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Research Article

DIVERSITY IN ANGIOSPERM FLORA OF SIJU WILDLIFE SANCTUARY, SOUTH GARO HILLS DISTRICT OF MEGHALAYA, INDIA

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ABSTRACT
Diversity of vascular plants was studied in the Siju Wildlife Sanctuary of Meghalaya, in Northeast India. A total of 257 species of angiosperms comprising 213 genera and 83 families were recorded from 5.20 sq. kms area, between 90-200m altitudes. Of these, Dicotyledons comprise of 67 families, 158 genera and 189 species and monocotyledons comprise of 16 families, 55 genera and 68 species. 12 species of rare occurrence in the state of Meghalaya including 9 species listed under CITES were reported from the sanctuary along with some primitive taxa.

***Keywords**: Angiosperm Diversit, Siju Wildlife Sanctuary, Meghalaya*

INTRODUCTION
The North-Eastern region of India, south of the Brahmaputra River, is part of the globally recognized Indo-Burma biodiversity hotspot and host to a remarkable biodiversity that includes a high proportion of endemic, rare and endangered species (http://www.conservation.org/where/priority_areas/hotspots/asia-pacific/Indo-Burma/Pages/default.aspx). The region is a unique transitional zone between the Indian, Indo-Malayan and Indo-Chinese bio-geographical zones as well as the confluence of the Himalayan region with peninsular India (Rao, 1994). The state of Meghalaya comes under this biodiversity hotspot and lies between 25^0-$26^0$10' N latitude and $89^0$45'-$92^0$45'E longitude, the altitude ranges from 90 m to 1961m, covering 22429 km^2 with 17,321 km^2 area under forest cover (FSI, 2009). This hilly state is bounded on North and East by Assam and on the South and West by Bangladesh. Its varied topography and high annual precipitation makes the state one of the richest biodiversity belt of the region. So far, a total of 3331 plant species are recorded from the state, of which 133 (4%) are confined to 'sacred forests' (Khan, 1997). Several species are in-situ conserved in different protected areas viz. Nokrek Biosphere Reserve, Balphakram National Park, Nongkhyllem and Siju Wildlife Sanctuary and Baghmara Pitcher Plant Wildlife Sanctuary.

As far as the floristic study of the state of Meghalaya is concerned, it is in scattered form. The reports are available through the publication of Hooker (1872-1897) and Kanjilal *et al.,* (1934-1940) till to the recent works to be mentioned as Balakrishnan (1981-83), Joseph (1982), Kumar (1984), Baishya and Rao (1982), Chauhan (1983), Kataki (1973, 1983, 1986), Hajra (1994), Singh and Singh (2003), Pandey *et al.,* (2005), Kumar *et al.,* (2006), Sharma and Borthakur (2010), etc. *Forest Flora of Meghalaya* (Haridasan and Rao, 1985-1987) is the only comprehensive work which dealt with 1150 species of dicots (shrub and tree species) only and left the monocots and herbaceous dicots untouched though they are equally significant. Recently some publications were made on floristic inventory and conservation aspect, the mentionable are Khan *et al.,* (1997), Jamir and Pandey (2003), Lakadong and Barik (2006). In recent years some floristic works initiated to document the flora of protected areas of the state and the *Flora of Nokrek Biosphere Reserve* by one of the authors and his associates (BKS). In continuation to this we have initiated a project to document the floristic diversity of other protected areas particularly in Garo Hills under Approved Research Program of Botanical Survey of India, Eastern Regional Centre, Shillong and the result of the study is presented in present context.

The paper deals with diversity of angiosperms in Siju Wildlife Sanctuary (SWLS) located in the South-Western part of Meghalaya and discussed its importance in conservation of plant diversity.

Study Area

The Siju Wildlife Sanctuary is situated in the South-Western part of Meghalaya. It is 40 Km far from Baghmara, the district head quarter of South Garo Hills distinct, 160 kms from Tura the head quarter of West Garo Hills district and 475 kms from Shillong the capital of the sate of Meghalaya. The Sanctuary lies between 25°25´ to 25°27´ N latitudes and 90°30´ to 90°45´E longitude and spreads over an area of about 5.2 sq. kms. It was declared as 'Wildlife Sanctuary' on 30th March, 1979. The Physiography and Drainage, Geology and Soil, Climate of the sanctuary are briefly discussed bellow.

*Physiography and Drainage***:** Siju Wildlife Sanctuary is a flat plateau along the Simsang River ascending up into steep slopes with scattered pockets of limestone crevices. Altitude varies from 90-200 m above sea level. The southern and western boundary consists of rocky cliffs. In some parts the limestone formations are very beautiful and are enthralling creations of nature. River Simsang, the mightiest of the rivers in Garo Hills, makes its winding course bordering this Sanctuary. Perennial streams like Rongjak Stream, Narambak stream, Dabat stream are found inside the sanctuary area and are west ward bounded till they meet the river Simsang. A smaller lake called Goerapattal Lake is situated at the middle of this hilly sanctuary.

Geology and Soil: The entire part of the SWLS is characterized by deep red clayey soil with light covering of humus. Quartzite and limestone pebbles are found with the soil. There are few caves situated in and around SWLS viz. Matchakol cave, Siju-Bobakkol cave, exhibit limestone formations and give greater details about the changes in soil profile of the area over a period of time in the past.

Climate: SWLS enjoys a tropical climate. The temperature ranges between 37˙ C and 6˙ C. Frost generally occur during the winter months of Dec. and Jan. The weather of the sanctuary can be grouped into three seasons viz. Rainy season (May to Oct.), Dry season (Mar. to Apr.) and Winter season (Nov. to Feb.). During the onset of monsoon (May –Jun.) there are always strong winds.

