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Environmental Degradation in West Khasi Hills District, Meghalaya

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ABSTRACT
The forest cover of Meghalaya has reduced from 69.06 to 63.06% over 15 years. The major environmental problems resulting from population pressure, Jhumming, burning of wood for charcoal, and increasing anthropogenic stresses may further aggravate the situation. The present research studies the impact of rural livelihood practices such as deforestation for commercial purposes and shifting cultivation on the environment. Environmental degradation has been studied through secondary data from governmental agencies and household surveys through random sampling. Further, the study in West Khasi Hills District has paved the way for us to understand the importance of protecting the environment. The data obtained reveal a significant loss of forest cover leading to biodiversity loss and an increased pocket of barren lands in most surveyed villages.
Further, the practice of shifting cultivation, deforestation and burning of wood to obtain charcoal for economic and domestic purposes continues. In that case, the area surveyed may turn into a desert-like situation. However, with emerging environmental awareness, efforts are being made by the government, NGOs, and local communities to impart the concept of sustainable development and provide alternative livelihood practices to the rural poor and maintain stability in the environment.

Key words: Forest cover, shifting cultivation, biodiversity loss, rural livelihoods, sustainable development.

INTRODUCTION

Environmental degradation is primarily the disintegration or the deterioration of the environment through the exploitation of the different assets provided free of cost by nature, which includes soil, air, water, and biotic and abiotic components (Chopra 2016). The destruction and degradation of the environment through natural (landslides, earthquakes etc.) and artificial processes (development, deforestation, shifting cultivation etc.) are all challenges for Meghalaya. Although several efforts have been made to restore the environment, Meghalaya has a long way to go to achieve its goal. Environmental degradation in Meghalaya, in general, and in the West Khasi Hills District is greatly influenced by the drivers of degradation and deforestation. These drivers include deforestation, shifting cultivation, permanent farming, wood collection, road network development, settlement expansion, charcoal making, mining, poverty, and lack of employment (ICFRE 2019).

Shifting cultivation, also called jhumming in India, is being practised by the tribal people of the hilly area as part of their tradition and culture (Deka and Sarmah, 2010). Jhumming involves clearing land and several years of wood harvesting or farming until the soil loses fertility. Once the land becomes inadequate for crop production, it is left to be reclaimed by natural vegetation or sometimes converted to a different long-term cyclical farming practice.

Ecological consequences are often deleterious but can be partially mitigated if new forests are not invaded. Cultivators may use the practice of slash-and-burn as one element of their farming cycle. In contrast, others employ land clearing without any burning, and some cultivators are purely migratory and do not use any cyclical method on a given plot. Sometimes no slashing is needed where re-growth is pure of grasses, an outcome common when soils are near exhaustion and need to lie fallow (Bartlett 1956). Shifting cultivation destroys the protective and productive vegetation in preference for a brief period of primary crop production, resulting in soil loss and other consequential damages (Tripathi 1996).

The burning of charcoal cuts down trees and produces a blackish residue of impure carbon. As charcoal is second only to wood as a Third World fuel, it is considered a wasteful fuel, as cooking with charcoal uses much more wood than cooking with firewood. Therefore, burning wood to make charcoal wastes energy and causes pollution (Robert 1995).

Hence, the massive production of charcoal is a significant cause of deforestation (Kauppi et al. 2006).

In developing countries, most of the residue launched into the air results from burning coal, wood, and charcoal for fuel, have deteriorated the air quality and degraded the environment. The Forest Department officials have started investigating the reported rampant felling of trees in the West Khasi Hills district for charcoal production, as it has posed a severe threat to the forest cover and the environment. Nowadays, pine trees are the latest victim of the people involved in the charcoal business in the West Khasi Hills District of Meghalaya.

Hence, this research tries to observe the environmental degradation in West Khasi Hills District as the area is characterised by shifting cultivation, deforestation, felling, and burning of wood to obtain firewood and charcoal, the primary source of livelihood for the rural poor.

MATERIAL AND METHODS

An intensive survey of locally available data and information on the environmental degradation caused by deforestation, shifting cultivation, felling, and burning of trees was collected through literature surveys and reports from various government agencies. Household survey was conducted using random stratified sampling in the selected villages namely Maroit-Nongkhlaw, Mawlangsu, Umsaw, Umlieh, Mawsyrpat, Mawsaw, Seinduli, Mawshynrut and Rambrai and 40 households in each surveyed selected village were taken into consideration. Personal observation of the areas affected by jhumming, felling, and burning of trees to obtain firewood and charcoal are also noted. Further, pictures of the affected areas by jhumming and burning trees to obtain charcoal are taken at specific locational sites, highlighting the destruction of the environment caused by these primary sources of livelihood.

