



## Are Khasis of Bangladesh Eco-Friendly Agro Manager? Reflections on Hill Farming Practices and Forest Conservation

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### ABSTRACT

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*Khasi is one of the major tree-crops-farming ethnic communities of North-East Bangladesh. In this paper, their farming and forestry knowledge is revealed in order to realize the importance of environmental preservation and conservation. What way Khasi administers hill farming practice with deeming locally derived knowledge and why they conserve forest and forestry in terms of agricultural extension without destroying the forest. To understand these issues local people's climate resilience farming practice and information has been collected through a qualitative method by applying observation, in-depth interview and collective discussion methods from local participants. Data has been analyzed following thematic and descriptive way and findings are conceptualized as research objectives. This study has explored that Khasis' integrated farming efforts that facilitate to uphold local peoples' subsistence, greenery landscape, and livelihood security, including essential eco-friendly forest conservation. The study findings also have shown how Khasi agroforestry and cultivation are developed by using local knowledge for improving the rural community, including tree crop farming with the conservation of bio-cultural diversity, and sustainable management of agro-ecosystem.*

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### I. Introduction

After having rigorous review the policy, principles, practice of sustainable use of sustainable agriculture and food security, Thrupp (2002) commented there was a pressing need to adopt an agro-ecosystems approach like integrated ecological pest and soil management for enhancing biodiversity rather than focusing only on genetic resource. Recent tension around climate change fosters the debate on the role of indigenous holistic coping mechanisms practices all over the world. Although anthropology has long-standing intellectual footings studying humans in the face of uncertainty where indigenous knowledge has always a central theme to encounter those uncertain events (Islam and Shafie, 2017). Khasi is one of the major indigenous tree-crops-farming ethnic communities of North-East Bangladesh. Their wisdom on agroforestry may regard as an addition in this line of scholarships in Bangladesh. In this paper, their farming and forestry knowledge is revealed in order to realize the importance of environmental preservation and conservation. The landscape of Bangladesh is mainly flat with about 12% of highland areas located mainly in the eastern and south-eastern parts of the country and some 'indigenous

communities' have dwelled in these hilly regions for a long time. The population of indigenous communities in Bangladesh has been calculated by numerous scholars (Bertocci, 1989; Khan, 1998) with the most recent estimate put at one million with forty-five ethnic communities (Khaleque, 1998). Khasis are one of them, and they are dispersed around eleven sub-districts of the greater Sylhet division. Most of the Khasis are found in the sub-districts of Kulaura, Rajnagar, Kamalganj, Sreemangal, and Barlekha of Maulvi Bazar district.

The Khasi hilly area in Sylhet region comprises mostly isolated blocks of land in reserve forest, un-classed State forest<sup>1</sup>, and private forest. Khasi have been allowed to live there as forest people by the Government and Forest Department since 1914 when the reservation process of forest land began in Sylhet (Alam and Mohiuddin, 1995). The Forest Department also established landless frontier local Khasi people in the forested areas where they earned their livelihood by carrying out forestry works as daily labourers. In return, the people are given the rights to grow agricultural tree crops along with forestry crops. In addition, the forest people obtained land allotments from the government for a specific period on a renewable basis for extra income. However, before the establishment of Forest Department, Khasi had been living in the forest areas since the 16<sup>th</sup> century although some other, especially Khasi and indigenous narratives claim from time immemorial this place belongs to Khasi (Zakaria, 2015). The Forest village as a new settlement pattern officially started at Sylhet in forested hilly regions in 1952 by forest Department of Government under the Forest Act 1927. This pattern was constituted with indigenous people to develop forestry, agroforestry, and conservation of biodiversity (Saha, 1998). However, before this pattern of forest village and Government Forest Act, Khasi had been planting tree crops for subsistence in the area which was declared as class/reserve forest later. After the reservation process of forest land, Khasis were included in reserve forest as forest villagers to take care of the forest as 'local manager'. Khasi agroforestry project has been expanded in forest villages and other relatives of Khasi have migrated from other Punjies due to scarcity of land, which is an outcome of encroachment of forest land by different government and private agents and agencies in the name of 'development' (Zakaria, 2015).

