Role of Traditional Institutions in Conservation of Plant Diversity in Meghalaya, Northeast India

Aabid Hussain Mir[1]*, Gunjana Chaudhury[1] and Krishna Upadhaya[2]

[1]Department of Environmental Studies, North-Eastern Hill University, Shillong-793022, Meghalaya, India
[2]Department of Basic Sciences and Social Sciences, North-Eastern Hill University, Shillong-793022, Meghalaya, India
***Corresponding author: aabidm4@gmail.com**

Abstract
The current paper highlights the role of conventional institutions in the conservation and management of plant diversity in Meghalaya, Northeast India. In the state, conventional institutions have developed an effective way of managing and conserving the plant diversity by classifying their forests into different categories such as, private forests, village forests, sacred forests and reserve/restricted forests. The management practices and use regime in each forest type varies and ranges from a higher degree of protection to low level of protection. These patches of forests are in vogue since times immemorial, are very rich in diversity and contain many primary species due to their antiquity in origin. This management system has helped in conservation of 3128 flowering plants of the state, of which 548 species are endemic and 834 are used in traditional herbalism. These forests are home to about 363 rare and threatened plant species and are possibly the last refuge for those vulnerable species. This system of management has not only helped in conserving the plant diversity, but has also ensured its sustainable use and has been regarded as a source of common good and safety net for the local people. During last few years, the changes in socio-cultural and religious attitude in local communities has led to shrinking of these forests which has put a major challenge to management institutions for the effective conservation of these forests.
Keywords: Community forest, conservation, endemic, sacred groove, threatened.

Introduction

The global indigenous population of approximately 300 million people is composed of about 5,000 distinct ethnic cultures worldwide, living in various climates, from the Arctic circle to the tropical rain forests. Although indigenous people make up only 4% of the world's population, but they represent 95% of the world's cultural diversity (WRI, 2005). It has been estimated that as much as 85% of the world's protected areas are inhabited by the indigenous people (IUCN/WCPA, 2004). Traditional indigenous territories encompass up to 22% of the world's land surface and they coincide with areas that hold 80% of the planet's biodiversity (White *et al.*, 2004). These ethnic people have developed a traditional knowledge system

which helps them to live in the close vicinity of forests along with the management and conservation of the biodiversity of their localities (Mir and Upadhaya, 2017). This conservation and management of biodiversity is mutual, where the indigenous people get the resources to live (shelter, food, fodder etc.), which in turn helps the biodiversity to conserve and flourish (Tiwari *et al.,* 1998). Studies have found that many areas inhabited by the indigenous people coincide with some of the world's remaining major concentrations of biodiversity (Parrotta and Agnoletti, 2007). This convergence of biodiversity-significant areas with indigenous territories presents an enormous opportunity to expand biodiversity conservation efforts beyond national parks and reserves.

Northeast India is a part of Indo-Burma hotspot and is rich in both the plant and cultural diversity (Tiwari *et al.,* 1998). At least two-thirds of the region's forests are official under the legal authority of Autonomous District Councils, and are controlled and managed by rural people. Indigenous Cultural Institutions (ICIs) such as village councils, chieftainships and councils of elders have been acting as stewards for protecting their forest resources. Same is the case in the state of Meghalaya which is rich in bio- and ethnic diversity (Tiwari *et al.,* 2010). Therefore, the current review was prepared to study the role of these conventional institutions in the conservation of plant diversity in the state.

Material and Methods

Study area

The state of Meghalaya is a part of Northeast India, covering an area of 22,429 km^2 and constitutes 0.7% of the total geographical area of the country (**Figure 1**). The State comprises of 11 districts inhabited by three tribes viz., Khasis, Jaintias, and Garos, with a total population of 29,64,007 (Census, 2011). Biogeographically, the state forms the part of Indo-Burma hot spot and is a connecting place of Paleo-Arctic, Indo-Malayan and Indo-Chinese biogeographic realms. The climate varies from Eastern to Western parts of the state, depending upon altitude and topography. The overall climate of the area can be divided into four seasons i.e., winter (December-February), spring (March-May), rainy (June-August) and autumn (September-November). The average maximum and minimum temperatures are 22°C (June-July) and 8°C (January-February). The state owing to the diverse ecological conditions such as wide variation in rainfall, temperature, altitude as well as soil conditions support luxuriant growth of different types of vegetation, viz., tropical evergreen, tropical semi-evergreen, tropical moist and dry deciduous, subtropical broad leaved hill forests, subtropical pine forests, temperate forests and grasslands (Champion and Seth, 1968).