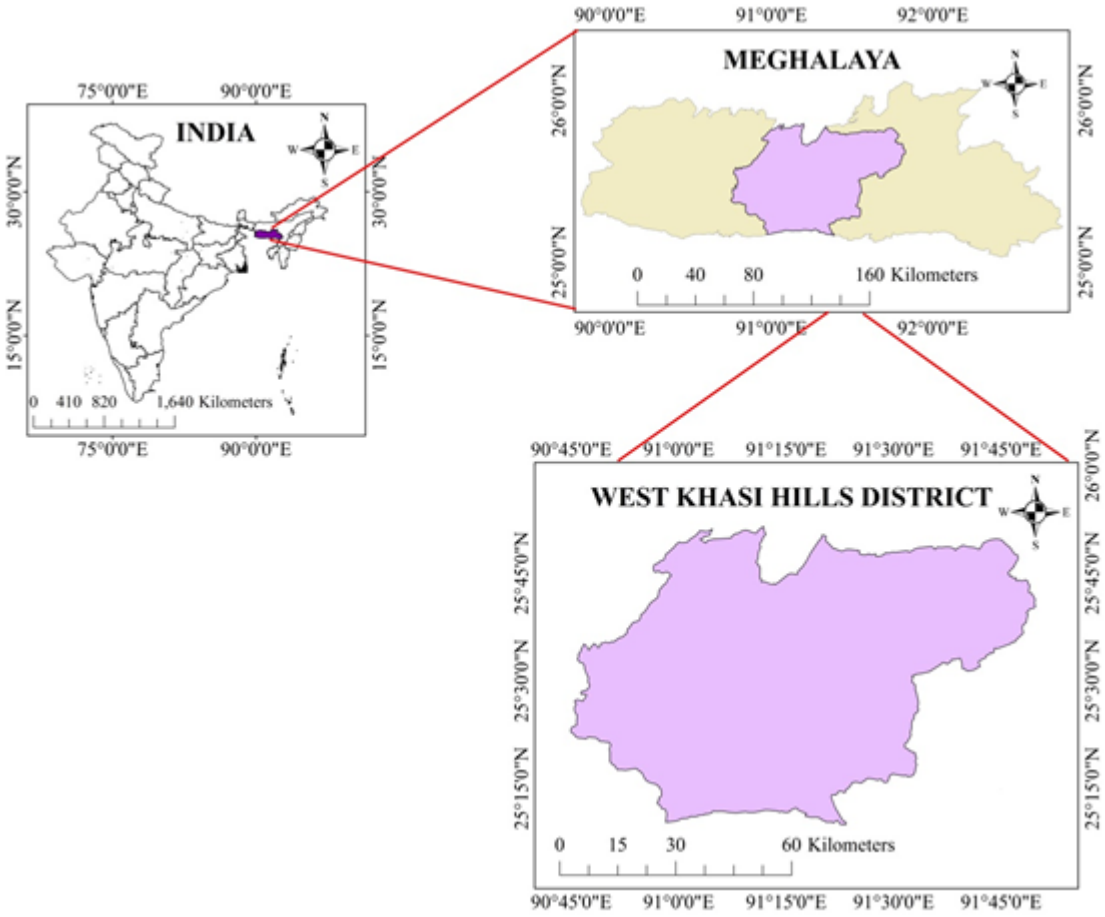

Figure 1. Location of the study area.

STUDY AREA

West Khasi Hills District, with Nongstoin (District Headquarters), is presently the most extensive District of Meghalaya, carved out from the Khasi Hills District on the 28th of October 1976. This District lies in the central part of the state, situated between 25°10' and 25°51' N latitudes and between 90°44' and 91°49' E longitudes (Nongshli 2015). It is bounded on the north-west by the Kamrup district of Assam, on the north-east by Ri-Bhoi district, on the east by the East Khasi Hills district, on the south by Bangladesh, on the west by East Garo and South Garo Hills district (Fig. 1).

The West Khasi Hills district experiences a mildly tropical climate in the northern and southern foothills. In contrast, the central upland experiences a temperate climate (MOWR 2013). Under the influence of the South West monsoon, this district receives maximum rainfall during the rainy season (June to August), with average rainfall ranging from 550 to 1000 mm.

RESULTS AND DISCUSSION

The effects of shifting cultivation, deforestation and burning wood to obtain charcoal in the West Khasi Hills District have led to different environmental hazards and loss of forest cover, as shown in Figure 2, affecting the function of the region's different bio-geo-chemical cycles.

