

Phytogeography of Chirang Reserve Forest under Manas Biosphere Reserve in Assam (India)

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[Received 20.12.2012; Revised 11.08.2014; Accepted 13.10.2014; Published 31.12.2014]

Abstract

Systematic survey carried out in Chirang Reserve Forest of Manas Biosphere Reserve during 2008 to 2010, showed a wide diversity of phytogeographical region. The forest type of the reserve can be divided into Sal forest, evergreen & semi evergreen forest, deciduous forest, savannah/grassland and riverine forest. The major floristic elements of these forest types were studied. The Chirang reserve forest is under severe threat because of habitat destruction and human encroachment.

Key words: Chirang Reserve Forest, Manas Biosphere Reserve, Phytogeography.

INTRODUCTION

Assam, the gateway to the North Eastern part of India is also known as the mother of rivers and blue hills. It lies within the Himalaya Biodiversity Hotspot zone. The Manas Biosphere Reserve (MBR) is one of the eighteen Biosphere Reserves of India, created on 14th March, 1989. Prior to the creation of Biosphere Reserve, it was Manas National Park. Manas was described as a World Heritage site by UNESCO in 1985. In 1992, UNESCO declared it as a world heritage site in danger due to heavy poaching and terrorist activities. On 21st June 2011, it was removed from the List of World Heritage in Danger and was commended for its efforts in preservation (http://en.wikipedia.org/wiki/Manas_National_Park, <http://cpreec.org/pubbook-biosphere>).

MBR is known for its unique and highly rich biodiversity (Baruah *et al.* 2003). It is surrounded by Bhutan and Arunachal Pradesh in the north and in the south there are 201 fringe villages of mostly ethnic communities falling under Kokhrajhar, Bongaigaon, Barpeta, Nalbari and Darrang districts. The western boundary is extended to river Sankosh while the eastern boundary is marked by the Dhansiri river of Darrang district. Geographical location is between 90 48'003 E & 91 15'003 E and 26 36'003 N & 26 49'003 N with altitude ranges from 57 – 280 meters from above the mean sea level. The average annual rainfall in this area is 330 cm and the temperature ranges between 6^oC and 36^oC (Baruah *et al.* 2003).

Manas got its name after the serpent Goddess 'Manasa'. The unique location of Manas at the confluence of the Indian, Ethiopian and Indo-Chinese realms along with hot and humid climate makes this reserve a treasure of immense diversity and endemism of the flora and fauna. It is a unique representation of tropical, humid *Bengal Rain Forests* in the

Indo-Malaya realm. The reserve extends along the Himalayan forest hills to the north of Brahmaputra valley. The Manas River is the largest Himalayan tributary of the Brahmaputra River. The MBR is a house of rare, endangered and threatened plants and animals. A good number of plants of the reserve have been noted for their medicinal properties (Sarma *et al.* 2012).

To study the phytogeography of a forest range is extremely important to understand the range of floral diversity of that area. From the conservation point of view, the exploration of forest type is important as it helps in the development of database, an essential step in the formulation of conservation strategies. On the basis of these facts the present study aims at to investigate the phytogeography of Chirang Reserve Forest under the Manas Biosphere Reserve.

STUDY AREA

The Chirang Reserve Forest (CRF) of MBR is the oldest reserve forest in Assam constituted by the notification No. 46 of 20th November, 1875 under the Act VII of 1865. The area of CRF is 593 sq km and falls under the Haltugaon Forest Division of Assam forestry divisions. This territorial division is spread over parts of present Kokrajhar, Dhubri and Chirang districts, on the northern bank of the river Brahmaputra. The study area falls between 26° 0.06' 56.05" N