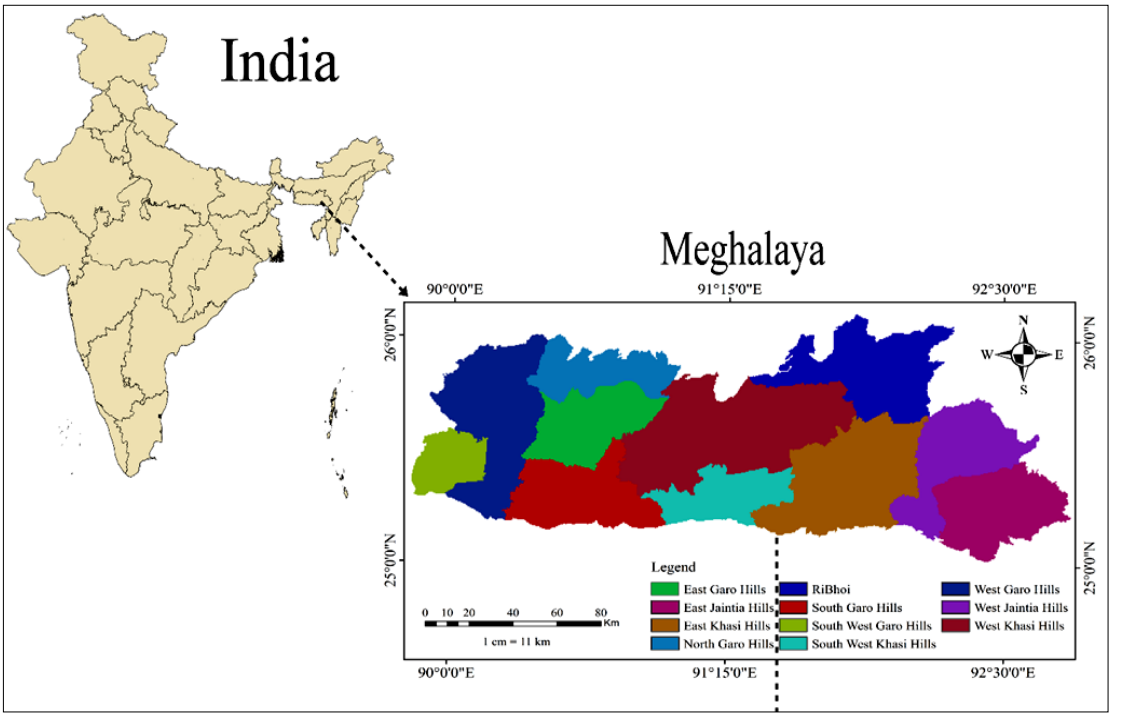

Figure 1. Map showing the study area

Methodology

In order to conduct the study, published literature in scientific journals, books, reports from national, regional and international organizations, thesis and conference papers regarding the traditional institutions, community forests and plant diversity in community managed forests of Meghalaya were consulted. Along with the secondary data, field visits and personal interactions with village heads were also carried out. Information was collected regarding plant diversity in forests and the processes of management system in these forests. Under rare category, only those species were considered, which have decreased their range of occurrence and are represented by very low populations in the state (Haridasan and Rao, 1985, 1987; Nayar and Sastry, 1990; Walter and Gillett, 1998). Species, whose distributions are restricted to Meghalaya or to the North-eastern region including Indo-Burma hotspot, were considered as endemic. Threatened category includes plants classified by IUCN Red List.

Results and Discussion

Traditional Institutions

It was observed that there are mainly three traditional institutions associated with the three major ethnic tribal groups namely, the Khasis, Jaintias and Garos in Meghalaya. In a typical Khasi community, the larger territory base is known as 'Hima' which is under the control of

'Syiem' who is also the head of the Hima. The Hima covers a number of villages, each having a different village council. The head of the village council is known as Rangboh Shnong, Sordar or Myntri Shnong who is in-charge for governance of forests and other common property of the village. Associated with the Headmen are the 'village Secretaries' who keep record of all the works done for the welfare of the particular village and in the absence of the headman takes the charge of administration. These councils or Durbars play an administrative role in issues of common interest such as sanitation, forests, water supply, health, roads, education and conflict resolution. A smaller unit consists of several clans, where there is the 'Clan Chief' who controls and functions within clan affairs regarding matters concerning the village. The supreme authority of the Jaintias is the 'Syiem' who is the head of congregation of Jaintia villages known as 'Raids', headed by 'Dolois'. The Dolois are responsible for performing the executive, magisterial, religious and ceremonial functions at the Raid level. In Garos, the clan is controlled mainly by a lady king, locally called 'Nokma'. The decision regarding the land use, selling of land etc. are made by 'Chra' (maternal uncle and brothers of the Nokma) and 'Mahari' (consists of the members closely related through common motherhood) (Sarma, 2015).

