

Inter-Temporal Analysis of Population Growth, Urbanization and Changing Land Use Pattern in Assam

Sbruti Dhara Kashyap

Assistant Professor, Dept. of Economics

Abstract:

Economic development and urbanization go side by side in almost all countries in 21st century. High rate of population growth and ill planned urbanization result in many challenges in third world countries. Changing land use pattern and its consequences are major challenges faced by the countries. The paper deals with inter-temporal analysis of population growth, urbanization and changing land use pattern in Assam. The secondary data used in this paper are collected from Economic Survey, 2012-13, India State of Forest report, FSI, 2011 and from the website www.mospi.gov.in. Population is increasing at a rapid rate in Assam but percentage decadal variation is coming down from 35 per cent in 1971 to 16.9 per cent in 2001-2011 periods. The percentage of urban population to total population is in an increasing trend in Assam. Female percentage is increasing but male percentage shows deterioration in total urban population share. The comparisons of different land uses categories show that the area under forests decrease but area under the category land not available for cultivation which includes built up areas increase significantly, the net changes in terms of decreased area is much more higher for moderately dense forest in comparison to very dense forest. Assam is losing 66 square kilometer of its forest cover in 2007 assessment and ten districts are showing negative net changes in terms of forest cover in 2007 assessment.

Keywords: population growth, urbanization, land use pattern, forest cover, moderately dense forest, very dense forest.

1. Introduction:

The economic development process of the 21st century is characterized by high rate of urbanization in almost all countries of the world. Economic development

and urbanization go side by side. The twenty century statistics showed that most of the developed countries of the world were the urbanized economies; the developing and the underdeveloped countries being primarily rural with very low rate of urbanization. But as the process of economic development progresses, the developing and the underdeveloped countries are becoming increasingly urbanized. These countries are experiencing increase in the number of people living in urban areas and expansion of the geographical boundaries of cities and towns. Many individuals prefer to live in an urban area because of the availability of different means of earning livelihood and necessary facilities including utilities and services, shopping, recreational and cultural facilities, educational facilities, means of transport and communication. That is the reason why more than half of the world's 6.6 billion people live in urban areas, crowded into only 3 percent of the total land surface area of the earth. There are various problems associated with the high rate of and particularly ill-planned urbanization in different countries of the world.

Although urbanization is the driving force for modernization, economic growth and development, there is increasing concern about the effects of expanding cities, principally on human health, livelihoods and the environment. The implications on rapid urbanization and demographic trends for employment, food security, water supply, shelter and sanitation, especially the disposal of wastes (solid and liquid) that the cities produce and staggering (UNCED, 1992).

Not only the issues as cited by the Rio Summit (UNCED, 1992) are troubling the countries as side effects of modernization and urbanization, another formidable challenge before the countries is changing land use pattern affecting productivity, employment and other socio-economic aspects of the societies.

The paper attempts to study the trend of urbanization and changing land use pattern in Assam along with the changing forest cover and different problems arising out of it. This is an inter-temporal analysis of the status of urbanization and changing land use pattern in the state.

2. Origin of the Problem:

Urbanization is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, transformation from rural to metropolitan pattern of governance and changes in land use pattern. India is experiencing a high rate of urbanization; the large cities becoming over-crowded with people and growth of small cities and towns. India's economic development process is followed up by urbanization. From 1951 to 1991, India's urban population grows by more than three times from 58 million to 216 million. In 1981, India had 12 metropolitan cities with a total population of about 42 million (6.2 percent of the

country's population) whereas in 1991, the number of metropolies had nearly doubled to 23 with a total population of 71 million (8.4 percent of India's total population). This high rate of urbanization has caused a change in land use pattern of the country. The lands which were previously covered by vegetation are brought under residential and commercial uses. Forest cover has been gradually declining. The hilly lands and other open access resources are subjected to clearing of vegetation at a rapid rate due to high demand for land arising from increased number of people in urban centers. The land used for agricultural purposes are brought under non-agricultural use. Infrastructural development also has effect upon changing land use pattern as lands are cleared for building roads- highways and bridges. These changing land use pattern is increasingly deriving attention as it has impact on productivity of agricultural goods, employment and moreover, on environment also.

