

**POPULATION, POVERTY AND THE  
DEGRADATION OF FORESTS:  
A Contemporary Analysis of Meghalaya**

**PhD Dissertation**

**by**

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## **Abbreviations**

BPL – Below Poverty Line

CB – Cantonment Board

CT – Census Town

DFID Department of International Development

DWCRA – Development of Women and Children in Rural Areas

EAS – Employment Assurance Scheme

EKC – Environmental Kuznets Curve

FAO – Food and Agriculture Organisation

GNP – Gross National Product

HH - Household

H – Head Count Index

HDI – Human Development Index

IAY – Indira Awaas Yojana

ICPD – International Conference on Population and Development

IRDP – Integrated Rural Development Programme

JFM – Joint Forest Management

JRY – Jawahar Rozgar Yojana

Kgs – Kilograms

LPG – Liquid Petroleum Gas

M – Municipality

MB – Municipal Board

MT – Metric Tonnes

NA – Not Available

NDDP – Net District Domestic Product

NDP – Net Domestic Product

NER – North Eastern Region

NFBS – National Family Benefit Scheme  
NREP – National Rural Employment Programme  
NRSSC – National Remote Sensing Satellite Centre  
NSDP – Net State Domestic Product  
NSS – National Sample Survey  
PG – Poverty Gap Index  
PMRY – Prime Minister's Rozgar Yojana  
RLEGP – Rural Landless Employment Guarantee Programme  
Rs – Rupees  
SDP – State Domestic Product  
SGRY – Sampoorna Grameen Rozgar Yojana  
SGSY – Swarnajayanti Gram Swarozgar Yojana  
SJSRY – Swarna Jayanti Shahari Rozgar Yojana  
SPG – Squared Poverty Gap Index  
Sq. Km – Square Kilometre  
TC – Town Committee  
TRYSEM – Training of Rural Youth for Self Employment  
UA – Urban Agglomeration  
UNCED – United Nations Conference on Environment and Development  
UNDP – United Nations Development Programme

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# **Chapter 1**

## **Background**

### **1.1: Introduction**

The basic relationship between population, poverty and the environment is not a new concept to us. Human being on the Earth is directly or indirectly dependent upon the environmental resources for their survival and maintenance of growing socio-economic activities. But due to the rapid growth of population and to meet the increasing need of the people for the improvement of standard of living, remarkable changes have been taking place all over the world in the field of agriculture, industry and services. The growth of those activities has been commensurate with the large-scale use of natural resources and led to notable quantitative and qualitative changes in the environmental resources including the forest resources. Thus it is obvious that people are directly or indirectly dependent on the environmental resources for their livelihood and so unbridled growth of population lead to surge in pressure on environment and the intensity is more if they are poor. That is why in 1990s we observe a series of global conferences with a view to raise the awareness of the challenges facing the world due to interactive linkages among growing population, increasing poverty and environmental degradation. The main concerns of several world summits like the Rio Earth Summit (1992), United Nations Conference on Environment and Development (UNCED, 1992), the International Conference on Population and Development (ICPD) etc. were to raise awareness and preparing

action plan for checking population growth, reduction in poverty, maintenance of food security and other necessities for the improvement of standard of living as well as fostering growth through the judicious use of natural resources in order to maintain the sustainable development and healthy environmental quality.

Rapid population growth and poverty have been identified by many as important factors behind the over-utilisation and degradation of natural resources (Rao, 1994). On the one hand, havoc population growth lead to the extensive and intensive use of land for cultivation and housing alongside the extension of urban areas over the surrounding forest areas. Therefore along with the rise in pressure on other resources, excessive population growth also leads to the degradation of forest through the excessive use of forest-based products.

Level of poverty also has important connection with the depletion of forest, as majority of them are highly dependent on the natural resources especially forest for their sustenance (De 2003, p.173). The poor people, due to lack of their purchasing power depend mostly on natural resources especially forest resources. Their consumption pattern also to a great extent shaped by the availability of surrounding forest resources. The poorer used to gather fuel-wood, leaves, fodder, fruits, roots, timber for daily consumption, making dwelling cottages, grazing their cattle and also collect other means of livelihood from the market in exchange of timber and other materials collected from the forest. Thus poverty alleviation has been identified as one important remedy of environmental especially forest resource destruction (World Bank, 1987 & 1988).

If the economy is poor (agriculture and industry are backward) and population growth is faster, it leads to rise in pressure on natural resources like that of forest in North-East India. Excessive use of forest and the destruction of forest biodiversity

lead to a fall in the productivity of land and forest and thus the scope of earning from the forest, which in turn leads to fall in income of those poor people and finally rise in pressure on forest again and the circular process continues unless it is broken. The incidence of poverty thus affects and also affected by the condition of natural resources, especially forest resources. Again, the tendency of population growth is high among the poorer (due to illiteracy and ignorance, lack of health care, incentive to have better future security etc) and thus reduces the per capita availability of resources, which cause further degradation that further push up the incident of poverty. UNDP and World Bank studies have underlined this critical interdependency and thus it became imperative to integrate the ecological dimension while addressing the problem of poverty and population. In this connection, distinction can be made between indigenous and exogenous poverty. Indigenous poverty is the poverty caused by environmental degradation, when degraded environment failed to serve the sustenance. Whereas, exogenous poverty is the poverty that is caused by factors other than environmental degradation (Duraiappah, 1996). However, poverty whether indigenous or exogenous can drive population growth and cause excessive pressure on environment. FAO (2005) study has shown that the maximum degradation of tropical dense forest in the world during 1995 to 2005 has been recorded in South America especially in Brazil and that was primarily due to the extension of cultivation (soybean) and cattle ranchers. During the same period, second highest degradation of forest was observed in Africa, especially in poverty prone Nigeria and Sudan and that too due to subsistence activities. Degradation in forest in Cambodia, Indonesia, Viet Nam, Sri Lanka, etc. has been due to the expansion of logging activities as well as subsistence activities by the poorer on the left logged patches by the earlier owners.

The economy of North Eastern Region of India exhibits the characteristics of

backwardness and underdevelopment (Choudhury, 2000, p. 23). The backwardness of the region has been largely due to the deficiency of investment, lack of capital formation and is exhibited through the extent of chronic poverty, large-scale unemployment, low per capita income etc. This has also been associated with the tremendous rise in population that further leads to shortage of per capita food production and food supply in the economy of the region (Banerjee, 1994, p. 45). The highest growth rate of population in the region since 1961 has been observed by the state of Nagaland. It was 39.88 per cent during 1961-71, 50.05 per cent during 1971-81, 56.08 per cent during 1981-91 and 64.46 per cent during 1991-01. In the state of Meghalaya, since the decade of 1950's the highest growth rate of population was 32.86 per cent observed during the decade 1981-1991 (Census Reports of India). But the size of population, its growth and quality are important factors for social and economic development of any region. As already stated; unchecked population growth leads to the emergence of many problems. Besides raising unemployment, incidence of poverty, excessive growth of population raises environmental stress and thus may cause the loss of natural resources, particularly of forest resources. This is because, rising population leads to fall in per capita availability of land and thus over-utilisation of land takes place (e.g., over-grazing, unsustainable felling of trees), which causes degradation of land quality; forest resource from which a large section of population earn their livelihood in North East India. Moreover, the forests in the region, particularly in the state of Meghalaya though owned and managed by the community, private individual and government, in many cases due to common access and poor enforcement of law, are subject to over-utilisation.

Rapid growth of population in an underdeveloped state like Meghalaya leads to the further decline of the possibility of capital formation, increases unemployment

and extent of poverty whose further consequence is the degradation of natural resources including forest in the region. The economy is over-burdened both in space and occupation with growing population and also there is the expansion of urban areas. Thus, with poor infrastructure, the living condition of the people is bound to degrade and stress on the environment is bound to rise. According to Pandey (2000, p. 65), the rapid increase in population in Meghalaya also has been associated with persistent poverty and the degradation of forests. In order to meet the growing requirements of the growing population, expansion of areas under cultivation takes place and also intensity of cultivation raises even at the steep hill slopes. Whereas, the extension of cultivation to increase food supply (for meeting the increasing requirement of the growing population) has been taking place through the deforestation and degradation of forestland. Also, we observe over time increase in number of timber industries in the state though there is Supreme Court ban (1997) on felling of trees and some of those industries have been closed in different areas. However, in order to tackle the rising unemployment arisen out of ban, at local level, the authorities on a judicious basis allow harvesting of forest to a certain extent and many of the closed saw mills have already reopened. Thus, we notice an overall increase in number of forest based small-scale industries including saw-mills, wooden furniture and cane and bamboo workshops from 131 in 1986-87 to 943 in 2004-05 (Directorate of Economics and Statistics, Government of Meghalaya).

