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Research Article

The Natural Habitats, Biodiversity Hotspots, Local Indigenous Cultures And Tourism Attraction In The North Eastern States Of India

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ABSTRACT

North East India connects with several neighboring countries through the borders of its North Eastern states. It opens gates for various tourists from the neighboring countries as well as from various parts of the world. The climatic condition of the region largely contains with hot and humid sub-tropical climate, humid summers, severe monsoons and mild winters. North East India region supports diverse flora and fauna and several crop species. It has some of the Indian subcontinent's last remaining rainforests. Moreover, the region shares a fifth portion of India's total prospective estimate of reserved petroleum and natural gas.

Over the time, the natural beauty of the region along the large hill areas with various species of flora and fauna, varieties of rich cultures, traditions, simple lifestyle and unique traditional costumes of the people, together increasingly attract various tourists from across the world. This makes North East India to be considered as one of the most important hotspots of biodiversity and tourism in the country. Moreover, the region is listed in the Global 200 list of ecoregions as priorities for global conservation. In the recent years, many tourists visited the region for business purposes, leisure and scientific studies. There are about 145 tribal communities in the North East India each having unique cultures, traditions and different dialects. The natural beauty, rich biodiversity, rich culture and tradition of the indigenous tribes have been a great attraction for the tourists. However, there is slow development in preserving its natural habitats and beauties in this region. Undeveloped transport system and poor tourism management create many inconveniences for visitors and the local people to reach several beautiful places and biodiversity hotspots. Therefore a great effort is necessary to preserve biodiversity, natural habitats and the unique cultures of the indigenous people. This would not only contribute in keeping balance towards the global ecological environment, but also in bringing a better livelihood to the poor people living in this region.

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INTRODUCTION

North Eastern states of India are located at the North Eastern part of India. Eight states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura together form North East (NE) India (Fig. 1). It shares 5182 kilometers along the border with the neighboring countries. The international border covers about 99 percent of its total geographical boundary. Its neighboring countries are China (connected with Sikkim), Myanmar (connected with Manipur, Nagaland and Arunachal Pradesh), Bangladesh (connected with Meghalaya, Assam and Tripura), Nepal (connected with Sikkim) and Bhutan (connected with Assam, Sikkim, and Arunachal Pradesh) (Fig. 2) [1]. Several tourists from various parts of the world visited NE India, for holiday leisure, sports, business and scientific research purposes etc [1].

NE India is largely occupied by hill/ mountain regions and geographically categorized into the Eastern Himalaya (Fig. 3), the Patkai, the Brahmaputra and the Barak valley plains [2]. The region has several unique places and iconic animals such as Mawsynram of Meghalaya (highest rainfall on the earth), Loktak Lake of Manipur (the largest freshwater lake in the region famous for the floating phumdis), Tea garden of Assam (Assam tea is famous in the world), Kangchenjunga (the third highest mountain in the world) located between Sikkim and Nepal, endangered one horned Rhino of Assam and Sangai (brow antlered deer) of Manipur, and many more to be named. This region comprises one of the most ethnically and linguistically diverse communities across Asia. Each state is rich with varieties of distinct cultures, languages and traditions. Several tourists visited NE India and described it as a place renowned for its magical beauty and bewildering diversity.

There are 51 forest types in NE India that harbor 80000 out of 150000 flowering plant species of the entire NE region [3]. Two states in the region, Arunachal Pradesh with 5000 species and Sikkim with 4500 species together

