

DEFORESTRATION IN NORTH-EAST INDIA

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Abstract:

Deforestation in the State of Meghalaya and the surrounding region is one of the most pressing environmental issues. Yet because of the area's social issues, deforestation is not being adequately addressed, the uniqueness of the climate allows for a wide range of biodiversity. Making the area all the more threatened. Deforestation rates have increased over the past few decades, and along with deforestation, many other conditions in the states and regions have changed, there are many factors that play into the issue, however, those with the most impact trend to be caused by humans. The impact that deforestations has are mostly on the natural environment, which then impacts human society. The responses to these problems are not addressing the root causes, but only Sikkim the surface of the issue. Like in most environmental problem, deforestation is in some way connected to every aspect of the environment and social world in N.E. India.

Keywords:- Deforestation, biodiversity, Environment Conservation, Shifting Cultivation, Industrialization, Ecosystem, Amplification on Agriculture.

Statement of the Problem:

The growing global concern for conservation of the world's natural resources has resulted in the formulation of long-term perspective plans for conserving forests. These forests facilitate the conservation of ecological balance, biodiversity, enhance the quality of environment by checking soil erosion, water retention and conservation, regulate water cycle, act as a carbon sink which balances the carbon dioxide and oxygen in the atmosphere and facilitate in reduction of the greenhouse gases effect, etc. Population pressure, poverty and weak institutional framework have often been viewed as the predominant underlying

causes of forest depletion and degradation in developing countries. Excessive population and livestock pressure and the requirements of forest products for essential development generate a pressure on forest resources like fuel wood, fodder, timber, lumber, paper, etc. which in turn triggers a deforestation process. Overexploitation of the forest's resources as compared to its incremental and regenerative capacities escalates the forest depletion and degradation process. Excessive deforestation has not only local but also global environmental degradation ramifications. It can also affect sustainable socio-economic developmental processes in the developing countries as forests have been generating a lot of employment opportunities in the primary, secondary, and tertiary sectors and have been a source of subsistence to the poorest of the poor in the agricultural economies. Furthermore, the inhuman face of deforestation is characterized by the increasing stress on the poorer sections of the society and women, as they have been primarily involved in gathering fuel wood, fodder and water in the traditional village economies.

According to an official estimate based on satellite images (survey report of FSI), the northeastern region has 1,63,799 km² of forest, which is about 25% of the total forest cover in the country. The management of the forest has suffered in the recent past due to pressure on land, decreasing cycle of shifting cultivation, exploitation of forest for timber and lack of scientific management strategy. The age-old practice of shifting cultivation has been a single factor responsible for the forest and land degradation, thereby changing the landscape extensively.

Study area:

The study Area, North Eastern States of India (20°N lat & 29°30' lat and 89°E long & 97°30'E long) has seven states. These are Assam, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram and Tripura. They cover an area of about 2, 62, 189 sq km which is about 7.86 per cent of total geographical area of India. Total population of these states in 2001 was more than 35.45 Lakhs. Out of these, about 60 per cent of the total belonged to scheduled tribes. About 76 per cent of

total geographical areas of the region are hilly as dominated by tribal people who are totally dependent on forests. Only 10 per cent of total area, of the region is completely tribal. Density of population per sq km in most of the states of the region except Assam is very low, because, the region is undulating and mountainous with average height varying from 1,000m to 2000m above mean sea level. Maximum temperature is 38°C in summer and minimum temperature is 5° C in winter. Rainfall is very high in the whole North Eastern States and average rainfall varies from 1200 mm in Manipur to 11,000 mm in Meghalaya. The climate is a warm humid, tropical semi evergreen. The climate is much suitable for dense vegetation. Major trees are tropical semi evergreen, sub-tropical pines, and mountain wet temperate and tropical moist evergreen. Under these circumstances, forest areas and natural vegetation of the region play a vital role in order to maintain the ecological balance. Hence, here attempts have been made to explore the present status of deforestation in this region.

Objectives of Study: The paper is based on the following objectives-

- (i) To highlight the trend of deforestation of green cover,
- (ii) To highlight certain dynamics of deforestation.

Methodology: Data base is generated mainly from secondary sources of information. In this project work, data on forest cover of North Eastern states of India (1987 to 2005) is collected from Forest Survey of India, MOEF. and the per centing of annual change of forest cover is calculated out. Total population of the region (state wise), rate of urbanization and industrialization are collected from Census of India, Ministry of DoNER and NEC.

