata</i> (Haw.) Roscoe	Deshi chhoto elachi	Herb	Yes	0.53	SUF 523	NE
524		<i>Alpinia nigra</i> (Gaertn.) B.L.Burtt	Jongli ada	Herb	Yes	0.83	SUF 524	LC
525		<i>Curcuma aromatica</i> Salisb	Bon holud, Jongli haldi, Bon owldi.	Herb	Yes	0.41	SUF 525	NE
526		<i>Curcuma longa</i> L	Holud	Herb	Yes	0.37	SUF 526	DD
527		<i>Curcuma zedoaria</i> (Christm.) Roscoe	Shoti	Herb	Yes	0.12	SUF 527	DD
528		<i>Hedychium coronarium</i> J.König	Dolan chapa	Herb	Yes	0.91	SUF 528	DD

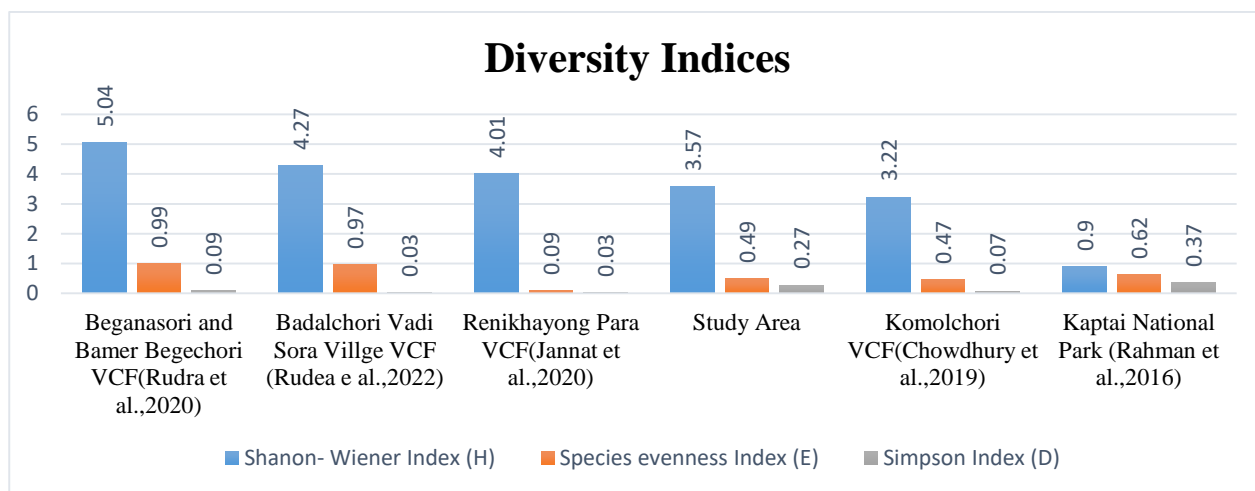


Fig. 2. Comparison of diversity Indices in this study (Surroundings of Karnaphuli River) with that in other community managed Village Common Forests (VCF) and Bangladesh Forest Department (BFD) managed forests.

Table 3. GPS location of study areas of Karnaphuli.

SL	NAME OF THE LOCATION	GPS
1	Karnaphuli Ship Builders LTD	N : 22°19'28" E : 91°49'48"
2	Ship Dock Yard	N : 22°18'59" E : 91°49'26"
3	BCG Boat pool	N : 22°18'59" E : 91°49'26"
4	Boat maintainance workshop (east zone)	N : 22°18'59" E : 91°49'26"
5	SK group	N : 22°19'13" E : 91°48'46"
6	S. Alam Refined Sugar Industries	N : 22°19'13" E : 91°48'46"
7	Dimond Cement Factory, Icha nagar/ Dimond nagar	N : 22°19'08" E : 91°48'40"
8	Premier Cement Factory, Icha nagar/ Dimond nagar	N : 22°19'08" E : 91°48'40"