Khasi are very much linked to trees, tree products and tree-crop farming, including shrubs and vegetative plant-species for their livelihood and earnings. Some vegetation looks like ordinary bushes to the surrounding forest areas, but it has an ecological niche and environmental significance to grow and produce trees and tree crops with soil nutrients (Patam, 2005). Khasi from time immemorial are habituated to a tree plantation practices and tree-crops yields but the problems were created while they were subject to invasions from the plain-lands of Surma valley. It is speculated that in the 15th century, the emergence of trade and commerce prompted the northeast Khasi (Assamese, present Sylhet) to plant trees for the market economy (Gurdon, 1914). The tree-crops and hill-farming products were mainly fruits, fuel, fiber, betel leaves, betel nuts, and other timbers and tree logs. Arguably, it has been said that when they start economic tree crop farming in uphill, they leave Swidden cultivation to protect ground vegetation and micro-organisms in the soil (Gangwar and Ramakrishnan, 1989). In the northeast part of India Jhum (Swidden agriculture) cultivation is an old form of land use system. It is being practiced in the southeast part of Bangladesh among the upland indigenous people except for the northeast frontier Khasi hill-region (Nath et al., 2005). In the uphill Khasi area of Bangladesh, from the post-Aryan regime (15<sup>th</sup> century) Jhum was replaced with the tree crop plantation system and presently, there is no practice of Swidden agriculture among the Khasis but in government/(non) government policy and plan, Khasis are often identified/represented as Jhumia like other 'indigenous'/'ethnic groups in the development discourse of Bangladesh (GOB, 1994). They plant and manage a mixture of tree crop with various hilly trees in the same forest surrounding fields. It is namely areca nut, betel leaf, orange, lemon, jackfruit, mango, guava, pineapple, bay leaf, black pepper, betel leaf, thatch grass, bamboo and so on (Talang, 2013).

In fact, Khasi takes care of farm-fields and homestead fields which are amalgamated with primary forest, secondary regrowth forest and planted a forest. Though Khasi hills are not primary deep forest, most parts of it are secondary. Major wild animals with biodiversity are deteriorated because the

<sup>1</sup>Reserve/protected forests are government classed state forests which are controlled and managed by Governments' Forest Department. Conversely, Un-classed State Forests (USF) are those areas which are not under the reserve/protected forests, rather they are controlled, managed and leased by local district administration for agriculture, agroforestry and forestry. They are called government *Khas DC* (District commissioner) land. However, both categories of forests are State-owned forests.

secondary forests are unfit for animals' habitation. Therefore, Khasi people are supported and allowed to stay in hill forest by the Forest Department for their 'sustainable tree-crop farming and management system'. They conserve and protect natural resources and improve the ecological condition of the hill-forest through a reduction in soil erosion with increasing tree cover (Haider et al., 2013). All their efforts of tree rearing are natural resource-backed by assimilating their prevalent indigenous knowledge. This paper tries to shed light on what way Khasi administers hill farming practice with deeming locally derived knowledge and why they conserve forest and forestry in terms of agricultural extension without destroying the forest. Following paragraphs deal to focus on study people and place and then the way we collect first-hand data to interpret the Khasi way of living in connection to nature.

## II. Materials and Methods

### Study Area

The study area is namely Singur Punji and Aynachara Punj (villages) at Kulaura and Rajnagar sub-districts under Maulvi Bazar district in Sylhet region. It is situated to the north and east of Sylhet town and secluded hillocks, which range from one to two hundred feet high. This area of Khasi living and farming place, and is considered as a distinct climatic zone in Bangladesh. The moist tropical climate of the study area is generally warm and humid, turning cool in the winter. Moderately cool and lovely, and dry conditions exist from mid-November to the end of February while June to September is the time of the highest precipitation. Average maximum and minimum temperatures are 35 and 15, respectively (Ahasan et al., 2010). The average annual rainfall is 3800 mm, and humidity ranges from 70% to 85% in most parts of the year (Ahasan et al., 2010). The hills and lower slopes of these hillocks with their topography are under tree crop and tea cultivation. The soil in the hilly ground range from clayey loam on level ground to sandy loam, mixed with dark brown, sandy clay dirt of Pliocene origin (Hussain et al., 1989). The sandy and clayey topsoil are very productive. Integration of humus on the surface soil is very little because of quick rot under the moist hot tropical setting (Alam and Mohiuddin, 1995).

