

POPULATION PRESSURE AND ITS IMPACT ON FOREST RESOURCES IN NORTH EAST INDIA

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ABSTRACT

Population growth, combined with other direct factors such as poverty, corruption, and weak property rights, contributes to forest loss and severe environmental degradation. In recent years, integrated management of population pressure and natural resources are widely implemented by researchers. Intense population pressure on the environmental resources is the leading factor in modifying the land use pattern of an area. Forest resource is a vital element that supports life on the surface of the earth, but human pressure on land has raised several environmental problems and created a huge impact on forests. In the case of India, it is found that continued population growth creates tremendous pressure on environmental components mainly on forests. North East India is small but a significant part of the country covering an area of 255, 511 km² i.e 7.77% of India's total area. As of 2011, the region had a population of 45.53 million, about 3.07% of India's total population, and the density of population in this region is 174 persons per km² of the 7.97% of all India (Bhattacharjee and Sarmah, 2018). There is a strong link between demographic and socio-economic trends on one hand, and the depletion of resources and environmental degradation, on the other (Sinha, B.K and Choudhary, S, 2008). Growing demand for forest and agricultural products to feed increasing rural and urban populations will continue to put pressure on forests. In this paper, an attempt has been made to focus on the major factors of population pressure in the region and how its impact on forests by using various methods as per need.

KEY WORDS: Population growth, environmental degradation, migration, deforestation.

STUDY AREA

North East India is the eastern most region of India connected to East India via a narrow corridor squeezed between Bhutan and Bangladesh. It comprises the contiguous seven sister states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The region is located between 27°57' to 28°23' North latitudes and 89°46' East to 97°25' East longitudes. It covers an area of 2,55,511 km² (7.7% of nation's land), 70% of which is hilly with more than

80% population living in the rural areas. As per the 2011 census, the population of North East India is 4,55,33,982 which is approximately 3.07% of the India's total population. The bulk of the population of the region is concentrated mainly in three sectors, viz- Brahmaputra valley and Barak valley of Assam, Tripura and Imphal in Manipur. The large variation is caused by the geographical and economic factors which vary greatly within the region.

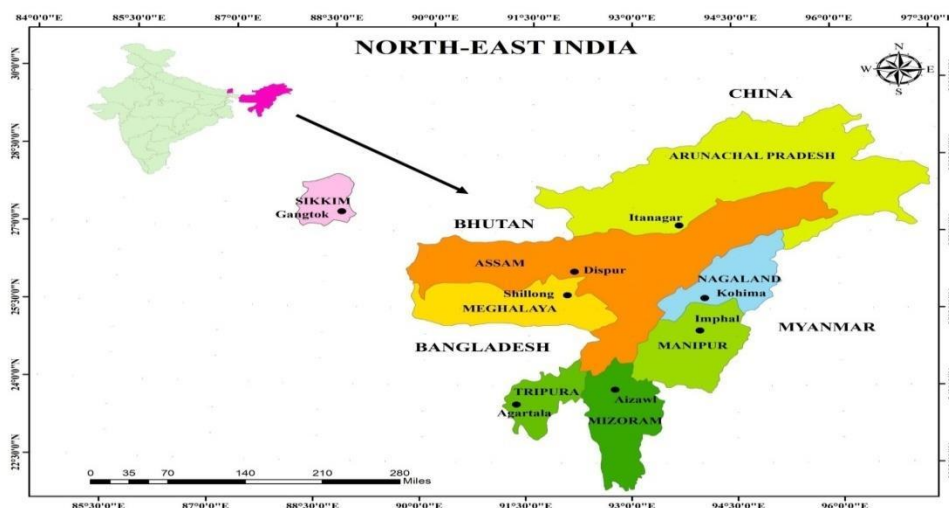


Fig.1 Location of North East India

METHODOLOGY

The present study is based on both primary and secondary sources of data. The field study method is applied to collect primary data based on visiting the villages near the reserved forest to generate relevant information about the situation. The secondary data are collected from different books, journal, reports, internet, newspaper etc. The collected data are processed, tabulated and represented by graphs, diagrams and maps. On the basis of the analysis made with the help of the above methods, conclusion is made on the topic.