MATERIALS AND METHODS

The present account on the diversity of angiosperm of Siju Wildlife Sanctuary is based on traditional taxonomic techniques. Extensive collections were made regularly from all parts and corners of the Sanctuary between the months of March 2011 and February 2013. The whole process of collection, pressing and preparation of herbarium specimens were in accordance to the conventional herbarium techniques (Jain and Rao, 1977). The specimens were identified with the help of different floras (Hooker, 1872-1897; Brandis, 1906; Kanjilal *et al.,* 1934-1940; Balakrishnan, 1981-1983; Haridasan and Rao, 1985-1987) and confirmed the identity at ASSAM. The floristic survey followed the System of Bentham and Hooker (1862-1883). The voucher specimens were deposited at ASSAM. Threatened plants found in the sanctuary were recorded based on the published works viz. Myrthong and Rao (1983), Haridasan and Rao (1985-1987), Jamir and Pandey (2003), Rao *et al.,* (2003), Barik *et al.,* (2007), Roy *et al.,* (2012), Singh *et al.,* (2012). The 'Rare' status of threatened plants is used in this paper even though the said status is excluded in the IUCN (2010) categories of threatened plants. Because, there is no any record of recent threat assessment of the plant species which are kept earlier under this status (Rare) of threatened plants in the state of Meghalaya. Nativity of the species was identified based on *Index Kewensis Plantarum Phanerogamarum* (Anonymous, 1883-1970). Species having origin or reported first from Himalayan region and Indian states were considered as native species. The abbreviations used in the text and table is as follows- Afghan: Afghatistan, Afr: Africa, Alp: Alpine, Am: America, Amphig: Amphigaea, App: Appendix, Arab: Arabia, Arch: Archaic, Arct: Arctic, As: Asia, Austr: Australia, Bor: Boreal, Caucas: Caicasus, C/Centr: Central, Calid: Calidonea, Cosmop: Cosmopolitan, et: And, Geront: Gerontia, Himal: Himalaya, Ind: Indian, Ins: Insular, Madag: Madagascar, Molucc: Moluccas, Mongol: Mongolia, Occ: Occidentalis, Or/ Orient: Oriental, Polynes: Polynesia, Subtro: Subtropical, Temp: Temperate, Trop: Tropical.

RESULTS AND DISCUSSION

Forest Types and Species Composition

Tropical Semi-Evergreen Forest: This type of forest occupies the western part of the sanctuary at some height on the eastern bank of Simsang River**.** The trees exhibit distinct zonation with dense herbaceous undergrowth, especially during the rainy season. Some species like *Dillenia pentagyna* Roxb., *Dillenia indica* L., *Callicarpa arborea* Roxb., *Tetrameles nudiflora* R. Br., which are deciduous in nature, are also found in this type of forest. The top canopy composed of *Balakata baccata* (Roxb.) Esser, *Dillenia pentagyna* Roxb., *Dillenia indica* L., *Crypteronia paniculata* Blume, *Helicia nilagirica* Bedd., *Toona ciliata* M. Roem., *Pterospermum acerifolium* Willd., *Schima wallichii* Choisy, etc. While the second layer composed of *Carallia bracheata* (Lour) Merr., *Dysoxylum gotadhora* (Buch.-Ham.) Mabb., *Saraca asoca (Roxb.) Willd., Pterospermum lanceifolium* Roxb., *Streblus ilicifolius* (Vidal) Corner, *Ficus semicordata* Buch.-Ham ex Sm. *Murraya paniculata* (L.) Jack., *Symplocos pyrifolia* Wall. ex G. Don, etc. The shrub layer is composed of *Ardisia paniculata* Roxb., *Chloranthus elatior* Link, *Lepisanthes senegalensis* (Poir.) Leenh., *Micromelum integerrimum* (Buch.-Ham. ex DC.) Wight & Arn. ex M. Roem., *Munronia pinnata* (Wall.) W. Theob., *Stachyphrynium placentarium* (Lour.) Clausager & Borchs., *Leea indica* (Burm. f.) Merr., *Goniothalamus sesquipedalis* (Wall.) Hook. f. & Thomson, *Licuala peltata* Roxb. ex Buch.-Ham., *Phlogacanthus thyrsiformis* (Roxb.) Nees, *Dracaena spicata* Roxb., *Wallichia oblongifolia* Griff., etc. The important herbaceous species were *Homalomena aromatica* (Spreng.) Schott, *Globba spathulata* Roxb., *Ariopsis peltata* Nimmo ex Grah., *Cheilocostus speciosus* (J.König) C.Specht, *Pollia subumbellata* C.B.Clarke, *Molineria capitulata* (Lour.) Herb., *Begonia* spp. *Disporum cantoniense* (Lour.) Merr., *Floscopa scandens* Lour., etc. Amongst the lianas *Teterastigma bracteolatum* (Wall.) Planch., *Tetrastigma thomsonianum* Planch., *Thunbergia alata* Bojer ex Sims, *Cayratia trifolia* (L.) Domin, *Hodgsonia macrocarpa* (Blume) Cogn., *Parabaena sagittata* Miers, etc. were dominant.