Assam is experiencing high population growth in the recent years. Guwahati, the capital of Assam, being the commercial hub of north east India is the most urbanized city among all the cities of north east India. Not only natural growth but also migration is contributing to this population growth of Guwahati to a large extent. Not only Guwahati, that is Kamrup district but other districts, its headquarters are increasingly urbanized with extension of geographical boundaries of towns. The result is the changing land use pattern in the state, with decreased forest cover and increased land used for commercial and residential purposes.

3. Objectives:

The main objectives of the paper are:

- To study the trend of population growth in post- independence censuses in Assam.
- To analyze the tempo of urbanization in Assam and comparison with all India average.
- To study the changing land use pattern in Assam.
- To analyze the impact of changing land use pattern on different categories of forest cover in the study area.
- To overview the district wise changes in forest cover in Assam.

4. Methodology:

The paper involves inter- temporal analysis of population growth, urbanization and changing land use pattern in Assam. The paper is based on analytical method based on secondary data. The secondary data used in this paper are collected from Economic Survey of Assam, 2012-2013, India State of Forest Report, 2011, Department of Forest, Government of India and the website www.mospi.gov.in.

As the title of the paper suggests, the state of Assam, situated at north –eastern part of India, between 24⁰⁰7' N-28⁰⁰0' N latitude and 89⁰⁰42' E- 96⁰⁰02' E longitude, a land of 78,438 square kilometer is selected as the study area. Assam is the gateway to north east India and Guwahati is the commercial capital of this part of India. The impact of commercialization and modernization accompanied with urbanization and changes in land use pattern is more rapid in Assam than other north eastern states.

5. Trend of Urbanization in Assam:

Assam is experiencing a high rate of population growth causing its impact upon different socio-economic and political dimensions. Assam which was a land of eighty lakhs population in 1951 turns into a land of more than three crores population in 2011. Different census reports for population of the state in the post independence -era reveal increased rate of population in the state.

Table1: Number of Population in different census years in Assam

Census Year	Population (in Lakhs)
1951	80
1961	108
1971	146
1981*	180
1991	224
2001	266
2011	311

*In 1981, census was not conducted in Assam; therefore, interpolated data for this year is used.

Source: www.mospi.gov.in

The percentage decadal variation of population in the state shows that from 1951 to 1961, in a decade, decadal variation is the highest (35%) which remained the same for the next decade (1961-71) also. But the latter decades (1971-81), (1981-91), (1991-2001) and (2001-2011) reveal a decreasing trend in the percentages.