Field reports suggest that although all consequences of deforestation are potentially severe, the most severe consequence is climatic change due to the loss of trees (Fig 2). From 2001 to 2020, the West Khasi Hills District lost 45.7 lakh ha of tree cover, equivalent to a 15% decrease since 2000. Further, from 2002 to 2020, the West Khasi Hills District lost around 14.9 lakh ha of the humid primary forest, up to 33% of the total tree cover lost. The total area of humid primary forest in the West Khasi Hills District has decreased by 13% from 2002 to 2020 (Global Forest Watch nd.). In 2015 the area under forest cover in the Meghalaya is 17,217 km^2 (FSI 2015), while in 2017 the area under forest cover has been reduced to 17,146 km^2. Further, reports suggested that there has been a negative change of 71 km^2 of area under forest cover as compared to 2015 (FSI 2017).

Forests serve as natural habitats for 2/3rd of the earth's species. The availability of sacred groves in various West Khasi Hills District locations has created a healthy ecosystem. However, in recent times, illegal felling and burning of different tree species, including bamboo, *Shorea robusta* (Sal), *Dillenia indica* (Elephant Apple), *Castanopsis indica* (Indian Chestnut tree), *Abizia lebbek* (Woman's tongue tree), *Toona ciliata* (Poma) etc., for high

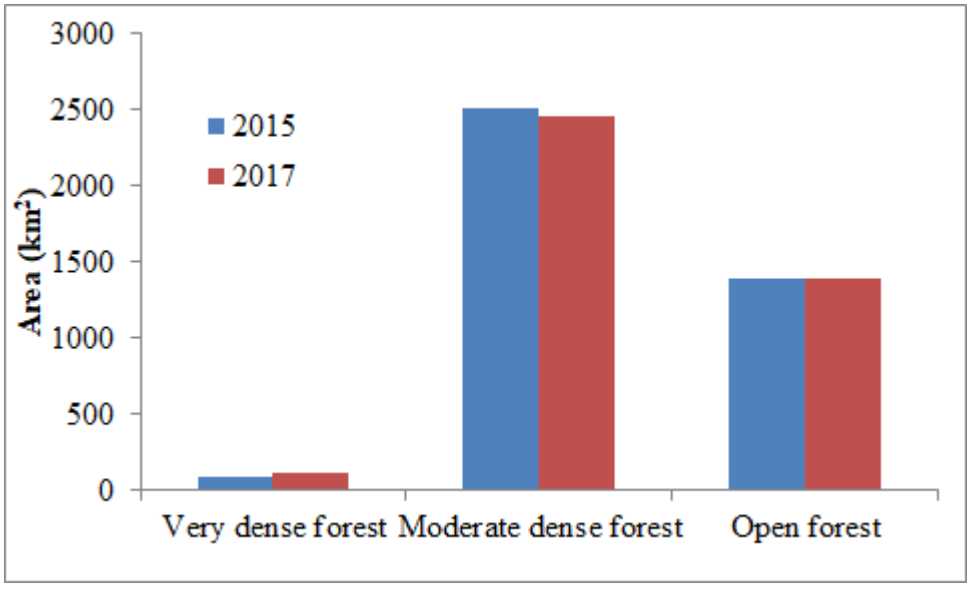

Figure 2. Forest cover of West Khasi Hills District.

Figure 3. Wood as a source of fuel in the study area.

demands of firewood and charcoal from the Public Ward Department (PWD) contactors and nearby towns for the domestic purpose (Kharwanlang 2007) has resulted in a decrease in the forest cover which has, in turn, increased the emission of carbon dioxide levels in the atmosphere from 2001 to 2020 in the study area (Fig. 2). Further, replacing the trees used is necessary for the environmental hazards to hamper West Khasi Hills and reduce this region's species diversity/richness.

The burning and transportation of charcoal in the West Khasi Hills District have become an issue of great concern. The field report suggests that the West Khasi Hills District is the only District in Meghalaya where the charcoal mafia produces and transports more than 6000 tons of charcoal annually. The main areas where illegal charcoal is produced include the Maroit-Nongkhlaw in Mairang, Mawlangsu, Umsaw, Umlieh, Mawsyrpat, Mawsaw, Seinduli, Mawshynrut and Rambrai (villages and areas of observations). The illegal charcoal produced from the West Khasi Hills District has increased over the years (Table 1).

Table 1. Forest products production (in quintals) from West Khasi Hills District during 1995 and 2005.

Villages	Firewood		Charcoal	
	1995	2005	1995	2005
Aragdonga	2160	3451	214	1680
Riangdo	708	853	438	29671
Nongstoin	912	1438	265	945
Mairang	54733	759	180	1743
Rambrai	3872	3951	317	21456

Source: Report from KHADC (Khasi Hills Autonomous District Council).