contribute more than half of the total flowering plant species. There are 1500 endangered floral species identified in India, out of which 800 are from the NE region and moreover 35 varieties of crops are also grown in this region [3]. Having warmer mean temperatures and fewer days with frost and much higher rainfall, the region is also rich in faunal diversity. Out of the 22 restricted range species of birds identified by Stattersfield et al. (1998), 19 are confined in the Endemic Bird Area (EBA) that include seven Northeast region (excluding Tripura) along with the neighboring countries such as Bangladesh, Bhutan, China, Nepal and Myanmar [4,5]. Eleven restricted-range species found in this region are considered to be threatened as declared by Birdlife International 2001 & 2008 [6,7,8]. According to the International Council for Bird Preservation data, out of the 78 globally threatened bird species found in the Indian Subcontinent, more than 2 critically endangered species, 3 endangered species, and 14 vulnerable species of birds are confined in the EBA of NE India [9]. Furthermore, as many as 15 species of non-human primates are found in the NE region, among them hoolock gibbon, stumptied macaque, pigtailed macaque, golden langur, hanuman langur and rhesus monkey are considered to be the most important primates of the region [10]. This rich endemism with higher plants, vertebrates and avian diversity, has made NE India qualified to be a hotspot of biodiversity. It may be noted that the World Wide Fund for Nature (WWF: world's largest conservation organization that priorities on conservation) has identified the entire Eastern Himalayas as a Global 200 priority ecoregion which included large area of NE India [11,12]. The forests within this ecoregion include Brahmaputra Valley Semi-Evergreen Forests, Eastern Himalayan Broadleaved Forests, Eastern Himalayan Sub-alpine Coniferous Forests and Naga-Manupuri-Chin hills moist forests etc. [13,14]. It may be noted that the Global 200 is the list of ecoregions selected by WWF as the most crucial ecoregions for

conserving global biodiversity. Moreover, Conservation International, after upscaling the Eastern Himalaya hotspot, proposed to include all the eight states of NE India, along with its neighboring countries such as Bhutan, southern China and Myanmar [15].

These several important features along with the natural beauties are also the potentials for attraction of global tourists to the NE India. Over the recent years, there have been a high increase number of tourists visiting to this region. However, a lot more attention is

required to bring development in this place, from the government organizations, non-government organizations, public sectors and private sectors towards providing proper transport system, driving awareness for maintaining and preserving the biodiversity hotspots and good shelters for the tourists. Furthermore, preservation of local indigenous cultures and traditions is also a certain part in balancing the ecological environment in the NE India.

Fig 1. Representative map of the eight NE states of India

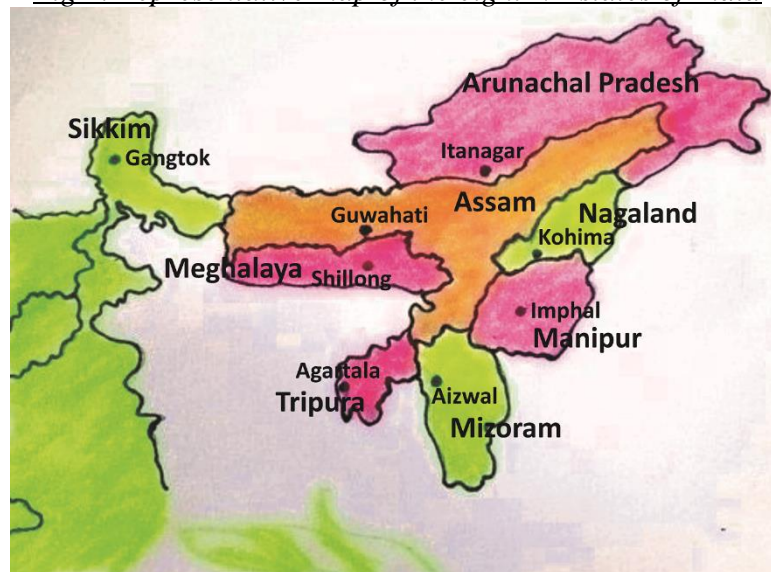


Fig 2. Representative map showing neighboring countries of India that share borders with the NE states of India