Analysis: A) Forest Cover Change [Present Trend]

Administrative classifications of the forest cover in the North Eastern Region:

Table - 1 Distribution of forest cover in North-East India in Percentage (2005)

State	Reserved	Protected	Unclassified	Total	Shifting Cultivation (1987-97)
Tripura	0.36	0.05	0.22	0.63	0.06
Sikkim	0.22	0.03	0.01	0.26	*
Nagaland	0.01	0.05	0.80	0.86	0.39
Mizoram	0.71	0.36	0.52	1.59	0.38
Meghalaya	0.10	0.10	0.85	0.96	0.18
Manipur	0.14	0.40	0.96	1.50	0.36
Assam	1.81	0.10	0.86	3.07	0.13
Arunachal Pradesh	1.53	3.61	.01	5.15	0.23
Total	4.88	4.91	4.23	14.02	1.73

Table-2 Forest Cover of the state of by Northeast India

State	Geographic Area (Km ²)	Forest Cover (Km ²)									
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005
Arunachal Pradesh	83.743	64.132	69.002	68.757	65.661	65.621	68.602	68.847	68.045	67.692	67.77
Assam	78.438	25.160	24.832	24.751	24.508	24.061	23.824	23.688	27.714	27.735	27.645
Manipur	22.327	17.475	17.685	17.685	17.621	17.558	17.418	17.384	16.926	17.259	17.086
Meghalaya	22.429	16.466	15.645	15.875	15.769	15.714	15.657	15.633	16.684	16.925	16.988
Mizoram	21.081	19.084	18.170	18.853	18.697	18.576	18.775	18.338	17.494	18.583	18.684
Nagaland	16.579	14.394	14.399	14.321	14.348	14.291	14.221	14.164	13.346	14.015	13.719
Sikkim	7.096	2.756	3.041	3.014	3.119	3.127	3.129	3.118	3.193	3.262	3.262
Tripura	10.486	5.953	5.535	5.535	5.538	5.538	5.546	5.745	7.065	8.123	8.155

The data of forest cover reveals some contradictory trend (Table-2). Data from the Forest Survey shows an increase in forest cover of 7896 km², at an annual rate of increase of 0.25% for Northeast India between 1987 and 2005. However, the trend analysis of the forest cover data since 1987 onwards to 2005 reveals a declining trend. To have a better picture of where exactly the increase in forest cover took place, the entire period from 1987-2005 is divided into 3 (three divisions) i.e. 1987-1991, 1991-2001 and 2001-2005. The first period (1987-1991) witnessed an increase in forest cover of 3371 km² (annual growth of 0.4%). Increase in

forest cover in the states of Arunachal Pradesh (4870 Km²) and Manipur (210 Km²) in 1989 and Meghalaya (2130 Km²) and Mizoram (683 Km²) in 1991 are the main drivers of growth during this period, while Assam, Meghalaya and Tripura along with the states like Arunachal Pradesh and Nagaland also witnessed considerable loss in the forest cover during that period (Table- 2). The growth of forest cover in between 1987-1991 in the region could not be maintained in the next decade as a result during the second period (1991-2001), only 575 Km² forest cover was increased in the region with an annual growth of 0.03%.

During this period, the growth of forest in the states of Assam and Tripura was maximum than other states in the region. However, during the period (2001-2005), there is maximum increase in forest cover of 2950 Km² with an annual growth rate of 0.46%. thus, the individual state level data provide a clear indication on the areas where exactly the forest cover decreases over the period.

Annual change in forest cover:

Table- 3 Table- 2 Percent annual change in forest cover between 1987-2005

State	1987-1989	1989-1991	1991-1993	1993-1995	1995-1997	1997-1999	1999-2001	2001-2003	2003-2005
Arunachal Pradesh	3.53	-0.18	-0.07	-0.03	-0.01	0.18	-0.59	-0.26	0.06
Assam	-0.66	-0.16	-0.50	-0.93	-0.50	-0.29	7.26	0.04	-0.16
Manipur	0.50	0.00	-0.18	-0.18	-0.40	-0.10	-1.35	0.96	-0.51
Meghalaya	-2.62	0.72	-0.34	-0.18	-0.18	-0.05	-0.16	3.96	0.19
Mizoram	-2.52	1.81	-0.42	-0.33	0.53	-1.19	-2.41	2.93	0.27
Nagaland	0.02	-0.27	0.09	-0.20	-0.25	-0.20	-3.07	2.39	-1.05
Sikkim	4.69	-0.45	1.68	0.13	0.03	-0.13	1.17	1.66	0.00
Tripura	-3.78	0.00	0.03	0.00	0.07	1.73	9.34	6.51	0.20
NE Total	0.86	0.14	-0.16	-0.23	-0.09	-0.06	0.72	1.22	-0.05