## **1.2: Changes in Forest Cover at All India Level**

The recorded forest area in India was about 68 million hectares in 1950-51 and that increased to 75 million hectares in the early 1980s and further increased to 76.5

million hectares in 1997. But the authenticity of the historical data on the forest area has been doubtful (Ministry of Environment and Forest, 1997; De, 2006).

Record shows that the overall forest cover has been declined from about 40 per cent of country's geographical area a century ago (Guha, 1983) to nearly 22 per cent in 1951 and further to around 19 per cent in 1997 (Ministry of Environment and Forest, 1997), which is well below the standard 33 per cent stipulated by the National Forest Policy, 1988. The forest cover declined from 71.8 million hectares in 1951 to 63.9 million hectares in 1991 and further to around 63.3 million hectares in 1997 that indicates a continuous decline of forest cover till now. Though the rate of decline has been decelerated over time due to campaign, legislation (Supreme Court's ban on felling of trees) and special afforestation programmes through JFM (Mukherjee, 1995), community forestry, social forestry, tree growers' cooperative etc. for the revival of some degraded forest area; in qualitative terms (crown density) there has been continuous decline of forest resources. FAO (2000) assessment shows that the aggressive policy of the Government has offset some losses in forest cover and in spite of significant population growth during 1990s India could regenerate 381000 hectares through tree plantation programmes. Despite governmental efforts through the aforesaid means this is not a significant improvement of forest resources (recorded area has increased slightly and in a scattered manner). Though the rate is declining, population is still growing at an annual around 2 per cent compound rate. Moreover, population growth, urbanisation etc. have been causing rise in demand for timber, fuel-wood, grazing etc. Hence the per capita availability of forest resources is bound to decline. Of course there has been a gradual decline in per capita forest resource mainly timber, and a shift of demand towards relatively cheaper substitutes; still one cannot ignore the importance of forest for arresting soil erosion, maintaining



biodiversity, productivity and environmental balance that proved to be very costly to mitigate.

### **1.3: A Brief Description of Meghalaya**

Meghalaya, which is also known as *the abode of clouds*, is one of the seven states of North-East India. The state lies within 25° 47' and 26° 1' North Latitudes and 85° 49' and 92° 52' East Longitudes. It is bounded on the North by Goalpara, Kamrup, Nagaon and Kaibi Anglong Districts of Assam, on the South by Bangladesh, on the East by the districts of Cachar and North Cachar Hills and Barak valley of Assam and on the West by Goalpara District of Assam and Bangladesh. The state of Meghalaya emerged within the union of India on 21<sup>st</sup> January 1972 with an area of over 22429 Sq. Km. and 1011699 inhabiting population (according to 1971 Census). The size of population rose to 2,318,822 (according to 2001 Census). The density increased from 45 per Sq. Km. in 1971 to 103 in 2001. The society of the state is commonly known as matrilineal. However, the sex ratio has always been in favour of male but increased from 942 to 975 per 1000 male during this period.

Population of Meghalaya is predominantly tribal, the majority of which lives in the rural areas. The villages are small and widely dispersed. It is, therefore, no surprise that most of those who constitute the unemployed in the state of Meghalaya are the rural unemployed and underemployed. A high proportion of the rural inhabitants and part of the urban population belongs to the class of below Poverty Line.

The economy of the state is predominantly agricultural. Around 81 per cent of the population depends primarily on agriculture and forest based activities for their livelihood. But the state is still deficient in food grains production. Per capita annual food grain production has declined from 118.77 Kgs in 1972-73 to about 87 Kgs in

2000-01. Production has been growing at faster rate than the national average. Hence, per capita availability of land (which is primary factor agriculture) has declined from 2.2 hectares in 1971 to 0.97 hectares in 2001. Therefore, the real agricultural income of the poorer has been declining and they are becoming more dependent on forest. Approximately, one in every three persons in the state is still lying below the poverty line (Planning Commission, 1999-2000), who lacks in economic access to imported food. Therefore, to meet their basic requirements, expansion of the area under cultivation takes place. Also, a large number of people practice jhum cultivation without having much scope for technological advancement. The productivity is much lower compared to plain land settled cultivation and hence more area expansion is required for identical increase in output. Thus this expansion of cultivation leads to massive deforestation in the state. So, it is very difficult to maintain the balance between competing agricultural and forest area, which have been closely interlinked. Therefore, it is essential to have a clear idea about the underlying relationship among various factors leading to degradation of forest so that appropriate policies can be undertaken in this situation of growing population, social and economic changes in the state. The present study is an attempt to analyse the nexus between population growths, changes in the poverty level and the degradation of forests in the state of Meghalaya.

The level of poverty in the state in 1973-74 was recorded at 50.25 per cent, which has declined significantly to 33.90 per cent in 1999-2000. So we observe that in spite of the decline in the poverty level. However, still now more than one-third of population is lying below the poverty line. Though there has been some development in the economy of the state but high population growth has eaten up the major fruits of development. The grim situation of the poverty further leads to the indiscriminate

felling of trees, rising intensity of shifting cultivation and falling fallow-period (Singh and Singh, 1992, p. 294), extension of mining, etc., in the state (Pandey, 2000, p. 58). Thus the region has gradually been showing signs of severe strains, pressure on land, water shortage, food crisis and the depletion of natural resources, particularly of forest resources (Husain, 1994, pp. 116-17). Because of excessive pressure on land and forest, the productivity of these resources is bound to decrease and consequently led to fall in the earning sources of the people, lying below the poverty line that depends mostly on these resources. Lack of technical expertise, skilled workers and state's own financial resources also contributed to slow growth of production and productivity and thus the economy of the state.

Various measures like high population growth, low rate of production, scarcity of capital, technological backwardness, vicious circle of poverty, etc are advanced to explain the cause of poverty. While all these factors have an element of truth in them, the structure of the economy is very low in development process. Structure is equally important in explaining the perpetuation of poverty, weak spread effects, and leakages in percolation of benefits of growth or poor incentives for growth itself. In the sense the fundamental cause of rural poverty is rooted in the structure of the economy. In Meghalaya, in spite of the fact of availability of some studies both on population, poverty and the degradation of forests respectively, very few attempts have been made to study the relationship between the three. In this thesis an attempt is made to study the relationship between these three factors in the context of Meghalaya.

#### **1.4: Objectives**

Though the proposed study aimed at finding out the nexus among population growth, poverty and the degradation of forests in Meghalaya, the specific objectives

of the proposed study are to:

(a) discuss the trend and nature of population growth in the state of Meghalaya vis-a-vis other states of North East India, (b) describe the nature of variations in incidence of poverty in the state of Meghalaya, (c) analyse the spatio-temporal changes in forest cover in the state of Meghalaya, (d) explain the impact of changing forest resources on the economy of Meghalaya and (e) finally examine the nexus among population growth, poverty and the degradation of forests in an interlinked fashion.

### **1.5: Hypotheses**

The following major hypotheses have been examined in the present study:

- (1) The rise in income of the people has significantly negative impact on dependence of forest resource and thereby degradation.
- (2) Population growth and family size has significantly positive impact on dependence and degradation of forests in Meghalaya.
- (3) Degradation of forests is highly negatively associated with the educational achievement.
- (4) The tendency of degradation of forest is higher if the forest is located nearer to the business centre or town or presence of timber industries in and around the area.

### **1.6: Period of Study**

The period of the study will be limited to 1971 to 2001. Though the state was born in 1972, data on different aspects of population were available since 1971 and in most cases data are not available after 2001. The whole period of the study is divided into three sub-periods 1971-81, 1981-91 and 1991- 2001 for the discussion of changes

in spatio-temporal pattern of population. Moreover, during these periods, the trend and structure of population in Meghalaya as well as North East India have gone through substantial changes. However, for the discussion of changes in poverty or forest resources; the period is constrained by the availability of data nearest possible years of two sides of the period of study.

### **1.7: Chapterisation**

Besides this chapter on background, next two chapters are devoted to the review of available literatures and methodology of the study undertaken. Spatio-temporal variation in structure of population in Meghalaya is examined in Chapter-4. Chapter-5 attempts to explain the nature of changes in incidence of poverty in Meghalaya. The spatio-temporal variation of forest cover in Meghalaya is considered in Chapter-6. Chapter-7 throws some light on the importance of forest and the implication of changes in forest resources on the economy of Meghalaya. The inter-linkages among the population growth, variation in incidence of poverty and changes in forest cover in the state is examined with the help of secondary as well as primary data in Chapter-8. Conclusions and policy implications of the study are incorporated in the last Chapter.

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## **Chapter 2**

### **Review of Literature**

Literatures available on the dynamics of population, poverty and the degradation of forests and the nexus among are plenty. In this connection several studies have also discussed the importance of forest resources on the economy especially for those who depend mostly on such resources for their sustenance and therefore the effect of degradation of such resources. Discussions have been going on to have an idea about the relationships among those aforesaid variables and also to find out the other factors that interfere in the interlinkages among those three. The question always arises that if the relation exists, what is the pattern of such relation and whether it differs from one region to another or from local level to regional and global level? People have been struggling to establish the exact pattern of interconnections for long period of time and to formulate models linking one with another through their physical, technological, social and economic linkages that may lay down the basis for providing a meaningful solution to the observed problems and avoid any disturbance that may lead to loss of environmental balance and economic collapse.