### Methods

We gathered data for this study over a period of several weekends of nine months from 2017 to 2018. We engaged over 110 village inhabitants in open-ended interviews administered in the Bengali language. The study used a purposive/criterion sampling strategy considering the entire farming population, those engaged in upland tree crop farming, aged between 15 to 55 years. In some instances, informants were selected through criterion and snowball sampling techniques. The criterion sampling technique was employed to recruit in in-depth interviewees those directly related to tree crop farming practices in the forest region. The snowballing strategy is adopted to recognize the knowledgeable and potential key informants to tree gardeners in the community, who were interviewed asked for further names, and so on. In other ways, they were selected with the help of community leaders to cover a broad spectrum of socioeconomic classes, ethnic-religious groups, gender, and age group as well as formal and informal education, certain experience and culture. In different cases, especially remarkable home gardens or field plantings were noticed and the owner then defined as an interviewee. Using a general interview guide that was openly changed as new situations and information arose; we discussed local tree cultivation technique, local environment, and soil quality, how they manage eco-friendly environment including tree crop-farming without deforestation while walking through their farm fields for direct observations. Interviews were open-ended nature, though not all topics were sheltered in all interviews, each main topic was at least covered by a large adequate sample to be flexible to some form of analysis. While the concentration of the study surrounded by tree-cultivation practice, the discussion often also turn to general to acute farming issues about trees health, local environment and biodiversity, which provided additional information of sustainable environment in the fields. We also took details information on diverse local farming, culture, and ethno-ecology, which is concurrently used in modern horticulture, agroforestry and so on. The native people used various categories of organic plants and materials to augment of soil nutrients for a balanced ecosystem in nature that was also recorded. This study employed the combination of insider (emic) and outsider (etic) approaches to understand the inherent quality of data because the way in which they were elicited and the method in which they were analyzed. The open-ended nature of interview questions permitted the informants to use their own phrase in describing their perception, and particular words

and terms were often jotted down in order to protect emic nature and farming culture. But real generalization and conceptualization of these individuals, insider views into a widespread system were in large part carried out later by myself from an etic perspective. The following discussion will able to provide a clearer picture of how these qualitative methods applied for illustrating the relationships between Khasi people and nature conservation.

### III. Results and Discussion

#### Forest Village and its Nature

The development of forest villages and 'sustainable forest' originate in two comparable and strategically linked processes. Firstly, the forest villagers provided their physical labor for production, safety from stealing and preservation of biodiversity of the adjacent reserved forests as narrated in Forest Act 1927. Secondly, forest villagers lived in the surrounding forest and practiced agroforestry systems that included planting various categories of trees, in return for benefits they obtain from it. The intervention of agroforestry developed the farming place, soil, and ecology. This strategy became effective by using its efforts with indigenous intelligence and efficacy.

Khasi dominant geographical place or farming field is signified by the characteristics of existing natural resources such as the quality supply of soil, air, and water. Khasi habitats and locality have been constructed by the influence of soil quality and local water bodies with bio-physical environment. This natural constituent synthesizes diverse origin resources and gives a meaningful structure of tree crops farming zone. Khasi land-use system with tree plantation of their household choice, taste and needs determine the sustainable quality of the soil. Moreover, Khasi afforested the degraded forest areas through subsistence-based tree crop farming and the ecosystem integration of the reforested secondary sustainable tree plantation ([Lamb, 2003](#)). The planted trees are used as supporting trees for betel leaf and black pepper creeping plants. The betel leaf cultivation system enriches the forest with a viable environment and supports forest rehabilitation while promoting community benefits.