Table- 3 shows that in the year 1987-89 only three states (Arunachal Pradesh, Manipur & Nagaland) had positive change in the growth of forest cover and the rest four states had shown negative growth where Tripura amounted to -3.78%. Situation had become healthier in the year

1989-91 where three states had shown negative change. In this period Mizoram was on the top having 1.81% positive change. But situation had once again collapsed in the year 1991-93 where five out of the total seven states had shown negative change in the growth of forest cover. This scenario continued up to the next successive year, i.e. 1993-1995 and here six states had shown negative change Mizoram sustained to a minimum level. Arunachal Pradesh had shown a little bit of positive change after a long recess in the year 1997-99 and the rest were still striving. In the year 1999-2001, Assam the only developed states in the region and Tripura had indicated tremendous growth of forest cover with 9.34% and 7.26% annual growth respectively. From the year 2001-2003, the region had shown healthy growth forest cover where Tripura, Mizoram, Meghalaya, Nagaland and Manipur recovered the earlier status. But the trend had been discontinued during the year 2003-2005.

Except minor improvement in the states like Meghalaya, Mizoram and Tripura the rest states experienced stunted in the forest cover. However, the overall data had shown the fact that Tripura was consistent over the year in the positive change of the forest cover.

B) Dynamics of Deforestation

(i) Population Pressure:-

The population of North-East region is 38.50 million in 2001 according to the Census of India. Out of this, Assam alone Accounts for 26.64 million. Mizoram has the lowest population of less than a million, i.e. only 0.891 million. The average population density in the region is 147 persons per square kilometer (Table- 5). But this varies from state and within the states too. While Assam and Tripura have a fairly high population density of 340 and 304 persons per square kilometer respectively; Arunachal Pradesh has the figure at only 13. In Tripura, again the density of population is much higher in the small valleys than the hilly areas. The decadal growth of population in majority of the states is higher than the national average.

One of the major factors affecting forest cover is the growth of human populations through out the North-East India and the forests are the best place to accommodate the growing.

Table- 4 Source: NER Data Bank:

States	Geographical Area (SQ.KM)	Total Population ('000)				
		1997	1981	1991	2001	2011
Arunachal Pradesh	83743	468	628	864	1091	12382
Assam	78728	-	-	22414	26638	31169
Meghalaya	22489	1012	1328	1774	2306	2964
Mizoram	21081	332	488	689	891	1091
Manipur	22327	1073	1434	1837	2388	2721
Tripura	10486	1556	2060	2757	3171	3671
Nagaland	16579	516	773	1209	1988	1980

Pressure of additional people. According to census statistics, the population density in many states grew by approximately 30% between 1991 and 2001 (Table- 4).

Table- 5 Decadal growth rate of population in North-East India:

States	1971-1981	1981-1991	1991-2001
Arunachal Pradesh	35.15	36.83	26.21
Nagaland	50.05	56.08	64.41
Manipur	32.46	29.29	30.02
Mizoram	48.55	39.70	29.18
Tripura	31.92	34.30	15.74
Meghalaya	32.04	32.86	29.94
Assam	23.36	24.24	18.85

(ii) Econommic Activities:

A) Jhum Cultivation:

Table- 6 States that shifting Cultivation is prevalent in all the north-Eastern states:

States	Showing Loss of Forest Cover (in sq. k.m.)					
	Shifting Cultivation		Other Factors		Total Loss	
	1993-95	1995-97	1993-95	1995-97	1993-95	1995-97
Arunachal	169	75	-	-	169	75
Assam	224	257	377	159	601	416
Manipur	65	603	-	-	65	603
Meghalaya	218	75	-	2	218	77
Mizoram	792	292	-	-	792	292
Nagaland	58	573	-	-	58	573
Tripura	-	-	-	3	-	3
Total	1526	1875	377	164	1903	2039

It was noted that loss in forest cover in the North-Eastern states was mainly due to the shifting cultivation. From 1993 to 1995 and 1995 to 1997, loss in forest cover was, respectively, 783 sq. k.m. and 316 sq. k.m. (Table- 5). According to the 1995 and 1997 reports, although 1078 sq. k.m. and 1700 sq. k.m. areas were gained from the shifting cultivation, they constituted only scrubby vegetation.