Plethora of studies are available on the topic and after going through those numerous literatures one may find it very difficult and confusing to conclude whether population really matters for environmental and resource management or not. Similarly, there are debates regarding to what extent poverty is responsible for population growth and environmental and resource degradation. Numerous arguments and counter-arguments have been given since the development of literature on



population and human resource, poverty, food security, environment and resource degradation whether renewable or non-renewable. Similarly, different schools are there regarding the problem of management and control of natural resources and whether the limitation of resources can affect the growth process or not.

### **2.1: Studies at International Level**

The causal relationship between population growth and environment or resource use as observed from earlier literatures are both ways. But from the available studies, we get the conflicting arguments on how population growth affects and is affected by the environmental changes. Historically human action has often been blamed for its adverse impact on environment and resource condition. More than two Centuries back, Malthus (1798) was concerned about the growth of population to outrun the available food supply. The negative impact on the nature due to increasing pressure caused by the population growth and natural logic of diminishing marginal productivity of resources was highlighted in his *An Essay on the Principles of Population*. In Malthusian view, the population growth would undo itself through its rising pressure on natural resources like land, water, forest and thereby declining the productivity of such resources and rising incidence of poverty, pollution, mortality etc; ultimately leading to a low level equilibrium. The pessimistic views have also been found in the writing of Ehrlich (1968), Meadows et al (1972), Ehrlich and Ehrlich (1990) etc., who were of the opinion that the world would be falling short of critical natural resources after some time if population continues to grow. They argued that if the existing patterns of population growth and resource use continued, it would lead to environmental break down and economic collapse. Even the renewable natural resources like forest, fishery can be exhausted if the population exceeds the

carrying capacity and thus rate of extraction is higher than the rate of regeneration. Therefore a balance between the population growth and resource use is well warranted for the maintenance of ecological balance and sustainable growth of the economies.

On the other hand, Julian Simon (1981, 1996), Simon and Myers (1994), were of the opinion that population growth is not a danger, but a benefit. According to them, the world is not running at the risk of shortage of resources. Rather, population growth in many ways helps economic development and better management of resources through their effort and improving knowledge, innovation, etc. Human being continuously learns how to overcome the bottlenecks imposed by the nature. Johnson (2000) also tried to prove through historical evidences that in spite of huge population growth in the last century the level of well-being has increased manifold.

Their arguments derive supports from the fact that at the beginning of Christian era i.e., 1 A.D. world population was around 2.5 crore and growing at around 0.04 per cent per year. Now the world's population passed 6 billion and growing at an annual rate of around 1.5 per cent (Tietenberg, 2003; De, 2006b). Still now, Malthusian catastrophe that was expected to happen much before and the world to return to a subsistence level have yet not been observed. The progress was supposed to halt because of over dependence on agriculture (that was subject to diminishing returns) and economic growth was supposed to be outstripped by the growth in population. In 1761 Robert Wallace also argued that the progress would eventually undo itself by overstocking the world with people (<http://www.sthopd.net>, visited in December, 2005). The interesting point to note is that at the time Malthus wrote, most societies were constrained by the agricultural limits and the world population was what India's population today. Still now we did not observe any such

catastrophe, rather we are living on an average in a better world today with better food security, fewer famines, lower mortality rates, enhanced life expectancy, better amenities and access to resources and most of those have been possible due to the advancement of education and technology in different fields. Whatever famines and food insecurity we observe today are mostly localised and occur largely due to war, political unrest, market distortions, loss of entitlement and sometimes due to crop failure (that sometimes may be because of unplanned or unsustainable use of land resources) (De, *op. cit.*).

At the same time we observe rising pollution level at many parts of the world, global warming, acid rain, ozone layer depletion, declining forest resources, rising mortality due to lack of access to safe drinking water, falling long term productivity of soil, loss of biodiversity etc. Those may be not only due to the growth of population but also for the application of advanced technology (but not environment friendly) to meet the increasing need of the growing population.

“The rapid growth of knowledge has resulted both from the growth of world’s population and the increase in the percentage of that population that is now able to devote time and energy to the creation of knowledge” (Johnson, 2000, p. 13).

Johnson’s argument may be partly true at the global level but not at the regional level. If it is certain that population growth helps development in the field of science and technology and thereby innovations, more scientific inventions would have occurred in Asia and more so in China and India (where more than one third of world’s population live and the region has experienced much higher population growth than any other region in the world) and not in Western Europe. It may however be related to the percentage of people engaged in academic and innovative

activities i.e., the level of human quality, which is definitely higher in European countries. If the acquired knowledge is not distributed uniformly, the gain as happened may not lead to uniform development across the globe that has always happened due to political and social disturbances as well as individual/selfish oriented motives (De, 2006a).

Here it is to be noted that rising population, when total population is well below the carrying capacity may raise the labour supply, contribute more to the production, better management of resources and thus well being. In other words, if we accept the notion of carrying capacity and the level of population is well below that capacity, growth in population normally tends to better utilisation of resources from their sub-optimal level with given technology and other parameters. If it crosses that limit, it would lead to rise in pressure on and thus depletion of resources. Definitely, technological development enhances the scope for use of any resource, its productivity and the capability to tolerate and bear more people (i.e., enhance carrying capacity) over time but there is uncertainty whether the same can grow at the desired pace all the time and uniformly. It also varies with the variation in consumption basket that changes along with the changes in standard of living and adjusted by the people with technological invention and innovation (De, op. cit). However the concept of carrying capacity is of very little relevance to those who have been optimistic (Simon, Johnson, Solow, Hartwick etc.) and think each and every constraint would be overcome if everybody is free and the markets are allowed to play their role, ensuring that is of course a remote possibility even under globalisation.

Simon had cited the examples of some countries like, Netherlands, Taiwan, Singapore etc. where the population density have been very high yet developing at faster rates compared to many other countries (especially African) with lower density

of population and thus population may not be a constraint. At the same time we observe the North-Eastern part of India that suffers from declining forest resources with comparatively higher population growth and sustained poverty (though population density is still well below the national average and poverty level declined over time). That may also be due to lack of alternative opportunity and also because, the growing population depends more on natural resources and their traditional agricultural practices. Dreze and Sen (1989) have also identified the incidence of poverty and not the population growth as the principal reason for the degradation of resources. They also cited the example of countries like Israel, Hong Kong and Portugal where per capita food production declined during the decade of 1980s but those countries able to compensate the underproduction through imports as the countries were developed and people had the entitlement to afford to buy imported items unlike many African citizens.

Bhagat and Hassan (1994) have shown that the changes in major environmental parameters and degradation of resources in the world during the last Century especially after 1950 was not only due to the rapid growth of population but also owing to the escalation of consumption of fossil fuel, industrial production and the growth of the economy, which have been much higher than the rate of growth of population. Therefore, the degradation of natural resources is a complex interplay of population growth, growth of consumption of resources per capita, advancement of technology and the later one is much more important than the former one (Macneill, 1989, p. 105). The rise in per capita consumption of such resources in North America and Western Europe have been much higher than that of other parts of the world, though the rate of population growth was comparatively lower in North America and Western Europe. Bartelmus (1986, p. 25) also argued that the increasing demand for

agricultural land and various forest products due to rising population as well as consumption behaviour of the people would lead to destruction of almost all the accessible forest (tropical forest) in the developing world.

Therefore population may be one of the reasons but not the only reason for the degradation of forest. Ownership pattern may be the other reason. If the resource whether forest or any other is a common resource it will be prone to over-utilisation and hence subject to rapid degradation (Hardin, 1968). On the other hand if the resource is owned by any private individual he/she will use it as if monopoly and the resource will be seriously under-utilised (Buchanan and Yoon, 2000). Though a major part of forest in Meghalaya is under the community ownership, in most cases there is open access.

By using panel data and regression analysis, Cropper and Griffiths (1994) showed that economic growth would not necessarily solve the problem of degradation of forest. Also higher population growth leads to higher deforestation and thus in their opinion, controlling population growth is the best method of reducing the rate of deforestation. Moreover, deforestation in developing countries are also due to market failure arises out of undefined property right, zero private cost of deforestation and as most of the poor people has no property right they do not have the incentive to make efficient use of forest land.

Moreover, poorer are often blamed for the degradation of the forest. But they are not always responsible for that, as in many cases they do not have the property right and thus limited access. In some cases even because of their indigenous knowledge and for sustainability, they are found to better manage and invest in such resources and whatever they extract is for their survival. It is rather the non-poor who have better access to such resources, damage much of the forest resource. The rich

overexploit the forest due to their profit motive where as the vulnerable poorer are highly affected due to such degradation (World Bank, 1987 & 1988).