Tropical Moist and Dry Deciduous Forest: This type of forest is characterized by seasonal shedding of leaves and profuse flowering. In SWLS the dominant species of this type of forest is *Shorea robusta* Gaertn. which forms the pure belts. The common associate species were *Erythrina stricta* Roxb., *Lagerstroemia parviflora* Roxb., *Duabanga grandiflora* (DC.) Walp., *Macaranga denticulata* (Blume) Müll.Arg., *Ficus racemosa* L., *Ficus hispida* L. f., *Ficus religiosa* L., *Grewia nervosa* (Lour.) Panigrahi, *Schima wallichii* Choisy, *Sterculia villosa* Roxb., *Toona ciliata M. Roem., Hibiscus macrophyllus* Roxb. ex Hornem., etc. The forest under growth is composed of *Phlogacanthus thyrsiformis* (Roxb.) Nees, *Glycosmis pentaphylla* (Retz.) DC., *Clerodendrum infortunatum* L., *Croton caudatus* Geiseler, *Cheilocostus speciosus* (J.König) C. Specht, *Crinum amoenum* Roxb. ex Ker Gawl., *Curcuma angustifolia* Roxb., *Solanum* spp. *Curculigo orchioides* Gaertn., *Urena lobata* L., *Scleria terrestris* (L.) Fassett, *Imperata cylindrica* (L.) Raeusch., etc. The common lianas met in the forest are *Dioscorea bulbifera* L., *Dioscorea pentaphylla* L., *Dioscorea hispida* Dennst., *Mucuna bracteata* Roxb., *Smilax perfoliata* Lour., *Stemona tuberosa Lour*., etc.

Riparian Forest: This type of forest occurs in the semi evergreen zones in the study site along the bank of river Simsang. The characteristic elements of this type of forest were *Dillenia indica* L., *Duabanga grandiflora* (DC.) Walp., *Ficus semicordata* Buch.-Ham ex Sm., *F. racemosa* L., *Trewia nudiflora* L., *Streblus asper* Lour., *Lagerstroemia speciosa* (L.) Pers., *Trema orientalis*, etc. The under growths consists of *Cleome spinosa* Jacq., *Cleome rutidosperma* DC., *Hibiscus surattensis* L., *Rubus ellipticus* Sm., *Crotolaria alata* D. Don, *Osbeckia nutans* Wall. ex C.B. Clarke, *Heliotricum indicum* L., *Synedrella nodiflora* (L.) Gaertn., *Chenopodium ambrosiodes* L., *Cyperus cyperoides* (L.) Kuntze, etc.

*Grassland***:** The grassland of the study site is not complex type. The rolling grass land can be seen in some patches along the Simsang River. The dominant grass and sedge species are *Saccharum arundinaceum* Retz., *Saccharum spontaneum* L., *Imperata cylindrica* (L.) Raeusch., *Bothriochloa bladhii* (Retz.) S.T.Blake, *Paspalum conjugatum* P.J.Bergius, *Cyperus diffuses* Vahl, *Cyperus rotundus* L., etc. Some dicot species like *Hedyotis scandens* Roxb., *Solanum torvum* Sw., *S. anguivi* Lam., *Urena lobata* L., *Heliptropium indicum* L., *Ageratum conyzoides* (L.) L., etc. and ground orchids like *Eulophia graminea* Lindl., were also found in the grass lands.

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Taxonomic Diversity of Angiosperms

A total of 257 species of angiosperms comprising 213 genera and 83 families were recorded from the Siju Wildlife Sanctuary (5.20 sq. kms area, between 90-200 m altitudes) (Table 1). Of these, Dicotyledons comprise of 67 families, 158 genera and 189 species and Monocotyledons comprise of 16 families, 55 genera and 68 species. Among dicotyledons, Polypetalae represents by 73 species, 64 genera and 36 families followed by Gamopetalae with 63 species, 56 genera and 15 families and Monoclamydeae with 53 species, 38 genera and 16 families. The foremost series of Monocotyledones are Glumaceae with 24 species, 20 genera and 2 families followed by Coronarieae (14 species, 10 genera, 4 families), Epigynae (13 species, 10 genera 7 families), Nudiflorae (8 species, 7 genera, and 1 family), Microspermae (7 species, 6 genera, 1 family) and Calycinae (2 species, 2 genera, 1 family) (Table 2).

Families

Total 67 families of dicotyledons and 16 families of monocotyledons were recorded. Forty five families were represented by one genus each, while thirty four families represented one species each. The rest were multi-genera families which contribute to the species richness. The major dominant families were Euphorbiaceae with 15 genera and 17 species followed by Asteraceae with 15 genera and 15 species and Rubiaceae with 13 genera and 13 species among the dicotyledons. Whereas major dominant monocotyledon families were Poaceae with 17 genera and 19 species followed by Araceae with 7 genera and 8 species and Orchidaceae with 6 genera and 7 species. Whereas, Kumar (1984) reported 130 families with 453 genera and 683 species of angiosperms from Balphakram sanctuary (220 sq. Km) which is fifty times larger than the Siju Wildlife sanctuary (5.20 sq. km) in areas. Balakrishnan (1981-1983) and Joseph (1982) reported 165 families with 747 genera and 1516 species from Jowai and vicinity (2000 sq. km) Khasi & Jaintia Hills District and 159 families with 639 genera and 1036 families from Nongpoh and its vicinity (300 sq. km.) Ri-Bhoi District of Meghalaya, India respectively. This observation is in conventionality that the Siju Wildlife sanctuary though smaller in size also larger in floristic diversity.

Genera

Total 213 genera, those of different floristic regions (Takhtajan, 1988) of the world were recorded. *Ficus* was the largest genus with 10 species. Other leading genera are *Smilax* (Tourn.) L. with 5 species and *Cyperus* (Mich.) L., *Solanum* (Tourn.) L., *Dioscorea* Plum. ex L. with 3 species each. Some primitive genera of angiosperms were also encountered in the sanctuary viz. *Chloranthus* Sw. (C. *elatior* Link), *Cryptocarya* R. Br. (*C. amygdalina* Nees), *Goniothalamus* Hook. f. & Thoms. (*G. sesquipedalis* (Wall.) Hook. f. & Thomson), *Tetrameles* R. Br. (T. *nudiflora* R. Br.), *Pycnarrhena* Miers ex Hook. f. Thoms. **(***P. pleniflora* Miers) (Chauhan, 1996; Chowdhery and Murti, 2000).