9	Brick field- 2 (Dimond er), Icha nagar/ Dimond nagar	N : 22°18'33" E : 91°48'40"
10	Min Fish traders, Icha nagar/ Dimond nagar	N : 22°18'34" E : 91°48'46"
11	kalamia er chang, Icha nagar/ Dimond nagar	N : 22°18'34" E : 91°48'46"
12	Shah Alaaddin chang, Icha nagar/ Dimond nagar	N : 22°18'34" E : 91°48'46"
13	Site for AKH group	N : 22°18'19" E : 91°47'40"
14	Jundha Power Plant	N : 22°18'19" E : 91°47'40"
15	SATTL	N : 22°17'58" E : 91°47'40"
16	Star Cement	N : 22°17'58" E : 91°47'40"
17	Unique Refinery LTD	N : 22°17'20" E : 91°47'44"
18	Partex petro	N : 22°17'20" E : 91°47'44"
19	Super petro chemical LTD	N : 22°17'20" E : 91°47'44"
20	HM steel	N : 22°16'20" E : 91°48'41"
21	Amanat Shah Agro and Rahmana Agro	N : 22°16'20" E : 91°48'41"
22	KAFCO	N : 22°14'58" E : 91°50'47"
23	Transport Team Express	N : 22°14'54" E : 91°50'48"
24	Chittagong Boat Club	N : 22°14'55" E : 91°50'49"
25	Eastern Refinery	N : 22°14'58" E : 91°50'46"
26	Padma Oil Refinery	N : 22°14'58" E : 91°50'46"
27	Meghna Oil Refinery	N : 22°14'58" E : 91°50'50"
28	Jamuna Oil Refinery	N : 22°14'58" E : 91°50'56"
29	Dry dock	N : 22°14'58" E : 91°50'52"
30	Standard Asiatic Oil Company	N : 22°16'30" E : 91°48'14"
31	VOTT Oil refinery LTD	N : 22°16'30" E : 91°48'14"
32	Elias Group of Industry	N : 22°16'30" E : 91°48'14"
33	PHP fertilizer Factory	N : 22°16'30" E : 91°48'14"
34	PRN fashion LTD	N : 22°16'30" E : 91°48'14"
35	Robi Cement	N : 22°16'30" E : 91°48'14"
36	Chittagong Fish Centre	N : 22°19'28" E : 91°49'46"
37	Firinghi Bazar Nala	N : 22°19'33" E : 91°49'54"
38	Sadarghat Channel or nala	N : 22°19'22" E : 91°49'36"
39	Banglabazar nala	N : 22°21'22" E : 91°48'16"
40	Robi cement Factory	N : 22°16'30" E : 91°48'14"
41	Chaktai Khal (Old)	N : 22°19'50" E : 91°50'51"
42	Chaktai khal (new)	N : 22°19'52" E : 91°50'53"
43	Kolpolok Abashik/ kher char/ karnaphuli abashik	N : 22°20'20" E : 91°52'07"
44	Beilla	N : 22°21'58" E : 91°52'23"
45	Ikbal Agro farm	N : 22°23'07" E : 91°52'40"
46	Kalor Ghat	N : 22°22'46" E : 91°52'51"
47	Taratari Ship yard/ Ship Building site	N : 22°23'36" E : 91°53'23"
48	Kalor Ghat chor/ Selimoddin Chairman Ghat	N : 22°24'19" E : 91°53'28"
49	Regent Textile Mills	N : 22°23'30" E : 91°53'21"
50	Ship building Mills	N : 22°23'30" E : 91°53'21"
51	TK paper Mills	N : 22°23'30" E : 91°53'21"
52	MAF Newsprint mills LTD	N : 22°23'30" E : 91°53'21"
53	Chor Khidir pur	N : 22°23'30" E : 91°53'21"
54	Hakkani Paper Mills	N : 22°23'30" E : 91°53'21"
55	FMC Dock Yard	N : 22°23'32" E : 91°53'22"
56	Soil Factory	N : 22°23'02" E : 91°52'21"

57	Muskan Salt	N : 22°23'02" E : 91°52'01"
58	Between Muskan salt and FMC Dock yard	N : 22°21'52" E : 91°52'16"
59	Chor Bakolia	N : 22°21'53" E : 91°52'16"
60	PPBL 108MW Power plant	N : 22°20'02" E : 91°52'14"
61	Zodaic Power Plant	N : 22°20'02" E : 91°52'14"
62	ANLIMA Group	N : 22°20'10" E : 91°52'14"
63	Western Marine Ship Yard	N : 22°20'01" E : 91°52'12"
64	Shikol Baha 225MW Power Plant	N : 22°20'12" E : 91°52'12"
65	Shikol Baha 1050MW Power Plant	N : 22°20'11" E : 91°52'13"
66	Tatia pokor par, Shikol baha	N : 22°19'33" E : 91°51'06"
67	Seven Ring Cement	N : 22°19'16" E : 91°51'18"
68	Ship Building site near Seven Ring cement	N : 22°19'03" E : 91°52'05"
69	Karnaphuli LP Gass	N : 22°18'46" E : 91°52'12"
70	Pubali Salt	N : 22°18'46" E : 91°52'12"
71	S. Alam Cold Rolled Mills	N : 22°19'26" E : 91°52'09"
72	S. Alam Power Plant	N : 22°19'25" E : 91°52'11"
73	Shutki Polli	N : 22°18'05" E : 91°52'37"
74	FMC Paint Factory, Shikolbaha	N : 22°17'20" E : 91°52'02"
75	Shutki polli, Bella para	N : 22°18'08" E : 91°52'35"
76	Regent Spinning Mills	N : 22°18'08" E : 91°52'35"
77	4H – Group	N : 22°18'10" E : 91°52'32"
78	Boal khali Channel	N : 22°20'07" E : 91°52'28"
79	Mostafa Paper complex	N : 22°20'19" E : 91°55'06"
80	Hokkani Pulp and Paper Mills	N : 22°20'21" E : 91°55'08"
81	Ambia Nitting and Dying Mills	N : 22°20'30" E : 91°55'03"
82	MM Salt Industry	N : 22°20'30" E : 91°55'03"
83	Karim Salt Factory	N : 22°20'25" E : 91°55'08"
84	Poultry Farm - 1	N : 22°20'25" E : 91°55'08"
85	Poultry Farm- 2	N : 22°20'25" E : 91°55'08"
86	Poultry Farm- 3	N : 22°19'24" E : 91°48'28"
87	Poultry Farm- 4	N : 22°19'24" E : 91°48'28"
88	Gorur Khamar	N : 22°19'24" E : 91°48'28"
89	Noton Bazar ,kaptai	N : 22°30'00" E : 91°12'46"