PATTERN OF POPULATION GROWTH AND DENSITY

The bulk of the population in the North eastern region is concentrated mainly in three sectors, viz- Brahmaputra valley and Barak valley of Assam, Tripura and Imphal in Manipur. The large variation is caused by the geographical and economic factors which vary greatly within the region due to unique topography of North East India as it is covered with mountains; rivers and barren hilly terrain

remain as problems rather than prospect for development.

Table 1 reveals that there is uneven spatial distribution of population among constituent states. For example, Assam, second in terms of area contains 68.45 % of the region's population whereas Mizoram less than 3% (2.40 %) of the regional population stands at the other extreme. The region's growth rate (18.28%) of population is much higher than the national average (17.64%). India's population in 2011 was 1.21 billion, comprising 624 million males and 587 million females. The population of India has increased by more than 181 million during 2001-2011 and decadal growth rate declines to 17.64% from 21.15% during 1991-2001 (Bhattacharjee and Sarmah, 2018).

Table 1: Trend of Population Growth in North-East India (1971 -2011)

States	Population (in millions)					Growth Rate (in %)			
	1971	1981	1991	2001	2011	1971-1981	1981-1991	1991-2001	2001-2011
Arunachal Pradesh	4.67	6.31	8.58	10.91	13.82	35.15	36.83	26.21	18.18
Assam	146.25	180.41	244.95	266.38	311.69	23.4	24.24	18.92	16.93
Manipur	10.72	14.2	18.27	23.88	25.7	32.46	29.29	20.29	13.95

Meghalaya	10.11	13.35	17.61	23.06	29.64	32.04	32.86	30.65	28.53
Mizoram	3.32	4.93	6.86	8.91	10.91	48.55	39.70	28.82	22.44
Nagaland	5.16	7.74	12.16	19.89	19.81	50.05	56.08	64.53	15.04
Tripura	15.56	20.53	27.45	31.91	36.71	31.92	34.30	16.03	15.04
North -East India	195.82	257.5	313.8	384.95	455.33	35.87	27.45	21.45	18.28
India		1	7						
India	5479.5	6832.29	8439.31	10270.15	12108.54	24.66	23.85	21.54	17.64

Source: Census of India 1971,1981,1991,2001 and 2011

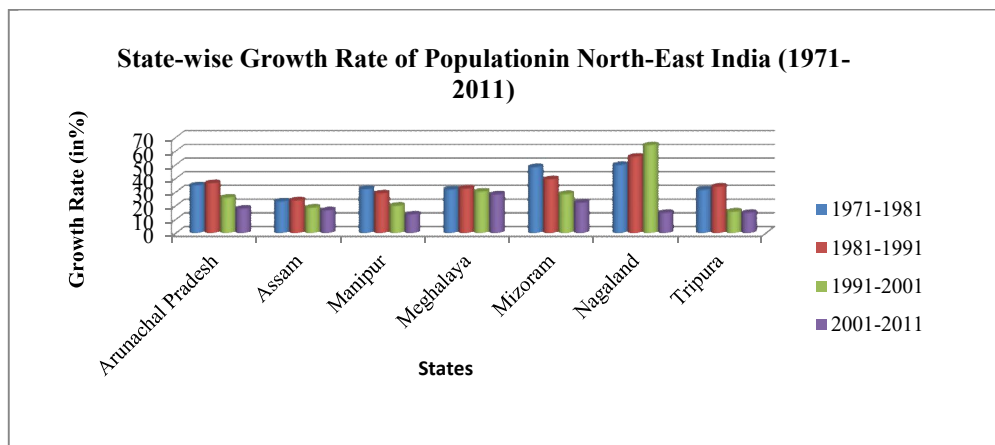


Fig.2

It is pertinent to note that India's total population increased by about 24.66% between 1971-1981 whereas for North-East, the growth was 35.87%. The population growth rate in India declined to 17.64% from 24.66% during 2001-2011 and similarly growth rate of North-East India declined 18.28% from 35.87% during 2001-2011. During the period of 1971-1981, except Assam (23.36%) all other states of North East India recorded more than 30% decadal growth rate of population. Nagaland recorded the highest growth of population (50.05%) and followed by Mizoram (48.55%). In the next decade (1981-1991), the distribution of population in North East India is very uneven. It is governed mainly by topography, soil, availability of water, mineral resources and accessibility to the areas. Since the economy of this region is primarily based on agriculture,

the topography and soil have great influence on the distribution of population. According to the 2001 Census an extensive rise of population in the Muslim majority districts of Assam took place due to influx of Bangladeshi Muslims. Similarly, Hindu Bangladeshis are entering into Tripura and its percentage of tribal population has declined from 58 percent in 1951 to 30 percent in 2001 (Deb, B.J; 2005 ,p-101).