Forest classification and administration

Meghalaya has a total forest area of 15657 km^2, where only 1027.20 km^2 is under the control of State Forest Department (Forest and Environment Department, 2016). Rest of the area (14630 km^2) is either private or clan/community owned and is under the indirect control and management of the Autonomous District Councils (Forest and Environment Department, 2016). The overview of management, degree of protection and forest access in community managed forests of Meghalaya is given in **Table** 1. The traditional institutions have classified their forest resources into different categories according to their use value and conservation which are discussed as under:

Private forests: These forests belong to an individual or clan or joint clans, which are raised or inherited by him/ them. These forests are managed by the owner as per their needs and requirements who can always extract various timber and non-timber products from there. They can also convert the land into different land use like agricultural, residential and others. These forests are having less importance from the conservation point of view.

Clan forests: These include the forest patches which are owned and managed by a group of clans. All members of the clan are entitled to get a share of the benefits which are derived from the use of these forests. Whole clan jointly manages the forests and decisions regarding these forests are dealt with by the clan council. Some of the clan forests are well protected and are rarely converted to other land use. Some clan forests are considered as sacred as well (e.g sacred clan forest of Swakpoh Wanninag at SW Khasi hills).

Group of village foressts: These forests are looked after by the heads of the raid (cluster of villages) and are under the management of the local administrative heads. These forest patches are usually large in size and are stretched on more than one village. These forests are managed by a council comprising the head of the group of villages and the headmen of all the villages within the territory. Here all people within the Raid have a free access to the forest resources from collection of timber to non-timber forest products. Therefore, these types are playing an important role in terms of livelihood of the local people who are dependent on the forest produce for their survival.

Village forests: Unlike Law Raid, these forests belong to and are the common property of a particular village. They are usually set aside to meet genuine needs of the villagers and are under the control and management of the village council. All the villagers can collect both timber and non-timber forest products (NTFPs) from these forests without any restrictions.

Village restricted forests: This category includes the forests which are similar to village forests but are having a higher degree of protection and full access to forest resources is restricted by village council. These forests are usually protected for ecological purposes like watershed management, conservation and access to fresh air. Extraction of timber is usually restricted but there are no restrictions for NTFPs that can be extracted without affecting the health of the forest. Extraction of timber from these forests is allowed only when acute needs arise such as for constructing houses for the poor and needy, for funerals and for construction of community structures in the case of natural calamities. Sometimes, the larger trees are sold out for the revenue generations and the funds are utilized for the welfare of the village. Such type of the land is non sellable and can't be converted to other land use.

Sacred forests**:** These forests include areas recognized as sacred by indigenous peoples as well as recognized by institutionalized religions or faiths as places for worship and remembrance. These areas are left untouched by the local inhabitants and the extraction of any forest produce is banned. These spiritual ties with prime patches of forests ensured not only the long-term subsistence interest of local people but also protected the dynamics of local ecosystems, therefore recognized as one of the most efficient and sustainable use of natural resources by modern scientific community (Ray and Ramachandra, 2010).

There are large numbers of forests in the state belonging to the above categories. The sacred groves are found in all the districts of the state and cover an approximate area of 1000 .km^2. Tiwari *et al*. (1999) have documented 8 sacred groves in East Garo Hills, 8 in West Garo Hills, 3 in Ri-Bhoi, 32 in the East Khasi Hills, 13 in the West Khasi Hills and 15 in the Jaintia Hills district. Though the exact number of reserved and village forests is not known, Mir (2018) has recorded 50 reserved forests and about 100 village forests in Khasi Hills.

Table 1: Management institution, degree of protection and resource access in community managed forests of Meghalaya

Forest type	Local name	Degree of protection	Resource access				
			Timber	Firewood	Fuelwood	NTFP collection	Grazing
Private forests	Law Ri-Kynti	Very low	Allowed	Allowed	Allowed	Allowed	Allowed
Clan forest	Law Kur	Very low	Allowed	Allowed	Allowed	Allowed	Allowed
Group of village forest	Law Raid	Low	Partially allowed	Allowed	Allowed	Allowed	Allowed
Village forest	Law Shnong	Low	Partially allowed	Allowed	Allowed	Allowed	Allowed
Village restricted forest	Law Adong	High	Restricted	Partially allowed	Partially allowed	Partially allowed	Restricted
Sacred forests	Law Lyngdoh Kyntang/ Niam	Very high	Restricted	Restricted	Restricted	Restricted	Restricted

Community attributes and conservation value

These traditionally managed forests are very rich in diversity and harbors many important plant species. The floristic richness of these forests has been recognised by several earlier workers (Hooker, 1854; Brandis, 1906; Kanjilal, 1934). About 3,128 flowering plants have been reported from the state, of which 548 are endemic (Mir *et al.*, 2019). The species richness, stand density, basal area, diversity and dominance indices of some forests managed by traditional institutions is given in **Table 2.**

Table 2. Community compositional attributes of forests managed by traditional institutions in Meghalaya