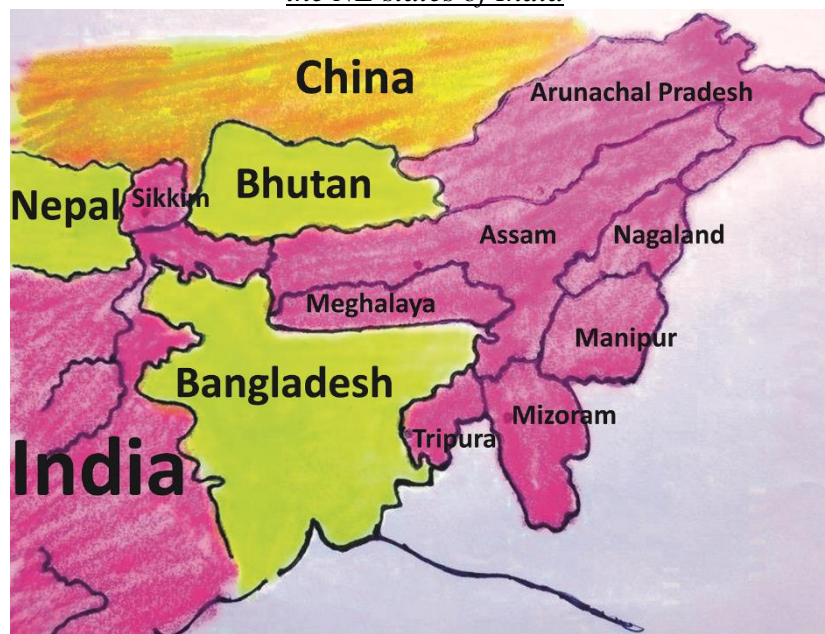


Fig 3. A representative map showing Eastern Himalayas with rich biodiversity. The continues green colour region represents the Easter Himalayas with rich biodiversity.

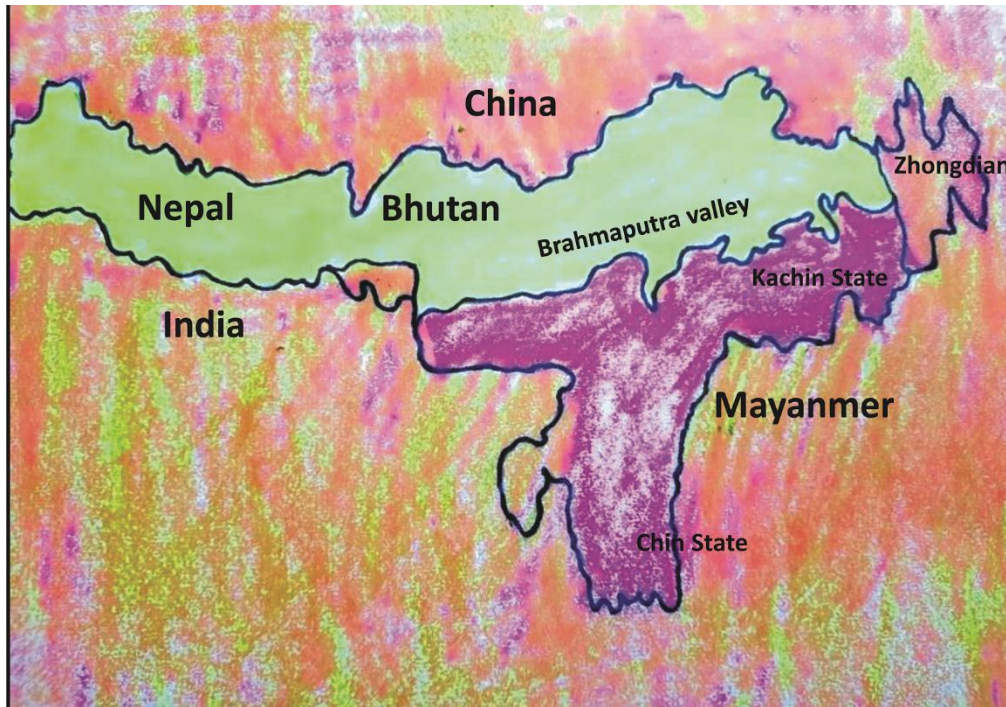


Figure 4: Beautiful site views of tourists' attractions: *The photographs taken from different sources are (A) Dzukou valley [57], (B) Loktak lake [58], (C) Sangai (brow-antlered deer or Eld's deer) [59], (D) Mawsynram [60], (E) Nohkalikai Falls [61], (F) Umanda Island [62], (G) Haflong [63], (H) Bum La Pass [64], (I) Ziro Valley [65], (J) Ziro Valley [66], (K) Tsomgo Lake [67], (L) Yumthang Valley [68], (M) Phek [69], (N) Dzudu Lake [70], (O) Lunglei [71] and (P) Phawngpui Peak [72].*