The density of population (person per km²) is very uneven in the North Eastern region. (Table 2). During 2011 census, the overall density of population in North-East India is found to be 174 person per km² against 77 person per km² in 1971, while the corresponding densities of India were 374 and 177. The density of North East India is much less than the national average.

Table 2 Population Density in North East India (1971-2011)

States	Population Density (per sq km.)					% share of All India
	1971	1981	1991	2001	2011	
Arunachal Pradesh	6	8	10	13	17	2.54
Assam	186	230	286	340	397	2.38

Manipur	48	64	82	107	122	0.67
Meghalaya	45	60	79	103	132	0.68
Mizoram	16	23	33	40	52	0.64
Nagaland	31	47	73	120	119	0.5
Tripura	148	196	263	304	345	0.31
North -East India	77	97	123	151	174	7.97
India	177	216	273	312	374	

Source: Census of India 1971,1981,1991,2001 and 2011.

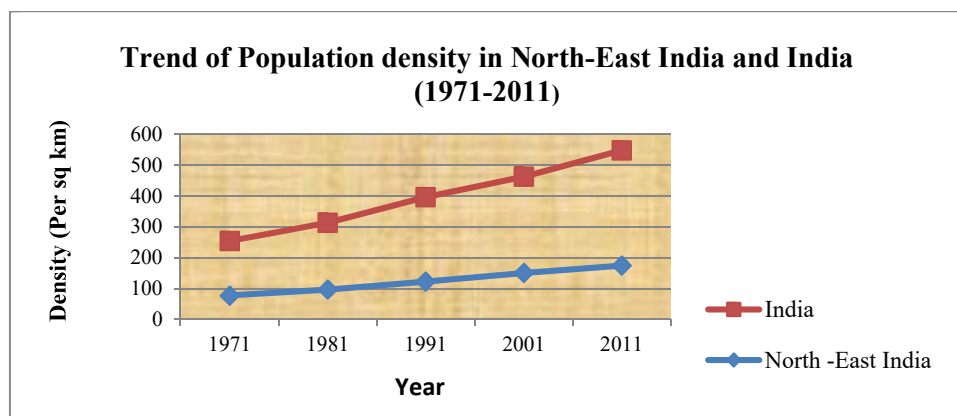


Fig.3

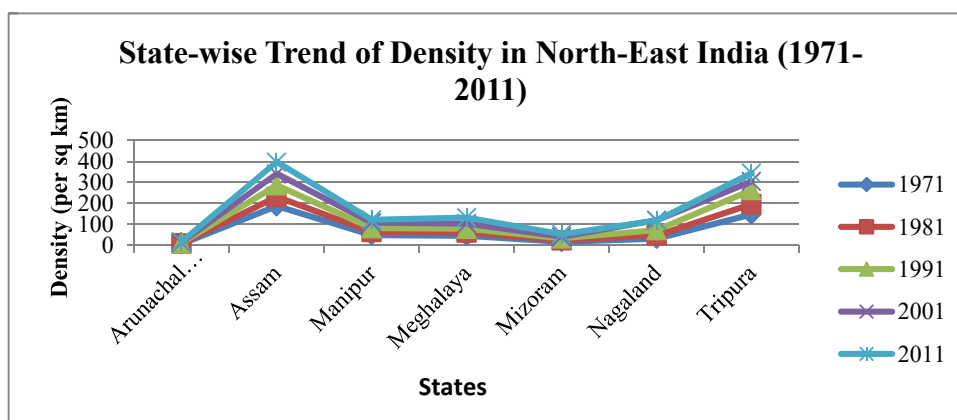


Fig.4

In 2011, the highest density of population is recorded by Assam (397/km²) followed by Tripura (345/km²) mainly due to the availability of fertile plain land on the one hand and influx of large number of immigrants especially from the neighboring countries (Bangladesh and Nepal) on the other. Moreover, around the state headquarters and other urban centers of this region many large villages have grown mainly because the inhabitants find ready market for their agricultural products and also because of the employment opportunities. Plain land, fertile soil and better transport and communication facilities account for the high density of population in the two states. Since the early