3.3 Medicinal and non-medicinal vegetation around the Karnaphuli River

In this study, 355 (67.2%) of the medicinal plant species in the study area were found. They came from 271 genera and 91 families. On the other hand, 173 (32.8%) non-medicinal plant species were found. These plants belonged to 74 families and 174 genera (Table-6). Information on medicinal uses was deposited in our online repository database at mpbd.cu.ac.bd.

3.4 Floristic diversity presence in the Karnaphuli riverside

Utilizing diversity indices, which statistically combine different aspects of biodiversity into a single value, is a single method to determine the plant diversity structure in a given community. In this study, the Shanon-Weiners index (H), one of the diversity index components, accounted for 3.57 while Simpson's Index (D) value was calculated at 0.27. and the species evenness index (E) value is 0.49 (Figure-2).

Dendrogram using ward linkage

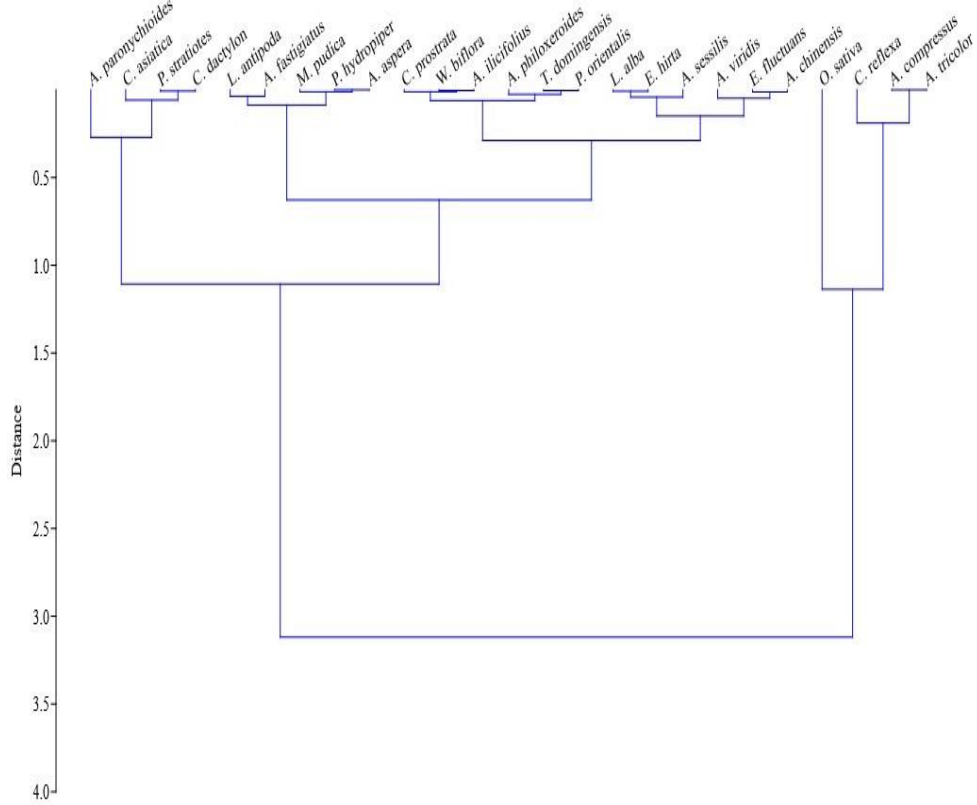


Fig. 3a. Hierarchical cluster of the 20 dominant species in the Karnaphuli riverside.