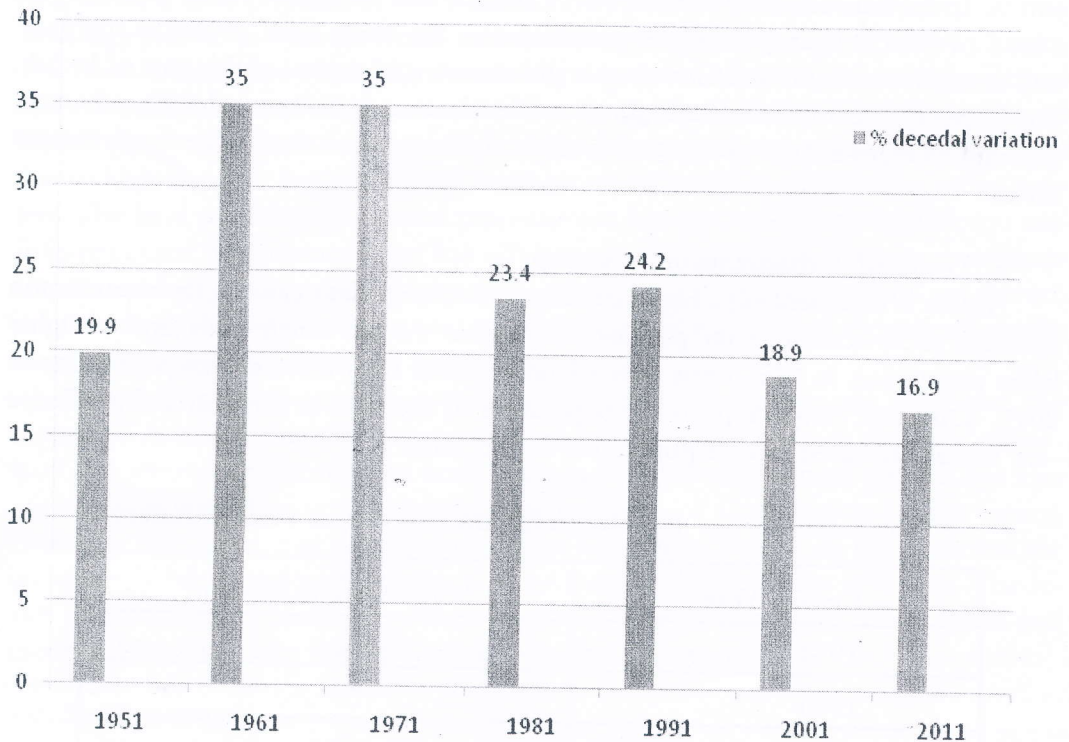
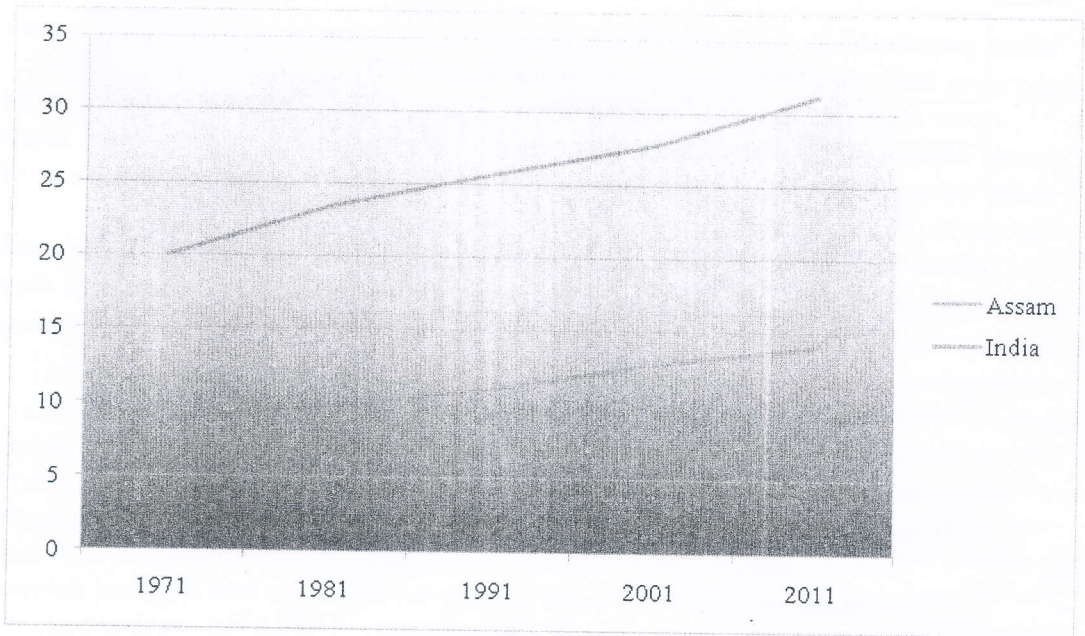


Fig.1: Percentage decadal variation of population in Assam

Source: *Economic survey-Assam, 2012-13*

Not only rural population, but also urban population has increased in Assam which has very important implications on Assamese economy. As India is growing very fast with rapid urbanization, Assam is also influenced by the wave of modernization and urbanization like other states of India. It is very important to be pointed out that the pace of urbanization is somehow slower than other states of India. The slow but rising trend of urbanization in terms of percentage of urban population to total population in Assam is revealed in the following figure.