part of 20th century, this flood plain of North East India has been attracting the land hungry people of the East Bengal /East Pakistan. The hilly areas of Arunachal Pradesh, Meghalaya, Nagaland, Mizoram and Manipur are sparsely populated due to rugged topography, low soil fertility and poor means of transport and communication having low carrying capacity.

TREND OF URBANIZATION

Urbanization is the most significant phenomenon of the 20th century which has affected all aspects of national life in India. The process of urbanization in India is largely city oriented. Pre independence, the North Eastern region was largely rural, but in the

second half of the 20th century, urbanization levels here shot up. Indications are that development projects initiated by state and central Government and the role of missionaries in creating educational

infrastructure were key contributory factors. The undue concentration of population in most of the towns in North Eastern States results in a number of problems for the inhabitants of the towns.

Table 3 Pattern of level of Urbanization in North East India
(Percentage of Urban Population)

States	1971	1981	1991	2001	2011
Arunachal Pradesh	3.70	6.56	12.80	20.41	22.94
Assam	8.82	9.88	11.10	12.72	14.10
Meghalaya	14.55	18.07	18.60	19.63	20.7
Manipur	13.19	26.42	27.52	23.88	29.21
Mizoram	11.36	24.67	46.10	49.50	52.11
Tripura	10.43	10.99	15.30	17.02	26.17
Nagaland	9.95	15.52	17.21	17.74	28.86
North East India	10.17	16.03	19.72	21.50	22.48
India	19.91	23.34	25.72	27.78	31.4

Source: Census of India 1971,1981,1991,2001 and 2011.

North East India being an area of subsistence economy, industrialization being almost absent and transport and communication being poorly developed, urbanization progressed in a slow

pace. Whatever urbanization took place at that time was based on tertiary activities (Goswami, B.N; 2012, p -44).

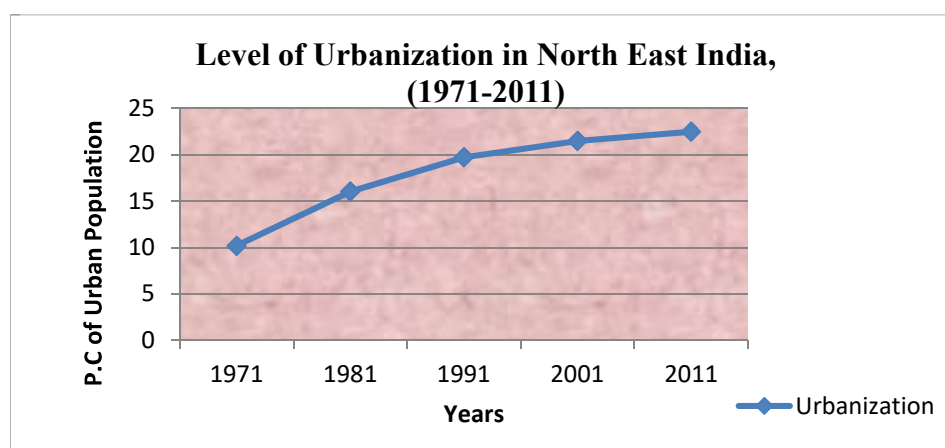


Fig.5

Urbanization directly alters forest ecosystems by removing or fragmenting forest cover. Urbanization also indirectly alters forest ecosystem by modifying hydrology, altering nutrient cycling, introducing no native species, modifying disturbance regimes and changing atmospheric conditions. Table 3 shows that the percentage of the urban population to the total population of North East India is quite higher in the hilly areas only. Urbanization and foreland constructions also accelerated the process of deforestation as the highways in

some areas pass through the reserved forest areas.

PRESENT SCENARIO OF FOREST IN NORTH EAST INDIA

The forest cover of North-East India had been assessed by the government at 16,8607sq. km (2015) of the total geographical area of 255,083 sq km. Table 5 shows the forest cover of the seven states of North East India from the period of 1981 to 2011.