Goodstein (1999) has argued that the poorer has a tendency to have more children and spent very less on birth control for their future security. Therefore the family size and population growth is rapid in many underdeveloped and developing countries. The rising population even for sustainable activities enhance pressure on natural especially forest resources.

Boyce (1994) also argued that it is not poverty but a combination of greed, power and wealth that causes environmental degradation in many developing countries. Many studies also pointed towards logging activities as the principal activity responsible for unsustainable deforestation in many parts of Asia, Central Africa and South America (Somanathan, 1991; Anderson, 1989; Repetto, 1990; Cropper and Griffiths, 1994). During 1980s also in Meghalaya to a certain extent, due to attractive benefit in the logging industries many of the community forests were privatised that had been harvested unsustainably by new owners of land<sup>1</sup>.

Also there are studies that show that agricultural and pastoral encroachment has been the primary forces behind unsustainable deforestation and logging has been the catalyst. The infrastructure (road etc) developed due to the expansion of logging opened up forestlands for agricultural and pastoral activities that intensified unsustainable deforestation activities in Amazon basin (Goodland, 1991). Westby (1987), Cruz and Gills (1990) argue that shifting cultivators, agricultural and pastoral encroachment in the wake of logging trails were the major causes of deforestation. Jaganathan (1989) however highlighted that market were the main factors causing deforestation in Indonesia. There logging activities were followed by conversion of

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<sup>1</sup> It came out during the discussion of the Author with some District Council Members in East and West Khasi Hills Districts.

such land to estates and mixed gardens. Of course poorer were involved in unsustainable activities on such logged lands after being abandoned by previous landlords.

FAO (1993) study also concluded that agricultural expansion driven primarily by population pressures was the principal cause for tropical deforestation in the past. Population pressure as well as government policies, which provided incentives for people to move into these areas contributed to the conversion of large tracts of forestlands into permanent agricultural lands. Also FAO (2005) study shows that the highest rate of deforestation in South America especially in Brazil in the world during 2000-2005 was due to the expansion of soybean plantations and cattle ranches. During the same period the second largest net loss in forests were observed in Africa, particularly in Nigeria and Sudan, which was largely due to the subsistence activities.

Southgate (1988) as well as Ives and Messerli (1988) also cited population growth as the prime contributor to unsustainable deforestation in tropical Africa and the Amazon basin, of course that caused expansion of agriculture and other subsistence activities. Also some other studies show that poverty intensified population growth are partly responsible for large-scale deforestation in those regions.

## **2.2: Studies in India and North-East India**

There are large number of studies on the aspects of population, poverty and environment in India and North-East India. De (2004) explained the inter-linkages among population, poverty and other indicators of human resource development with degradation of environment especially forest in terms of a flow diagram given below. The flow chart-1 itself explains how the incidence of poverty, population growth and degradation of environment are closely interrelated.



Flow chart-1



The rapid growth of population in the North East India is partly due to the influx of people from the neighbouring countries, Bangladesh and Nepal. Singh (1987, p. 146) pointed out that those immigrants in many cases are responsible for the damage of forest cover.

Joshi (1990, p. 147) also argued that poverty and population growth has affected the economic growth and development of the state of Meghalaya. He further argued that due to high rate of population growth (over 2% per year), the pattern of economic growth could not be improved and also the living conditions of the people.

It is true that more land, water and forest resources are required to feed the growing population and to take care of their welfare in a variety of ways. At the same time, excessive exploitation is counter-productive, and not only suffers from the law of diminishing return, but poses the risk of complete exhaustion of non renewable resources and the depletion of renewable resources for in excess of their regenerative potential (Dikshit, 1991, p. 171).

Historically, intensification of agriculture and higher yields has been the response to increasing pressure of population on available land. With the availability of modern technology, rapid increase in yields is possible through farm research, extension and distribution mechanisms of inputs and products and adequate incentives to promote rapid diffusion. Thus, while slower population growth would help safeguard the resource base, it would certainly not enough and not even the most critical change that is needed. Commercial exploitation, often to meet the demand, has frequently led to resource depletion and destruction of potentially renewable resources. Commercial exploitation is likely to lead to depletion whenever high profits can be made from sales of the accumulated stock of a resource that reproduces slowly; whenever property rights over a resource are uncertain, so that conservation is not in the interest of a single proprietor; or whenever new technologies make the costs of exploitation insensitive to the level of the remaining stock. Although the pressures of poverty and rapid population growth on resources are intense, abundance also encourages the idea that resource destruction entails no permanent harm and thus leads to unplanned extraction. Whereas, perceived scarcity in many cases evoke social mechanisms to limit and regulate resource use (Swarup, et al, 1992, p. 190). Swarup et al further argued that the most important step to preserve the resource base is the creation, or the recreation of effective social controls over exploitation, whether market or subsistence. The lack or breakdown of effect controls is related in complex ways to population growth, which can overwhelm the social institution and traditional mechanisms evolved by communities for resource management or being opened up for commercial exploitation without the controls would cause more environmental damage than slow population growth.

Singh and Tripathi enlisted that forest degradation may begin with subtle

alterations in the growth and reproductive responses of constituent population or chemical characteristics of the soil and then gradually lead to damages in all biotic and abiotic components. They further said that the increasing human and cattle population and the developmental activities e.g., industries, power generation, irrigation, road building, food production, etc., directly or indirectly cause reduction in the forest area (Singh and Tripathi, 1993, p. 78).

Banerjee argued that the rapid increase in world population and its effect on food production and more particularly the food supply poses a severe threat to mankind. In India particularly the growing population is the root cause of poverty, underemployment and the like (Banerjee, 1994, p.45).

Sen in his study mentioned that the growth of population is the cause of several problems such as it intensifies food problem, reduces the quality of life of the people and also reduces the happiness of the human race (Sen, 1994, p. 53). Dasgupta also identified the degradation of forest that affects the environment and the resources available for economic development. The main causes of forest degradation are the institutional failure and poverty. He argued that when population size is higher relatively to the resources available, the more urgent is the need to control the growth of population (Dasgupta, et al, 1994, pp. 39-40). At the local level, the combination of poverty and rapid growth of population is often cited as contributing to environmental degradation -for example, rising population pressure leads to farming to hill sides and other marginal areas causing more soil erosion or heavy cutting of forests for fuel, etc. (Birdsall, 1994, pp. 179-80).

Sengupta (1994) also described that the unbalanced growth of population and food grains production can only be balanced by bringing in food grains in the state of Meghalaya from the other parts of the country, thereby increasing the dependence of

the state on the other states. Moreover, economic stagnation of the state of Meghalaya in the face of increasing population could only bring down the quality of life of the masses. This increases the hardship of the common man that they have to face in every sphere of their daily life. This has the dangerous potentiality of not only creating the economic development of the state but also aggravate social and political tensions (Sengupta, 1994, p. 41).

Patil (2000, pp. 147-148) also argued for the introduction of the environmental aspects into the planning and development. Along with effective conservation and rational use of natural resources, particularly of forests, protection and improvement of human environment is vital for national well-being. Rajalakshmi also mentioned that rapid population growth can be exacerbated by the mutually reinforcing effects of poverty and environmental damage. The poorer are both victims and agents of environmental damage. Because of lack in resources and technology, hungry farmers resort to cultivating erosion-prone hill sides and moving into tropical forest areas where crop yields on cleared fields usually drop sharply after just a few years (Rajalakshmi, 2000, p. 219). Thus, the increase of population has put natural resources and the environment under pressure. If population continues to rise, the pressure on natural resources will probably become more because the unexploited resource base is reduced and the costs of bringing new lands under cultivation will become higher.

Devi et al (2000) also argued that the rapid population growth places enormous pressure on all aspects of the environment and combined with deforestation, land degradation and soil erosion is increasing the numbers of those living in extreme poverty (Devi, et al, 2000, p. 91). Population Explosion in India and also in North East India was either through high reproductive rate of the population or

through migrating of population from the neighbouring areas, which has been a problem for the country as a whole (Banerjee, 2002, p. 19). Realising the negative effect of rapid population growth on development, many developing countries have launched family planning programmes. But in many countries, including India, family planning programmes have not been so successful. Population is a very important factor in the whole process of socio-economic development. However, rapid growth of population in developing and under-developing countries in particular, is straining social, economic and even political system of the nation (Dutta, 2002, p. 143). On the other hand, urbanisation is a place or process of population concentration and it has simultaneously created numbers of socio-economic and environmental problems.

The rate of growth and size of population in the states of North-East India has influence on environment, natural resources and existing system of food productions. As a result of this, the region is experiencing depletion of flora, fauna and soil, fragmentation of cultivated land, rise in import of food grains from other regions and some socio-economic and cultural problems (Husain, 1994, p. 118).