Habits Diversity

Out of the total recorded Angiosperms, larger and smaller tree species were 73 (28.40%) which contribute to the canopy formation in the forest. Total 58 shrub species were recorded which 22.57% of the total species. Whereas, 73 (28.40%) herbaceous plant species were recorded. There were 29 species (11.30%) of lianas and 24 (9.30%) species of grasses and sedges recorded in the sanctuary.

Nativity

Of the total plants recorded, 78 species were native to Himalayan region and Indian states (44 native to Indian oriental, 2 native to Indian occidental and 32 species native to Himalayan region itself) and 17 species were native to the Himalayan region and other biogeoghraphical regions, together and the remaining species were non-native to the Himalayan region.

Rarity

12 species of angiosperms with rare occurrence in the state Meghalaya were reported including 9 species listed under CITES viz. *Aerides multiflora, Dendrobium aphyllum, D. transparens, Eulophia graminea, Nepenthes khasiana, Nervilia plicata, Pholidata imbricata, Rauvolfia serpentina, Rhynchostylis retusa*. Three plant species were found threatened one of which critically endangered viz. *Streblus ilicifolius* and two endangered viz. *Nepenthes khasiana* and *Rauvolfia serpentina*.

Table 1: List of species recorded in Siju wildlife sanctuary, Meghalaya

Scientific name	Family	Nativity	Habit	Conservation status
Achyranthes aspera L.	Amaranthaceae	Geront Trop	Herb	
Aegle marmelos (L.) Correa in Trans.	Rutaceae	Ind Or	Tree	
Aerides multiflora Roxb.	Orchidaceae	Ind Or	Herb	CITES App.II
Aeschynanthus gracilis Parish ex C.B. Clarke	Gesneriaceae	Ind Or	Herb	
Aeschynanthus parasiticus (Roxb.) Wall.	Gesneriaceae	Ind Or	Herb	
Ageratum conyzoides (L.) L.	Asteraceae	Reg Trop	Herb	
Ainsliaea latifolia (D.Don) Sch.Bip.	Asteraceae	Nepal	Herb	
Alangium chinense (Lour.) Harms	Alangiaceae	Ind Or, Chian, Japan	Tree	
Alpinia malaccensis (Burm.f.) Roscoe	Zingiberaceae	Ind Or, Java	Herb	
Amaranthus viridis L.	Amaranthaceae	Reg Trop	Herb	
Anacardium occidentale L.	Ancardiaceae	Ind Occ	Tree	
Anacolosa ilicoides Masters	Olacaceae	Reg Himal	Tree	
Anaphalis contorta (D.Don) Hook.f.	Asteraceae	Reg Himal	Herb	
Anotis wightiana (Wall. ex Wight & Arn.) Hook. f.	Rubiaceae	Ind Or	Herb	
Aphanamixis polystachya (Wall.) R.Parker	Meliaceae	Ind Or (Assam)	Tree	
Aporosa dioica (Roxb.) Müll.Arg.	Euphorbiaceae	Ind Or	Shrub	
Ardisia involucrata Kurz	Myrsinaceae	Reg Himal	Shrub	
Ardisia paniculata Roxb.	Myrsinaceae	Ind Or	Tree	
Argyreia roxburghii (Wall.) Arn. ex Choisy	Convulvulaceae	Ind Or	Climber	
Ariopsis peltata Nimmo ex Grah.	Araceae	Reg Himal	Herb	Rare
Arisaema album N.E.Br.	Araceae	Siam	Herb	
Arisaema consanguineum Schott	Araceae	Reg Himal	Herb	
Artemisia nilagirica (C. B. Clarke) Pamp.	Asteraceae	Reg Temp Bor	Shrub	
Artocarpus heterophyllus Lam.	Moraceae	Ind Or, Malaya	Tree	
Arundinella setosa Trin.	Poaceae	Nepal	Grass	
Asparagus racemosus Willd.	Liliaceae	Ind Or, Afr Trop, Austra	Climber	
Atalantia simplicifolia (Roxb.) Engl.	Rutaceae	Malaya	Shrub	
Baliospermum solanifolium (Burm.) Suresh	Euphorbiaceae	Ind Or, Malaya	Shrub	
Bauhinia khasiana Baker	Caesalpiniaceae	Ind Or	Climber	
Begonia hatacoa Buch.-Ham. ex D. Don	Begoniaceae	Nepal	Herb	Rare