Nevertheless, these growths can also help in checking soil from the hilly slopes which are catchment of a number of streams and rivers of the region.

B) Industrialisation:

North-East India is industrially backward even in the context of Indian standard. A part from a few agro-based and mineral based industries, it has practically no manufacturing industry worth the name. the Table- 7 reveals the fact that Assam holds the

Table- 7 Large and Medium Industries in NER. (As in March 2000):

States	No. of Units	Percentage
Arunachal Pradesh	17	9.39
Assam	129	71.27
Manipur	12	6.63
Meghalaya	10	5.52
Mizoram	1	0.55
Nagaland	7	3.87
Sikkim	3 (As on 31-03-04)	1.66
Tripura	2	1.10
Total	181	100.00

Lion's share in industrialization among states of North-East India followed by Arunachal Pradesh with a big gap. Industries responsible for deforestation found available are plywood industries (56 No.s), per industry (11 No.s – both big and small), match factory (05 No.s, both big and small), cement industries (02 large and 10 small), etc.

(iii) Rate of Urbanisation: Pattern and Level of Urbanisation North-Eastern States-

Table- 8 Level of Urbanisation:

States	1971	1981	1991	2001
Assam	8.82	9.88	11.09	12.72
Arunachal Pradesh	3.70	6.32	12.21	3.70
Meghalaya	14.55	18.03	18.69	19.63
Manipur	13.19	26.44	27.69	23.88
Mizoram	11.36	25.17	46.2	49.5
Tripura	10.43	10.98	15.26	17.02
Nagaland	9.95	15.54	17.28	17.74

Table- 8 Shows that the percentage of Urban population to the total population is quite higher in the hilly states only. It is because of dearth of the fertile plains. Hence, majority of the people hilly states are so settle in the administrative towns or the capital towns only. In contrast, Assam

shows the slow development of the urban concentrations as the people spread over the river valleys.

Findings: From the above stated dynamics of deforestation in North-East India, following findings can be drawn:-

- (i) The slow growth of Urbanisation and Industrialization is less significant for the loss of forest cover in north East India.
- (ii) In the hilly states, the shifting cultivation, especially Jhum is responsible for deforestation. Gradual increase of population have been decreasing the landholding size and putting much pressure on traditional system of cultivation. Therefore, the landholding size and frequency of rotation in Jhumming has been sh-inking, and as a result, afforestation cannot be done adequately and timely.
- (iii) In the plain states like Assam, population pressure is responsible for forest cover depletion. One of the major factors affecting forest cover is the growth of human population through ought the Northeast India and the forests are the best place to accommodate the growing pressure of additional people. According to Census statics, the population density in many states grew by approximately 30% between 1991 and 2001.
- (iv) A part from the above, one can easily infer that deforestation in north India shows a different scenario. For, the statics shows that there is no average loss of forested areas in spite of the fact that population has been increasing. But, the climatic behavior or other atmospheric phenomenon reveals that deforestation is at its moderate pace.
- (v) The categorization of forest in the tribal dominated states is different than that of the plains. So, it becomes difficult to have a standard statics on forest at regional level in North-East India.

- (vi) At last but not the least, free economy being implemented from 1991 in India has also been affecting the forest cover as more forest based industries have come up (as per the data).

Conclusion:

According to a report of IPCC, land use change (primarily deforestation) was responsible for about 20% of the CO₂ released to the atmosphere worldwide from 1989- 1988. It may be mentioned that deforestation is responsible for nearly 26% of India's greenhouse emissions. Besides, the growing human population and livestock pressure gradually widening the gap between demand and supply of natural resources. These impacts will cut across multiple dimensions of day to day life affecting not just the environment but the communities as well. Climate change thus could impose a variety of stress on sustainable livelihood of the poor inhabitants of Northeast India through stress on ecosystem function. The major concerns are erratic & irregular rainfall patterns, longer dry spells, and amplifications on agriculture calendar, productivity, new pests; food security; health and disasters like flash floods. It is presumed that there would be a change in distribution, abundance of species, more particularly wide, endemic species, crop plants, pests and vectors. Due to change in habitat condition, displacement both human and other wilderness would take place.

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