Forest name	District	Number of species					SD	BA	DI	DoI	Source
		T	S	L	E	H					
Raliang	JH	96	60	31	39	84	938	71.44	3.55	0.56	Upadhaya, 2002
Lyngdoh Mawnai	WKH	133	–	–	–	–	1256	42.80	4.50	0.01	Mishra and Jeeva, 2012
Urkhla	JH	122	46	34	47	85	–	–	–	–	Jamir and Pandey, 2003
Lyngdoh Mawphlang	EKH	81	–	–	–	–	1490	21.70	3.90	0.01	Mishra and Jeeva, 2012
Law Adong Pynursla	EKH	91	–	–	–	–	2100	68.05	–	–	Tynsong and Tiwari, 2011
Khloo Paiu Ram Pyrthai	JH	97	45	28	41	57	–	–	–	–	Jamir and Pandey, 2003
Law Khleighshnong	EKH	70	–	–	–	–	1473	30.52	3.12	0.09	Upadhaya, 2015

Law Adong Siatbakon	EKH	76	–	–	–	–	1972	52.26	–	–	Tynsong and Tiwari, 2011
Law Adong Swer	EKH	40	52	32	14	67	1268	18.6	2.30	0.20	Mishra *et al.*, 2004
Law Mawsmai	EKH	81	–	–	–	–	1637	38.38	3.39	0.06	Upadhaya, 2015
Law Kyntang Swer	EKH	49	31	26	11	40	2103	26.90	2.20	0.10	Mishra *et al.*, 2004
Law Mamloorim	EKH	80	–	–	–	–	1109	34.01	3.62	0.05	Upadhaya, 2015
Khloo Langdoh	JH	98	35	23	25	42	–	–	–	–	Jamir and Pandey, 2003
Law Lyngdoh Nonglang	SWKH	56	–	–	–	–	1000	26.76	3.26	0.061	Upadhaya *et al.*, 2008
Ialong	JH	90	47	20	33	90	1476	57.46	3.42	0.53	Upadhaya, 2002
Law Nongkrem	EKH	32	–	–	–	–	898	62.42	2.4	0.147	Upadhaya *et al.*, 2008
Law Khlieng	EKH	75	–	–	–	–	722	77.36	3.58	0.04	Mir and Upadhaya, 2017
Thang U Niaw	EKH	65	–	–	–	–	930	27.70	2.76	0.18	Mir and Upadhaya, 2017

Legend: T = tree, S = Shrub, L = Liana, E = Epiphyte, H = Herb, SD = Stand density ha^{-1}, BA = Tree Basal area (m^2/ha.), DI = Shannon Diversity index, DoI = Simpson Dominance index, JH = Jaintia Hills, WKH = West Khasi Hills, EKH = East Khasi Hills, SWKH = South West Khasi Hills.

The community attributes of these forests varied with highest diversity in restricted forests, followed by sacred and village forests (Mir, 2018). High species richness in Reserve forests as compared to Sacred and Village forests is due to intermediate levels of disturbances in these forests (Mir, 2018). Intermediate levels of disturbances create an environment in which both late successional and pioneer species can establish and persist, therefore adding to overall species diversity (Connell, 1978). In these forests tree species richness is high as compared to other growth form. The herbaceous layer is sparse in sacred forests, whereas it is dense in village forests, especially during rainy season. The life form composition reveals that Phenerophytes are the dominant as compared to others. Village forests are highly disturbed and thus have low- species richness, basal area and tree density, which is attributed to high human disturbances (Mir, 2018).

The forests are rich in diversity of rare and endemic plants (**Table 3**). Revision of published literature has revealed that Orchidaceae, Rubiaceae and Magnoliaceae are dominant families in these forests. There are 101 endemic species, 138 rare and 16 species have been listed as globally threatened by IUCN (2 critically endangered, 8 endangered, 4 vulnerable and 2 near threated). The highest numbers of rare and endemic plants are found in sacred forests which might be last refuge for these species. The conservation of the plant species in the sacred

groves is noteworthy. The role of sacred groves in the conservation of biodiversity has long been recognized (Gadgil and Vartak, 1976; Haridasan and Rao, 1985; Khan *et al.*, 1997). All forms of vegetation in the sacred groves are supposed to be under the protection of the reigning deity of that grove, and the removal of even a small twig is taboo (Upadhaya, 2002). They contain many primary species due to their antiquity in origin (Jamir and Pandey, 2003).