Begonia palmata D. Don	Begoniaceae	Reg Himal, Burma, China	Herb
Bidens pilosa L.	Asteraceae	Ind Occ, Am Austr	Herb
Boehmeria glomerulifera Miq.	Urticaceae	Ind Or; Malaya	Shrub
Boehmeria macrophylla Hornem.	Urticaceae	Reg Himal; Burma	Shrub
Bothriochloa bladhii (Retz.) S.T.Blake	Poaceae	Afr Bor, Ind Or, Austra	Grass
Calliandra umbrosa (Wall.) Benth.	Mimosaceae	Ind Or, Penang	Tree
Callicarpa arborea Roxb.	Verbenaceae	As Trop	Tree
Callicarpa rubella Lindl.	Verbenaceae	Reg Himal, China	Shrub
Canthium angustifolium Roxb.	Rubiaceae	Ind Or (Assam, Bengal)	Shrub
Carallia brachiata (Lour.) Merr.	Rhizophoraceae	As et Austr Trop	Tree
Cayratia trifolia (L.) Domin	Vitaceae	As et Austr Trop	Climber
Centella asiatica (L.) Urb.	Apiaceae	Reg Trop et Subtrop	Herb
Chaetocarpus castanocarpus (Roxb.) Thwaites	Euphorbiaceae	Ind Or, Malaya	Tree
Cheilocostus speciosus (J.König) C.Specht	Costaceae	Ind Or, Malaya	Herb
Chenopodium ambrosiodes L.	Chenopodiaceae	Reg Temp et Trop	Herb
Chloranthus elatior Link	Chloranthaceae	Ind Or, Malaya	Shrub
Chromolaena odorata (L.) R.M.King & H.Rob.	Asteraceae	Am Trop	Shrub
Cinnamomum bejolghota (Buch.-Ham.) Sweet.	Lauraceae	C Jussieui	Tree
Cleome rutidosperma DC.	Cleomaceae	Ind Occ	Herb
Cleome spinosa Jacq.	Cleomaceae	Am Austr	Shrub
Clerodendrum infortunatum L.	Verbenaceae	Ind Or, Arch Malaya	Shrub
Clerodendrum bracteatum Wall. ex Walp.	Verbenaceae	Reg Himal	Shrub
Colocasia esculenta (L.) Schott	Araceae	As Trop	Herb
Commelina paludosa Blume	Commelinaceae	Burma	Herb
Conyza bonariensis (L.) Cronquist	Asteraceae	Am Austr	Herb
Crassocephalum crepidioides (Benth.) S. Moore	Asteraceae	Afr Trop	Shrub
Crinum amoenum Roxb. ex Ker Gawl.	Amaryllidaceae	Ind Or (Silhet)	Herb
Crotalaria alata D.Don	Fabaceae	As Trop	Shrub
Croton caudatus Geiseler	Euphorbiaceae	Ind Or	Shrub
Crypteronia paniculata Blume	Crypteroniaceae	Java	Tree
Cryptocarya amygdalina Nees	Lauraceae	Reg Himal	Tree
Curculigo orchioides Gaertn.	Hypoxidaceae	As Trop	Herb

Curcuma angustifolia Roxb.	Zingiberaceae	Reg Himal	Herb	Near threatened
Cynodon dactylon (L.) Pers.	Poaceae	Cosmop	Grass	
Cyperus rotundus L.	Cyperaceae	Cosmop	Grass	
Cyperus cyperoides (L.) Kuntze	Cyperaceae	Reg Trop	Grass	
Cyperus diffusus Vahl	Cyperaceae	Reg Trop	Grass	
Cyrtococcum oxyphyllum (Steud.) Stapf	Poaceae	Java	Grass	
Dalbergia rimosa Roxb.	Fabaceae	Reg Himal	Tree	
Dendrobium aphyllum (Roxb.) C.E.C.Fisch.	Orchidaceae	Reg Himal	Herb	CITES App.II
Dendrobium transparens Wall. ex Lindl.	Orchidaceae	Reg Himal	Herb	
Dendrocalamus hamiltonii Nees & Arn. ex Munro		Reg Himal	Grass	
Dendrocalamus strictus (Roxb.) Nees	Poaceae	Ind Or	Grass	
Desmodium gangeticum (L.) DC.	Fabaceae	As Trop, Austr	Shrub	
Desmos longiflorus (Roxb.) Safford.	Annonaceae	Reg Himal	Tree	
Dichanthium annulatum (Forsk.) Stapf	Poaceae	Afr Bor, Ind Or, Austr	Grass	
Dichrocephala integrifolia (L.f.) Kuntze	Asteraceae	Ind	Herb	
Digitaria cruciata (Nees) A.Camus	Poaceae	Am. Austr	Grass	
Dillenia indica L.	Dilleniaceae	As Trop	Tree	
Dillenia pentagyna Roxb.	Dilleniaceae	Ind Or	Tree	
Dioscorea bulbifera L.	Dioscoreaceae	As Trop	Climber	
Dioscorea hispida Dennst.	Dioscoreaceae	Ind Or	Climber	
Dioscorea pentaphylla L.	Dioscoreaceae	As Trop	Climber	
Diospyros lanceifolia Roxb.	Ebinaceae	Ind Or, Burma	Tree	
Disporum cantoniense (Lour.) Merr.	Liliaceae	Ind Or, Java, China	Herb	
Dracaena angustifolia (Medik.) Roxb.	Agavaceae	Ind Or, Malaya	Herb	
Dracaena spicata Roxb.	Agavaceae	Ind Or	Herb	
Duabanga grandiflora (DC.) Walp.	Sonneratiaceae	Ind Or	Tree	
Dysoxylum gotadhora (Buch.-Ham.) Mabb.	Meliaceae	Ind Or	Tree	
Elaeocarpus floribundus Blume	Elaeocarpaceae	As Trop	Tree	
Elatostema integrifolium (D.Don) Wedd.	Urticaceae	Ind Or, Malaya	Shrub	
Eleusine indica (L.) Gaertn.	Poaceae	Cosmop Trop et Subtrop	Grass	
Engelhardtia spicata Lechen ex Blume	Juglandaceae	Reg Himal, Malaya	Tree	
Erigeron linifolius Willd.	Asteraceae	Reg calid	Herb	
Erythrina stricta Roxb.	Fabaceae	Ind Or	Tree	