Rich Biodiversity and priority ecoregion in North East India in global conservation

The geographical region of NE India is subdivided into Eastern Himalaya range, Patkai range, Brahmaputra valley and the Barak valley

plains. It occupies 262179 km² of India's total 3287263 km² area which equals to 7.97% of the total land of the country. The climatic condition of the region is primarily seasoned with humid sub-tropical climate (with hot and humid

summers), severe monsoons and mild winters. Such weather and climatic features are suitable for diverse flora and fauna and several crop species. This region, along with the west coast constitutes some of the last remaining rainforests of India. Moreover, the region approximately occupies a fifth of India's total of 14 possible reserved petroleum and natural gas [16].

Imphal valley and some flatlands that lie between the hills of Meghalaya and Tripura are the other plain areas of NE India along with Brahmaputra-Barak river systems and its tributaries which widely spread across the region. Altitude in this region varies from the Mean-sea-level (MSL) to over 23000 feet above MSL and the valleys are predominant with tropical climate characteristics. There are different climatic conditions between the valleys and mountain regions of the North East. For example, while the mean temperature of January in the valley of Assam is about 16 °C, the scores in the mountain region of Arunachal Pradesh and Nagaland is 14 °C to sub-zero. In summer, the valley temperature ranges from 30°C to 33°C while the hills temperature scores between 20°C to 15°C respectively. The rainfall is generally very heavy in the region with the average annual precipitation of 2000 mm (79 in) which is mostly concentrated during monsoon season [17]. Remarkably, Mawsynram of Meghalaya which had been declared as wettest place on earth receiving 872mm annual rainfall. In the valley like Imphal of Manipur, the annual rainfall is about 2,000–3,000 mm. Arunachal Pradesh and Sikkim have a montane climate with cold, snowy winters and mild summers. The geographical location of NE India is also considered to be unique, because it is located at the juncture of Indo-Malayan, Indo-Chinese bio-geographical regions; moreover the region also dwells at a meeting place between Himalayan Mountains and the Peninsular India [18]. The entire NE region occupies a significant part of 'Himalaya' and 'Indo-Burma' global biodiversity hotspots [19,20]. The region possesses abundant natural ecosystems as it harbors diverse biota with high

level of endemism. Therefore, when WWF identified the entire Eastern Himalaya as "priority global 200 Eco-region", the eight states of NE India were included [15]. Notably, NE India is located within the regions of one of the world's richest biodiversity region [21]. Considering the types of vegetation that range from foothills' tropical rain forest to the Alpine meadows and cold deserts, NE India accumulates more than one-third of the country's total biodiversity [22].

It may be noted that, a biodiversity region to be considered as a hotspot, the area must have at least 0.5% of world's plant species as endemic; i.e., 1500 of 0.3 million identified plant species of the world. So far, all the globally recognized biodiversity hotspots have a minimum of 2500 endemic species. Moreover, the region also should have lost 70% or more of its primary vegetation, upon the qualification as hotspot [23]. The Global 200 is the list of ecoregions identified by WWF to give priorities for conservation. According to WWF, a place is said to be an ecoregion when the place is a relatively large unit of land or water and possesses a characteristic set of natural communities that share their species dynamics by a large majority and environmental conditions [24,25,26]. Based on the criticality of endangered, vulnerability, stability or intact conditions, WWF assigns a conservation status to each ecoregion listed in the Global 200. Following this criteria, the entire region of NE India has been assigned as one of the priority ecoregion of Global 200 by WWF. It signifies the important role of NE India in conservation of global biodiversity and the ecosystem.