Lamin argued that the fast growth of population in the state of Meghalaya affects the environment and forest resources available. The demand for timbers, fuel-wood and other commercial uses of forests continued to rise rapidly. This has also caused adverse ecological change. In some cases, forests have suffered a great loss and the tribal economy has been badly affected. Thus, there is an urgent need to review the relationship between forest and life, culture and economy of people (Lamin, 1995, pp. 78-89).

Mitra (1995, pp. 221-22) clearly mentioned that the environmental degradation is at the very centre of interaction between man and what he consumes and produces; because whatever contributes to greater production and productivity

and distribution has an inbuilt negative aspect of environmental degradation to it. He further pointed out that nowhere is the evil conjunction of the positive and negative factors more visible in all the fury than in the extensive forest-cum-tribal population tracts, whether on the plains or in the hills, where the lack of the non-commercial domestic fuel policy, coupled with the demands of cultivation, industry, housing and population growth, has led to extremes of environmental degradation and regional poverty through denudation of forest cover. Thus, the rapid growth of population in such an undeveloped state like Meghalaya will have an adverse impact on the environment because most of the people are poor and living in the rural areas. They have to depend on forest resources and forest products so that they could be able to substitute and meet their basic needs and requirements of their livelihood. However, their heavy dependence on forest resources has resulted to the loss of forest cover in the state. Even in Shillong, the Capital of Meghalaya, we have seen that indiscriminate felling of trees for construction purposes leading to the loss of forest cover and also caused environmental degradation to a great extent (Purkayastha, 2000, p. 184).

In rural areas with large number of population, there is always a tendency to over-exploit the supply of natural resources. Exploitation of forest resources can be attributed to the commercial logging and cultivation purposes, which consequently led to the deforestation and soil erosion (Sanchez, 1998, p. 100).

According to Pandey (2000, p. 58), increased degradation of the environment in the North Eastern Region is due to indiscriminate felling and cutting of trees, shifting cultivation and mining and increased human activities towards massive utilisation of natural resources, particularly forest, the climate and ecology has been adversely affected.

Sengupta also pointed out that the adverse effect of population growth on the land man ratio. The per capita availability of land for cultivation thus declines with rising population thereby retarding the development of the economy. This results in raising the level of poverty, giving rise to the problem of unemployment as well as underemployment (Sengupta, 2000, p. 148).

Datta is of the opinion that the high rate of growth of population is sure to create pressure on the limited availability of land in the state of Meghalaya and at the same time leads to large-scale depletion of forest coverage, when associated with unplanned and uneconomic use of them for shifting cultivation (Datta, 2000, p. 174).

Purkayastha (2000, p. 184) opined that in and around Shillong, the Capital of Meghalaya, indiscriminate felling of trees for construction purposes along with rapid growth of population leads to environmental degradation. This loss has occurred not only because man had too many needs but also because he was too greedy and careless (Dutta, 2000, p. 382-83).

The interactions of the factors that influence deforestation are very complex and policies designed to address the problem should take care to examine the local context and target factors that mostly affect rates of deforestation in a given area. The role of population dynamics (growth, density, and migration) should always be considered in combination with other causes of deforestation. In the long run, controlling deforestation acquires addressing the numerous social and demographic interactions that contribute to this process. This call for multisectoral approaches that encompass all four drivers: people, poverty, plunder, and policy (Nash, 2003, pp. 43-45). Potrykowska (2003) also said that environmental damage has several sources: poverty among some parts of the population and rising affluence among others, skewed systems of land tenure, uncontrolled of commercialisation of natural

resources, inadequate control of polluting industries, destructive farming techniques and urbanisation. Poverty is clearly a major factor. She further pointed out that in their struggle to survive; poor people often have no choice but to destroy their surrounding forests by cutting down trees, overworking the soil, overgrazing rangelands, and over-fishing. The efforts of the poor people to escape from poverty also damage the environment. For example, timber and cash crops are exploited beyond sustainable levels, and mineral supplies are rapidly depleted in order to earn quick revenue.

She further argued that the developing countries are facing the environmental problems that threaten the efforts to improve the standard of living, that worsen health conditions and that reduce income from agriculture and other sources. In rural areas, pressure to grow both more food and cash crops has led to massive losses of topsoil, trees, plants and animals. It has increased congestion in towns and urban places, industrial expansion and also increased of air and water pollution. Although some consider that this environmental stress is the price of development, in fact widespread environmental change is likely to hinder the development efforts and worsen the people living in acute poverty (*op. cit.* p. 451).

Kuri (2005) by using his village level survey data has shown that around one-fourth of the income of rural households in Arunachal Pradesh comes from nearby forest resources. However both poor and non-poor people earn substantial material both for consumption and commercial purposes. By regression analysis also he showed that extent of extraction by the families depends positively on their family size and inversely with the distance of forest from the residence of the families.

By using panel data on degradation of forest, incidence of poverty and level as well as variation in per capita SDP, De (2006, *op. cit.*) has found a significantly positive correlation between income variation and degradation. Also a positive



relation is observed in his study between reduction in poverty and degradation of forest. However taking queue from the EKC principle or inverted-U hypothesis one can say that the degradation first increases with the rise in income (i.e, in the early stage of development) and after reaching a peak level it declines with further development (Grossman and Krueger, 1995). He opined that the states of North East India were still low developed having lower per capita income and higher incidence of poverty especially rural poverty than the national average and hence, they were on the rising phase of EKC. Moreover, whatever poverty reduction had taken place it was at the cost of forest resources, which were easily accessible by the people.

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## Chapter 3

### Method of Enquiry and Data

#### 3.1: Analysis of Population, Poverty and Changes in Forest

The whole analysis on population, poverty and degradation of forests in Meghalaya is divided into four major parts. First of all, trend of population in Meghalaya vis-à-vis other states of North-East India is described. Then nature of changes in composition of population in the state and in all the districts of Meghalaya is analysed. Spatio-temporal variation in composition and structure of population in Meghalaya is analysed through the changes in growth rate, density, rural-urban distribution, age-sex composition, literacy and dependency ratio, etc. for all the districts as well as state by using tabular method. The decadal growth rate of population is calculated by  $g = (P_t - P_o) / P_o * 100$ ; where 'P<sub>t</sub>' is the population at t<sup>th</sup> Census year, 'P<sub>o</sub>' is the population of the previous Census year and 'g' is the percentage decadal growth rate of population. Annual average exponential rate of growth of population is estimated by using the equation  $Y_t = Y_o e^{rt}$  where Y<sub>t</sub> is the size of population at the year t and Y<sub>o</sub> is the initial year figure of population, 'r' is the exponential rate of growth.

Thereafter the variation in level and incidence of poverty in the state of Meghalaya is discussed. The analysis is also made for the rural and urban areas separately for the state as a whole. Data on over time inter-district variation in poverty in Meghalaya are not available. But the figures on percentage of families lying below



poverty line in rural areas, which is more important in the context of degradation of forest in Meghalaya, are available from the Community and Rural Development Department of Government of Meghalaya. However, it was recorded for the implementation of targeted public distribution system in Meghalaya along with the other states in India in 1997 and still now the same figures are in operation. Hence those figures are described to have an idea of inter-district variation in rural poverty. That is why, over time variation in rural poverty across the districts on the basis of secondary data remain unexplained. However, one point can be noted here is that the state as a whole is a poor state and though per capita Net State Domestic Product has increased over time, in relative terms the position of the state has gone down during last few decades, which is clear from the declining ranking of the state at all India level in terms of human development as well as poverty index. Still now almost one third of the population are in absolute poverty. Hence, an inter-district comparison of over time changes in economic condition or reduction in poverty (if there is no substantial change in distribution of income) can be made through the comparison of growth of per capita Net District Domestic Products, which has been considered in the analysis of secondary data obtained on that.

As there is lack of information on changes in poverty and degradation of forest or dependence of people on forest over time across the districts, it is very difficult to correlate among them. To fill the gap in analysis, village level primary data have been collected and used for the same. Though it is cross section information; an inter-family comparison between income, availability of resource, family structure, education, occupation, dependence on forest etc can help to draw inference about macro level and dynamic relationship from such micro level observations and thereby conclusion.

For the estimation of poverty, the measure like Head-Count Ratio is considered in the present study. In order to find out the incidence of poverty in the survey villages Rs 327.56 is considered as bench mark of poverty line as Rs 327.56 and 454.11 are fixed by the Planning commission of India as poverty line in 1999-2000 for the rural and urban areas respectively.

Then quantitative and qualitative changes in forest cover in the state are elaborately discussed. Also inter-district variation in degradation of forest due to shifting cultivation is highlighted. Changes in total output of forestry and logging over time are also described, which is followed by the analysis of the contribution of forestry and logging to the net district domestic product as well as it's over time change during 1993-94 to 1999-2000.