Eulophia graminea Lindl.	Orchidaceae	Ind Or, Malaya	Herb	CITES App.II
Eurya japonica Thunb.	Theaceae	Japan	Tree	
Evolvulus nummularius (L.) L.	Convulvulaceae	Amphig Trop	Herb	
Excoecaria oppositifolia Griff.	Euphorbiaceae	Reg Hiaml	Shrub	
Ficus auriculata Lour.	Moraceae	As Trop	Tree	
Ficus benghalensis L.	Moraceae	Ind Or, Afr Trop	Tree	
Ficus glaberrima Blume	Moraceae	As Trop, Malaya	Tree	
Ficus heterophylla L.f.	Moraceae	As Trop	Tree	
Ficus hirta Vahl	Moraceae	As Trop, Malaya	Tree	
Ficus hispida L. f.	Moraceae	As et Austra Trop	Tree	
Ficus lamponga Miq.	Moraceae	Ind Or	Tree	
Ficus racemosa L.	Moraceae	Ind Or, Burma	Tree	
Ficus religiosa L.	Moraceae	Ind Or	Tree	
Ficus semicordata Buch.-Ham ex Sm.	Moraceae	Nepal	Tree	
Floscopa scandens Lour.	Commelinaceae	As et Austra Trop	Herb	
Garberia heterophylla Merr. & F.Harper	Asteraceae	USA (Florida)	Herb	
Garcinia mangostana L.	Clusiaceae	Ins. Molucc	Tree	
Garcinia sopsopia (Buch.-Ham.) Mabb.	Clusiaceae	Ind Or	Tree	
Glinus oppositifolius (L.) Aug.DC.	Molluginaceae	Geront Trop	Herb	
Globba spathulata Roxb.	Zingiberaceae	Ind Or (Assam)	Herb	
Glochidion multiloculare (Rottler ex Willd.) Voigt	Euphorbiaceae	Ind Or	Shrub	
Glycosmis pentaphylla (Retz.) DC.	Rutaceae	As Trop, Austr	Shrub	
Gmelina arborea Roxb.	Verbenaceae	Ind Or, Malaya	Tree	
Gnaphalium luteo-album L.	Asteraceae	Cosmop	Herb	
Goniothalamus sesquipedalis (Wall.) Hook. f. & Thomson	Annonaceae	Reg Himal, Burma	Shrub	
Grewia nervosa (Lour.) Panigrahi	Tiliaceae	As Trop	Tree	
Hedyotis scandens Roxb.	Rubiaceae	Ind Or (Assam)	Shrub	
Helicia nilagirica Bedd.	Proteaceae	Ind Or	Tree	
Heliotropium indicum L.	Boraginaceae	Geront Trop	Shrub	
Hevea brasiliensis (Willd. ex A. Juss.) Müll. Arg	Euphorbiaceae	Bras	Tree	
Hibiscus macrophyllus Roxb. ex Hornem.	Malvaceae	Ind Or, Burma, Malaya	Tree	
Hibiscus surattensis L.	Malvaceae	Geront Trop	Shrub	
Hodgsonia macrocarpa (Blume) Cogn.	Cucurbitaceae	Reg Himal, Burma, Malaya	Climber	
Homalomena aromatica (Spreng.) Schott	Araceae	Ind Or, Malaya	Herb	

Homonoia riparia Lour.	Euphorbiaceae	Cochinch	Shrub
Imperata cylindrica (L.) Raeusch.	Poaceae	Reg Calid	Grass
Itea macrophylla Wall.	Saxifragaceae	Reg Himal	Tree
Ixora nigricans R.Br. ex Wight & Arn.	Rubiaceae	Ind Or, Malaya	Shrub
Jatropha gossypiifolia L. i	Euphorbiaceae	Am et Afr Trop	Shrub
Justicia gendarussa Burm. f.	Acanthaceae	As Trop	Herb
Lagerstroemia parviflora Roxb.	Lythraceae	Ind Or	Tree
Lagerstroemia speciosa (L.) Pers.	Lythraceae	As Trop	Tree
Lasia spinosa (L.) Thwaites	Araceae	As Trop	Herb
Leea indica (Burm. f.) Merr.	Leeaceae	Bengal, Burma, Malaya	Shrub
Lepidagathis incurva Ham. ex D. Don	Acanthaceae	As Trop	Herb
Lepisanthes senegalensis (Poir.) Leenh.	Sapindaceae	Afr Trop	Shrub
Licuala peltata Roxb. ex Buch.-Ham.	Arecaceae	Ind	Shrub
Lindernia crustacea (L.) F.Muell.	Scrophulariaceae	Cosmop Trop	Herb
Lippia javanica (Burm.f.) Spreng.	Verbenaceae	Java	Shrub
Lithocarpus elegans (Blume) Hatus. & Soepadmo	Fagaceae	Reg Himal, Malaya	Tree
Lithocarpus thomsonii (Miq.) Rehder	Fagaceae	Reg Himal	Tree
Loranthus scurrula L.	Loranthaceae	Ind Or, Malaya	Herb
Luculia pinceana Hook.	Rubiaceae	Reg Himal	Tree
Macaranga denticulata (Blume) Müll.Arg.	Euphorbiaceae	Reg Himal, Malaya	Tree
Maesa indica (Roxb.) A. DC.	Myrsinaceae	Ind Or, Malaya	Shrub
Maesa montana A. DC.	Myrsinaceae	Reg Himal	Shrub
Mallotus albus (Roxb. ex Jack) Müll.Arg.	Euphorbiaceae	Reg Himal	Tree
Mallotus roxburghianus Muell.-Arg.	Euphorbiaceae	Reg Himal, Burma	Tree
Melastoma malabathricum L.	Melastomataceae	Ind Or, Malaya	Shrub
Melocanna baccifera (Roxb.) Kurz	Poaceae	Burma	Grass
Merremia umbellata (L.) Hallier f.	Convulvulaceae	Mexico	Climber
Micromelum integerrimum (Buch.-Ham. ex DC.) Wight & Arn. ex M. Roem.	Rutaceae	As Trop, Ins Pacif	Shrub
Mikania micrantha Kunth	Asteraceae	Am Calid	Climber
Mimosa pudica L.	Mimosaceae	Bras	Herb
Molineria capitulata (Lour.) Herb.	Hypoxidaceae	As Trop, Austr	Herb

