CHAPTER 1

INTRODUCTION

1.1. General account

India is one of the 17 megadiverse countries, makes up about 10% of the global flora, and has 47% endemic dicot plants (Champion and Seth 1968; Daimary 2011). The eight states that constitute the northeast India—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura—are among the hotspots of biodiversity and account for 2,62,179 sq. kms. (7.97 %) of the country's total land area (FSI 2017). Northeast India is phytogeographically very diverse, with many threatened species, comprising almost half of the country's flora and a number of primitive flowering plant taxa (Barooah and Ahmed 2014). Takhtajan (1969) regarded this area as the "cradle of flowering plants" or the beginning of Angiosperms. Assam is the second largest state of northeast India in terms of area (78,438 sq. kms), accounting for approximately 2.39 % of the country. The state has a total forest cover of 28,105 sq. kms. or 35.83 %, of which 2,797 sq. kms. are Very Dense Forest (VDF), 10,192 sq. kms. are Moderately Dense Forest (MDF), and 15,116 sq. kms. are Open Forest (OF) (FSI 2017).

India is endowed with a total 74 species of Gymnosperms (8 endemic species, 7 threatened species), 18,043 species of Angiosperms (c. 4,036 endemic species, 1,700 threatened species), 1,267 species of Pteridophytes (47 endemic species, 414 threatened species), 2,523 species of Bryophytes (629 endemic species, c. 80 threatened species), and 2,401 species of Lichens (c. 520 endemic species) (Saikia and Khan 2018). In northeast India, there are about 8,600 species (including 40 species of Gymnosperms) of flowering plants, 700 species of ferns, 500 species of mosses, and 728 lichens distributed in different parts and corners of the region (Hegde 2000; Chakravarty *et al*. 2012; Saikia and Khan 2018). Assam comes third in terms of species richness with 3,593 flowering plants in northeast India after Arunachal Pradesh (c. 5,000 species) and Sikkim (c. 4,500 species) (Chatterjee *et al*. 2006). Assam consists of 3,854 taxa, including 22 species of Gymnosperms and 261 infraspecific taxa (40 subspecies (ssp.), 218 varieties (var.), and 3 forma (f.) where 2,752 taxa are dicotyledons, and 1,080 taxa are monocotyledons under 1,394 genera of 236 families. Of them, 167 taxa are endemic to the state and 871 taxa are in threatened categories (Barooah and Ahmed 2014).

The assessment of plant diversity in a particular region is the basis of biodiversity which indicates its richness in floristic composition and the present status of the area. The

maintenance of all ecological functions, ecosystem services, biological resources, and social benefits, as well as the satisfaction of all human requirements, depend greatly on biodiversity. The Convention on Biological Diversity (CBD) defined Biodiversity as "*the variability among living organisms from all sources, including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part: this includes diversity within species, between species, and of ecosystems*" (CBD 1992). Protected areas (PA) such as World Heritage Site, Biosphere Reserve, National Park, Wildlife Sanctuary and Reserve Forests play a vital role for the conservation of key components of wildlife as well as for scientific, educational, and cultural endeavors. The (CBD) defined Protected areas (PA) as "*a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives*" (CBD 1992). The protected areas are designated for the maintenance of the integrity and diversity of ecosystems, the conservation of flora and fauna, cultural heritage, and the region's distinctive landscape. Floristic components found in protected areas in various parts of any region should be collected, documented, and subjected to taxonomic study because they can be considered local flora.

Assam exhibits a unique geo-climatic condition because of its varied geographical location and vegetation. On the basis of floristic composition, the forest of Assam is mainly divided into tropical and subtropical forests. The details are provided in Table 1.

The state has three physiographic domains— The Brahmaputra valley, Central Assam Hills (Hills of Karbi Anglong and North Cachar Hill districts), and the Barak valley. The region is blessed with plains and green hills, rivers, wilderness, and a variety of ethnic groups, whose appealing cultures produce entrancing aesthetic beauty (Gogoi 2017). The state main waterway for drainage is the Brahmaputra. The diverse habitat and various forest types are home to a variety of valuable flora and fauna. Assam has many Protected Areas as given in Table 2.

Table 1. Forest types of Assam

Main Forest types	Forest subtype	Name of the areas

Tropical forest	Tropical Wet Evergreen Forests	Foothills of Arunachal Pradesh, Lakhimpur, Tinsukia, Dibrugarh, Southern part of Sivasagar, foothills of Barail ranges, and South-east part of Cachar district.
	Tropical Semi-Evergreen Forests	Brahmaputra valley, foothills of Barail ranges, and Manipur hills in the Barak valley.
	Tropical Moist and Dry Deciduous Forests	Kokrajhar, Goalpara, Kamrup, Nagaon, Dima Hasao, and Plains of Barak valley.
	Grasslands	Manas National Park, Kaziranga National Park, Sonai Rupai, Laokhowa, Pabitora, Barnadi, and Burachapori.
	Riparian Forests	Area along river banks.
	Swamps	All wetlands
Subtropical forests	Sub-Tropical Broad-leaved Forests	Hamren Sub-division of Karbi Anglong, and Dima Hasao district.
	Subtropical Pine Forests	Dima Hasao bordering Jaintia hills, and Karbi Anglong.
	Bamboo Forests and Can Brakes	Foothills of Barail range of Dima Hasao, and Hills slope of Karbi Anglong.