Due to very short period of time, for which data on all the relevant variables are available, regression analysis would not be fruitful as there would be very small degrees of freedom. Hence, tabular method and cluster analysis is followed. The bivariate correlations among the inter-district variation in degradation of forest, changes of population, density of population, literacy rate, percentage contribution of forest to net domestic product, growth of per capita Net Domestic Product etc are calculated. In a two-way correlation table, correlation coefficients of all relevant pairs are displayed. From those results we tried to find out the nature and pattern of relationship among those variables. From the relevant and desired correlation results a flow-diagram is drawn to explain the dynamic linkage among the major variables, we are interested, i.e. population growth, incidence of poverty examined through low or high growth of per capita Net Domestic Product, extraction and contribution of forest product to Net Domestic Product and finally the degradation of forest.

### 3.2: Analysis of Primary Data

Because of lack and limitations of data, the broad relationship among poverty, socio-economic characteristics of population (family size, educational achievement, job status, income etc) and population growth and their impact on forest as well as the impact of changing forest on income of the people is explained through statistical analysis by using primarily collected data. Here, the consumption and livelihood pattern of people of different income categories is also looked into in order to have an idea of the nature of dependence of, especially poor people on the forest and forest-based product, which would help in analysing the cause of degradation of forest in Meghalaya. After having an idea about the nature of population growth, incidence of poverty, consumption pattern and resource utilisation by the people and variation in forest cover in Meghalaya; inter-linkages among them is analysed to find out exact cause of changes in characteristics of forest in the state. The percentage of income/expenditure earned from the forest is estimated from the collected data. The regression method is used to find out the impact of income and in the same way poverty, education, occupation, distance of market, existence of any timber industry, land holding, family size on the percentage of income/expenditure, fuel-wood and building materials used by the people derived from the forest. From the observed pattern of relation and availability of forest and other resources we can infer about the nature of dependence and hence cause of degradation if any in the state.

Regression equation of the type  $Y = b_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + D_1 + U$  is formed by using the collected and processed data. Here  $Y$  is percentage of income/expenditure earned or housing/ fuel-wood etc material collected from the forest and  $X_i$ s are the explanatory variables like family size, gross income, education, land holding, job status, number of sawmill present in and around the village etc and

$D_1$  is the dummy variable for distance of the village from the nearest town or business centre. The numerical value of distance could be used in the regression equation. But only one distance (central distance) for each family in a village can be entered in the equation. Therefore, only four values will be available for the four villages. That is why we have used dummy variable on the principle that if good communication is there, the difficulty of extraction and the cost of transportation in five-ten or fifteen Km away village would not differ much (due to the fact that the cost of loading and unloading trucks will be very high compared to the fuel expenditure and thus total marketing cost would be more or less same). So the commercial exploiters would not give emphasis on this minor variation in distance unless it is substantial. Only in case of subsistence activities like fuel-wood collection, even the richer in the villages use it and the chance is more in the distant villages because of non-availability of better substitutes (LPG, Kerosene etc). Even though they themselves do not collect it; they receive from the others in the market who directly extract the same.

Thus looking at the location and difficulty of transportation and overall impact of timber and non-timber produces, we have put  $D_1 = 1$  if distance from town is less than 15 Km and 0 otherwise. More over many of the families in the villages here harvest forest for sustenance and distance of dwelling house to forest where from materials are collected is also an important factor influencing the rate of harvest as the requirement of time and energy for the collection of equal amount of material will be more if the villagers have to travel long distance for the same purpose. But all chosen villages are nearby the forest area and thus it is not considered in the present analysis.

### **3.3: Collection of Data and Limitations**

For the purpose of analysis, both primary and secondary data is used. Data on

various aspects of population growth, poverty and forest cover during 1971 to 2001 for the state as a whole as well as for all districts are collected from the Census of India, Statistical Hand Book and office of the Directorate of Economics and Statistics, Government of Meghalaya, Shillong; Chief Conservator of Forests, Govt. of Meghalaya, Shillong and State of Forest report; Ministry of Environment and Forests, New Delhi; North-Eastern Council Secretariat, Shillong and also from the District Councils wherever possible. Especially the data on poverty are collected from the Planning Commission and various NSS Reports. However, the figure on rural poverty estimated by the Planning Commission is not comparable with the figure supplied by the Directorate of Community and Rural Development, Government of Meghalaya. The incidence of poverty according to the latter source is much more than the former one. Actually, in most cases there is a tendency to highlight the poverty by the respective state machinery to draw sympathy and receive more concessions, relief materials, goods through public distribution system as well as plan or non-plan allocation from the Central Government.

Also, because of limited number of families surveyed in North-East India, always poverty level of Assam is considered to be representative of all the North-Eastern states. But if one looks at the per capita land holding, production and productivity, industrial structure and employment, dependence, exploitation and degradation of forest resources, per capita NSDP and its distribution, variation in prices of commodities across the states and changes of all of those; the variation in incidence of poverty of across the North-States will be significantly observed.

Moreover, in the general estimation of poverty in India, the value of non-timer products or minor forest produces (food, fruit, leaves, roots etc except major commercial timber value) collected by the inhabitants due to their customary rights

have never been taken into account as a part of their income. Therefore, in such cases the individual family income is likely to be underestimated and hence poverty is over-estimated. The more is the extraction of such forest resources and earning through hunting and gathering by the inhabitants; the more will be the deviation of estimated poverty from the actual incidence of poverty. Also the more dependence on forest implies the greater will be the impact of degradation of forest on the poorer as they have less other alternative opportunities and thereby the scope to remit the loss of forest income. This is a major drawback of the secondary data available from major Government agencies.

Moreover, the direct inter-district comparison of degradation and district domestic product, inter-district variation in poverty level, growth of timber industry, and density of population is not possible for a substantial period because of paucity of data at district level over time or for the whole period under consideration. Also, forest has some indirect impact on income and employment excepting timber and non-timber forest produce like the forest related allied industries besides its importance for tourism, maintenance of bio-diversity, conservation of soil etc, which are very difficult to estimate. Hence, only the directly collected resources from the forest by the people either on their own or by hired persons are considered in the analysis. Moreover, population and poverty are causes and consequences of environmental especially forest degradation. Also, population and poverty are closely interrelated among themselves. Therefore, a simultaneous and multi-equation model could be provide better result. But due to lack of information for a substantial period especially data on poverty we are constrained to do so.

For the purpose of regression analysis, primary data have been collected from four villages selected purposively (two from East Khasi Hills, one from West Khasi

Hills and one bordering East and West Khasi Hills) after having a preliminary idea about their locations, characteristics of the forest resource, distance from the nearest towns and business centres, communication facilities and socio-economic condition of the people. Also, the requirement of time, accessibility and cost for the collection of data has been taken into consideration in this regard. These villages are Mawtawar, Laitjem, Sohiong and Mawlangkhar. Survey was conducted during January to March 2006.

Mawtawar and Laitjem are located in Myllem Community and Rural Development Block and Sohiong in Mawphlang Community and Rural Development Block of the East Khasi Hills district. The fourth village, Mawlangkhar belongs to the erstwhile Nongstoin (and now to Mawthadraishan) Community and Rural Development Block of West Khasi Hills district.

Sohiong and Mawlangkhar are situated far away from their nearest towns, approximately 30 and 20 kilometres away from Shillong and Nongstoin respectively. Mawtawar and Laitjem are within 5 and 12 kilometres from their nearest town, Shillong. That means two villages are located nearer to their nearest towns (within 15 KM) and two are far away from their nearest towns (more than 15 KM).

From each village, 40 families have been selected by simple random sampling without replacements i.e., in total 160 families have been chosen as sample units. From each family, information on their social and economic background especially family size and composition, level of education, land holding, occupation, monthly income, method of cultivation (if farmer), monthly consumption items, housing pattern and materials used, land holding, number of cattle owned, materials (food, non food, housing and marketable items) collected from the neighbouring forests have been gathered. Also we have taken note of the nature of degradation of forests in all

those four villages. From there we tried to find out the reasons for differences in dependence of people on the forest and the difference in level of degradation. From the personal experience, we observe that Mawtawar and Sohiong recorded very high degradation of forests during past decade. Most part of the primary forests in these two villages have been disappeared and still now it is going on because these two villages are nearer to business centres and incidence of poverty is also high (though relatively better than the other two villages) in spite of having better urban facilities. Influx of population from the remote villages further compounded the problem. The degradation of forest in the other two villages, Laitjem and Mawlangkhar, are however less as compared to Mawtawar and Sohiong, though they are relatively poorer and there is less availability of substitutes of forest produce like fuel-wood. Agriculture is their main occupation. However, other occupation and business activities also are found in the villages.

Saw mill industries are also prevalent in these villages but not in the same manner. Now only one is operating at Mawtawar. Earlier there were five at Laitjem of which now only three are in operation and at Sohiong earlier there were five and only two are actively running and there is no timber industry at Mawlangkhar though earlier there was one. Most of those closed timber industries stopped operation after 1997. Of course some are reopening at various places with the permission of local bodies (which controls and monitor the forest) to collect the timber, as mentioned in the later chapters.