Morinda angustifolia Roxb.	Rubiaceae	Ind Or	Shrub	
Mucuna bracteata Roxb.	Fabaceae	Reg Himal, Burma	Climber	
Munronia pinnata (Wall.) W. Theob.	Meliaceae	Ins Timor	Shrub	Rare
Murraya paniculata (L.) Jack.	Rutaceae	As et Austr Trop, Polynes	Tree	
Mycetia longifolia (Wall.) O. Kuntze	Rubiaceae	Ind Or	Shrub	
Nepenthes khasiana Hook. f.	Nepenthaceae	Reg Himal	Climber	Endangered, CITES App.I
Nervilia plicata (Andrews) Schltr.	Orchidaceae	Ind Or	Herb	CITES App.II
Ophiopogon japonicus (Thunb.) Ker Gawl.	Liliaceae	Japan	Herb	
Osbeckia nutans Wall. ex C.B. Clarke	Melastomataceae	Reg Himal	Herb	Rare
Paederia foetida L.	Rubiaceae	Indo Or, Malaya	Climber	
Parabaena sagittata Miers	Menispermaceae	Reg Himal, Burma	Climber	
Paspalum conjugatum P.J.Bergius	Poaceae	Reg Trop	Grass	
Pavetta indica L.	Rubiaceae	As et Austr Trop	Shrub	
Peliosanthes griffithii Baker	Liliaceae	Reg Himal	Herb	
Pennisetum glaucum (L.) R.Br.	Poaceae	Europ.; As. temp	Grass	
Pericampylus glaucus (Lam.) Merr.	Menispermaceae	Ins. Molucc	Climber	
Persicaria hydropiper (L.) Delarbre	Polygonaceae	Reg Temp Bor et Austr	Herb	
Phlogacanthus thyrsiformis (Roxb.) Nees	Acanthaceae	Ind Or (Bengal)	Shrub	
Phoebe lanceolata (Nees) Nees	Lauraceae	Ind Or, Burma	Tree	
Pholidota imbricata Lindl.	Orchidaceae	Ind Or	Herb	CITES App.II
Phragmites karka (Retz.) Trin. ex Steud.	Poaceae	As Trop, Austr	Grass	
Phyllanthus cochinchinensis Spreng.	Euphorbiaceae	Cochinch	Herb	
Phyllanthus reticulatus Poir.	Euphorbiaceae	Geront Trop	Shrub	
Physalis minima L.	Solanaceae	Geront Trop	Herb	
Piper nigrum L.	Piperaceae	Ind Or, Malaya	Climber	
Piper pedicellosum Wall.	Piperaceae	Singapore	Climber	
Plantago erosa Wall.	Plantaginaceae	Nepal	Herb	
Pollia subumbellata C.B.Clarke	Commelinaceae	Reg Himal	Herb	
Potentilla indica (Andrews) Th. Wolf	Rosaceae	Ind Or, Malaya, China	Herb	
Pothos chinensis (Raf.) Merr.	Araceae	Ind Or, Malaya, China	Herb	
Pseodoeranthemum palatiferum (Nees) Redlk.	Acanthaceae	Reg Himal	Shrub	

Psilanthus bengalensis (Roxb. ex Schult.) J.-F.Leroy	Rubiaceae	Ind Or (Bengal)	Shrub	
Pterospermum acerifolium (L.) Willd.	Sterculiaceae	Ind Or, Java	Tree	
Pterospermum lanceifolium Roxb.	Sterculiaceae	Ind Or	Tree	
Pycnarrhena pleniflora Miers	Menispermaceae	Reg Himal	Climber	
Pycreus pumilus (L.) Nees	Cyperaceae	Ind Or	Grass	
Randia fasciculata DC	Rubiaceae	Reg Himal, Burma	Shrub	
Rauvolfia serpentina (L.) Benth. ex Kurz	Apocynaceae	Indo Or, Java	Shrub	Endangered, CITES App.II
Rhaphidophora decursiva (Roxb.) Schott	Araceae	Ind Or	Climber	
Rhynchostylis retusa (L.) Blume	Orchidaceae	Ind Or, Malaya	Herb	CITES App.II
Rubus calycinus Wall. ex D. Don	Rosaceae	Reg Himal	Herb	
Rubus ellipticus Sm.	Rosaceae	Ind Or	Shrub	
Rumex maritimus L.	Polygonaceae	Reg Temp et Subtrop	Herb	
Saccharum arundinaceum Retz.	Poaceae	Ind Or, China	Grass	
Saccharum spontaneum L.	Poaceae	Geront Trop	Grass	
Sapium baccatum Roxb.	Euphorbiaceae	As Trop	Tree	
Saprosma ternatum (Wall.) Hook.f.	Rubiaceae	Reg Himal, Burma	Shrub	
Saraca asoca (Roxb.) Willd.	Caesalpiniaceae	Ind Or, Malaya	Tree	Rare
Sarcochlamys pulcherrima Gaudich.	Urticaceae	Ind Or, Malaya	Shrub	
Saurauia napaulensis DC.	Actinidiaceae	China	Tree	
Sauropus trinervis Hook.f. & Thomson ex Müll.Arg.	Euphorbiaceae	Reg Himal	Shrub	
Schima wallichii Choisy	Theaceae	Reg Himal, Malaya	Tree	
Schizostachyum helferi (Munro) Majunder	Poaceae	Burma	Grass	
Scleria terrestris (L.) Fassett	Cyperaceae	Ind Or	Grass	
Scoparia dulcis L.	Scrophulariaceae	Reg Trop	Herb	
Scutellaria discolor Colebr.	Lamiaceae	Ind Or, Burma, Java	Herb	
Senna tora (L.) Roxb.	Caesalpiniaceae	Cosmop Trop	Shrub	
Setaria pumila (Poir.) Roem. & Schult.	Poaceae	Mexico	Grass	
Shorea robusta Gaertn.	Dipterocarpaceae	Ind Or	Tree	
Sida cordifolia L.	Malvaceae	Reg trop	Shrub	
Smilax lanceifolia Roxb.	Smilacaceae	Reg Himal, China	Climber	
Smilax ocreata A.DC.	Smilacaceae	Reg Himal, Malaya	Climber	
Smilax orthoptera A.DC.	Smilacaceae	Reg Himal	Climber	
Smilax oxyphylla Wall. ex Kunth	Smilacaceae	Reg Himal	Climber	