The charcoal is transported and sold to several industries in Byrnihat (Ri Bhoi District) and Assam (Kharwanlang 2007, The Shillong Times 2019). The production of firewood as a source of fuel has increased from 1995 to 2005 except for Mirang village (Table 1). On the other hand, the production of charcoal increased in 2005 compared to 1995 in all the observed villages of the West Khasi Hills District. Consequently, the mass production of firewood and charcoal because of their high demand has led to deforestation and the reduction of the forest cover of the study area.

Field surveys report that the large-scale deforestation of trees for commercial and domestic purposes (Figs. 3 and 4), especially in the selected villages, has resulted in rapid loss of habitat and habitat fragmentation, which has tremendously affected the biodiversity richness of the area.

Figure 4. Deforestation in West Khasi Hills District.

The household survey conducted at different selected villages reveals that 66 per cent of the respondents observed that there had been a reduction in the number of animals and bird species cited in the forest as compared to the late 1990s. Reports also suggest that the number of endangered and vulnerable fauna species, such as the Hoolock gibbons and *Ailurus fulgens* (Red Panda), locally called by the Khasis as Dkhan-bah and *Bubalus arnee* (Indian Wild Water Buffalo) (Fauna Diversity 2017) are decreasing over the years. Recently, habitat loss caused by the haphazard cutting of trees and indiscriminate burning of forests has led to the depreciation of the elephant population (Rao et al. 2013), especially in the areas bordering the West Khasi Hills District and the Garo Hills. Although, wildlife advocates have constantly been reminded that several wild animals left in the world could still be saved if deforested forests were only reforested. The practice of slash and burn of forests would be abandoned. However, if the local community does not implement such mitigation to retain the flora and fauna species and conserve the environment, it would affect their source of income and livelihood.

Shifting cultivation, or Jhum, is one of the prominent agricultural practices highly related to the tribal society of the West Khasi Hills. Characterised by hilly terrain, high labour costs, and high energy input in terrace cultivation, the tribal farming community of this area are compelled and must depend on shifting cultivation as the primary source of livelihood. Apart from Long-Cycle jhum and Modified jhum, stressed jhum is a dominant type of jhum practised in West Khasi Hills District. Stressed jhum is a type of jhum where the villagers are forced to reduce the fallow period (one or two years), which is insufficient for the soil to regain fertility, resulting in land degradation. Field survey suggests that this type of jhum could be more productive and sustainable. Further, the decline in the area under natural forests, local disappearance of native species and vulnerable flora species, including the flowering plants, wild apples, scarlet and white rhododendrons in some areas, and an invasion by alien species and exotic weeds such as *Lantana Camara* (an alien flora species not native to Meghalaya and India) are some of the ecological consequences of shifting agriculture (Kharwanlang 2007, Rao et al. 2013).

CONCLUSIONS

The West Khasi Hills District has rich, diverse, cultivated flora. The region is characterised by abundant tree species and indigenous medicinal plants, which the rural population rely on as their source of livelihood and fuel, building materials, food, and medicine. However, the rapid degradation of the environment due to anthropogenic activities and exploitation of forest resources has significantly impacted the forest ecosystem in the West Khasi Hills District. Deforestation in the study area has increased soil erosion rates by loosening the soil profile, increasing the amount of runoff, and reducing soil protection from tree litter. Removing trees on steep slopes with shallow soil has increased the risk of landslides and soil erosion, especially during the peak monsoon season characterised by incessant rain, which has become an anthropogenically induced hazard threatening people's lives on the slopes. Further, increased intensive farming has decreased the soil nutrients by consuming the trace minerals needed for crop growth at an accelerated rate. Overall, the effects of deforestation cannot be offset by the contribution of the practice to develop. While it is logical that humanity needs progress, it must also be noted that nature knows no defeat. Destroy it, and it will undoubtedly retaliate, one way or another. The recent efforts by the government, NGOs and local communities have shown a positive trend. Spreading environmental awareness among the people through the concept of sustainable development and finding new ways to enhance the people's livelihood, most of the environmental crises (shifting cultivation, deforestation etc.) are now being checked. Further, the areas which practised "slash-and-burn" have resorted to "slash-and-char", preventing the rapid deforestation and subsequent degradation of soils. The biochar, thus created from "slash-and-char", is given back to the soil, and this is not only a durable carbon sequestration method but also a highly beneficial amendment to the soil. Mixed with biomass, it helps create terra preta, one of the richest soils on the planet and the only one known to regenerate itself. Finally, reforestation through tree planting could take advantage of changing precipitation patterns due to climate change. Thus, leading to a positive outcome that will

eventually help the environment to heal.

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