In case of primary data, it is very difficult to get time series data on quantity of extraction, values of the items collected as most of the rural people who are associated with such activities are illiterate and none of them keep account of such things. In Meghalaya, till now there is no land record especially in the rural areas. Though we



find a tendency of privatisation of resources especially in the mining areas that benefits mostly the richer, who has better knowledge and control over politics and power, it is very difficult for the rural respondents to say about the quantity of land under their possession. Moreover, still now, most of them use community land due to their customary right. Only they can say yes or no about whether they possess land or not. Even with the limitations of the data mentioned here, the study is able to provide some important clue about the reasons for changing interdependence and causes of degradation of forest that would help in forecasting and policy formulation.

## Chapter 4

### The Spatio-Temporal Variation of Population in Meghalaya

#### 4.1: Introduction

The size and structure of population plays an important role for the development of an economy. It is the source of labour force for the production and other socio-economic activities in the economy. Hence rising population increases the supply of labourer and thus (if properly utilised) it contributes to the rising production of an economy. But that is possible if there is shortage of labour in the economy and production activities are on a suboptimal level. But if the population rises beyond the carrying capacity of the system then it instead of adding to the growth, create several problems because of rising needs for food, shelter etc. and management of waste materials that it generates beyond the assimilating capacity of the environment. Also if the increased labourers do not find any gainful employment, it generates the problem of unemployment and other related issues.

Malthus (1798) was very much concerned about the growth of population to outrun the availability of food supply. The increasing pressure of the human population on the nature and diminishing marginal productivity of resources leading to Malthusian catastrophe was underlined in his book, *An Essay on the Principles of Population*. The pessimistic views have also been found in Ehrlich (1968), Meadows et al (1972), Ehrlich and Ehrlich (1990) etc. who were of the opinion that if the population continues to grow the world would be falling short of resources especially the critical natural resources after some time. Moreover, labourers in the production units to a certain extent can be

substituted by machineries through the improvement of technology, which may compound the problem of unemployment. However, the rising waste materials and other environmental problems can also be better managed through the innovation of improved technology, which is possible when an economy grows and that is associated with the rise in human qualities and not the size of population only. Hence Johnson (2000), Simon (1981, 1996) pointed out that rising population is not a problem but it enhances the utility of resources through improved and judicious management. In their opinion markets, if allowed to play their role freely would solve many of the problems.

However, one can safely argue that if technological improvement does not match with the rising requirements of the growing population, rapid growth of population may act as a retarding factor for the growth and development of the economy. That is, if income does not grow at least at the identical rate of population growth, per capita income will necessarily fall and also reduce the per capita availability of other resources needed to maintain a particular standard of living. Rapid growth of population increases the supply of labour in the market and if it is not possible to provide them job and employment opportunities, that will create the problem of unemployment and other related social hazards. Then there will be a rise in pressure on natural, especially common resources as they will be increasingly dependent on such resources for their livelihood. Therefore, rapid growth of population in many cases leads to environmental and natural resource degradation. Mikesell (1995, p. 86) also pointed out that crowding is one of the consequences of population growth that reduces the quality of life.

Moreover, rising population means rising requirement of land for agricultural purposes to produce more (unless technology helps rise in productivity in the same way)

and hence it expedites cutting and felling of trees by the people for extension of cultivation, settlement purposes, etc. leading to depletion of forest resources and thus severe environmental change. That is why many environmentalists think population growth is the greatest threat to sustainable development, and perhaps to the survival of the human species itself. Even the application of modern seed, fertilizer, irrigation, technology for the improvement of land productivity, yields better result in the short run but in the long run the productivity of soil is adversely affected as already observed in several parts of India.

The nature of changes in population and its composition as well as the spatial distribution of such changes during 1971 to 2001 in Meghalaya has been described in this chapter.

#### 4.2: Trend of Population in the North Eastern Region

**Table-4.1**  
**Trend of Population in North Eastern Region of India, 1951 to 2001**

State	(In Thousand)						Annual Exponential Growth Rate (in percentage)		
	1951	1961	1971	1981	1991	2001	1951-71	1971-01	1951 -01
<b>Arunachal Pradesh</b>	N. A	337	468	632	865	1097	3.28*	2.84	<b>2.95*</b>
<b>Assam</b>	8029	10837	14625	18041	22414	26655	3.00	2.00	<b>2.40</b>
<b>Manipur</b>	578	780	1073	1421	1837	2166	3.09	2.34	<b>2.64</b>
<b>Meghalaya</b>	606	769	1012	1336	1775	2318	2.56	2.76	<b>2.68</b>
<b>Mizoram</b>	196	266	332	494	690	888	2.64	3.28	<b>3.02</b>
<b>Nagaland</b>	213	369	516	775	1210	1990	4.42	4.50	<b>4.47</b>
<b>Tripura</b>	639	1142	1556	2053	2757	3199	4.45	2.40	<b>3.22</b>
<b>N. E. R</b>	10261	14500	19582	24750	31548	38316	3.23	2.24	<b>2.64</b>
<b>All India</b>	<b>361088</b>	<b>439235</b>	<b>548160</b>	<b>683329</b>	<b>846303</b>	<b>1028737</b>	<b>2.09</b>	<b>2.10</b>	<b>2.09</b>

Source: *Census of India*, 2001

Note: \* indicates that the base year for Arunachal Pradesh is 1961 in stead of 1951.

Tremendous growth of population during 1951 to 2001 has been observed in the North Eastern Region of the country. The population in the region has registered an increase from over 1.03 crore in 1951 to around 3.83 crore in 2001. That is population

has increased to more than three times during these five decades as against 2.8 times in the country as a whole.

During 1951-71, the highest annual exponential growth rate of population among the North Eastern states was recorded by Tripura (4.45 per cent), which was followed by Nagaland with 4.42 per cent (Table-4.1). The annual exponential growth rate of population in Meghalaya during that period was 2.56 per cent only, which was the lowest among all the North Eastern states. However, the overall annual exponential rate of growth during 1951 to 2001 in Meghalaya was 2.68 per cent. During the same period, Nagaland recorded the highest annual exponential rate of growth of population, which was 4.47 per cent. Annual exponential growth rate during 1951 to 2001 was the lowest in Assam and highest in Nagaland. Also, during 1971 to 2001, annual exponential growth rate was highest in Nagaland and lowest in Assam. Annual exponential growth rate has increased during the later sub-period in the state of Meghalaya, Nagaland and Mizoram, while in the other North Eastern states it has declined. Though growth rate of population in Meghalaya was the lowest during 1951 to 1971 sub-periods, it became higher than the states of Assam, Manipur and Tripura in the later sub-periods. The growth rate significantly declined in Tripura, Arunachal Pradesh, Assam and Manipur, which together more than offset the rising annual exponential growth rate of other North Eastern states and led to decline in overall growth rate in post 1971 period. Here, population growth has been not only due to the natural growth but also due to the net in-migration from the neighbouring country, Bangladesh. These states, mainly Tripura and Assam were highly affected due to partition (at the time of Independence) and even at the time of Bangladesh War, when we observe huge influx of people. But during 1980s and 1990s

the net in-migration has come down significantly and the population growth that was observed during that time was mainly due to the natural growth. Moreover, the population controlling measures have been successfully implemented in those states and not in Meghalaya, Nagaland and Mizoram. Though the overall annual exponential growth rate has declined in 1980s and 1990s, it was still higher than the all India average.

#### **4.3: Decadal Growth Rate of Population in the North Eastern Region of India**

The decadal growth rates of population in all the states of North Eastern Region and the country as a whole since 1951 are shown in Table-4.2. The table also shows a phenomenal increase of population by around 78.71 per cent during 1951-61 in Tripura, which can be explained in the light of large scale immigration (as mentioned earlier) of the people from the adjoining areas as well as from Bangladesh and Nepal (Choudhury, 2000, p, 35). Nagaland also experienced considerable rise in growth rate of population since 1951. It has recorded the highest rate of growth among all the North Eastern states since 1961 though it was the lowest during 1951-61.

**Table-4.2**

##### **Decadal Variation of Population in North East India since 1951 (in Percentage)**

<b>State</b>	<b>1951-61</b>	<b>1961-71</b>	<b>1971-81</b>	<b>1981-91</b>	<b>1991-01</b>
<b>Arunachal Pradesh</b>	N. A	38.91	35.15	36.83	<b>26.82</b>
<b>Assam</b>	34.98	34.95	23.36	24.24	<b>18.92</b>
<b>Manipur</b>	35.04	37.53	32.46	29.29	<b>17.91</b>
<b>Meghalaya</b>	27.03	31.50	32.04	32.86	<b>30.65</b>
<b>Mizoram</b>	35.50	24.93	48.55	39.70	<b>28.70</b>
<b>Nagaland</b>	14.07	39.88	50.05	56.08	<b>64.46</b>
<b>Tripura</b>	78.71	36.28	31.92	34.30	<b>16.03</b>
<b>All India</b>	<b>21.51</b>	<b>24.80</b>	<b>24.66</b>	<b>23.85</b>	<b>21.56</b>

Source: *Census of India*, various issues

The percentage decadal variation of population in Nagaland was 39.88 during 1961-71, 50.05 during 1971-81, 56.08 during 1981-91 and 64.46 during 1991 to 2001. In the state of Meghalaya, since 1950s the growth rate of population was increasing and reached its peak at 32.86 per cent, during the decade 1981-1991. Thereafter, it started declining. The average decadal growth rate of population in all the states of the region during 1991 to 2001 was significantly higher than the national average, except Assam, Manipur and Tripura, where it was 18.92, 17.91 and 16.03 per cent respectively. The lowest growth during 1991 to 2001 in Tripura was attributed to drastic fall in immigration and successful application of fertility controlling measures, that was also primarily due to the development of education especially of the females.