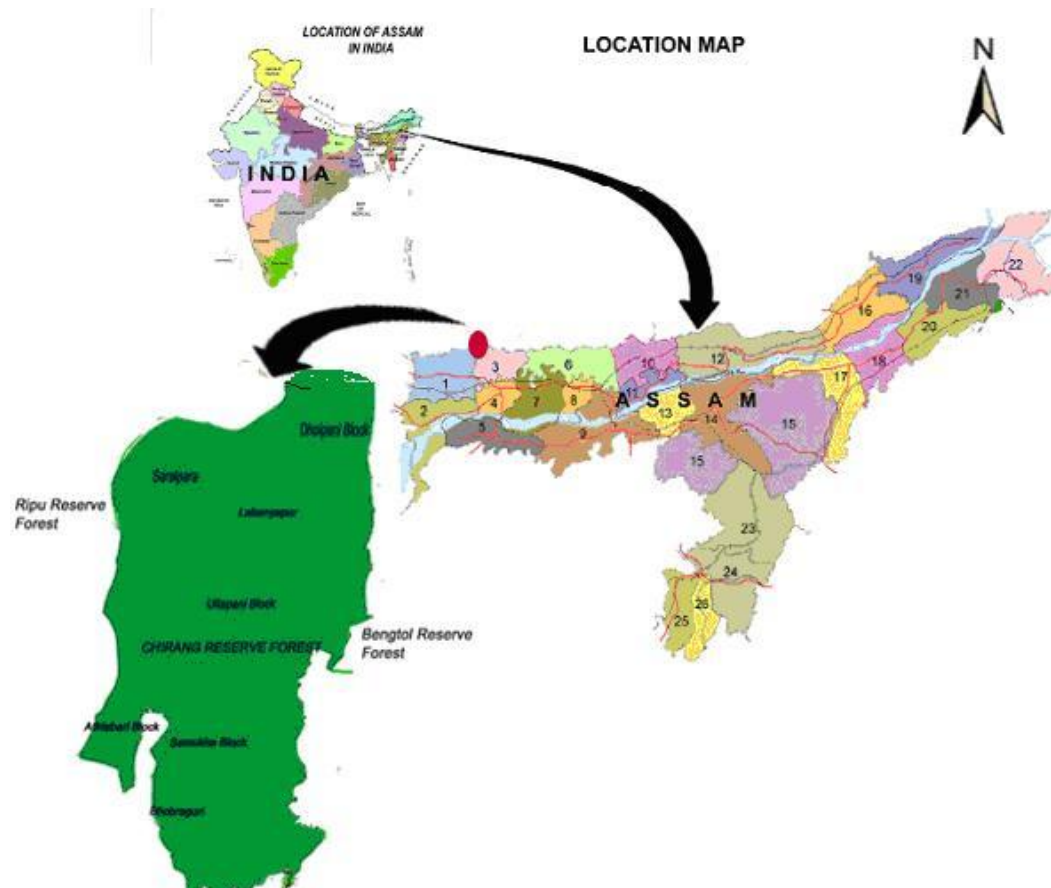


Fig.1. Chirang R. F. under Manas Biosphere Reserve (Map not in scale) [Source: Dolphin Foundation, Guwahati-4]

to 26° 0.54' 21.95" N latitudes and 90° 0.12' 03.76" E to 90° 29' 07.02" E longitudes. However, the total geographical area of the division is 1071 sq km. The division is bounded on the west by the Saralbhanga River, on the north by an international boundary with Bhutan, on the east by the river Bhur, which is also, known as Champamati in the plains. On the south it is bounded by the river Brahmaputra. CRF also falls under the Ripu-Chirang Elephant Reserve. (<http://www.birdlife.org/datazone/sitefactsheet.php?id=18099>). The Elephant reserve was declared on 6th March, 2003 (Notification no. FWR-44/2002/47) covering an area of 2600 sq km.

The soil type of CRF is distinctly alluvial. The bhabar tract in the area consists of coarse water borne pebbles of chiefly quartos and schistose origin, upon which lies a thin layer of sandy loam and humus. As one approaches Terai areas, water level gets higher. The tract experiences a typical tropical, monsoonal climate. The total annual precipitation is over 300 cm with most of it being received from the South West monsoons. The rainy season continues up to September. Floods are a regular feature during the monsoon. A part of the annual precipitation is also received during the cold season. Summers are fairly hot and the mercury may soar up to 34°C or even more. Autumn is the most pleasant season in the reserve area. Cold season begins by late November with December and January being the coldest months. At this time temperature drops down to about 5°C, fogs and mists are common during winter (Negi 1996).

MATERIAL AND METHOD

The present investigation is the result of several field visits in Chirang Reserve Forest during 2008 – 2010 covering all seasons. For study of plant biodiversity the Reserve Forest was divided roughly into seven parts depending on topography and altitude. Based on visual survey five types of vegetation have been recognized in Chirang Reserve Forest. These are Sal Forest, evergreen and semi evergreen forests, deciduous forests, savannah/grassland and riverine forest. Each forest type was randomly surveyed for the major floristic elements covering all strata of the vegetation.