Dendrogram using ward linkage

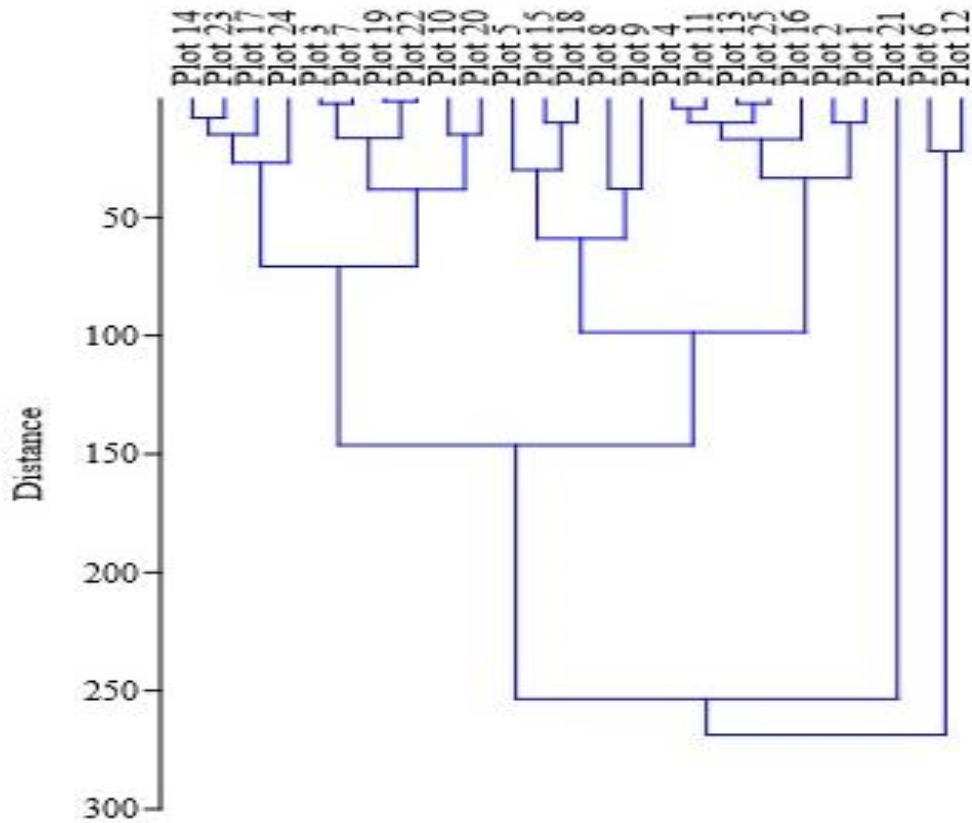


Fig. 3b. Hierarchical cluster of the total plot studied in the Karnaphuli riverside.

3.5 Hierarchical cluster of the 20 dominant species and total plot studied in the Karnaphuli riverside

In order to determine the number of clusters, we have produced a scree plot for the clusters (Supplementary file-1). Based on IVI, the recorded plant species can be divided into five hierarchical clusters (Table 2). Figure 3a depicts the hierarchical cluster of the 20 prominent species in the research region. *Axonopus compressus*, *Cuscuta reflexa*, *Oryza sativa*, and *Amaranthus tricolour* dominate the first cluster. The study's second leading plant cluster is *Lippia alba*, *Euphorbia hirta*, *Alternanthera sessilis*, *Enhydra fluctuans*, and *Albizia chinensis*. The 3rd, 4th, and 5th groups contain the remaining plant species (Figure 3a). Results postulated that all the recorded plant species are of natural origin, signifies the importance of the study area for native plant diversity protection and conservation. We also found considerable vascular species turnover between plant types along an elevation gradient (Figure 3b), which indicates moderate species diversity in the study area. It appears that the studied region has modest species richness and plant types with almost different species composition.

4. Discussion

The present study recorded a total of 528 plant species distributed to 376 genera for the first time in the studied area. Out of those, 355 plant species were used for their medicinal properties. Angiosperms were the most common type, followed by pteridophytes, bryophytes, and gymnosperms. Several diversity indices proved the presence of moderate-level diversity among evenly distributed individuals while confronting substantial risk. This study also recorded some threatened plant species from the study area. The literature is vastly lacking in the study area, as no mentionable work has been done in this area except for one study done by Islam *et al.*, (2018). Their study recorded 128 species from a small fraction (Rangamati district) of the studied area, and a comparative evaluation of these findings with their study unearthed the slightly decreasing trend in gymnosperm and the incrementing specified frequency in pteridophytes, as the lower plants are depicted at present (Islam *et al.*, 2018). The results of our study manifests the existence of diverse plant individuals over the Sundarban Mangrove Reserve Forest with respect to 182 species belonging to 135 genera under 59 families (Islam *et al.*, 2016). At a

global point of view, this number is a lucidly excellent comparison to the French Overseas Territories, mangroves of New Colombia, and Gbaga Channel mangroves (Akueson & Kévin, 2022). This preceding gymnospermic species, *Araucaria araucana* of the family Araucariaceae, had a relatively lower total number of mature individuals in comparison to the Chunati Wildlife Sanctuary, Sitakunda Botanical Garden, and Eco-Park, Chattogram (Hossain & Hossain, 2014; Biswas *et al.*, 2021).

In the present study, herbaceous plants were dominant followed by shrubs, trees, and climbers. Similar results were observed by other researchers (Jashimuddin & Inoue, 2012; Faruque *et al.*, 2018; Malik *et al.*, 2018; Gumisiriza *et al.*, 2019; Durso *et al.*, 2021).