The way Khasi frame their farming, it is impossible to separate farming lands from tree, shrub and plant vegetation. The voluminous presence of vegetation on the hill surface determines the quality and status of the land. The field productivity depends on the availability of decomposed plant litter and foliage. For sustainable hill farming system, the concern of Khasi forest dwellers is to consume forest resources in order to meet their daily needs. They know if it is overly exploited, the land will be barren. The farm sustainability level could be identified by an increase in management of soil fertility, the constant or increased tree crop of the major crops and slowly increasing or constant farm population ([Nath et al., 2002](#)).

#### Traditional Farming Trends

The Khasi are usually dependent on hill-farming cultivation called tree-crop gardening system. In Bangladesh, the Khasi's main harvests are betel leaves, betel nuts, and timber and non-timber trees as well as multiple fruiting tree-species. This type of farming is the replacement of Jhum cultivation among the Khasi. Recently, they are introduced with innovative land-use systems such as agro-farming and agroforestry. They also produce and plant other profitable trees in the fields and home premises. Besides economic tree cropping, they conduct animal husbandry. The non-feasibility of undulating hilly atmosphere prompts Khasi to engage in plant economy rather than plain-land agriculture for their subsistence and economic earnings. Modern and scientific farming systems occupy completely Khasi as they maintain balance between need and greed through crafting knowledge and skill in farming materials and instruments and also they involve in hunting and gathering in the forest at the sustenance level. Khasi households make designs, utensils and artifacts that show the diversity to their living strategies. By coping with this knowledge and skills since time immemorial, Khasi have been practicing multi-storied tree cropping system in the vertical space in forest surrounding fields which is comparable to agro-farming and agroforestry with sustainable environment ([Kumar, 2007](#)). Khasi adopted it in their farming way of life with indigenous knowledge for tree crop farming and economic development, even though they use natural farming resources and local instrument for sustainable farming system.

### Eco-friendly Settlement and Gardening

The Khasi live permanently under the condition of helping the Forest Department in the uphill surrounding forest, habituated on the tree crop farming system. The land-use system comprises tree growing in the homesteads and uphill fields. Their living and subsistence are coming from the tree crop farming economy with various categories of trees cultivated year-round without practicing jhum or swidden agriculture. Therefore, cultivated land is not eroded through this negative connotation of land promotion with Swidden cultivation is purely a biased connotation driven by mainstream media and intellectuals to blame Pahari/Indigenous people for destroying/burning the forest in Chittagong Hill Tracts (CHT) ([Tripura and Harun, 2003](#)). On the other hand, population pressure and insecurity of land prompt them to practice uninterrupted tree crop farming ([Saha and Azam, 2004](#)) though it is evident from their ethnohistory that population density among Khasi population is unchanged since 1971. It is not the pressure of overpopulation rather increasing land grabbing by eco-tourism industrialists and tea garden owners Khasi feel always a sense of insecurity that influences Khasi to utilize the natural resources wisely for sustainable development. The government has taken the initiative to tackle the grabber and to rehabilitate the forest and conserve biodiversity by using the effective land-use system. In addition to the assigned forest work of Forest Department, Khasi is entitled to grow extra tree crops in their allotted farmland. The Khasi indigenous people have appeared as a dynamic social group with social security and economic benefits with a sustainable hill farming system. Also, they contribute through the adoption of local knowledge of agro-farming system to fill up the forest reserves of a specific region.

Khasi uphill farming is near multi-story integration of different trees and crops. It is the oldest land-use farming system after swidden agriculture. The notion of the forest surrounding uphill tree-crops farming is an integrated system. It has hilly natural tree cover at the top, middle stage planted fruiting trees and surface stage-shrubs or climber trees ([Kumar, 2007](#)). Besides this, uphill farming production is mostly supplementary and mainly centered on vegetables, fruits, fuelwood and small timber for gainful income. From their early settlements and hill farm fields, Khasi has been tending tree-crop with fruiting trees to fulfil their subsistence needs. They plant natural trees with different new tree-species in the garden based on perception or information, which is passed on by neighbours or relatives. Therefore, the compilation of uphill farm-species contains various functional groups such as fruiting trees, vegetables, medicinal plants, and tall trees for shade, timber, and fruits ([Kumar et al., 1994](#)). When various kinds of trees reach maturity, most of them are used to support betel leaf cultivation while others provide fruits, fuel, and resins to the households.