The specimens were collected mainly in their flowering and fruiting stages and were preserved as dried herbarium specimen using standard herbarium technique (Jain & Rao 1977). The plants were identified with the help of *Flora of Assam* (Kanjilal *et al.* 1934 – 1940; Bor 1940), *Flora of British India* (Hooker 1872–1897), other available literatures (Bor 1940; Rajkhowa 1961) and by comparing at GUBH. For the up-to-date nomenclature www.theplantlist.org has been largely consulted. The voucher specimens has been deposited in the GUBH.

RESULTS AND DISCUSSION

The vegetation of the Reserve Forest is of rare composition. The basic forest type of the reserve is mainly semi-evergreen and moist deciduous type. On identification of collected species of plants from five different vegetations in Chirang Reserve Forest, following types of assemblage of plants have been recognized.

1. Sal Forest: Sal forest was found in parts of the Samukha, Upper Lungsung, lower part of Ultapani, Bhur and Khalasi blocks of CRF. Sal forest also occurred in Bansbari, Maligaon, Haltugaon and Amguri blocks of Chirang RF. *Shorea robusta* J. Gaertner is the most dominated species and its associated trees are *Dysoxylum gotadhora* (Buchanan-Hamilton) Mabblerley, *Dipterocarpus retusus* Blume, *Sterculia villosa* Roxburgh, *Phyllanthus emblica* Linnaeus, *Macaranga denticulata* Müller Argoviensis, *Mallotus philippensis* (Lamarck) Müller Argoviensis, *Butea monosperma* (Lamarck) Taubert, *Lannea coromandelica* (Houttuyn) Merrill, *Ziziphus jujuba* Miller, *Wrightia arborea* (Dennstedt) Mabblerley.

In this type of vegetation under-storey is poorly developed but some shed loving species like *Lantana camara* Linnaeus, *Callicarpa macrophylla* Vahl, *Cleodendrum serratum* Sprengel, *Leea guineensis* G. Don, *Tephrosia candida* DC., *Premna bengalensis* C.B. Clarke, *Holmskioldia sanguinea* Retzius, *Uraria picta* (Jacquin) DC., *Mimosa himalayana* Gamble are recorded. Ground cover vegetation is poorly developed with few species like *Chromolaena odorata* (Linnaeus) R.M. King & H. Robinson, *Dioscorea pentaphylla* Linnaeus, *D. globosa* Linnaeus *Dioscorea alata* Linnaeus, etc. and some other herbs like *Elephantopus scaber* Linnaeus, *Senecio raphanifolius* Wallich *ex* DC., *Rauvolfia serpentina* (Linnaeus) Benth *ex* Kurz, *Buddleia asiatica* Loureiro, *Lippia javanica* (Burman *f.*) Sprengel, *Hedyotis coronaria* (Kurz) Craib, *Oldenlandia auricularia* (Linnaeus) K. Schumann, *Senecio sisymbriifolius* de Candolle, *Lepidagathis incurva* Buchanan-Hamilton *ex* D. Don, *Rungia pectinata* (Linnaeus) Nees, *Achyranthes aspera* Linnaeus, *Achyranthes aspera* var. *porphyristachya* (Wallich *ex* Moquin) Hooker *f.*, etc.