Source: Economic survey-Assam, 2012-13

The figure 2 reveals that the rate of urbanization in terms of percentage of urban population to total population which was 8.87 per cent in 1971 has increased to 14.08 per cent in Assam. The percentage of urban population to total population is 31.2 per cent in 2011 in India. Therefore, the all India figure is higher than which-ever in Assam. The male population which was 53.41 per cent of total urban population according to 2001 census decreases to 51.61 per cent in 2011 census whereas the female population which was 46.58 per cent of total urban population shows an increasing trend (48.39 per cent in 2011). The increased female population indicates more entrance of females to urban centres in search of employment, for availing educational opportunities and through marriage. The increasing female participation in urban centres shows the sign of women empowerment for some instance. According to 2011 census, the highest number of urban population is in Kamrup (Metro) with 1,044,832 number of urban population whereas the lowest number of urban population is in Baksa district (12,173).

6. Changing Land Use Pattern in Assam:

Population growth in a country has significant impact upon the land use pattern; as population grows, the amount of land used for non-agricultural purposes increases at the expense of loss in area used for agricultural purposes. Increasing share of

urban population in total population growth of a country makes the effect upon changing land use pattern more prompt and rapid.

Apart from the known effects of urbanization on global warming, acid rain and ozone depletion, it is also claimed that urbanization has serious impact on the availability of arable land and subsequently leading to deforestation in several parts of the world. (Mohanty, S.)

Before explaining the relationship between population growth, especially the growth of urban population and land use pattern in the context of Assam, it is very important to study the land use data and to classify them into the following categories-

1. Forests.
2. Area not available for cultivation, which includes:
Area under non-agricultural uses;
Barren and unculturable land.
- Other uncultivated land excluding fallow land, which includes:
3. Permanent pastures and other grazing lands;
4. Miscellaneous tree crops and groves
5. Culturable wasteland.
- Fallow land, which includes:
6. Fallow lands, other than current fallows;
7. Current fallows.
8. Net area sown.

To study the change in land use pattern in Assam, land use data for two periods 2005-06 and 2008-09 are collected from India State of Forest Report, Government of India, 2011. The changing land use pattern is determined by several socio-economic, demographic factors etc. in Assam.

Table2: Land Use Pattern in Assaam

Classification	Area in' 000 hectares	
	2005-06	2008-09
Total geoggraphical area	7,844	7,844
Reporting area for land utilization	7,850	7,850
1. Forests	1,954	1,853
2. Not available for cultivation	2,512	2,696
3. Permanent pastures and & other grazing lands	160	160

4. Miscellaneous tree crops and groves	209	196
5. Culturable wasteland	77	77
6. Fallow lands, other than current fallows	60	59
7. Current fallows	127	126
8. Net area sown	2,753	2,753

Source: Land use Statistics, Government of India.

Table 3 reveals that the area under forests in Assam has been in a decreasing trend from 1,954,000 hectares in 2005-06 to 1,853,000 hectares in 2008-09. Other land utilizations showing the same trend are miscellaneous tree crops and groves, fallow lands, other than current fallows and current fallows. The land uses categories showing decreasing trend are very important for ecological stability and environmental safety concerns. However, land used under category 'not available for cultivation' which includes land used for non-agricultural use and barren and unculturable land increases from 2,512,000 hectares in 2005-06 to 2,696,000 hectares in 2008-09. The following figure shows the changing share of different land uses categories in total geographical area during the periods under consideration.