NE India also is richly inhabited with several varieties of medicinal plants and other rare/endangered plants and animal species. According to Hegde 2000 report, there are 51 types of forest in this region which are clubbed into six major domains – 1) tropical moist deciduous forest, 2) tropical semi-evergreen forest, 3) tropical wet evergreen forest, 4) subtropical forest, 5) temperate forest and 6) alpine forests [3]. The entire India has nine important vegetation types, of which six are

found in the NE Region. These forests harbor more than half of the total flowering plant species in the region, i.e., 80000 out of 150000, that includes gymnosperms (40/54), pteridophytes (500/1012), orchids (825/1145), rhododendrons (80/90), bamboos (60/110) and cans (25/56). Among the states, Arunachal Pradesh reported highest floral diversity with 5000 species followed by Sikkim with 4500 species, Meghalaya (3500), Assam (3010), Manipur (2500), Nagaland (2250), Mizoram (2000) and Tripura (1600). The Indian Red Data Book published by the Botanical Survey of India reported that, 10% of the flowering plants in the country are endangered. And 800 out of the 1500 endangered floral species in India are from NE region.

NE India has about 850 avifauna species and this richness of avifauna in the region signifies habitat diversity associated with a wide range of altitude. The Royal Society for Protection of Birds had also identified Eastern Himalaya and Assam plains as an Endemic Bird Area. Stattersfield et al. (1998) had identified 22 restricted range bird species in the Eastern Himalaya; of which 19 are confined in the NE region and the remaining 3 are present in other endemic and secondary areas [4]. In 2001, the Birdlife International considered that 11 of the 22 restricted-range species had been threatened [6].

Natural Beauties of NE India and the tourists' attractions:

Every state of NE India is nicely decorated by nature with its uniqueness of God's creation, the mountains, the hills, the lakes, the rivers, the trees, the flowers, the animals, the birds, the insects and several tribes with unique cultures, traditions and different languages. Few well known popular tourists' spots are briefly described below in Fig 4.

- Dzukou valley: It is a small valley located at the border between Manipur and Nagaland. Its natural environment, seasonal flowers and birds have made this valley a worldwide attraction for several tourists. The valley is also famous for its wide varieties of flowers in every season.

Among them, Shirui Lily is highly commended as this flower happened to be found only to this valley. [27]

- Loktak Lake: This Lake of Manipur is the largest freshwater lake in the Northeast India which is famous for its phumdis floating over it. Phumdi is a heterogeneous mass of vegetation, soil and organic matter that is formed at various stages of decomposition with thickness varying from few centimeters to two meters. The phumdis cover an area of 40 km² (15 sq mi). This spongy floating mass can support small huts which are attracted to the various tourists and they love to experience spending few nights in these huts during their trips. Fish from this lake is also a source of livelihood for several villagers living around the lake [28].
- Sangai (brow-antlered deer or Eld's deer) also known as dancing deer is an endemic and endangered deer species found only in Manipur. This medium sized deer has two extremely long brow tines (100-110 cm) that form the main beam and a continuous curve at right angles to the closely set pedicels, thus signifies its name 'brow-antlered deer'. The forward protruding beam appears to come out from the eyebrow and the antlers of the opposite sides are unsymmetrical [29]. This state animals' natural habitat is the floating phumdis of the Keibul Lamjao National Park, located in the southern parts of the Loktak Lake. In 1975, only 14 sangai was listed in the Red Data Book [30,31], now it has increased to 204 after declaring area as national park enforcing strict conservation measures by the Forest Department. [32]
- Mawsynram: It is a village in the East Khasi Hills district of Meghalaya. The place is well regarded for being the highest rainfall region on the planet. This place receives an annual rainfall of 11,872 millimetres (467.4 in) in average. [33]
- Nohkalikai Falls: Nohkalikai Falls of Meghalaya is the tallest plunge waterfall in

India with the height of 1115 feet (340 metres). The waterfall is located near Cherrapunji which was the wettest place on earth, before replacing by Mawsynram, but still remains as one of the wettest places on Earth [34, 35].