Table 2. Protected areas (PA's) in Assam

Sl. Nos.	Name of PA's	Districts	Area (sq. kms)	Year of Establishment

		Biosphere Reserves (BR)		
1	Manas BR	Kokrajhar, Chirang, Baksa and Udalguri	2837	1989
2	Dibru-Saikhowa BR	Dibrugarh and Tinsukia	765	1997
		National Parks (NP)		
1	Dehing Patkai NP	Dibrugarh and Tinsukia	231.65	2021
2	Dibru-Saikhowa NP	Dibrugarh and Tinsukia	340	1999
3	Kaziranga NP	Golaghat, Nagaon and Sonitpur	430	1974
4	Manas NP	Baksa and Chirang	500	1990
5	Nameri NP	Sonitpur	200	1998
6	Orang NP	Sonitpur and Udalguri	78.81	1999
7	Raimona NP	Kokrajhar	422	2021
		Wildlife Sanctuaries (WLS)		
1	Amchang WLS	Kamrup	78.64	2004
2	Bherjan-Borajan Podumoni WLS	Tinsukia	7.22	1999
3	Barnadi WLS	Baksa and Udalguri	26.22	1980
4	Burhachapori WLS	Sonitpur	44.06	1995
5	Barail WLS	Cachar	326.25	2004
6	Chakrashila WlS	Kokrajhar	45.56	1994
7	Deepor Beel WLS	Kamrup	4.14	1989
8	Dehing-Patkai WLS	Dibrugarh and Tinsukia	111.19	2004
9	East Karbi Anglong WLS	Karbi Anglong	221.81	2000
10	Garampani WLS	Karbi Anglong	6.55	1952
11	Gibbon WLS	Jorhat	20.98	1997
12	Laokhoa WLS	Nagaon	70.11	1997
13	Marat Longri WLS	Karbi Anglong	452	2003
14	Nambhor WLS	Karbi Anglong	37	2000
15	Nambor-Doigurung WLS	Golaghat	97.15	2003

16	Pobitora WLS	Morigaon	38.83	1998
17	Pani-Dihing WLS	Sivasagar	33.93	1999
18	Sonai-Rupai WLS	Sonitpur	220	1998
		Ramsar Site		
1	Deepor Beel	Kamrup	6.89	2008

1.2. Choice of the present work

A floristic study is a scientific investigation that focuses on plant species and their distribution in a particular geographic region. It plays a vital role in understanding the biodiversity and ecological dynamics of an area. The floristic information can be used to develop strategies for conservation and management of natural resources as well as to identify medicinal and other economic uses of plant species.

The Chirang Reserve Forest (CRF), which is located in the western part of Assam in the Kokrajhar and Chirang districts on the foothills of Bhutan. This CRF is consists of three important forest ranges—Ultapani Range, Jharbari Range, and Gaurang Range. The area has diverse vegetation and floristic composition, which play a significant role in making suitable habitats for a number of wild birds, animals, insects, amphibians, and reptiles. However, no attempt has been made to specifically pinpoint this rich biodiversity area through the exploration of floristic diversity.

The study is anticipated to provide all the information needed to create policies for a sustainable livelihood and a balanced approach to conservation management of the forest. An attempt is made here to complete the floristic diversity of the CRF along with the assessment of the endemic species, threatened species, ethnobotany of the region, and information that is needed by those who protect biodiversity, including naturalists, educators, lawmakers, foresters, and the local populace.

The current state of global biodiversity, whose foundation is plant diversity, is in danger. The biodiversity of plants not only gives humans everything they need, but also performs ecological functions by regulating hydrological cycles and weather patterns.

In light of the above facts, the topic entitled "**Floristic diversity of Chirang Reserve Forest of Bodoland Territorial Region in Assam with special reference to threatened and endemic plants**" was chosen for the present study.

1.3. Aim and objectives of the study

The present study is proposed to undertake with the aim of preparing a well-documented floristic account of Chirang Reserve Forest, which is botanically an unexplored area, and to fill the gap in our knowledge of flora.

The objectives of the study include—

1. Survey, exploration and collection of floristic elements from the Chirang Reserve Forest.
2. Identification and documentation of taxa with keys, illustration and/or photographs whenever necessary.
3. Preparation of an authentic floristic account of the area with latest nomenclature of the taxa.
4. To access the conservation status of threatened and endemic plants/taxa occurring in the area.
5. To study the plant resources utilized by the local communities of the area and their traditional knowledge.
6. To access current and future threats to the study area.