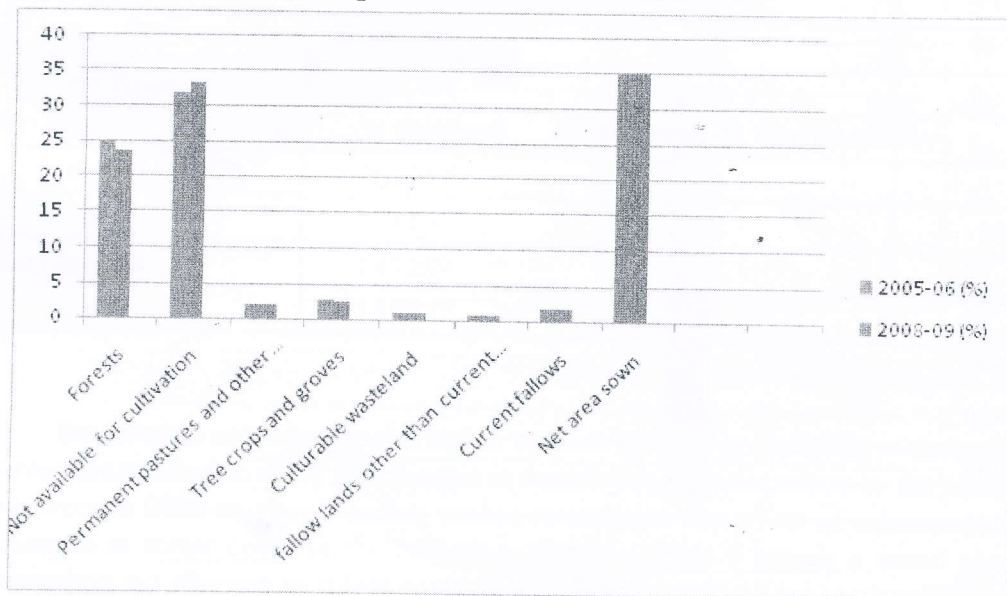


Fig.3: The percentage share of land uses categories to total reporting area

Source: India State of Forest Report, 2011

7. Changes in forest cover in Assam:

Assam is gifted by nature with rich natural heritage including rivers, forest resources, hills etc. There is no need to say about the importance of forest resources towards the economic development of a country or a region. The very necessity of existence of forests lies in maintaining stability of our ecosystem now a days. But changing dynamics of economic development accompanied by population growth, industrialization and urbanization have adverse effect upon the forest cover all over the world. Studying the situation in the context of Assam also gives the same kind of results.

Table 4: Forest cover in the state

Classifications	Area in square km.	
	2009	2011
Very dense forest	1,481	1,444
Moderately dense forest	11,558	11,404
Non forest	50,567	50,583

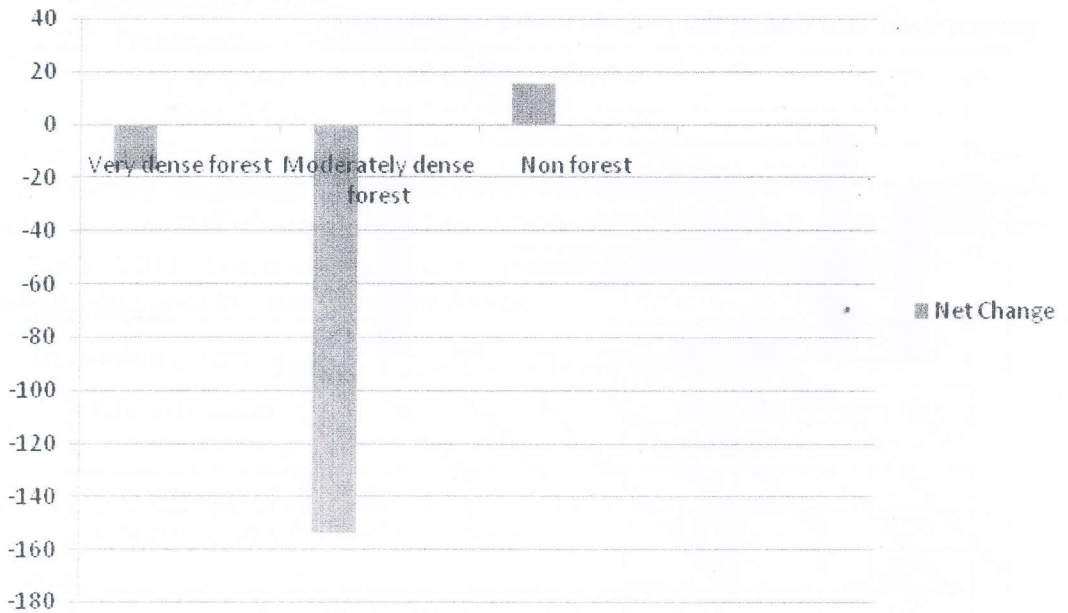


Fig.4: Net changes (2009-2011) in forest cover

Source: India State of Forest Report, 2011

Comparison of forest cover in Assam of 2009 with year 2011 reveals that the net changes which is negative are higher for moderately dense forest than very dense forest indicating that people are targeting to clear up moderately dense forest to establish different types of constructions, be it residential, commercial or infrastructural due to ease for clearing at low cost and fewer time. This type of forest is found to be decreased by a significant level of 154 square kilometer.