The emergence of the tree crop farming economy and marketing system changed the subsistence-based old farming system into income based tree crop farming a bit. When the quality of soil is deteriorated due to short fallows and land pressure. Khasi understands the bio-physical milieu of the region, and they start cultivation and protection of native trees by merging modern agroforestry ([Saha and Azam, 2004](#)). According to one of our informants, it is a worthwhile adaptation associated to sustainable forest production system that maintains soil fertility and decrease land erosion. Khasi indigenous cultivators use friendly ecological approaches to protect and operate their trees for farming sustainability. Thus, Khasi upland tree-crop farming comprises a unique land-use action that integrates the key process of the tree cultivation system such as classification, production, management and adoption of agroforestry tree genetic resources ([Leakey and Tchoundjeu, 2001](#)). It also shows a substantial indigenous knowledge base. The consequence is that the significant developments achieved by traditional gardeners over generations are widely through sporadic and uncoordinated activities and agricultural changes conducted by market economies in the past.

### Economy, Soil Condition and its Treatment

The Khasi are not rich because of the insecurity of land ownership and inadequate productive farming land but they have a sense of affluence. They could cultivate various kinds of tree crops for their extra income and livelihood. However, they depend on forests and forest land. Nevertheless, life is untenable and the increased outside pressure from industrialists and land grabber intensively hampered their lives, and their farming lands are becoming inadequate to meet their needs. Therefore they take multiple strategies to augment their land fertility for farming subsistence. In the British regime in the

past, the land was sufficient and had a long fallow cycle, Khasi people were allowed to reside in the reserve forest as foresters. Today, the scenario has changed as the land is used, controlled, and managed by various development concepts of government and multinational agencies. Most of the Khasi are unable to lease their 'possessed' land in permanent settlement via a land tenure system due to bureaucratic complexity and the partiality of local administration (Patam, 2005). However, they are identified as the center of problem as their betel-leaf farming is identified as 'Jhum' by recent development plans (USAID, 2006) where 'Jhum' is coined overwhelmingly a negative practice in the development discourse of Bangladesh.

Currently, Khasi face a lot of natural calamities even in matured-farming seasons, which was very rare in the past. Now Khasi cultivate fields, they take precaution to reduce the severity of any natural damages. For this reason, farmers take initiative to manage their land and eco-farming system using local knowledge. Problems found in farming land, including landslides, erosion, excessive tree shade and hard sunlight. Khasi minimise uphill soil erosion through the traditional process by using bamboo culms, special creepers and barriers made of mulch and gunny bags filled with soil. They consider soil and its fertility by different physical aspects such as size, shape and colour. They classify soil based on colour and texture as well as their experiences of the potentiality and limitations of the soil.

Some Khasi cultivate non-cereal crops especially nitrogen-fixing trees to conserve the organic matter in the soil. These trees facilitate the conservation of the soil, even if some nutrient minerals are run off from the topsoil. Employment of green leaves, twigs, lops and other tree residues with farmyard manure are the traditional way of increasing the condition of the soil fertility. The very common ones among these plants litters are used in tree plantation of tree roots and pits or topsoil in the dry season. Generally, this technique helps to augment soil fertility by fixing nitrogen using micro-organisms (Bregman, 1993). They do not clear fuel and flower litter from the field so as to augment organic fertilizer for the soil.

### **Environmental Knowledge and Forest Conservation**

The tree-based farming practice has a long tradition among indigenous people of Sylhet where trees are incorporated widely in the crop production following agro-climatic setting. Indigenous people know the farming environment in different seasons and react to it from planting to harvesting (Jeeva et al., 2006). A diversified indigenous and cultivated tree-crop is grown with edible and timber value trees. In sustainable farming, the land is collectively used for various tree-species, hilly tree plantation, and fruiting tree crops. The traditional tree-based farming practice of Khasi helps in conserving and improving the field, optimizing the integrated production of various tree-species (Jeeva et al., 2006). In this system, there is a symbiotic relationship between the grown tree-species in the forest.