To ascertain the number of plant species and their individual community heterogeneity in Karnaphuli riverside, we statistically determined the documented vegetation's diversity employing a number of frequently used diversity indices, namely the Shannon-Weiner index (H), Simpson's diversity (D), and Pielous' equitability index or species evenness index (E). Estimation of 3.57 Shannon-Weiner index (H) in the study area representing the subsistence of average uniform individuals' apportionment within species having moderately amenable environmental conditions for survival. This diversity index is superior to two protected areas in Bangladesh, namely Kaptai National Park (0.9) (Rahman *et al.*, 2016) and Komolochori Forest (3.22) (Chowdhury *et al.*, 2018). Compare to Simpson's index (D), current study areas disclosed the existence of variable species forms with amplitude distribution of those species individuals computing a 0.27 D value over a number of man managed forests in Khagrachari, Bandarban, and Rangamati (Jannat *et al.*, 2020; Rudra *et al.*, 2021, 2022), but almost identical to Kaptai National Park (Rahman *et al.*, 2016). There was a relatively uneven distribution of individuals from each species as well as greater abundance of a few species portrayed in these sites than in the preceding cited places, which reflected the presence of a significant detrimental factor as computed by the 0.47 species evenness index (E) (Figure 2). Although this diversity is almost comparable to that of the Sundarbans in terms of H value, the following statements hold true in terms of the relatively high values of the D and E index in the Sundarbans, demonstrating the evenly distributed individuals among species entities (Islam *et al.*,

2016). The diversity matrices indicated above show that the current research area, the Karnaphuli riverside, is fairly saturated by a variety of plants and trees, and they imply the presence of a real jeopardy of diversity degradation owing to biotic and abiotic forces. Moreover, IVI and the hierarchical cluster of the plant species poster the most naturally important and dominant species in the study area. Similar vegetation types and neighbouring sites may have similar plant diversity due to similar species composition, while extreme

sites and dissimilar vegetation types may not share high species composition, which would lead to high diversity. Despite the spatial scale, topography and microclimatic changes can increase the plant diversity of some sites within the same vegetation types. Soil texture, elevation, and aspect affect 100% species composition replacement in the studied area. Geographical distance and microclimate play an important role in vascular plant diversity.

Table 4. Dominant Families of Dicotyledonous and monocotyledonous group.

Dicotyledonous Group			Monocotyledonous group		
Family	Genus	Species	Family	Genus	Species
Fabaceae	17	30	Poaceae	25	31
Euphorbiaceae	20	28	Araceae	12	19
Asteraceae	21	21	Cyperaceae	04	13
Caesalpiniaceae	09	15	Orchidaceae	10	11
Rubiaceae	14	14	Arecaceae	07	09
Mimosaceae	06	14	Zingiberaceae	03	06
Moraceae	05	12	Dioscoreaceae	01	05
Verbenaceae	09	13	Liliaceae	04	04
Malvaceae	05	12	ommelinaceae	03	04

Moreover, anthropogenic activities like deforestation, industrialization, solid waste, air pollution, water pollution, and urbanisation could alter habitat conditions, destroying macro- and micro-vegetation in the study area, and our observation is corroborating with other studies done by other researchers (Moustafa *et al.*, 2015; Nakahama, *et al.*, 2015). Anthropogenic activities disturbed plant clusters to varying degrees and affected their floristic composition especially urbanisation, illegal structures on the banks, over-collection, and invasive species are cluster-averaged disruptions. This result was partly in agreement with others from a wide range of regions, including Abdelaal (Abdelaal, 2017) in Wadi Hagul, an affluent of the Cairo-Suez road (Egypt); Abd El-Wahab (2016) in the Western Arabian Gulf of Kuwait; and Neji *et al.* (2018) in the Southern Mediterranean. Long-term disturbance by various anthropogenic activities will lead to destroy the vegetation permanently, ultimately reducing biodiversity. Thus, a good monitoring system and eco-friendly conservation strategy can assist recover plant species.

During our field study, we observed that the Karnaphuli region between Kalurghat and Patenga has the highest levels of pollution as a result of the numerous anthropogenic and other activities, which was also reported by a previous study (Hossen *et al.*, 2019). Other studies also reported that heavy metals and atmospheric particulate matters (PM) concentrations are abundant in the studied area (Ahmed and Reazuddin, 2000; Begum and Hopke, 2018). Interestingly, we observed that some plants, namely *Ipomoea fistulosa* Mart. ex Choisy,

Calotropis gigantea (L.) Ait.f., *Xanthium indicum* J.König. ex Roxb., *Coccinia grandis* (L.) Voigt, *Crateva magna* (Lour.) DC., *Solanum xanthocarpum* Schrad., *Alternanthera sessilis* (L.) R.Br. ex DC., *Erythrina fusca* Lour., *Casuarina equisetifolia* L., *Borassus flabellifer* L., *Areca catechu* L., *Acacia auriculiformis* Benth., etc., were found frequently in the most polluted areas.