8. District wise changes in forest cover:

From the view point of the number of urban population in the districts in Assam, ten districts are taken to study the changing forest cover in the districts.

Table 5: District wise forest cover distribution

Districts	Number of urban population	Percentage of geographical area	Change
Kamrup (Metro+ Rural)	1186846	32.96	-2
Nagaon	368100	20.60	0
Cachar	316010	58.93	2
Tinsukia	262992	40.53	1
Dibrugarh	243764	22.42	2
Jorhat	219565	21.40	7
Dhubri	201917	14.90	-3
Sonitpur	171140	17.90	-10
Barpeta	147289	12.36	0
Goalpara	137827	18.42	-1

Source: India State of Forest Report, 2011

Ten districts according to the higher number of urban population in descending order are selected to study the changes in forest cover in comparison to the previous assessment 2005 so that it makes enable to estimate the effect of urbanization to changes in forest cover in the respective districts. Table 5 reveals a mixed picture regarding net changes in forest cover in the districts. Out of ten districts, four districts - Kamrup (both Metro and Rural), Dhubri, Sonitpur and Goalpara are found to be losing forest cover in terms of percentage of geographical area over the previous

assessment in 2005. Nagaon and Barpeta are neither improving nor deteriorating in terms of changes in forest cover, net changes being zero. Jorhat, Dibrugarh, Tinsukia and Cachar have shown improvement with addition to forest cover, net changes being positive. Due to this mixed effect, the correlation coefficient between the number of urban population and percentage of geographical area is very low (0.2964). But it is worth mentioning that the districts with negative net changes, especially Kamrup district is losing its forest cover in a rapid rate due to rapid urban growth. Assam is losing 66 square kilometer of its forest cover in 2007 assessment over 2005 assessment.