In Khasi indigenous knowledge on farming, environmental issues especially the soil, air, and water are most commonly considered in the tree-crop fields. These conceptual physical functions are very much integrated and cross-linked to the whole farming production system (Arnold and Dewees, 1997). Trees do not only provide subsistence but also maintain ecological balance in floristic settings. Khasi's most managerial work in tree plantation activities is to integrate various natural resources by employing past experiences and present perspectives with onward predictive consequence. They consider the local environmental setting in terms of soil, air-water, including flora and fauna. The humid tropical condition with cool shade high humidity is favourable for the cultivation of tree-crop production in the uphill. This bio-physical environmental knowledge inspires Khasi to plant various categories of trees and nurture them in the fields. They prune trees and twigs, manage shade, provide mulch and allowed optimum sunlight in the field to grow up tree crops (Haider et al., 2013) by maintaining a balanced ecosystem. Where the soil is not fertile there some watery trees are planted to release fluid and foliage into the soil. Khasi cultivates their land by using the surrounding flower litter and decomposed plants. They arrange partial shade by planting fast-growing trees with the addition of extra organic manure from natural sources.

Another conception of conservation of tree diversity is betel leaf cultivation. It prompts Khasi to plant, rear, and control all categories of native trees in the field, which are used as supporting the tree of betel vine tree cultivation (Alam and Mohiuddin, 1995). On the other hand, they look after the tree garden because of other necessities of trees such as fruits, fuel, fodder, resin, and household materials. They

clean the piece of landscape, weed the unwanted things from the trees, as well as prevent and control pest and diseases through the adoption of old-aged practice indigenous knowledge. They protect nature and natural resources by avoiding excessive exploitation of resources. Ultimately, they protect forests and trees and like to consider them as their livelihood of existence. Fundamentally, it can be said that betel leaf cultivation is a form of forest conservation system.

Sustainability has become an important global concern of hill-farming system because of population growth and exploitation of the natural resource. According to [Nath et al. \(2002\)](#) on the farming method, sustainability signifies the augmented or constant status of land fertility. Khasi illustrates that decomposed things are adequate to sustain the soil fertility. It is a good natural source of soil fertility, and land productivity remains unchanged. This scenario pertained last few decades ago among the Khasi. The maximum attributes of sustainable farming systems are prevalent in Khasi hill-farming way of life. However, the non-indigenous people exploit natural tree-resources overly due to the pressure of overpopulation, and the consequent fall on the hill-farming environment. The effects of globalization, commercialization, and industrialization have declined the natural resources ([Guha and Gadgil, 1995](#)), hill farmers have not found available natural farming inputs. This is why recently, for their subsistence need and economic tree crops production, Khasi extends the use of local knowledge in agricultural farming too but in a very small scale. Khasi always consider agricultural setting in landscape ecology and agroforestry, and conservation of trees is seen as essential for livelihood, earning and ecosystem. They plant various disasters preventive trees and keeps surface vegetation on the ground to minimize the severity of natural disasters. Specifically, trees are preserved to protect other trees from windbreaks and maintain soil conservation, wildlife habitat and for aesthetic reasons. Therefore, they follow the farming calendar and perform farming activities based on their experiences and needs for the sake of agro-climate resilience environment.

### **Traditional Beliefs and Forest Management**

Forests are being protected by Khasi beliefs and customs and they follow the prevalent concept of purity and pollution which protect trees and the environment as a whole. Most of the Khasi in Sylhet are converted Christian, though they believe in traditional customs and rituals. They even perform some rituals to satisfy the farming deities. Some trees are considered holy trees and abode deities on it such as *Ficus religiosa* and *Ocimum sanctum*. It is not inflicted by any mechanical damage beyond the pruning of small branches and leaves ([Jeeva et al., 2006](#)).

Khasi clean unwanted twigs of trees for tree-growth when they work in tree-garden for betel leaves cultivation. They keep in memory the concept of purity and pollution. Every hill-farm foot has shallow-well, where they wash and clean their hands and legs as well as the instruments they used. They thereafter enter the field and after finishing their works, they do the same thing. Sometimes, they bathe before going to their farmland and then take care of trees and fruits. They believe that if they take bathe all evil will be cleaned away and the farm will not be attacked by pests and diseases. If they think the infested twigs and leaves touch their bodies, they immediately take their bathe to stop the spread of diseases. This way the vegetation and forest resources are being protected and conserved.

