

Forest Dynamics and its Social Implication in the Foothills of Assam-Nagaland Border of India

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ABSTRACT: Any change that takes place in a transitional area shows its impact in a distinctive way. The forest cover changes in the transitional foothills between the plains of Assam and the hills of Nagaland obviously show such distinction. These have been revealed from studies conducted in the area using topographical sheets prepared by the Survey of India, satellite imagery, maps and other reports prepared by different governmental and non-governmental agencies and also from personal visit to the concerned area. Setting up of villages, practice of *jhuming* (shifting cultivation on the slope), construction of roads, educational institutions, religious institutions like churches, diesel engine operated saw mills, business enterprises, opening up of tea gardens and others in the areas previously occupied by a thick forest cover have brought about a permanent change to the foothills environment which has a fragile ecological set up. But, injudicious developmental activities cause environmental degradation and ecological disturbance leading to imbalance between the environment and the socio-economic development of the society. The social implications of these activities, which are going on the forests of the foothills assume a significant dimension. The impact of these activities in the social aspects of the area is equally appealing and enticing as their impact in the physical aspects of the study area and its surrounding. Against this backdrop, some of the social aspects of the study area have been observed through personal survey and certain first hand data and information have been generated. The observation reveals an occupational shift among the workers of the villages, alteration in the age-structure of the population and some others.

INTRODUCTION

Assam and Nagaland are the two neighbouring states of India located in the north eastern part of the country. These two states are sharing a common boundary of 347 km between them. Nagaland, basically has a hilly topography while Assam is a state with its major part under plains. A distinct zone of foothills exists along the Assam-Nagaland boundary. These foothills belong to the Naga-Patkai range. The Assam-Nagaland boundary is not merely a political boundary separating the two states. In fact, it is a geographical boundary separating two very important physiographic divisions of the north eastern part of the country. When the political boundary between the states is strictly followed, a narrow and elongated strip of foothills between the states comes under the territory of Assam. These foothills had a very thick cover of forest and remain undisturbed by human activities before few decades. Topographical sheets prepared by Survey of India and

satellite imagery indicate the presence of a thick forest cover in these areas. Several reserved forests belonging to the state of Assam are located along the foothills of the Assam-Nagaland boundary.

Shrinkage in the forest areas due to human interference coupled with soil erosion and landslides that take place in the foothill areas not only affect the areas of their occurrence, but also have their far reaching impact in the plains as the geographic processes like soil erosion, surface flow of water, channel flow characteristics and many others are directly associated with slope. The southern plain of the Brahmaputra valley starts from the foot of Naga Hills. A good number of large and small rivers of Assam either have their sources in the hills of Nagaland or they flow through the foothills zone before meeting Brahmaputra. Commercial felling of trees, practice of shifting agriculture on the slope, human encroachment and reclamation of forest land for settlement, clearing of

forest to open up tea gardens, large scale collection of earth materials like sand, gravel and boulders from the river channels of this zone have been changing the land cover in the foothills. Areas previously under thick vegetation cover are now being cleared up and used for agriculture and human settlement. Whatever trees are existing are also under the threat of extinction owing to illegal trade of timber. Along with invasion of human population certain infrastructural development activities like construction of roads, schools, church, small commercial establishments, rice mills, saw mills, setting up of police camps and out-posts and also Govt. offices by both the governments of Assam and Nagaland are seen to take place in this foothills tract (Nath, 2007). It is worth mentioning that there has been an inter-state border conflict between Assam and Nagaland, which is continuing since long back.

The foothill zone is often rocked by seismic activities as it is located along a seismic fault called Naga Thrust. Geologically and structurally, the zone is highly prone to natural disaster like landslides. These disasters coupled with human activities have led to an accelerated rate of soil erosion and mass wasting and the materials so produced finally come to the streams and rivers. As a result of this, the rivers coming out of the area have undergone certain changes in their morphological and fluvio-geomorphic behaviours. These happenings are of serious concern to the state of Assam. As these rivers flow through the plains of Assam to meet the master stream, it is obviously a matter of concern to state because destruction of the land cover and disturbances caused by man in the upstream bring about concomitant downstream impact in different forms.