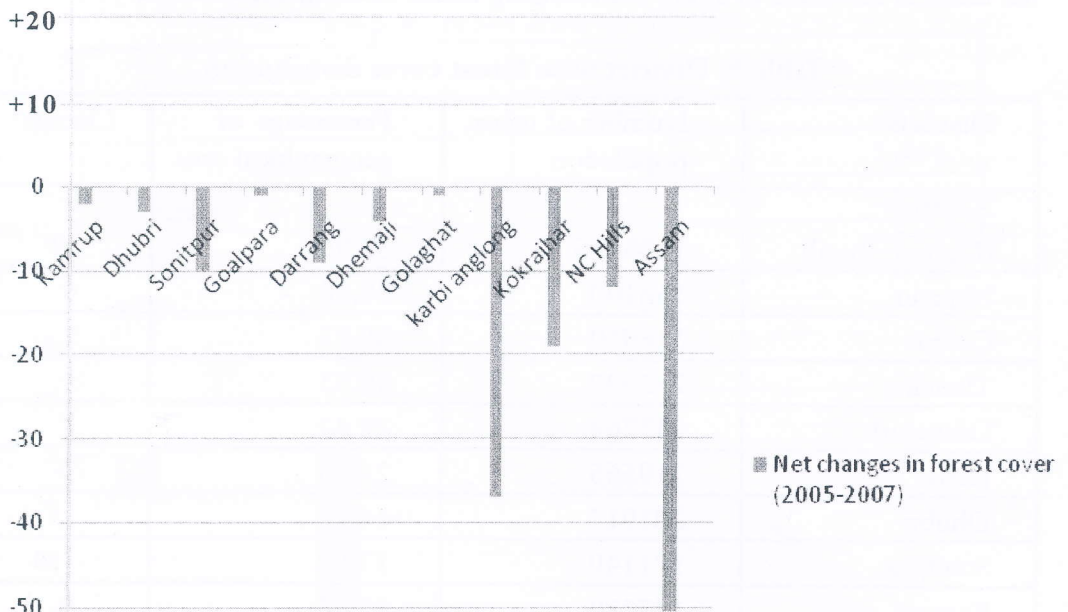


Fig. 5: Districts with negative net changes

Source: India State of Forest Report, 2011

Ten districts in Assam-Kamrup, Dhubri, Sonitpur, Goalpara, Darrang, Dhemaji, Golaghat, Karbi Anglong, Kofkrajhar, and North Cachar Hills are showing deterioration in terms of percentages of forest cover in 2007 assessment. Karbi Anglong district has lost the highest 37 square kilometer of its geographical area as compared to 2005 assessment.

9. Results and Conclusion:

The temporal analysis of population data and land use data in Assam reflects many interesting results. The changing land use pattern and specially the forest cover

obviously reflect the pressure of population on land. Changing land use pattern in Assam with increased non forest areas and decreased forest covered areas results in socio-economic and environment related problems. Due to decreased forest cover, the instances of human - animal conflict becomes frequent in Assam. In urban areas, land encroachment is the common problem. Absence of property rights on forest lands and government lands help the encroachers to target such type of lands. The encroachers are generally the marginalized section of people who do not afford to purchase land of their own at a higher land prices in cities. Another problem which is acute in third world cities is the creation of slums. Slums affect not only the land use pattern but also urban infrastructure to a large extent. Migrating people encroach upon the lands on the banks of rivers, on the sides of roadways and railways, hill slopes etc. This is the common story of third world cities and Guwahati, the capital of Assam is seriously affected by the problems accompanied with urban growth. Borah et al. (2002) states that according to 1991 census, 57.8 per cent of the total migrants to the city were rural of which 27.3 per cent were illiterate. These illiterate rural migrants were to form the urban poor. With the growth of the city, the rate of migration of the poor has been increasing with time leading to the formation of slum areas. There are forty slum areas in Guwahati in 2002 according to the Office of the Municipal Administration. There are 19558 families with total population of 1,13,064 living in slums in Guwahati.

The inter-temporal analysis of population growth and changing land use pattern in Assam gives the following results:

Although population is increasing at a rapid rate in Assam but percentage decadal variation shows deterioration as in from 1951 to 1961 and 1961 to 1971, the percent decadal variation of population was 35 per cent which is coming down to 16.9 per cent in 2001-2011 period.

- Although the ratio of the number of urban population to total population is lower in Assam than all India average, it is in an increasing trend in Assam. Female percentage is increasing but male percentage shows deterioration in total urban population share in Assam.
- The comparisons of different land uses categories between the periods 2005-06 and 2006-07 show that the area under forests decrease but area under the category land not available for cultivation which includes built up areas increase significantly.
- Studying the net changes in area under different forest types from 2009 to 2011 gives an interesting result that there are negative net changes in both the cases of very dense forest and moderately dense forest, the net changes in terms of decreased area is much more higher

- for moderately dense forest in comparison to very dense forest. However, in that period, non forest areas are showing positive net changes.
- The district wise analysis of urban population, geographical area under forest and net changes in forest cover reflects a vivid result. Among the ten districts in terms of highest urban population in Assam, Kamrup, Dhubri, Sonitpur and Goalpara are losing forest cover, Nagaon and Barpeta are neither improving nor deteriorating in terms of forest cover and others are found to be improving. As a whole, Assam is losing 66 square kilometer of its forest cover in 2007 assessment and ten districts are showing negative net changes in terms of forest cover in 2007 assessment.

In modern era, the dynamics of development and environment creates trade-off between the two and globalized world faces many challenges arising out of it. But both of the two are important. No one can deny the necessity of economic development and environmental protection. The process of economic development accompanied with urbanization and industrialization alters land use pattern in the countries which have significant adverse impact upon environment. The need of the hour is to make proper urban planning and management to ensure urban sustainability.

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