Table 4 Forest Cover in North-East India, 2015

State	Total areas in Sq. Km.	Areas under recorded forest in Sq. Km,2015				
		Very Dense Forest	Medium Dense Forest	Open Forest	Total	Percent of Geographical Area
Arunachal Pradesh	83,743	20,804	31,301	15,143	67,248	80.30
Assam	78,438	1,441	11,268	14,914	27,623	35.22
Manipur	22,327	727	5,925	10,342	16,994	76.11
Meghalaya	22,429	449	9,584	7,184	17,217	76.76
Mizoram	22,081	138	5,858	12,752	18,748	88.93
Nagaland	16,579	1,296	4,695	6,975	12,966	78.21
Tripura	10,486	113	4,609	3,089	7,811	74.49
N E India	2,56,083	24,968	73,240	70,399	16,8607	65.84

Source: India State of Forest Report, 2015

Forests take part a very significant role for the survival of life on the earth. It's not only acts as habitat to many of both flora and fauna but

also act as the provider of life saving oxygen to man.

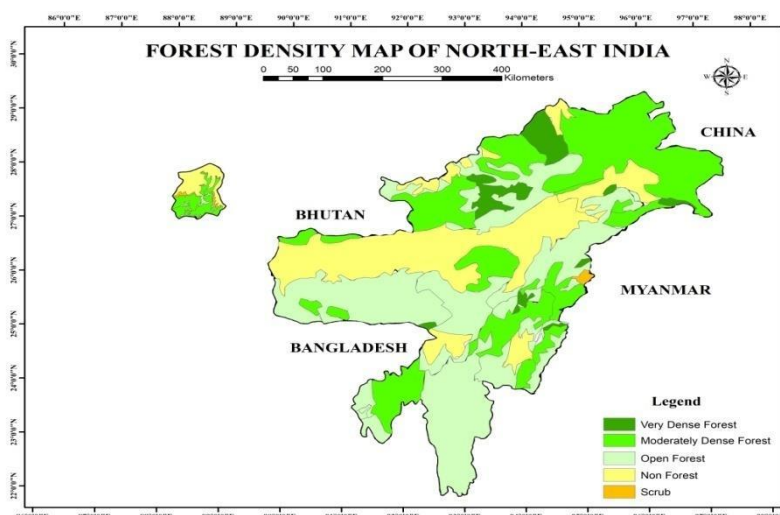


Fig. 6

Forest and forest ecosystems of North East India are under severe pressures, both from biotic and abiotic factors, due to population explosion, encroachments on forest lands, loss of forest cover for other non forest uses, shifting cultivation practices and degradation causes by illicit felling, lopping for fuel wood

forest and fodder, removal of forest cover for litter, forest fires etc. There are four factors leading to forest fragmentation in the North East India. They are- jhum cultivation, human population pressure, industrial logging and weak Government policies.

Table 5 Forest Cover of the States of North East India (1981-2011)

States	Geographical area (km ²)	Forest Cover (km ²)				
		1981	1991	2001	2011	2015
Arunachal Pradesh	83,743	64,132	68,757	68,045	51,540	67,248
Assam	78,438	25,160	24,751	27,714	26.832	27,623

Manipur	22,327	17,475	17,685	16,926	17,714	16,994
Meghalaya	22,429	16,466	15,875	15,584	9496	17,217
Mizoram	21,081	19,084	18,853	17,494	16,717	18,748
Nagaland	16,579	14,394	14,321	13,345	9,222	12,966
Tripura	10,486	5,953	5,535	7,065	6,294	7,811
North- East India	2,63,179	1,62,664	1,65,777	1,66,173	1,37,815	16,8607