Table 5. Dominant families of Pteridophytes group.

Family	Genus	Species
ADIANTACEAE	01	05
PTERIDACEAE	02	04
DRYOPTERIDACEAE	02	03
DENNSTAEDTIACEAE	02	02
SCHIZAEACEAE	01	02

Table 6. Percentage of medicinal and non-medicinal plant.

Unit	Medicinal	Non-Medicinal
Species	355	173
Genera	271	147
Family	91	74
Percentage	67.3%	32.7%

Table 7. List of some common species.

SN.	Scientific name	Frequency
1	<i>Acanthus ilicifolius</i> L.	72
2	<i>Wedelia biflora</i> (L.) DC.	72
3	<i>Acalypha indica</i> L.	64
4	<i>Actinoscirpus grossus</i> (L.f.) Goetgh. & D.A.Simpson	64
5	<i>Cynodon dactylon</i> (L.) Pers	64
6	<i>Cyperus rotandus</i> L	64
7	<i>Mikania micrantha</i> Kunth	64
8	<i>Pongamia pinnata</i> (L.) Pierre	64
9	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	60
10	<i>Commelina benghalensis</i> L.	60
11	<i>Mimosa pudica</i> L	60
12	<i>Acacia auriculiformis</i> Benth	56
13	<i>Alternanthera paronychioides</i> A. St.-Hil.	56
14	<i>Brachiaria reptans</i> (L.) C.A.Gardner & C.E.Hubb	56
15	<i>Erythrina fusca</i> Lour	56

Table 8. List of some rare species.

SN.	Scientific name	Frequency
1	<i>Aidia cochinchinensis</i> Lour.	2
2	<i>Amaranthus blitum</i> subsp. <i>oleraceus</i> (L.) Costea	2
3	<i>Amaranthus tenuifolius</i> Willd.	3
4	<i>Amorphophallus bulbifer</i> (Roxb.) Blume	3
5	<i>Ampelopteris prolifera</i> (Retz.) Copel.	3
6	<i>Aquilaria agallocha</i> Roxb.	3
7	<i>Aristolochia indica</i> L.	3
8	<i>Arundina graminifolia</i> (D.Don) Hochr.	3
9	<i>Barleria lupulina</i> Lindl	4
10	<i>Bauhinia acuminata</i> L	4
11	<i>Benincasa hispida</i> (Thunb.) Cogn.	4
12	<i>Bischofia javanica</i> Blume	4
13	<i>Callicarpa arborea</i> Roxb	4
14	<i>Camellia sinensis</i> (L.) Kuntze	4
15	<i>Cannabis sativa</i> L.	4

5. Conclusion

The vegetation around the river helps form river erosion and is also helpful for the dwellers of the surroundings of the river. This vegetation helps to run the ecosystem properly and balance the abiotic and biotic components in a very organized way. Karnaphuli River is full of industry, and that region lacks vegetation, so proper plants must be planted in the region to keep the environment balanced. For example, heavy metals are abundant in both the

water and the sedimentation of the river, and lots of plants have been found that can survive well in this type of habitat. So, these types of plants can be planted here in this region. Yet we have a recorded database containing the 528 species around these rivers that may be degraded through anthropogenic activities. Some threatened species that are found in the area can be lost if we do not take proper steps. However, this study provides potential sources for environmental planners, herbalists, ecologists, taxonomists, ethnobotanists, pharmacists, phytochemists, and local administration.

Acknowledgements

Authors expressed sincere gratitude to the local people for providing valuable information during this study.

Funding

Research was funded by Effective Creation on Human Opinion (ECHO), a Non-government social development and research organization. Chattogram, Bangladesh.

Conflict of interest

The authors declare no conflict of interest.

References

Alam, W. (2013). Microbial species diversity and hydrological effects on their occurrence at Karnaphuli River estuary. *Agricultural Science Research Journal*, 3(6), pp. 158–166.

Akueson, A.H.G. and Kévin, S.D.I.T. (2022). Floristic Diversity of the Gbaga Channel Mangroves in Southwest Benin. *International Journal of Applied Sciences: Current and Future Research Trends*, 15(1), pp. 87–100.

Abdelaal, M. (2017). Current status of the floristic composition in Wadi Hagul, northwest Suez gulf, Egypt. *Rendiconti Lincei*, 28, pp.81-92.

Abd El-Wahab, R.H. (2016). Plant assemblage and diversity variation with human disturbances in coastal habitats of the western Arabian Gulf. *Journal of Arid Land*, 8, pp.787-798.

Ahmed, A.U. & Reazuddin, M. (2000). Industrial Pollution of Water Systems in Bangladesh. University Press Limited, Dhaka, Bangladesh, pp.175-178.

Ara, A., Al Faria, L., Rani, R., & Rahman, A. M. (2021). Diversity of Angiosperm Taxa in Chaar Khidirpur Area of Rajshahi, Bangladesh. *Journal of Scientific Research in Medical and Biological Sciences*, 2(3), 51-66.