- **Umanda Island:** This smallest river island is located in the middle of Brahmaputra river that flows through Guwahati, the capital city of Assam. British named it as Peacock Island for its structure looked alike splayed feathers of a peacock. This island is home for one of most endangered primate species the endangered 'golden langur' (an old world monkey). The hair of golden langur male and female/juvenile ranges from cream to golden and silvery white to light buff colour respectively. They have black face and very long tail and their fur color changes with season. [36, 37]
- **Haflong:** Haflong is a town and headquarters of Dima Hasao district (formerly known as North Cachar Hills district) in Assam. This is the only hill station in Assam. The town is set in the oscillating hills, lofty terrains, and a sparkling lake and lush valleys of Dima Hasao. This "Scotland of Assam" has been referred to Halfong for its beauty [38, 39].
- **Bum La Pass:** A high altitude pass situated at the border of Tibet's Cona County and India's Tawang district of Arunachal is found to be elevated by 15,200 feet above the sea level. Throughout the year, the place is often covered by heavy snow and it is one of the most offbeat passes in the world. Tracking is advisable only on the day with a clear weather with no snowfall or rainfall. This place is also one of the five official Border Personnel Meeting points between the Indian Army and the People's Liberation Army of China [40,41,42].
- **Ziro Valley:** The census town of Arunachal Pradesh Lower is located in the Subansiri district. The town has been shortlisted for inclusion in the Tentative List for further nomination to UNESCO for inscription in the World Heritage Site by the Archaeological Survey of India (ASI). The Valley is surrounded by pine ridden mountains, paddy fields, quaint hamlets, bamboo huts and vibrant range of flora and fauna. Talley Wildlife Sanctuary is home for the elusive clouded leopards [43,44].
- **Tsomgo Lake:** The glacial lake, also known as Changu Lake is located in the East Sikkim. With the elevation of 12,313 ft from the mean sea level, the lake remains frozen from early winter to late spring and embedded in steep and rugged mountain terrain. Tsomgo Lake is associated with many legends and myths and considered as a holy lake by the Sikkimese. The surface of the lake reflects different colours with the change of seasons [45,46].
- **Yumthang Valley:** The valley of flowers of Sikkim is also known as Sikkim Valley or Flowers sanctuary which is located in the North Sikkim district. It is a natural sanctuary connected with river Teesta, hot springs, yaks and grazing pasture on Rolling Meadows surrounded by the Himalayan Mountains. The lake stays at 11,693 ft above mean sea level and is a home for the Shingba Rhododendron Sanctuary with more than twenty-four species of the rhododendron, the state flower of Sikkim. Flowering season begins from late February until mid June. When the vast multitude of flowers with different colours blooms like a carpet of the valley, it looks like a multicolored shade of rainbow. There is heavy snowfall in Yumthang valley between December and March. [47,48]
- **Phek:** It is a mountainous district of Nagaland with 70% evergreen forest. The tallest mountain in this region is 7900 ft higher from the mean sea level. This region is also accompanied by the rivers such as Tizu, Lanyi and Arachu; and lakes such as Shilloi, Chida and Dzudu [49].
- **Dzudu Lake:** The Lake is found at the top of mount Zanibu of Nagaland and thus also

known as Zanibu lake. The lake stays at the heart of the greenery flourishing forests. There are seven different streams flowing into this Lake and form a reservoir [50,51].

- Jampui Hills: These hills accompanied by beautiful valleys and splendid sceneries are located in the Northern part of Tripura with an altitude of 1000 meters above sea level. The sunrise and sunset can be viewed from various points of Jampui Hills. It is also a land of juicy oranges [52,53].
- Lunglei: A town with beautiful landscapes and the scenic setting is located in the south-central part of Mizoram. There is bridge of rock in this town and thus, the name Lunglei was given to it. This second-largest town in Mizoram was important for commercial and educational centre until the partition of India as it had direct access to Chittagong (a big city in Bangladesh) [54,55].
- Phawngpui Peak: This blue mountain located in the south of Aizawl is the highest point of Mizoram with the height of 2157 m from the sea level. There is a semi-circular series of cliffs with sharp and deep fall on the western side of the peak called as Thlazuang Khàm which provides natural home of mountain goats [55,56].