Source: Forest Survey of India,2011

IMPACT OF POPULATION PRESSURE ON FOREST

The facet of forest cover has been changing continuously in all parts of North East India. The changes have been increased in last few decades mainly due to human activities. As the population pressure is very high and consequently the scarcity of food has been increased day by day so the result is agricultural expansion. Simultaneously illegal cutting of trees mainly depletes the forest land. Deforestation not only affects the areas of occurrence, but also has a long affect in environmental perspective. Cutting or felling of trees, shifting cultivation in the hilly areas, cleaning of forest areas for settlement, clearing of forest land for establishment of small tea gardens and human encroachment for other reasons are the major causes of declining or

negative changes of area under forest. Burning the forest for shifting cultivation or “slash and burn” also called *jhum* cultivation, which is widely practiced in the hilly tribal dominated areas. Thus the practice of shifting cultivation is also responsible for progressive loss of forest cover. The main reasons for deforestation are felling of trees, along with illegal encroachment in the forest areas. Deforestation has also increased in a large scale in insurgency affected areas specially in the Bhutan Himalayan region. The landholding size and frequency of rotation in *jhum* cultivation has been shrinking, as a result, afforestation cannot be done adequately. The Forest Survey of India assessed forest cover affected by shifting cultivation in North Eastern states between the period 2001 to 2003 and the results are shown in the table 5.

Table 6 Loss of Forest Cover due to Shifting Cultivation in North East India (2001-2003)

States	Dense Forest (Area in km ²)	Open Forest (Area in km ²)	Total (Area in km ²)
Arunachal Pradesh	663	262	925
Assam	272	337	609
Manipur	125	730	855
Meghalaya	141	543	684
Mizoram	351	336	687
Nagaland	321	1,011	1,332
Tripura	221	163	384
North –East India	2,094	3,382	5,476

Source: Forest Survey of India

India's north east, basically the northern part of a geological province, is constituted by the Assam Arakan basin which includes Assam, Nagaland, Arunachal Pradesh, Manipur and Tripura (Mathur and Evans,1964).Forestry is now days considered as a very important part of natural resources. Besides timber, a number of non timber forests produce including cane, bamboos, Bromgrass, Mushrooms, Orchids, commercially important grass species, oil yielding trees, honey and wax are extracted

from the forest every year in large quantities. Due to the high growth of population in north east India during the last few decades needs more and more areas for settlement, agriculture and other uses. These two factors are mainly responsible for reducing the area of forests in the region. Shifting cultivation in the hilly areas, cleaning forest areas for settlement, clearing forest land for establishment of small tea garden and human encroachment for other reasons are the major causes of declining or negative changes

of forest area. The ever increasing demand of timber by the rapidly increasing population has done great damage to green covers of the forest region in North East India. The developments of forest based industries are the cause of deforestation. The GIS data the land cover classes of the forests indicate a significant increase in the area under stone quarrying built up mining and industrial and built up rural inhabitant. These types of drastic changes have brought about many socio-economic as well as environmental problems in the north eastern region of India. Their impacts on natural environment as well as on socio-economic conditions are needed to be identified for the sustainable development of the nation. Forestation by social forestry done by Government as well as individual or community groups added new areas under forest. From the observation of various thematic map including satellite imagery of last few decades, it becomes clear that the forest cover has been tremendously decreasing in the upper part of the Brahmaputra valley, Barak valley in Assam and Imphal valley in Manipur (Bhattacharjee and Sarmah, 2018). Illegal logging is made easier when tenure rights to forests are weak or unclear. So, there is an urgent need to chalk out a policy for private plantation on non forest land.

The reason of deforestation is noted to be the defective forest policy. Existing Forest Act 1891 is not strict; it allows the migrants to inhabit within the forest areas of North East India. After certain years of inhabitation, they are allowed to have the land holding certificate and revenue patta. Thus, the forest villages are gradually converted into revenue villages leading to deforestation of fringe areas reserved forest. As such the forest policy should be rectified inhibiting occupation on forest land by any person in any reason. The Kaziranga National Park is the burning example of it (Goswami, B.N,2012,p-153).