### **IV. Conclusion**

This study presents the Khasi people, their livelihood strategy, greenery landscapes and tree conservation that triggers environmental sustainability. It prioritizes the locality with their ethno-ecological knowledge and practice, and the interrelationship of people with their surrounding agroforestry environment. It also focuses on the Khasi way of life based on their respective farming place, agriculture, environment, and plantation economy. Almost all villages have similar soil conditions, topography, and biophysical environments, though there is some variation in surrounding lowland areas with ecology. Khasi's diversified indigenous and cultivated uphill multi-story tree crops cultivation for subsistence need would get concentration as a viable way to conserve the forest, biodiversity, and ethnoecology. Fundamentally, Khasi's betel leaf cultivation system is a form of forest conservation system. Betel leaf creeping plant cultivation is performed on the basis of fruiting trees, timber, and non-timber trees as supporting trees. Over the centuries all over the world, indigenous

people have been providing series of diversified ecological and cultural services in order to retain food security through agroforestry, crop rotations, polyculture, mixed/intercropping and water preserving agricultural practices (Perroni, 2017). Therefore, for economic livelihood they emphasis on diverse categories of trees in the uphill and nurture it for healthy trees with getting food, fuel, fodder, and fruits as well as for homemaking materials and household artifacts. Therefore, Khasi takes cares on soil, air, and water, including flora fauna to conserve local forest and environment. Khasis are known as 'real' managers for forest carried out some roles as a labourer and join partner of agroforestry

### Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

### References

- [1]. Ahsan, M., Chowdhary, M. A. and Quadir, D. (2010). Variability and trends of summer monsoon rainfall over Bangladesh. *Journal of Hydrology and Meteorology*, 7(1), 1-17. <https://doi.org/10.3126/jhm.v7i1.5612>
- [2]. Alam, M. and Mohiuddin, M. (1995). Conservation of tree diversity through betel-leaf (*Piper betel*) based agroforestry in Sylhet. *Bangladesh Journal of Forest Science*, 24(2), 49-53.
- [3]. Arnold, J. M. and Dewees, P. A. (1997). Farms, trees and farmers: Responses to agricultural intensification. London: Earthscan Publications.
- [4]. Bertocci, P. J. (1989). Resource development and ethnic conflict in Bangladesh: The case of the Chakmas in the Chittagong Hill Tracts. *Religious and Ethnic Minority Politics in South Asia*.
- [5]. Bregman, L. (1993). Comparison of the erosion control potential of agroforestry systems in the Himalayan region. *Agroforestry Systems*, 21(2), 101-116. <https://doi.org/10.1007/BF00705223>
- [6]. Gangwar, A. K. and Ramakrishnan, P. S. (1989). Ecosystem function in a Khasi village of the desertified Cherrapunji area in northeast India. *Proceedings: Plant Sciences*, 99(3), 199-210.
- [7]. GOB (Government of Bangladesh) (1994). *Bangladesh National Forest Policy 1994*. Asian Development Bank/UNDP/FAO-BGD, Government of the Peoples' Republic of Bangladesh, Dhaka, pp. 56-63.
- [8]. Guha, R. and Gadgil, M. (1995). *Ecology and Equity: The use and abuse of nature in contemporary India*. London and New York: Routledge.
- [9]. Gurdon, P. R. T. (1914). *The Khasis*. London: Macmillan and Company, limited.
- [10]. Haider, M. R., Khair, A., Rahman, M. M. and Alam, M. K. (2013). Indigenous management practices of betel-leaf (*Piper betle* L.) cultivation by the Khasia community in Bangladesh. *Indian Journal of Traditional Knowledge*, 12, 231-239.
- [11]. Hussain, M., Islam, Q., Tarafdar, M., Zashimuddin, M. and Ahmed, A. (1989). Assistance to the Second Agricultural Project-Bangladesh, Status report on the activities of the Silvicultural Research Division, BFRI, Chittagong. Fo: DP (No. 6). BGD/83/101, Working Paper.
- [12]. Islam, Z. and Shafie, H. (2017). Anthropology of Climate Change: Culture and Adaptation in Bangladesh, Bangladesh Climate Change Trust and the Department of Anthropology.
- [13]. Jeeva, S., Laloo, R. C. and Mishra, B. P. (2006). Traditional agricultural practices in Meghalaya, North East India. *Indian Journal of Traditional Knowledge*, 5(1), 7-18.
- [14]. Khaleque, K. (1998). Ethnic communities of Bangladesh. In P. Gain (Ed.), *Bangladesh land forest and forest people* (pp.1-26). Dhaka: Society for Environment and Human Development.
- [15]. Khan, M. (1998). Prospects of ethnobotany and ethnobotanical research in Bangladesh. In R. Banik, M. K. Alam, S. J. Pei and A. Rastogi (Eds.), *Applied ethnobotany* (pp. 24-27). Chittagong, Bangladesh: BFRI.
- [16]. Kumar, B. M. (2007). Home garden-based indigenous fruit tree production in peninsular India. In O. A.- RRB Leakey (Ed.), *Indigenous fruit trees in the tropics: Domestication, utilization and commercialization* (pp. 84-99). UK: CABI. <https://doi.org/10.1079/9781845931100.0084>
- [17]. Kumar, B. M., George, S. J. and Chinnamani, S. (1994). Diversity, structure and standing stock of wood in the home gardens of Kerala in peninsular India. *Agroforestry Systems*, 25(3), 243-262. <https://doi.org/10.1007/BF00707463>
- [18]. Lamb, D. (2003). Is it possible to reforest degraded tropical lands to achieve economic and also biodiversity benefits? RAP Publication (FAO).