In view of the present status of the zone, the following geo-environmental problems have been identified:

1. Loss of biodiversity and habitat loss particularly in the foothills zone.
2. Decline in the area under forest.
3. Conversion of the reserved forest areas into built up area and agricultural area.
4. Soil erosion at an accelerated rate and deposition of these materials in the plains.
5. Siltation in the river beds and deposition in the river banks.
6. Changes in the fluvio-geomorphic behaviours of the rivers.
7. Expansion of area under inundation in the plains.
8. Increase in flooding intensity.
9. Increased sedimentation and damage to the crop fields and soil quality in the plains.
10. Increase in the dimension on the issues on border problem between the states.

11. Probability of low rainfall and high atmospheric temperature in the area in the future.

In addition to these geo-environmental aspects, some social changes have also been identified which have a very close cause-effect relationship with the forest cover change that has been taking place in the Assam-Nagaland border.

THE STUDY AREA

The study area is an elongated belt of foothills between the states of Assam and Nagaland. These foothills belong to the Naga-Patkai range and they separate the hills of Nagaland from the Brahmaputra plain of Assam. The Brahmaputra plain is the largest plain of North-East India which is surrounded from all the sides by hills and plateaus excepting a narrow opening in the west. The state of Assam is bounded by seven different states of Indian Union and two international units, i.e., Bhutan and Bangladesh. Five districts of Assam, namely North Cachar hills, Karbi Anglong, Golaghat, Jorhat and Sibsagar are located along the Assam-Nagaland boundary. Of these five districts North Cachar Hills and Karbi Anglong have hilly topography and the remaining Golaghat, Jorhat and Sibsagar districts span over the Brahmaputra plain. Geographically, the boundary between Assam and Nagaland is extending from the intersecting point of 27°3'45" N latitude & 95°2'43" E longitude in the north-east to 25°35'37" N latitude & 95°52'45" E longitudes in the south-west. The boundary line along the foothills of Naga-Patkai range, is stretching from north-east to south-west. Of the total span of 347 km of the Assam-Nagaland boundary, the north-eastern 220 kms along the southern margins of Sibsagar, Jorhat and Golaghat district of Assam is considered for the study. As many as eight reserved forest of Assam are distributed along these 220 km of the Assam-Nagaland boundary. They are Nambar, Rengma, Diphu, Disoi valley, Tiru hills, Geleki, Abhayapur, and Dilli reserved forests. The famous Kaziranga National Park, Gobbon wildlife sanctuary and Pani-Dihing wildlife sanctuary of Assam are located very close to this foothills zone. The part of the area within the territory of Nagaland also has an almost continuous cover of degraded forest with Intangki National Park and Rangapahar wildlife sanctuary and Singphan reserved forest along the inter-state boundary.

The entire study area is highly sensitive from geo-political point of view. There has been an age-old dispute between the states arising out of the inter-state border issue. Nagaland has already occupied several patches of area belonging to Assam and is claiming an extensive area of Assam to be their own.

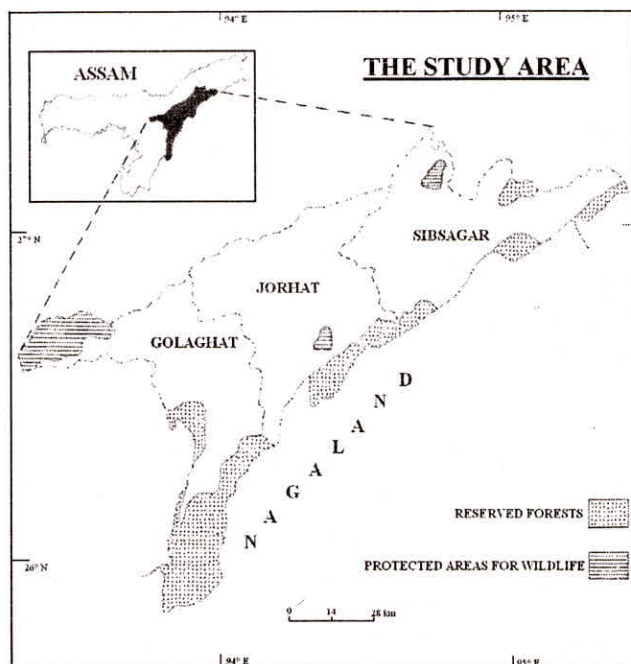


Fig. 1: The study area

METHODOLOGY AND DATABASE

The study is designed in two parts. The first part deals with the land cover change in the area. It includes the measurement of areas under different land categories following temporal scale. The difference between two such measurements taken at two different periods indicates the land cover change for that period. This refers to the land cover dynamics observed in respect of different land categories in the study area. It also makes an attempt to trace out the factors leading to changes in the land cover. The second part of the study attempts to identify the social problems arising out of the land cover change.