The community managed forests have not only helped in conserving the resource as evident from the presence of large patches of well protected forests and ensuring its sustainable use but has also been a source of common good and safety net for the communities (Tiwari *et al.*, 2013). These forests may be the only climax vegetation remaining in many areas but majority are now disturbed due to human activity (Khiewtam and Ramakrishnan, 1989; Upadhaya *et al.*, 2013). Deforestation, shifting cultivation, cultural change, urbanization and forest fragmentation are posing threat to the plant species present in these forests (Upadhaya *et al.*, 2013). Increasing threats to the plant species in these forests therefore demands new conservation approaches, which are enabling fair share of the wider values of conservation to the local communities. Though the conventional institutions have taken steps for the conservation, this system needs to be further strengthened. In addition to help traditional institutions in the conservation process, scientific methods of conservation should also be implemented.

Table 3. List of rare, endemic and threatened (RET) species with their habit.

Name of species	Family	Habit	Nativeness	Conservation	
				Meghalaya	IUCN
Saurauia punduana Wall.	Actinidiaceae	T	NE	R	CR
Crinum amoenum Ker Gawl. ex Roxb.	Amaryllidaceae	H	NE	–	–
Drymycarpus racemosus (Roxb.) Hk.f.	Anacardiaceae	T	NE	R	–
Mangifera sylvatica Roxb.	Anacardiaceae	T	–	R	LC
Artabotrys caudatus Wall. ex Hook.f.	Annonaceae	Cl	E	R	–
Fissistigma verrucosum Merr.	Annonaceae	Cl	NE	R	–
Fissistigma rubiginosum (A. DC.)	Annonaceae	Cl	–	R	–
Polyalthia jenkinsii (Hook.f. &	Annonaceae	T	NE	R	–
Unona longiflora Roxb.	Annonaceae	T	–	R	–
Uvaria hamiltonii Hook. f. & Th.	Annonaceae	Cl	NE	R	–
Alstonia scholaris (Linn.) R. Br.	Apocynaceae	T	–	R	LC
Gymnema tingens Roxb. ex Spreng.	Apocynaceae	Cl	–	R	–
Ichnocarpus frutescens (L.) W. T.	Apocynaceae	Cl	–	R	–
Strophanthus wallichii A. DC.	Apocynaceae	Cl	–	R	–
Ilex embelioides Hook.f.	Aquifoliaceae	T	E	R	–
Ilex godajam Colebr. ex Hook.f.	Aquifoliaceae	T	NE	R	–
Ilex khasiana Purkay.	Aquifoliaceae	T	E	R	CR
Ilex venulosa Hook.f.	Aquifoliaceae	T	NE	R	EN
Acorus calamus L.	Araceae	H	–	–	LC
Arisaema nepenthoides (Wall.) Mart.	Araceae	H	NE	R	–
Rhaphidophora decursiva (Roxb.)	Araceae	Cl	–	R	–
Rhaphidophora hookeri Schott	Araceae	Cl	NE	–	–