Begum, B.A. & Hopke, P.K. (2018). Ambient Air Quality in Dhaka Bangladesh over Two Decades: Impacts of Policy on Air Quality. *Aerosol and Air Quality Research*, 18(7).

Biswas, T., Dutta, S., Hossain, M. A., Rahman, M. R., Hossen, S., & Hossain, M. K. (2021). Floral diversity in the central part of Chattogram city,

- Bangladesh. *Ecofeminism and Climate Change*, **2**(4), 185-197.
- Chowdhury, M. A., Islam, K. N., Hafiz, N., & Islam, K. (2019). Diversity of trees in a community managed forest: The case of Komolchori VCF, Khagrachari, Bangladesh. *Geology, Ecology, and Landscapes*, **3**(2), 95-103.
- Colwell, R.K. (2014). Biodiversity: Concepts, Patterns, and Measurement. *The Princeton Guide to Ecology*, pp. 257-263. doi:10.1515/9781400833023.257/HTML.
- Dallmeier, F. (1992). Methods for long-term biodiversity inventory plots in protected tropical forest. *Long-term Monitoring of Biological Diversity in Tropical Forest Areas: Methods for Establishment and Inventory of Permanent Plot*, 11-46.
- Das, R., Islam, M. A., Naher, K., Khan, R., Tamim, U., & Rashid, M. A. (2018). Distribution and contamination of trace elements in core sediments of the Karnaphuli River using neutron activation analysis. *Nuclear Science and Application*, **27**, 45-52.
- Dey, S., Das, J., & Manchur, M. A. (2015). Studies on heavy metal pollution of Karnaphuli river, Chittagong, Bangladesh. *IOSR Journal of Environmental Science, Toxicology and Food Technology* **9**(8), 79-83.
- Dey, S., Uddin, M. S., & Manchur, M. A. (2017). Physicochemical and bacteriological assessment of surface water quality of the Karnaphuli River in Bangladesh. *Journal of Pure Applied Microbiology*, **11**(4), 1721-1728.
- Durso, A. M., de Castañeda, R. R., Montalcini, C., Mondardini, M. R., Fernandez-Marques, J. L., Grey, F., ... & Bolon, I. (2021). Citizen science and online data: Opportunities and challenges for snake ecology and action against snakebite. *Toxicon: X*, **9**, 100071.
- Faruque, M. O., Uddin, S. B., Barlow, J. W., Hu, S., Dong, S., Cai, Q., ... & Hu, X. (2018). Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban District of Bangladesh. *Frontiers in pharmacology*, **9**, 40.
- Gumisiriza, H., Birungi, G., Olet, E. A., & Sesaaizi, C. D. (2019). Medicinal plant species used by local communities around queen elizabeth national park, maramagambo central forest reserve and ihmbo central forest reserve, south western Uganda. *Journal of ethnopharmacology*, **239**, 111926.
- Hassan, M.M. & Nazem, M.N.I. (2016). Examination of land use/land cover changes, urban growthdynamics, and environmental sustainability in Chittagong city, Bangladesh. *Environment, Development and Sustainability*, **18**(3), pp. 697-716.
- Hill, M.O. (1973). Diversity and Evenness: A Unifying Notation and Its Consequences. *Ecology*, **54**(2), pp. 427-432. doi:10.2307/1934352.
- Hossain, M. A., Mahmud, R., Chakma, N., & Hossain, M. K. (2019). Wild Fodder Yielding Plants in the Protected Areas of Bangladesh. In *Wildlife Population Monitoring*. IntechOpen.
- Hossain, M. S., Islam, M. S., & Chowdhury, M. A. T. (2005). Shore based pollution sources of the karnaphuli river and the effects of oil-grease on the riverine environment. *The Journal of Geo-Environment*, **5**, 55-66.
- Hossain, M.K. & Hossain, M.A. (2014). Biodiversity of Chunati Wildlife Sanctuary: Flora, Arannayk Foundation and Bangladesh Forest Department. Dhaka. *Arannayk Foundation* [Preprint].
- Hossen, M. A., Rafiq, F., Kabir, M. A., & Morshed, M. G. (2019). Assessment of water quality scenario of Karnaphuli River in terms of water quality index, South-Eastern Bangladesh. *American Journal of Water Resources*, **7**(3), 106-110.
- Islam, K. K., Anwar, K. B., Uddin, S. N., & Rahman, N. (2018). Vascular Flora of The Karnafuli River and its Surrounding areas under Rangamati District of Bangladesh. II. Pteridophyte, Gymnosperm and Liliopsida (Monocots). *Bull. Bangladesh National Herbarium*, **6**, 95-108.
- Islam, S., Feroz, S. M., Ahmed, Z. U., Chowdhury, A. H., Khan, R. I., & Al-Mamun, A. B. D. U. L. L. A. H. (2016). Species richness and diversity of the floristic composition of the Sundarbans mangrove reserve forest, Bangladesh in relation to spatial habitats and salinity. *The Malaysian Forester*, **79**(1&2), 7-38.
- Jain, S., Banaś, K., Salamon, M., & Plachno, B. J. (2021). Invasive alien plants in Bangladesh: taxonomic inventory, impact assessment and management issues. Available at: <https://doi.org/10.21203/rs.3.rs-1078474/v1>.
- Jannat, M., Kamruzzaman, M., Hossain, M. A., & Hossain, M. K. (2019). Tree species diversity in the forest of Renikhayong para village in Bandarban, Bangladesh: a case study. *Journal of Biodiversity Conservation and Bioresource Management*, **5**(2), 115-126. doi:10.3329/jbcbm.v5i2.44922.
- Jashimuddin, M. & Inoue, M. (2012). Management of Village Common Forests in the Chittagong Hill Tracts of Bangladesh: Historical Background and Current Issues in Terms of Sustainability. *Open Journal of Forestry*, **02**(03), pp. 121-137. doi:10.4236/ojf.2012.23016.
- Malik, K., Ahmad, M., Bussmann, R. W., Tariq, A., Ullah, R., Alqahtani, A. S., ... & Shah, S. N. (2018). Ethnobotany of anti-hypertensive plants used in northern Pakistan. *Frontiers in pharmacology*, **9**, 789.
- Moustafa, A.A., Zaghloul, M.S. and Ahmed, N.R. (2015). Autecology for two threatened species *Teucrium polium* and *Verbascum sinaiticum* growing in south Sinai for conservation approach. *Journal of Global Biosciences*, **4**(8), pp.3121-3139.
- Nakahama, N., Hirasawa, Y., Minato, T., Hasegawa, M., Isagi, Y. and Shiga, T. (2015). Recovery of genetic diversity in threatened plants through use of germinated seeds from herbarium specimens. *Plant Ecology*, **216**, pp.1635-1647.
- Neji, M., Serbaji, M.M., Hardy, O. and Chaieb, M. (2018). Floristic diversity and vegetation patterns along disturbance gradient in arid coasts in southern Mediterranean: Case of the Gulf of Gabès, southern