CONSEQUENCES OF DEFORESTATION

In the present century, environmental degradation due to deforestation along with increasing trend of population have emerged as a major global concern for human survival. The whole world is facing the problems of environmental degradation due to technological, scientific development on one hand, and over population, urbanization and

industrialization on the other. Environmental pollution is the result of mass unplanned and unwise use of technology. Thus, the impact of rapidly growing population manifests in the environmental disasters are discussed in the following few heads.

a) Impact on human health is the most striking direct implications of growing densities of population are its impact upon human health. It has led to large scale undernourishment and malnutrition, particularly in the backward regions of the study region. The root cause of human health hazard is the improper disposal of sewage and wastes which lead to the spread of disease causing micro- organisms (Kalita and Sarma, 2017).

b) Reduction of agricultural production is caused due to increase rate of soil erosion caused due to deforestation results in colossal loss of fertile topsoil and agricultural production. The natural vegetation has been cleared extensively for agricultural use; the land use has changed significantly. Moreover, large numbers of new settlements have come up over the time; and the demand for land for various non- agricultural uses has been increasing (Kalita and Sarma, 2017).

c) Greenhouse effect is one of the major concerns due to deforestation. It results in the increase of the concentration of carbon dioxide in the atmosphere because forests consume carbon dioxide during the process of photosynthesis for the manufacturing of their food. But absence of forests allows more concentration of carbon dioxide in the atmosphere.

d) Soil Erosion and Flooding is another affect of deforestation. In addition to their previously mentioned roles, trees also function to retain water and topsoil, which provides the rich nutrients to sustain additional forest life. Without them, the soil erodes and washes away, causing farmers to move on and perpetuate the cycle. The barren land which is left behind in the wake of these unsustainable agricultural practices is then more susceptible to flooding, specifically in coastal areas (Kushik and Kaushik, 2004).

e) Biodiversity loss is one of the prime threats to the living being due to growing population

by directly or indirectly endangering the extinction of certain species and thus reducing the biological diversity of the planet. Deforestation is a major cause of bio-diversity loss and species extinction; some of life forms have totally vanished, while some others are categorized as endangered (Kalita and Sarma, 2017).

f) *Man-Animal Conflict* becomes a notable phenomenon in the recent years of human civilization. The animals rendered homeless and food less for deforestation, come out to the human inhabited areas, thus creating havoc and conflict in some areas of North- East India. There are several incidents of man-elephant conflict in Jorhat (Teak, Upper Majuli, Kokilamukh, Neematighat, Jhankhona, Charigaon), Lakhimpur, Udalguri, Tezpur, Tinchukia in Assam.

REMEDIAL MEASURES

The remedial measures may be taken as disseminating encouraging active participation of all for the conservation process. The remedial measures may be taken is follows:

- 1) In the rural areas, the family welfare programmes should be initiated honestly and sincerely.
- 2) To meet the demand of fuel, fodder and timber for increasing population, implementation of horticulture or agro-forestry system is the need of the hour.
- 3) Infrastructural development is compulsory, so the forest department has to undertaken more plantation programmes in the degraded areas of the region.
- 4) Environmental Awareness Programmes at all levels should be sponsored by Governmental and Non- Governmental agencies engaged in environment development. They should create awareness about the importance of forest among the villagers.
- 5) Programmes should be organized to create awareness about harmful effects of burning of fuel wood on health. Interactive workshop to promote the usages of bio-gas

plants, LPG and pressure cookers are also equally important.

- 6) The new policy of the state preservation and restoration of ecological balance wherever needed, conserving natural heritage of Assam by preserving forests checking, erosion in catchment areas of rivers increasing forest cover in the forest deficient areas and meeting benefited livelihood need for the poor people including tribal.

CONCLUSION

The concept of population pressure and deforestation is tried to explain that growing population pressure is a vital factor and can be regarded root cause for affecting the forest cover area in North – East India. Along with population pressure, urbanization is also increasing and putting additional pressure on forest to accommodate habitation and also collecting food, fuel, fodder, shelter, etc. This has adverse effect on the quality of forest, changing dense forest into open forest or scrub. Economic growth is important to meet the demand of increase population but not at the cost of natural resources, which is important to protect the environment and ecosystem. The existing mode of infrastructural development is posing major threat to the prospect of sustainable development. The Changing nature of forest area has directly being effected on environment, which is very detrimental to our future generation. So all-out effort is necessary at all levels to make people aware about the preservation of forest. So, appropriate steps including rules and regulation to be implemented in true sense. Strategies for future forest protection to be taken and new policies for decreasing population to be work out to reduce population pressure on the study region. Agro forestry should be implemented to meet the demand of the increasing population instead of clearing forest for cultivation. Hence, more attention need to be given to forest management and appropriate and useful steps to avoid further deforestation and conservation of biodiversity are needed to be taken expeditiously.

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