Zalacca secunda Griff.	Araceae	Sh	–	R	–
Aralia thomsonii Seem. ex C. B. Cl.	Araliaceae	Sh	NE	R	–
Hedera nepalensis K. Koch	Araliaceae	Cl	–	R	–
Hydrocotyle javanica Thunb.	Araliaceae	H	–	–	LC
Panax pseudoginseng Wall.	Araliaceae	H	NE	R	–
Aristolochia saccata Wall.	Aristolochiaceae	Cl	NE	R	–
Ceropegia angustifolia Wight	Asclepiadaceae	Cl	E	–	–
Ceropegia pubescens Wall.	Asclepiadaceae	Cl	–	–	–
Peliosanthes griffithii Baker	Asparagaceae	H	NE	R	–
Asplenium finlaysonianum Wall. ex	Aspleniaceae	H	NE	–	–
Asplenium laciniatum D. Don	Aspleniaceae	H	–	R	–
Ainsliaea aptera DC.	Asteraceae	H	–	R	–
Ainsliaea pteropoda DC.	Asteraceae	H	–	R	–
Anaphalis cinnamomea (DC.) C. B.	Asteraceae	H	–	R	–
Brachycome assamica C. B. Cl.	Asteraceae	Sh	NE	R	–
Cirsium interpositum Petr.	Asteraceae	H	NE	–	–
Impatiens porrecta Wall.	Balsaminaceae	H	–	R	–
Begonia josephi A. DC.	Begoniaceae	H	NE	R	–
Begonia pedunculosa Wall.	Begoniaceae	H	NE	R	–
Begonia roxburghii A. DC.	Begoniaceae	H	–	R	–
Begonia rubrovenia Cl.	Begoniaceae	H	NE	R	–
Celastrus championi Benth.	Celastraceae	Cl	–	R	–
Celastrus hookeri Prain	Celastraceae	Cl	NE	R	–
Euonymus attenuatus Wall. ex M. A.	Celastraceae	Sh	NE	–	–
Euonymus lawsonii C. B. Cl. ex Prain	Celastraceae	Sh	NE	R	–
Euonymus pendulus Wall. ex Roxb.	Celastraceae	Sh	–	R	–
Garcinia tinctoria (DC.) Dunn.	Clusiaceae	T	–	R	–
Commelina benghalensis L.	Commelinaceae	H	–	–	LC
Porana racemosa Roxb.	Convolvulaceae	Cl	–	R	–
Cyperus zollingeri Steud.	Cyperaceae	H	–	–	LC
Fimbristylis complanata (Retz.) Link.	Cyperaceae	H	–	–	LC
Kyllinga brevifolia Rottb.	Cyperaceae	H	–	–	LC
Dryopteris pulvinulifera (Bedd.)	Dryopteridaceae	H	–	R	–
Dryopteris stenolepis (Baker) C. Chr.	Dryopteridaceae	H	–	R	–
Egenolfia appendiculata (Willd.) J.	Dryopteridaceae	H	–	–	LC
Peranema aspidioides (Bl.) Mett.	Dryopteridaceae	H	–	R	–
Polystichum lentum (D. Don) T.	Dryopteridaceae	H	–	R	–
Diospyros lanceifolia Roxb.	Ebenaceae	T	NE	–	–
Elaeagnus pyriformis Hook. f.	Elaeagnaceae	Sh	NE	–	–
Elaeagnus conferta Roxb.	Elaeagnaceae	Sh	–	R	–
Echinocarpus dasycarpus Benth.	Elaeocarpaceae	T	NE	R	–
Elaeocarpus acuminatus Wall. ex	Elaeocarpaceae	T	NE	R	–
Elaeocarpus lancifolius Roxb.	Elaeocarpaceae	T	NE	–	–
Elaeocarpus sikkimensis Mast.	Elaeocarpaceae	T	–	R	–
Elaeocarpus prunifolius Wall. ex	Elaeocarpaceae	T	NE	R	VU
Agapetes setigera D. Don ex G. Don	Ericaceae	Sh	NE	–	–
Agapetes variegata (Roxb.) D. Don ex	Ericaceae	Sh	–	R	–
Monotropa hypopitys L.	Ericaceae	Sp	–	R	–
Monotropa uniflora L.	Ericaceae	Sp	–	R	–
Rhododendron formosum Wall.	Ericaceae	T	E	R	–
Erythroxylum kunthianum Wall. ex	Erythroxylaceae	T	NE	–	–
Antidesma acuminatum Wight	Euphorbiaceae	Sh	NE	–	–

Bauhinia khasiana Baker.	Fabaceae	Cl	–	R	LC
Bauhinia purpurea L.	Fabaceae	T	–	–	LC
Cassia mimosoides L	Fabaceae	Sh	–	–	LC
Quercus kamroopii D. Don	Fagaceae	T	–	R	–
Gentiana quadrifaria Bl.	Gentianaceae	H	–	R	–
Swertia chirata Buch.-Ham. ex C. B.	Gentianaceae	H	–	R	–
Chirita hamosa R. Br.	Gesneriaceae	H	–	R	–
Chirita oblongifolia (Roxb.) J. Sincl.	Gesneriaceae	H	–	R	–
Gnetum gnemon Linn.	Gnetaceae	Cl	–	R	LC
Gnetum montanum Markgr.	Gnetaceae	Cl	–	R	LC
Ixonanthes khasiana Hook.f.	Ixonanthaceae	T	E	R	VU
Engelhardtia spicata Leschn. ex Bl.	Juglandaceae	T	–	–	LC
Engelhardtia roxburghiana Lindl.	Juglandaceae	T	–	R	–
Alseodaphne khasyana (Meisn.)	Lauraceae	T	E	R	–
Beilschmiedia assamica Meisn.	Lauraceae	T	NE	R	–
Beilschmiedia brandisii Hook.f.	Lauraceae	T	NE	R	–
Litsea elongata (Nees) Hk. f.	Lauraceae	T	–	R	–
Phoebe paniculata (Nees) Nees	Lauraceae	T	–	R	–
Couroupita guianensis Aubl.	Lecythidaceae	T	–	–	LC
Fagraea ceilanica Thunb.	Loganiaceae	Sh	–	R	–
Taxillus assamicus Danser	Loranthaceae	Sh	NE	–	–
Huperzia hamiltonii (Spreng. ex Grev.	Lycopodiaceae	H	–	R	–
Huperzia javanica (Sw.) Fraser-Jenk.	Lycopodiaceae	H	–	R	–
Rotala rotundifolia (Buch.-Ham. ex	Lythraceae	H	–	–	LC
Magnolia baillonii Pierr.	Magnoliaceae	T	NE	R	LC
Magnolia punduana (Hook.f. & Th.)	Magnoliaceae	T	NE	R	DD
Magnolia rabaniana Hk.f. & Th.	Magnoliaceae	T	NE	R	DD
Magnolia champaca (L.) Baill. ex	Magnoliaceae	T	–	–	LC
Magnolia hodgsonii (Hook.f. & Th.)	Magnoliaceae	T	–	R	LC
Magnolia insignis (Wall.) Bl.	Magnoliaceae	T	NE	R	LC
Magnolia lanuginosa (Wall.) Figlar &	Magnoliaceae	T	NE	R	DD
Osbeckia capitata Benth. ex Naudin	Melastomataceae	H	NE	R	–
Oxyspora paniculata (D. Don) DC.	Melastomataceae	Sh	–	R	–
Sonerila khasiana C. B. Cl.	Melastomataceae	H	NE	R	–
Aglaia edulis (Roxb.) Wall.	Meliaceae	T	–	R	NT
Aglaia perviridis Hiern	Meliaceae	T	–	R	VU
Hypserpa cuspidata (Hook. f. & Th.)	Menispermaceae	Cl	–	R	–
Stephania glabra (Roxb.) Miers	Menispermaceae	Cl	–	R	–
Mitrastemon yamamotoi Makino	Mitrastemonaceae	P	–	R	–
Cudrania fruticosa (Roxb.) Wight ex	Moraceae	Sh	NE	R	–
Ficus subincisca Buch. Ham. ex. J.E.	Moraceae	T	–	R	–
Ficus ischnopoda Miq.	Moraceae	T	–	R	–
Myrica esculenta Buch. Ham. ex D.	Myricaceae	T	–	–	NT
Horsfieldia amygdalina (Wall.) Warb.	Myristicaceae	T	NE	–	–
Syzygium cuneatum (Duth.) Brahm. &	Myrtaceae	T	–	R	–
Nepenthes khasiana Hook.f.	Nepenthaceae	Sh	E	R	EN
Olax acuminata Wall. ex Benth.	Oleacaceae	T	–	R	–
Fraxinus floribunda Wall.	Oleaceae	T	–	R	–
Jasminum subglandulosum Kurz	Oleaceae	Sh	NE	–	–
Ligustrum indicum (Lour.) Merr	Oleaceae	T	NE	–	–
Ligustrum myrsinites Decne.	Oleaceae	Sh	E	R	–
Olea fragrans Thunb.	Oleaceae	T	–	R	–