- Tunisia. *Arid Land Research and Management*, 32(3), pp.291-315.
- O'Mallery, L. S. S. (1908). EB District Gazettes, Chittagong. *The Bengal Secretariat Book Depot, Calcutta*.
- Pasha, M.K. & Uddin, S.B. (2013). Dictionary of Plant Names of Bangladesh (Vascular Plants). *Janokalyan Prokashani: Chittagong, Dhaka, Bangladesh*.
- Rahman, A. (2021). A Preliminary Assessment of Angiospermic Flora in and around Rajshahi metropolitan city, Bangladesh. *Applied Ecology and Environmental Sciences*, 9(4), pp. 440-449.
- Rahman, M. M., Mahmud, M. A. A., Shahidullah, M., Nath, T. K., & Jashimuddin, M. (2016). The competitiveness of the phytosociological attributes of the protected areas in Bangladesh with that in the other tropical countries. *Journal of Sustainable Forestry*, 35(6), 431-450. doi:10.1080/10549811.2016.1202841.
- Rakib, M., Jahan, R., Hossain, M. B., Kumar, R., Ullah, M., Al Nahian, S., ... & Sayed, M. M. (2022). Spatial distribution and risk assessments due to the microplastics pollution in sediments of Karnaphuli River Estuary, Bangladesh. *Scientific Reports*, 12(1), 1-15.
- Rudra, S., Chowdhury, M. H. U., Hossen, I., Rahman, M. K. R., Hossain, M. A., Faruque, M. O., & Uddin, S. B. (2022). Ethnomedicinal Plant Diversity in Badalchori Vadi Sora Village Common Forest of Rangamati, Bangladesh. *Bangladesh Journal of Plant Taxonomy*, 29(1), 109-128. doi:10.3329/bjpt.v29i1.60452.
- Rudra, S., Islam, K. N., Rahman, M. M., & Uddin, S. B. (2021). Medicinal plant diversity and their therapeutic uses in selected village common forests in chittagong hill tracts, Bangladesh. *Journal of Herbs, Spices & Medicinal Plants*, 27(1), 83-107. doi:10.1080/10496475.2020.1786874.
- Sarwar, M. I., Majumder, A. K., & Islam, M. N. (2010). Water quality parameters: A case study of Karnafully River Chittagong, Bangladesh. *Bangladesh Journal of Scientific and Industrial Research*, 45(2), 177-181. doi:10.3329/bjsir.v45i2.5722.
- Shukla, R.S. & Chandel, P.S. (2000). Plant Ecology and Soil Science. 9th ed.; S. Chand & Company: New Delhi, India [Preprint].
- Siddique, M.A.M. & Aktar, M. (2012). Heavy metals in salt marsh sediments of porteresia bed along the Karnafully River coast, Chittagong. *Soil and Water Research*, 7(3), pp. 117-123. doi:10.17221/7/2012-swr.