Both primary and secondary data are used in the study. The topographical sheets prepared by Survey of India bearing No. 83F, 83G, 83I, 83J, 83M and 83N at 1:250,000 scale are used to prepare the base map. Landsat (MSS) and IRS (PAN, LISS-2 and WiFS) imagery are also used for its preparation. The Land Use/Land Cover Maps and Reports of Assam prepared by Assam Remote Sensing Application Centre (ARSAC), District Census Handbooks for the concerned area, Statistical Handbook of Assam for different years, information collected from Forest Department of Assam, NATMO publications, other published reports on the subject are used in the study. Above all, information gathered from personal visit to few selected area and personal interaction with the people of the area make it possible to understand the social problems prevailing in the area.

ANALYSIS AND DISCUSSION

The reserved forests of the foothills show a linear pattern, but they do not form a continuous belt. The topographical sheets prepared by Survey of India in 1971, distinctly show these reserved forests. The total geographical area of these eight reserved forests amounts to 137488.76 ha. Observation on the Survey of India topographical sheets reveals that there is conspicuous variation in the distribution of forest areas when viewed districtwise. With 66.51 per cent of the forest area of these three districts, Golaghat is leading over the other two districts; whereas Jorhat and Sibsagar districts have 17.26 and 16.23 per cent respectively. It is evident that Golaghat district alone accounts for more than half of the area under forest of the study area.

Table 1: Land Cover within the Reserved Forests of the Assam-Nagaland Border (1987)

District	Area of Reserved Forests Under Different Categories (in ha.)				Total
	Actual Forest Cover	Degraded Forest	Cropland	Plantation Crops	
Golaghat	15199.72 (16.02)	12822.17 (13.51)	66859.92 (66.25)	4003.20 (4.22)	914885.01
Jorhat	19465.19 (82.04)	2251.39 (9.49)	2010.92 (8.47)	—	23727.50
Sibsagar	10900.75 (48.85)	9537.50 (42.75)	1875.00 (8.40)	—	22313.25
Total	45565.66	24611.06	66745.84	4003.20	14925.76

(The figures within parentheses indicate percentage of the category to district total)

During the early part of the seventies, few of these reserved forests of the study area remained free from human encroachments while few others started to experience human cruelties. According to 1971 population census report there were 31 villages inside these reserved forests. Of these 31 villages a few were Forest villages. A forest village is a village inside a reserved forest where the state Forest Department allows few families to settle down in lieu of a certain amount of annual revenue to the concerned Department. Forest villages differ from Revenue villages of the state government in that they need not pay the annual revenue to the State Revenue Department; instead, they pay the annual revenue to the Forest Department.

Table 2: Number of Villages within Reserved Forests, 1971

District	Name of Reserved Forest	No. of Villages
Golaghat	Nambar	22
	Diphu	none
	Rengma	
Jorhat	Disoi valley	05
	Tiru hill	02
Sibsagar	Geleki	none
	Abhayapur	02
	Dilli	none

Source: District Census Handbook, Sibsagar (1971)

The table shows that some of the reserved forests of the study area remained free from human encroachment during the early years of the seventies. The state Forest Department does not have records of all these villages. The above table shows five such villages inside Disoi valley reserved forest even in 1971; but the state forest department is still claiming the number of forest village inside Disoi valley reserved forest to be only one. The table also says that the destruction of forest in these reserved forests started well before the 1971 census year. It has been continuing at an ever increasing momentum since then. Study reveals that shrinkage of forest area, encroachment in the forest land and reclamation of forest area for agricultural use are much more conspicuous in the western end of the study area where the Golaghat district has undergone tremendous change in the land-use pattern over the years. Till 1987 there was an addition of 66859.92 ha to the total area of the district under agricultural land-use at the cost of depletion of the reserved forests. Between 1971 and 1987 an area measuring little more than 40 sq. km. (4003.20 ha) of the reserved forests of Golaghat district was annexed to the total area under plantation crops, which refer mainly to tea gardens. Similar expansions of land categories have occurred in the reserved forests of the other two districts also.