Calanthe densiflora Lindl.	Orchidaceae	H	NE	–	–
Callostylis rigida Bl.	Orchidaceae	EP	NE	–	–
Cleisostoma paniculatum (Ker Gawl.)	Orchidaceae	EP	–	R	–
Coelogyne flaccida Lindl	Orchidaceae	Ep	NE	–	–
Coelogyne nitida (Wall. ex D. Don)	Orchidaceae	EP	–	R	–
Coelogyne punctulata Lindl.	Orchidaceae	EP	NE	–	–
Micropera rostrata (Roxb.) N. P.	Orchidaceae	EP	NE	–	–
Neogyna gardneriana (Lindl.) H. G.	Orchidaceae	Ep	NE	–	–
Nephelaphyllum cordifolium (Lindl.)	Orchidaceae	EP	NE	R	–
Nephelaphyllum pulchrum Bl.	Orchidaceae	EP	–	R	–
Pleione maculata (Lindl.) Lindl. &	Orchidaceae	EP	–	R	–
Pleione praecox (Sm.) D. Don.	Orchidaceae	EP	NE	R	–
Sunipia bicolor Lindl.	Orchidaceae	EP	NE	–	–
Sunipia scariosa Lindl.	Orchidaceae	EP	NE	–	–
Thrixspermum pygmaeum (King	Orchidaceae	EP	NE	–	–
Uncifera acuminata Lindl.	Orchidaceae	Ep	NE	–	–
Adinandra griffithii Dyer	Pentaphylacaceae	T	NE	R	EN
Cleyera grandiflora (Wall. ex Choisy)	Pentaphylacaceae	T	E	R	EN
Ternstroemia gymnanthera (Wight &	Pentaphylacaceae	T	–	R	–
Pinus kesiya Royle ex Gord.	Pinaceae	T	–	–	LC
Peperomia reflexa (L.f.) A. Dietr.	Piperaceae	H	–	R	–
Piper griffithii C. DC.	Piperaceae	H	NE	–	–
Piper longum L.	Piperaceae	H	–	R	–
Cephalostachyum pallidum Munro	Poaceae	Sh	NE	–	–
Eleusine indica (L.) Gaertn.	Poaceae	H	–	–	LC
Isachne globosa (Thunb.) Kuntz.	Poaceae	H	–	–	LC
Podocarpus neriifolius D. Don	Podocarpaceae	T	–	R	LC
Ardisia khasiana C. B. Cl.	Primulaceae	Sh	E	R	–
Ardisia neriifolia Wall. ex A. DC.	Primulaceae	Sh	NE	–	–
Ardisia griffithii C. B. Cl.	Primulaceae	T	E	–	–
Ardisia odontophylla Wall. ex A. DC.	Primulaceae	Sh	NE	R	–
Cyclostemon lancifolius Hook.f.	Putranjivaceae	T	NE	R	–
Photinia cuspidata (Bertol.) N. P.	Rosaceae	T	E	R	–
Photinia integrifolia Lindl.	Rosaceae	T	–	R	–
Prunus ceylanica (Wight) Miq.	Rosaceae	T	–	R	EN
Coffea khasiana Hook. f.	Rubiaceae	Sh	NE	–	–
Coffea jenkinsii Hook.f.	Rubiaceae	Sh	–	R	–
Hyptianthera stricta (Roxb.) Wight &	Rubiaceae	Sh	NE	–	–
Ixora subsessilis Wall. ex G. Don	Rubiaceae	Sh	NE	–	–
Lasianthus biermanni King ex Hook.	Rubiaceae	Sh	–	R	–
Lasianthus cyanocarpus Jack.	Rubiaceae	Sh	–	R	–
Lasianthus hookeri C. B. Cl. ex Hook.	Rubiaceae	Sh	NE	–	–
Leptomischus wallichii (Hook.f.) H. S.	Rubiaceae	H	E	R	–
Luculia pinceana Hook.	Rubiaceae	Sh	NE	–	–
Morinda umbellata L.	Rubiaceae	Sh	–	R	–
Saprosma ternatum (Wall.) Hook.f.	Rubiaceae	T	–	R	–
Uncaria macrophylla Wall.	Rubiaceae	Cl	NE	–	–
Uncaria sessilifructus Roxb.	Rubiaceae	Cl	–	R	–
Citrus latipes Hook.f. & Th. ex	Rutaceae	T	E	R	–
Sabia purpurea Hook. f. & Th.	Sabiaceae	Cl	NE	R	–
Salix psilostigma Anders.	Salicaceae	Sh	NE	–	–
Allophylus zeylanicus L.	Sapindaceae	T	–	R	VU