Smilax perfoliata Lour.	Smilacaceae	Cochinch	Climber	
Solanum anguivi Lam.	Solanaceae	Madag	Herb	
Solanum nigrum L.	Solanaceae	Amphigaea	Herb	
Solanum torvum Sw.	Solanaceae	Cosmop Trop	Herb	
Solena amplexicaulis (Lam.) Gandhi	Cucurbitaceae	Ind Or	Climber	
Spilanthes acmella (L.) Murray	Asteraceae	Cosmop Trop et Subtrop	Herb	
Stachyphrynium placentarium (Lour.) Clausager & Borchs.	Marantaceae	Ind Or, Malaya	Herb	
Stachytarpheta jamaicensis (L.) Vahl	Verbenaceae	Cosmop Trop	Shrub	
Stemona tuberosa Lour.	Stemonaceae	As Trop	Herb	Rare
Stephania japonica (Thunb.) Miers	Menispermaceae	As Trop	Climber	
Sterculia villosa Roxb.	Sterculiaceae	Ind Or	Tree	
Streblus asper Lour.	Moraceae	As Trop	Tree	Rare
Streblus ilicifolius (Vidal) Corner	Moraceae	Ins Philip	Tree	Critically endangered
Streptolirion volubile Edgew.	Commelinaceae	Reg Himal	Herb	
Symplocos pyrifolia Wall. ex G. Don	Symplocaceae	Ind Or (Silhet)	Tree	
Synedrella nodiflora (L.) Gaertn.	Asteraceae	Am Trop	Herb	
Syzygium cumini (L.) Skeels	Myrtaceae	As et Austr Trop	Tree	
Tabernaemontana divaricata (L.) R.Br. ex Roem. & Schult.	Apocynaceae	Ind Or	Shrub	
Tamarindus indica L.	Caesalpiniaceae	As et Afr Trop	Tree	
Tectona grandis L.f.	Verbenaceae	Ind Or, Burma	Tree	
Teterastigma bracteolatum (Wall.) Planch.	Vitaceae	Reg Himal	Climber	
Tetrameles nudiflora R. Br.	Tetramelaceae	Ind Or, Malaya	Tree	
Tetrastigma thomsonianum Planch.	Vitaceae	Silhet	Climber	
Thottea tomentosa (Blume) Ding Hou	Aristolochiaceae	Ind Or, Malaya	Shrub	Rare
Thunbergia alata Bojer ex Sims	Acanthaceae	Afr Trop, Ind Or	Climber	
Thysanolaena latifolia (Roxb. ex Hornem.) Honda	Poaceae	Ind Or	Grass	
Toona ciliata M. Roem.	Meliaceae	Malaya, Austr	Tree	
Trema orientalis (L.) Blume	Ulmaceae	Geront Trop	Tree	
Trewia nudiflora L.	Euphorbiaceae	As Trop	Tree	
Urena lobata L.	Malvaceae	Cosmop Trop	Shrub	
Wallichia oblongifolia Griff.	Arecaceae	Reg Himal	Shrub	
Walsura robusta Roxb.	Meliaceae	Reg Himal; Burma	Tree	
Wendlandia wallichii Wight & Arn.	Rubiaceae	Reg Himal	Tree	

Table 2: **Taxonomic diversity of Angiosperms in Siju Wildlife Sanctuary, Meghalaya**

Angiosperms	Groups	Series	Genera	Species	Families
Dicotyledones	Polypetalae	Thalamiflorae	20	25	12
		Disciflorae	16	17	7
		Calyciflorae	28	31	17
	Gamopetalae	Inferae	28	28	2
		Heteromerae	4	6	3
		Bicarpellatae	24	29	10
	Monochlamydeae	Curvembryeae	5	5	3
		Multiovulatae Aquaticae	0	0	0
		Multiovulatae Terestres	2	2	2
		Micrembryeae	2	3	2
		Daphnales	4	4	2
		Achlamydosporeae	1	1	1
		Unisexuales	24	38	6
		Ordines Anomali	0	0	0
Monocotyledones		Microspermae	6	7	1
		Epigynae	10	13	7
		Coronarieae	10	14	4
		Calycinae	2	2	1
		Nudiflorae	7	8	1
		Apocarpeae	0	0	0
		Glumaceae	20	24	2

An overall analysis of the findings of the work authenticated the possession of a rich botanical wealth in Siju Wildlife Sanctuary, which re-emphasized this protected area as a treasure house of plants. It is playing a vital role in conservation of biodiversity, though smaller in size as it harbours a good number of angiosperm including 12 species with rare occurrence. Total 9 species included in CITES are also recorded from the sanctuary, of which 2 viz. *Nepenthes khasiana* and *Rauvolfia serpentina* are negative listed medicinal plants of India (Selvam, 2012). From the local inhabitants it is known that during last few decades the human interference in this forest patches has been gradually increased. From the field observation it is noticed that illicit cutting of trees, stone queering, extraction of valuable plant and plant products are some of the major threats to the plant diversity of the sanctuary. So for an effective conservation of the biodiversity, the local people to be educate on the importance of conservation and protection of environment so that they can willingly participate in conservation.

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