2. Evergreen and semi-evergreen forests: It is spreading over the Ultapani, Laopani, Dholpani and Saralbhanga Blocks of the CRF. The top canopy are composed of *Dipterocarpus retusus* Vesque, *Artocarpus chama* Buchanan-Hamilton, *Canarium bengalense* Roxburgh, *Garcinia cowa* Roxburgh *ex* Choisy, *Chrysophyllum roxburghii* G. Don, *Mallotus repandus* (Willdenow) Müller Argoviensis, *Cinnamomum glaucescens* (Nees) Handel-Mazzetti, *Pterospermum acerifolium* (Linnaeus) Willdenow, *Bauhinia purpurea* Linnaeus, *B. vahlii* Wight & Arnott, *Shorea robusta* J. Gaertner with canopy coverage of 25 – 60 %. The middle storey is generally dominated by *Artocarpus gomezianus* Wallich *ex* Trécul, *Magnolia griffithii* Hooker *f.* & Thomson, *M. hookeri* (Cubitt & W.W. Smith) D.C.S. Raju & M.P. Nayar, *M. hodgsonii* (Hooker *f.* & Thomson) King, *Magnolia mannii* (King) Figlar, *Dillenia indica* Linnaeus, *D. pentagyna* Roxburgh, *Lagerstroemia speciosa* (Linnaeus) Persoon, *Shorea robusta* Gaertner *f.*, etc. The ground cover is represented by scattered growth of *Piper mullesua* Buchanan-Hamilton *ex* D. Don, *Dendrolobium triangulare* (Retzius) Schindler, *D. triflorum* (Linnaeus) DC., *Globba racemosa* Smith, *Glycosmis pentaphylla* (Retzius) de Candolle, *Dracaena angustifolia* (Medikus) Roxburgh, *Phlogacanthus thyrsoiflorus* Nees, *Chromolaena odorata* (Linnaeus) R.M. King & H. Robinson, *Mikania scandens* (Linnaeus) Willdenow, *Leea asiatica* (Linnaeus) Ridsdale, *Mimosa rubicaulis* Lamarck, *Flemingia strobilifera* (Linnaeus) W.T. Aiton and *Ageratum conyzoides* (Linnaeus) Linnaeus. The climbers are *Hodgsonia macrocarpa* (Blume) Cogniaux, *Smilax perfoliata* Loureiro, *Calamus floribundus* Griffith, *Byttneria aspera* Collebroke *ex* Wallich, *Cissus quadrangularis* Linnaeus, *Mucuna pruriens* (Linnaeus) DC., *Delima sarmentosa* Linnaeus, *Thunbergia grandiflora* (Roxburgh *ex* Rottl.) Roxburgh. Epiphytic orchids like *Dendrobium salaccense* (Blume) Lindley, *D. chryseum* Rolfe, *D. nobile* Lindley, *D. sulcatum* Lindley, *D. chrysotoxum* Lindley, *Cymbidium bicolor* Lindley, *C. aloifolium* (Linnaeus) Swartz, *Mycaranthes floribunda* (D. Don) S.C. Chen & J.J. Wood, *Pinalia mysorensis* (Lindley) Kuntze, *Papilionanthe teres* (Roxburgh) Schlechter, *Eulophia mannii* (Reichenbach *f.*) Hooker *f.*, *Pholidota pallida* Lindley, and *Rhynchostylis retusa* (Linnaeus) Blume in the middle and top canopy and a few ground orchids are found with restricted distribution including *Geodorum densiflorum* (Lamarck) Schlechter, *Habenaria digitata* Lindley, *Zeuxine nervosa* (Wallich *ex* Lindley) Benth *ex* Trimen, *Calanthe odora* Griffith, *Calanthe sylvatica* (Thouars) Lindley, *Spiranthes sinensis* (Persoon) Ames etc.

3. Deciduous forests: The miscellaneous formations in the southern part of Chirang Reserve Forest fall under this category. The top canopy is mainly comprised of *Dillenia pentagyna* Roxburgh, *D. indica* Linnaeus, *Shorea robusta* Gaertner f., *Careya arborea* Roxburgh, *Terminalia bellirica* (Gaertner) Roxburgh, *Lagerstroemia parviflora* Roxburgh, *Zanthoxylum rhetsa* DC., *Z. acanthopodium* DC., *Strychnos laurina* Wallich, *Bombax ceiba* Linnaeus, *Kydia calycina* Roxburgh, *Sterculia villosa* Roxburgh, *Dysoxylum gotadhora* (Buchanan-Hamilton) Mabberley, *Toona ciliata* Roemer, *Mangifera sylvatica* Roxburgh, *Spondias pinnata* (Linnaeus f.) Kurz, *Semecarpus anacardium* Linnaeus f., *Lannea coromandelica* (Houttuyn) Merrill, forming canopy zone of 16 – 20 m height. The middle stratum of 10 – 15 metres height is dominated by *Holarrhena pubescens* Wallich ex G. Don, *Oroxylum indicum* (Linnaeus) Kurz, *Albizia lebbek* (Linnaeus) Bentham, *Gmelina arborea* Roxburgh, *Holmskioldia sanguinea* Retzius, *Lantana camara* Linnaeus, *Tephrosia candida* (Roxburgh) de Candolle, *Bischofia javanica* Blume, *Breynia vitis-idaea* (Burman f.) C.E.C. Fischer, *Bridelia retusa* (Linnaeus) A. Jussieu, and *B. stipularis* (Linnaeus) Blume. The ground vegetation is formed by *Rauvolfia serpentina* (Linnaeus) Bentham ex Kurz, *Hedychium spicatum* Smith, *Tacca integrifolia* Ker Gawler, *Musa velutina* Wendland & Drude, *Butomopsis latifolia* (D. Don) Kunth, *Commelina appendiculata* C.B. Clarke, *C. benghalensis* Linnaeus, *C. paludosa* Blume, *C. suffruticosa* Blume, *Cyanotis axillaris* (Linnaeus) D. Don ex Sweet, *Murdannia japonica* (Thunberg) Faden, etc.