Sarcosperma griffithii Hook. f. ex C.B.	Sapotaceae	T	NE	–	–
Sarcosperma arboreum Hook.f.	Sapotaceae	T	NE	–	–
Illicium griffithii Hook. f. & Th.	Schisandraceae	T	NE	R	EN
Brucea mollis Wall. ex Kurz.	Simaroubaceae	T	–	R	–
Turpinia nepalensis Wall. ex Wight &	Staphyleaceae	T	–	R	–
Gomphandra axillaris Wall. ex Voigt	Stemonuraceae	Sh	–	R	–
Reevesia wallichii R. Br.	Sterculiaceae	T	NE	R	–
Sterculia alata Roxb.	Sterculiaceae	T	–	R	–
Styrax hookeri C. B. Cl.	Styracaceae	Sh	–	R	–
Symplocos ramosissima Wall. ex D.	Symplocaceae	T	–	R	–
Camellia cauduca Cl. ex Brand.	Thaeceae	Sh	NE	–	–
Gordonia dipterosperma Kurz.	Thaeceae	T	NE	R	–
Pyrenaria barringtonifolia (Griff.)	Thaeceae	T	–	R	–
Pyrenaria cherrapunjeana A. H. Mir	Thaeceae	T	E	R	EN
Schima khasiana Dyer.	Thaeceae	T	NE	R	–
Aquilaria khasiana Hallier f.	Thymelaeaceae	T	NE	R	EN
Daphne involucrata Wall.	Thymelaeaceae	Sh	NE	–	–
Celtis tetranda Roxb.	Ulmaceae	T	–	R	–
Tetrastigma obovatum (M. A. Lawson)	Vitaceae	Cl	NE	–	–
Caulokaempferia linearis (Wall.) K.	Zingiberaceae	H	NE	R	–

Legend: T: tree, H: herb, Sh: shrub, Cl: climber, Sp: saprophyte, P: parasite), nativeness (NE: near endemic, E: endemic) and conservation status (R: rare, CR: Critically Endangered, E: Endangered, VU: Vulnerable, NT: Near threatened, LC: Least Concern, DD: Data Deficient) found in traditionally managed forests of Meghalaya

(Source; Modified after Upadhaya, 2002; Mir *et al.*, 2014; Mir and Upadhaya 2017, Mir, 2018 and Mir *et al.*, 2019)

Conclusion

In Meghalaya, traditional management of the forests is viewed as one of the effective strategies for conservation and livelihood sustenance of the rural poor. Traditional forest management systems have existed in diverse forms throughout Meghalaya for centuries and continue to be the primary mode of forest conservation and management. The forests have not only provided the local people with food, medicine and livelihoods but have also contributed to the maintenance of indigenous culture. The community managed forests were rich in diversity and harbors many rare, endemic, threatened and economically important plant species.

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