- [19]. Leakey, R. and Tchoundjeu, Z. (2001). Diversification of tree crops: Domestication of companion crops for poverty reduction and environmental services. *Experimental Agriculture*, 37(03), 279-296. <https://doi.org/10.1017/S0014479701003015>
- [20]. Nath, T. K., Inoue, M. and Myant, H. (2005). Small-scale agroforestry for upland community development: A case study from Chittagonj Hill Tracts, Bangladesh. *Forest Research*, 10(6), 443-452. <https://doi.org/10.1007/s10310-005-0171-x>
- [21]. Nath, T., Inoue, M., Islam, M. and Kabir, M. (2002). Khasia tribe of northeastern Bangladesh: Their socio-economic status, hill farming practices and ethno-medicinal knowledge. Paper presented at the International Symposium on Mountain Farming held at Uttarancal, India, 19-21 November.
- [22]. Patam, R. (2005). The Khasi people history, heritage and Culture. Nilkheyet, Dhaka: Silvanus Lamin.
- [23]. Perroni, E. (2017). Five Indigenous Farming Practices Enhancing Food Security, Resilience.
- [24]. Saha, N. (1998). A study of forest industries of Bangladesh. *Bulletin of the Kochi University Forests (Japan)* (25), 1-107.
- [25]. Saha, N. and Azam, M. A. (2004). The indigenous hill-farming system of Khasia tribes in Moulvibazar district of Bangladesh: status and impacts. *Small-scale Forest Economics, Management and Policy*, 3(2), 273-281.
- [26]. Talang, F. B. (2013). The role of khasi in conservation of biodiversity and environment. *Ecology and Environment*, 10(4), 198-202.
- [27]. Thrupp, L. A. (2002). Linking Agricultural Biodiversity and Food Security: the Valuable Role of Agrobiodiversity for Sustainable Agriculture, *International Affairs*, Vol. 76: 2. <https://doi.org/10.1111/1468-2346.00133>
- [28]. Tripura, P. and Harun, (2003). Parbotto chotrograme jumchash, (Jhum Cultivation in Chittagong Hill Tracts,) SHED.
- [29]. USAID (2006). Management Plans for Lawachara National Park, IRG, Washington.
- [30]. Zakaria, A. F.M. (2015). State Making and Subject Managing into the Lawachara National Park of West Bhanugach Jungle Mahal in Bangladesh: A Study on Place, People. Property and Nature (Unpublished Thesis Paper), Memorial University, Canada.

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