4. Savannah/Grassland: This type also occurs in Chirang Reserve Forest. Dry Savannah occupies extensive areas in the Bhabar terraces, and the locations are subject to fierce man-made annual fires. Very scattered and stunted *Careya arborea* Roxburgh, *Bombax ceiba* Linnaeus, *Sterculia villosa* Roxburgh, *Dillenia pentagyna* Roxburgh, *Lagerstroemia parviflora* Roxburgh and occasional *Gmelina arborea* Roxburgh, *Premna bengalensis* C.B. Clarke are the main tree species found in such areas growing in the ocean of grasses. - - Wet Savannah is also found in this area. In such locations, occasionally, trees like *Albizia procera* (Roxburgh) Bentham, *Bischofia javanica* Blume, *Dillenia indica* Linnaeus, *Mallotus repandus* (Willdenow) Müller-Argoviensis and *Bombax ceiba* Linnaeus comes up. Some of the grasses and sedges found in such areas are *Saccharum procerum* Roxburgh, *S. spontaneum* Linnaeus, *Apluda mutica* Linnaeus, *Phragmites karka* (Retzius) Trinius ex Steudel, *Erianthus* spp., *Carex breviculmis* R. Brown, *Kyllinga brevifolia* Rottboell, *C. compactus* Retzius, *C. compressus* Linnaeus, etc.

5. Riverine Forest: This type occurs on riverine accretions both along the river-banks as well as on islands. The type is also found in abandoned and silted-up courses of rivers and streams, away from the present channels. Mixed vegetation of *Typha elephantina* Roxburgh and *Lasia spinosa* (Linnaeus) Thwaites occurring together are rather rare and in such patches *Dalbergia sisso* Roxburgh invariably predominates. In such patches *Dalbergia sisso* Roxburgh invariably predominates. *Acacia catechu* (Linnaeus f.) Willdenow stands persist as isolated groups or as individuals in all stages of the succeeding moist mixed deciduous formation with the grasses (Lahkar *et al.* 2007; Talukdar *et al.* 2007). The dominant species are *Alpinia nigra* (J. Gaertner) Burt, *Amomum aromaticum* Roxburgh, *Lasia spinosa* (Linnaeus) Thwaites, *Typha elephantina* Roxburgh, *Carex breviculmis* R. Brown, *Cheilocostus speciosus* (J. Koenig) C.D. Specht, *Zingiber capitatum* Roxburgh, *Z. zerumbet* (Linnaeus) Roscoe ex Smith, *Phrynium pubinerve* Blume, *Curculigo orchioidea* J. Gaertner, etc.

CONCLUSION

Based on the field observation it may be concluded that the angiospermic floral diversity of Chirang Reserve Forest is very rich and is the home for many threatened plant species of

Assam like *Strychnos laurina* Wallich, *Rauvolfia serpentina* (L.) Bentham *ex* Kurz, *Hedychium spicatum* Buchanan-Hamilton *ex* J.E. Smith, *Tacca integrifolia* Ker Gawler, *Musa velutina* Wendland & Drude, *Butomopsis latifolia* (D. Don) Kunth. But, due to socio-political situation and insurgency problems majority of the areas of Chirang Reserve Forest have been degraded. The situation in the area is far from normal for the last two decades. The forest wealth was virtually looted. During the middle of the last decade, the Sal was slowly replaced by refugee camps of the victims of an ethnic strife. Areas like Bismuri and Karigaon were well inside Chirang Reserve Forest are now free from any forest cover. Rapid reduction in forest cover has also assigned a great threat to the Golden Langurs thriving along the Assam-Bhutan border in Chirang Reserve Forest (Choudhury 2002.). Two rare and up till now unreported butterflies were also sighted in the proposed Ripu-Chirang Wildlife Sanctuary (Choudhury 2010).

Large scale slaughtering of trees and encroachment during the last 10 years has shaken the very existence of the Reserve Forest. So, long term conservation programs are suggested to preserve the valuable species of flora and fauna of Chirang Reserve Forest.

Acknowledgements

The authors are very much thankful to the authority of Forest Department, BTAD, members of Ultapani Biodiversity Conservation Society and local villagers for their cooperation during field visits for this study. Sincere thanks are also given to the Ministry of Environment and Forests, Govt. of India for providing financial assistance during the study.

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