The present status of these forest areas is deplorable and much more deteriorating. The forests cover of the western end of the study area is nearing extinction. The Nambar and Rengma have been encroached almost totally. The areas which were previously covered by evergreen and semi-evergreen forests have been wiped out and modified into croplands. The recent status of Nambar (south) reserved forest, as revealed by survey conducted by NRSA, is that only 3.60 per cent of its total geographical area actually has forest. The same report says that Rengma reserved forest has only 2.5 per cent of its total area under actual forest cover (Sarma, 2001). The forest resources of the remaining areas have been cleared up for a variety of purposes. Such areas with gentle slope are being used for both Rabi and Kharif crops. The slopes of the foothills are now extensively used as Jhumlands (areas under shifting cultivation). An important aspect about jhuming is that a plot is kept fallow for 7 to 10 years after one harvesting. Such plots support a thin cover of vegetation during the fallow period which is described as degraded forest. The ARSAC report, 1987 defines degraded forest as, "...area within the reserved forest boundaries where there is no forest or where the crown coverage is less than 30 per cent. They are covered mostly by undergrowths of grass, reeds and *Jatibets*". However, the forest areas with most of their trees cut down for legal or illegal trade of timber are also shown as degraded forests. It could be mentioned here that the process of forest destruction can be understood only through personal visit to the affected areas and which can not be revealed from satellite imagery.

The forest cover dynamics has a distinctive bearing on the occupational shift of the people of the study area and the neighbouring plains of Assam. From personal visit to Disoi valley reserved forest during December, 2006 it was found that nearly 80 per cent of the area of the reserved forest has been degraded. Investigation revealed that the factors responsible for the loss of forest are (a) clearing of land for shifting cultivation coupled with human settlement, (b) illegal trade of timber to meet the demand of timber in the neighbouring townships and other inhabited areas and (c) opening up of tea gardens within the reserved forest. It further reveals that during the last decade many new tea gardens have been set up in all these reserved forests of the Assam-Nagaland border. Information received from state Police Department confirms the fact. Several incidents of exchange of fire have been reported between Assam Police and suspected Naga miscreants trying to clear forest areas to set up tea gardens. Besides, the spread of urbanization or physical

growth of the existing townships near the forest areas has been identified as one of the factors of rapid forest depletion. The excessive demand for timber and also firewood in Dimapur, the largest urban centre of Nagaland has been identified as the principal factor for the extinction of Nambar, Rengma and Diphu reserved forests which surround the urban centre from three sides.

Along with the forest cover changes, certain other changes have also taken place in the social environment of the study area and its surrounding. An amazing change is observed in the age-structure of the population of these villages within the reserved forests. The age-structure refers to number of population of a particular area shown against different age categories. The encroachers within the reserved forests are deprived of certain essential services and infrastructural facilities. Lack of adequate communication links, the scattering distribution of the human population and non availability of educational institutions of upper level have forced the inhabitants to send their children to be educated in the urban centres of Nagaland like Dimapur, Mokokchung, Wokha, Kohima and others. Accordingly, there is an overall absence of population belonging to the age-sex group of 10 to 20 years in these encroached villages. This group of population comprising mainly students does not show their willingness to come back to the reserved forests after staying few years in urban environment. Therefore, the age-sex pyramids of these encroached villages display an unusual pattern which resembles neither developing nor developed economy. A survey conducted in Aosungkham and Aosenden villages within Disoi valley reserved forest of Jorhat district of Assam reveals that there were only 29 persons (13 boys and 16 girls) in the age group of 10 to 20 years out of a total population of 403 persons.

to the other areas in the subsequent periods. With little exceptions in the Golaghat district, the majority of these encroachers are Naga people who, normally like to live in the hills and practice shifting cultivation on slope. Primary investigation reveals that none of these villages is older than 40 years. The people migrated to these areas from the interior of Nagaland and during the early years all of them were practitioners of shifting cultivation and depended mostly on it. It is worth mentioning that as hill dwellers and practitioners of shifting cultivation on slope, the Naga people understand the importance of forest and they have regulatory customs and traditions with regard to clearing of forest land for shifting cultivation. But the encroachers are different and their ruthless and injudicious activities have led to large scale destruction of forest resources in the foothills. As a result of increasing interaction with the people of the plains and the encouragement (instigation) of a section of people, these encroachers take up some other economic activities which mainly include trade of timber and other forest products. The demand of timber in the townships and other inhabited areas of the plains has provoked the encroachers in felling of trees and illegal trade of timbers. Milling of logs, supply of timbers and other forest materials like bamboo and firewood appear before them to be better and easier sources of earning. Now only a handful of the working population belonging to the older generation is found engaged in production of food crops by traditional method of cultivation. The younger generation doesn't like to associate themselves with food production activities.