Diverse cultures and tradition of various communities in NE India

People living in NE India comprises of vast diverse ethnic communities which follow a wide varieties of traditions, customs and languages. There are about 475 ethnic groups which speak 400 different dialects [73]. The region is largely occupied by different tribal communities with 59% (approx.) of the total NE population. The highest tribal population is found in Mizoram with 95% (approx.) and the lowest in Assam with 13% (approx.). Majority of the tribes lived in the hills under the rule of village chiefs [74]. The tribe communities are classified based on their origin, language, race and geographical locations. Some tribal communities are composed of many smaller groups having unique identities with different

language and culture; and thereby sub classified within the same community. The various dialects in NE India are clustered into Indo-European, Sino-Tibetan, Kra-Dai, Austroasiatic language families along with some creoles languages that share a number of features, but different from the rest of the larger part of India [75,76]. Each community also has different traditional costume which is unique to the community. Those traditional costumes are usually worn during traditional ceremonies. All the tribes in NE India also have unique folk dances that associates with their own culture and traditions. While few dances like Manipuri dance from Manipur, Sttriya dance from Assam have been among the lists of Indian classical dances. The tribal practice for livelihood in the region is primarily hunting, land cultivation and indigenous crafts [77,78]. The highly rich culture of the different tribe communities are clearly seen during their festivals. Handicrafts of bamboo and cane, traditional weapons, musical instruments made of wood carving and traditional handloom weaving etc. are also part of the culture of NE tribes [79]. The rich culture, tradition and languages of NE tribes represent highly diverse groups of people living together in the region.

DISCUSSION AND CONCLUSIONS:

Since NE region of India is a hotspot of biodiversity with several endangered plants and animals, sharing a global ecoregion along with the neighboring courtiers such as China, Bhutan; further research and policies to safeguard the biodiversity of the region is highly needed. Some scientists have already begun to study the wildlife flora and fauna in the NE India. This needs to be strengthened further at the large scale to finding more endangered plants and animals. It is important to keep constant tracking the ecological environment changes in the region.

More than half of the NE region is occupied by the forests (over 60%). Even though there is very high rainfall the lost of soil due to erosion is protected by the forests. Moreover, human inhabited area is mostly in the plain region.

There are more biodiversity of plants and animals in the NE region, because its larger area is occupied by hills and mountains. Nonetheless, in the course of time, due to scarcity of land, and high population density in the plains, people started moving towards the hill regions. Moreover, there is continuation of jhum cultivation (burning large areas of forest for cultivation), which has been practiced as means of livelihood for the tribes dwelling in the hills. This increase population, development and jhum cultivation cause lost of forests in the region over the time that in turn affects the survival of many plant and animal species leading them to become endangered.

It has been well known that North Eastern India has enormous potential for tourism. The natural beauties, biodiversity hotspots, unique cultures, different languages of different tribes are the potential drivers for the increase of tourists in the region. For several tourists who came to visit for holiday pleasures, the natural beauties are their favorites. It is natural for a tourist to love to see and experience, a new culture, tradition and lifestyle of the people living in a new place they are visiting. Tourism opens the door to communicate people from different places. Therefore it is important to promote tourism in the NE region. While the number of tourists visiting in the region has been increasing over the recent years, there is slow process of development of tourism in the region, in terms of route transport system, food, shelter, health and hygiene etc. There are many stunning places like Dzukou Valley in Manipur which are difficult for the tourist to reach mainly due to lack of proper road transport and lack of other facilities such as food and accommodation etc. For a tourist it is natural to buy something that is unique to the new place to keep for memory. Quite often people love to buy clothes, handicraft and handloom products which are rich in the region. NE India is very rich with several kinds of traditional costumes and handicraft products that are unique from one tribe to another. If there are about 475 ethnic groups and 400 different dialects [73],

there will be several unique varieties of costumes according to the number of tribes.

Considering those potentials and contributions of NE India in preserving biodiversity and ecosystem globally and its beauties that attracts various tourists across the world it is highly essential to provide the necessary inputs from the government and non-government organizations and volunteers. Preserving indigenous tribes' traditions and cultures while controlling hunting of wild animals and jhum cultivation, will play a certain role in maintaining the balance of global ecosystem. Effective progress of development in those areas will have a substantial contribution in the economy of the people in the region and in the transformation of the nature of traditional livelihood (such as hunting wild animals and jhum cultivation) of the several tribes of NE India.

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