The areas under study, as per the topographical sheets prepared by Survey of India, belong to the state of Assam. But it is amazing to note that the Government of Nagaland has shown interest to develop these areas by extending certain facilities to the Naga villagers within the reserved forests of the foothills. These facilities include construction of roads, schools, supply of electricity, setting up of police camps, visit of health workers from time to time and few others of this sort. The Aosungkham, Aosenden, New Longpha, Watiyim and Mayamati are some of the electrified villages within Disoi valley reserved forests of Jorhat district of Assam. Along with these developmental activities establishment of saw mills, rice mills and other business enterprises are going on in these areas. All these have resulted in an occupational shift of the population in the study area. The villagers, who were living exclusively on the limited production of shifting cultivation, are now experiencing a diversification of economic activities. The younger and educated generation of these villages

AGE-SEX PYRAMID
OF
AOSUNGKHAM AND AOSENDEN VILLAGE

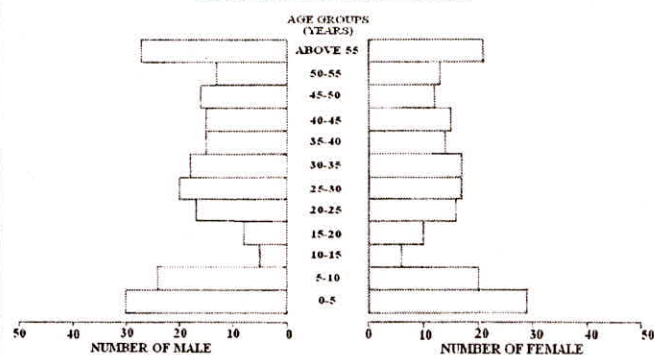


Fig. 2

Depletion of forest took its momentum from the western end of the study area and was gradually spread

shows their reluctance towards the production of food crops and is inclined towards the cultivation of tea. Consequently, many new tea gardens are coming up in the areas which were previously under shifting cultivation. The plains of Assam adjacent to the foothills of Assam-Nagaland border are densely dotted with many tea gardens. The entrepreneurs of these encroached villages willing to open up tea gardens generally do not possess required skill in the subject and are availing of the opportunity to engage skilled tea garden labourers of the tea gardens of the plains of Assam. During field visit such skilled workers were seen working in the Tokzulu tea garden near Aosungkham village.

Another relevant point in this connection is that some of the Naga people of these villages have acquired agricultural plots in the plains of Assam; but they do not know the technical aspects of cultivating land in the plains. As such, they get their plots cultivated by hired labourers. Some of the land owners let their plots on lease for cultivation. Such practices sometimes result in unwanted circumstances and dispute between the land owner and the tenants over the ownership of land properties and sharing of agricultural production. In view of this many Naga families have now learnt the art of cultivating lands in the plains.

The ethnic composition of the population of these areas has also undergone a steady change during the last two decades which not only shows an increase of scheduled tribe (Naga) population, but also shows an increase in the number of a class of Bangla speaking people whose nationality is often doubted in the state of Assam. The Naga people engage these people in agricultural fields and get their crop production done by them. The number of these people is increasing and Police sources say that many of these people have link with criminal and antisocial activities. In this regard several public organizations of Assam have reacted to the presence of these people expressing doubt over their link with cross-border terrorism and the fundamental organizations of Bangladesh and Pakistan.

Traditionally, the Naga people like to build their residential houses at the hill tops and in this particular aspect they are different from the other hill tribes of North-East India. The typical Naga house is a rectangular Chang-ghar with its floor nearly five feet above the ground and remains suspended on pillars. One of the longer ends of the rectangular house usually has a balcony and a ladder to climb up the floor. The building materials are bamboo, cane, wooden planks, pillars and thatch or leaves of plants belonging to Palmaceae family to be used as roofing materials. All these materials are collected from the forests. The

traditional practice of building houses on the hill top and the indigenous architectonic characteristics of the Naga people are not commonly noticed in these encroached villages. During survey only few Chang-ghars were noticed which were somewhat different from the typical Naga dwelling houses. Again, instead of hill tops many houses of these people were seen scattered in the valley floors and even in the plains. In this way the people of the study area have lost some of their social and cultural traditions as a result of isolation from Naga mainland and have adopted somewhat modified form of social life in a different environment.

The disputed tract of the foothills between the states, more particularly the encroached villages of the reserved forests has been used by some antisocial elements. These marginal areas under two different administrations of two different governments obviously have poor vigilance from the viewpoint of maintenance of law and order. This is highly encouraging for these antisocial elements. The state of Nagaland is very close to the South-Asian headquarter of international drug traffic, commonly known as the 'Golden Triangle'. Flow of narcotic drugs, fire-weapons and foreign goods from Myanmar and other south Asian countries to India is taking place via Nagaland. The persons associated with these activities find the villages of the study area as their safe and secured shelter place. It is why narcotic drugs and fire-weapons are very commonly available in the North-Eastern states. Dimapur of Nagaland, Mariani of Assam and many places of North-East India have markets of foreign goods. The wide spread use of narcotic drugs and easy availability of fire weapons have already assumed the dimension of major social problems in the north eastern part of the country. The terrorist and insurgent activities of Assam and Nagaland in particular and entire North-East India in general have posed a serious threat to the sovereignty and integrity of India.

CONCLUSIONS

The reserved forests, in fact, are source of revenue to the govt. exchequer; but their role in maintaining ecological balance, that too in a transitional zone, is much more important than their role as source of revenue. All possible measures should be implemented to stop depletion of the forests. Restoration of the forests involving the goodwill of central and the state governments, political parties, NGO's and active participation of common people would not be a Herculean task. Forest is a renewable resource and all the area under degraded forest need to be brought under regeneration or afforestation scheme. The encroachers should be evicted to the maximum possible extent and

the area under settlement and shifting cultivation should immediately be brought under a forestation plan. An intensive and well designed rehabilitation strategy for these evicted people need to be formulated very carefully. Another intensive motivation strategy needs to be framed to divert the people who could not be evicted from the reserved forests to go for economic activities other than shifting cultivation. Animal husbandry, diary farming, piggyery and hand loom textile etc. are some of the appropriate alternatives in this regard.

The dispute over the interstate boundary indicates lack of goodwill of both central and the state governments and the bureaucrats. Its solution is urgently felt. This will be a positive step towards the protection and preservation of the forests. The people of Nagaland prefer to live on slopes while the people of the plains of Assam discard slope for the purpose of settlement. Non delineation of the interstate boundary on the earth surface has been found to be highly instrumental in the invasion of the Naga encroachers into these forests. Nothing exists to restrict the inflow of encroachers from Nagaland into the reserved forests of the foothills within the territory of Assam. A very strong and effective vigilance with regard to maintenance of law and order in the area by both the state governments is highly solicited. An act is required prohibiting tea gardens in these areas and to root up the existing ones. Besides, there is ample scope for the academicians and the environmentalists to work together for a detailed survey of the area and also for an intensive land-cover management scheme along the Assam-Nagaland border.

REFERENCES

- ARSAC Report (1993). "Land Use / Land Cover Maps and Reports of Assam", Assam Remote Sensing Application Centre, Guwahati.
- Bora, A.K. (1998). "Sustainable Development in a Highland-Lowland Interacting System: A modal Study of the Dhaleswari Basin in North East India", *Proceedings of NAGI's (Eastern Zone) National Conference*, Vol. 1. pp. 84-93.
- Bhagabati, A.K., Bora, A.K. and Kar, B.K. (Ed) (2001). "Geography of Assam" Rajesh Publication.
- Bhattacharyya, N.N. (2005). "North East India: A Systematic Geography", Rajesh Publication
- Dhar, P.K. (2005). "The Economy of Assam" , Kalyani Publishers.
- Govt. of Assam (1990). "Statistical Hand Book of Assam", Govt.Press, Guwahati.
- Govt. of Assam (1992). "Statistical Hand Book of Assam", Govt.Press, Guwahati.
- Govt. of Assam (1995) : "Statistical Hand Book of Assam", Govt.Press, Guwahati
- Govt. of Assam (2004). "Statistical Hand Book of Assam", Govt.Press, Guwahati.
- Nath, M. (2007). "Forest Depletion as a Consequence of Human Encroachment in the Assam-Nagaland Border: Towards a Disastrous Future", paper presented in UGC sponsored National seminar in Tinsukia College, Assam.
- Taher and Ahmed (1998). "Geography of North East India", El Dorado Publication.
- Taher, M. (1987). "The Population Base of Assam", *North Eastern Geographer*, Vol. 19, No. 1 & 2. pp. 1-16, North East India Geographical Society.