#### **4.4: POPULATION IN MEGHALAYA**

##### **4.4.1: Composition of Population in Meghalaya**

The majority of population in Meghalaya consists of tribals. The main tribes of the state are the Khasis, Jaiñtias and Garos. These groups are also divided into different sub-groups such as Khyntiam, Pnar, Bhoi, War, etc in case of Khasis and Jaiñtias. These people belong to a number of clans and are essentially differentiated from each other by their locations and functions they perform (Gopalakrishnan, 2001, p. 33). The Khasis and Jaiñtias are mainly settled in four districts of the state, viz, East Khasi Hills, West Khasi Hills, Jaiñtia Hills and Ri Bhoi districts, whereas the Garos are primarily living in the three districts of the western part of the state, known as East Garo Hills, West Garo Hills and South Garo Hills districts. These groups of people are also included in the category of 'Scheduled Tribes' by the Sixth Schedule of the Indian Constitution. Besides these,

there are other groups of minor tribes, who are settled in the state of Meghalaya like the Mikir, Lalung, Biate, Dimasa, Hajong, Hmar, Kuki, Lakhar, Koch, Rabha, etc.

#### **4.4.2: District-wise Trend of Population in Meghalaya**

Population in Meghalaya has been increasing at a steady rate since 1951; which has been higher than the national average. Yet now the density of population (103 per sq. km) is much lower than the national average (313 per sq. km, according to 2001 Census Report), that is less than one-third of the national average. Though the state is endowed with huge forest, mineral resources, it is unable to absorb the rising population because of the lack of enterprises and technological development. Therefore, even with very low population density the state failed to create sufficient employment opportunities and hence the growing population became more and more dependent on their surrounding natural resources for the sustenance and the dependence is intense among the poorer section. The district-wise variation in population over time has been displayed in Table-4.3.

During the past three decades, the growth of population in the state was by nearly 130 per cent over the total population of 1971 (Table-4.4). In absolute terms, the population of the state increased by 1307123 persons during 1971 to 2001. In all the districts population has been following the more or less similar trend. The inter-district decadal variation in population in Meghalaya is explained in the next sub-section.



**Table-4.3**  
**District-wise Variation of Population in Meghalaya (1971-2001)**

State/District	Persons				Males				Females			
	1971	1981	1991	2001	1971	1981	1991	2001	1971	1981	1991	2001
Jaiñtia Hills	113562 (11.22)	156402 (11.71)	220473 (12.42)	299108 (12.89)	56810 (50.03)	79052 (50.54)	111753 (50.69)	149891 (50.11)	56752 (49.97)	77350 (49.46)	108720 (49.31)	149217 (49.89)
East Khasi Hills	327922 (32.41)	411489 (30.80)	537914 (30.31)	660923 (28.50)	198972 (52.27)	262952 (51.42)	341670 (51.36)	333553 (50.47)	181678 (47.73)	248462 (48.58)	323548 (48.64)	327370 (49.53)
West Khasi Hills	110872 (10.96)	161576 (12.09)	220157 (12.40)	296049 (12.77)	56687 (51.13)	82906 (51.31)	112860 (51.26)	150419 (50.81)	54185 (48.87)	78670 (48.69)	107297 (48.74)	145630 (49.19)
East Garo Hills	102698 (10.15)	136550 (10.22)	188830 (10.64)	250582 (10.81)	53218 (51.82)	70365 (51.53)	96444 (51.07)	127474 (50.87)	49480 (48.18)	66185 (48.47)	92386 (48.93)	123108 (49.13)
West Garo Hills	248913 (24.61)	306347 (22.94)	401571 (22.63)	518390 (22.35)	155280 (51.09)	188435 (50.95)	244960 (51.02)	263424 (50.82)	148637 (48.91)	181442 (49.05)	235140 (48.98)	254966 (49.18)
Ri Bhoi	52728* (5.21)	99925* (7.48)	127304* (7.17)	192790 (8.31)	N.A	N.A	N.A	99319 (51.52)	N.A	N.A	N.A	93471 (48.48)
South Garo Hills	55004* (5.43)	63530* (4.75)	78529* (4.42)	100980 (4.35)	N.A	N.A	N.A	52007 (51.50)	N.A	N.A	N.A	48973 (48.50)
Meghalaya	1011699 (100.00)	1335819 (100.00)	1774778 (100.00)	2318822 (100.00)	520967 (51.49)	683710 (51.18)	907687 (51.14)	1176087 (50.72)	490732 (48.51)	652109 (48.82)	867091 (48.86)	1142735 (49.28)

Sources: (1) *Census of India*, 1981, Series – 14, Part A & B: General Population Totals and Primary Census Abstract

(2) *Census of India*, 1991, Series – 1; Paper-2 of 1992

(3) *Census of India*, 2001, Primary Census Abstract, Meghalaya, Series – 18

(4) *Basic Statistics of North Eastern Region*, 2002

Notes: (1). Population for Ri Bhoi and South Garo Hills are not available for the years 1971, 1981 and 1991 since these two districts are newly created on June 4, and June 18, 1992 respectively. Here, value is approximated by assuming growth rate figures available in Basic Statistics of North Eastern Region

(2). Figures in the brackets of males and females indicate the percentage to Total Population of each district.

(3). Figures in the brackets of persons indicate the percentage of Total Population of the state.

(4). \* Population of East Khasi Hills and West Garo Hills in 1971, 1981 and 1991 have been estimated by the scholar by assuming estimated population of Ri Bhoi and South Garo Hills districts. So for those years the male and female figures may not be added up to total population of those districts.

(5). N. A. means not available and earlier Ri Bhoi was part of East Khasi Hills and South Garo Hills was part of West Garo Hills.

#### 4.4.3: Decadal Growth Rate of Population in Meghalaya

Table-4.4 represents the comparative picture of decadal growth rate and an annual exponential growth rate of population at the district level in Meghalaya and in the country as a whole since 1971.

**Table-4.4**  
**Changes in Decadal Growth Rate, Decadal Variation and Average Exponential Growth Rate of Population in Meghalaya (in Percentage)**

State	Decadal Variation in Population				Average Annual Exponential Growth Rate			
Period	1971-81	1981-91	1991-2001	1971-2001	1971-81	1981-91	1991-2001	1971-2001
<b>Jaiñtia Hills</b>	37.72	40.97	35.67	163.39	3.20	3.43	3.05	<b>3.23</b>
<b>East Khasi Hills</b>	25.48	30.72	22.86	101.55	2.27	2.68	2.06	<b>2.34</b>
<b>West Khasi Hills</b>	45.73	36.26	34.47	167.02	3.77	3.09	2.96	<b>3.27</b>
<b>East Garo Hills</b>	32.96	38.29	32.70	144.00	2.85	3.24	2.83	<b>2.97</b>
<b>West Garo Hills</b>	23.07	31.08	29.09	108.26	2.08	2.71	2.55	<b>2.45</b>
<b>Ri Bhoi</b>	89.51	27.40	51.44	265.63	6.39	2.42	4.15	<b>4.32</b>
<b>South Garo Hills</b>	15.50	23.61	28.59	83.59	1.44	2.12	2.51	<b>2.03</b>
<b>Meghalaya</b>	32.04	32.86	30.65	129.20	2.78	2.84	2.67	<b>2.76</b>
<b>India</b>	<b>24.66</b>	<b>23.86</b>	<b>21.56</b>	<b>87.67</b>	<b>2.20</b>	<b>2.15</b>	<b>1.95</b>	<b>2.10</b>

Sources: *Census of India*, 2001; *Basic Statistics of North Eastern Region*, 1995, 2000 and 2002.

The table reveals that the decadal growth rate of population in the state was increasing from 1971-81 to 1981-91 and we observe the deceleration in the growth rate during 1991-01. Whereas the decadal growth rate of population at the national level from 1971 onwards indicated a declining trend. In other words, we have seen that the decadal growth rate of population in the state since 1971 has always been higher in comparison to that of India as a whole. Though during 1991-01, the decadal growth rate in Meghalaya declined marginally and reached to the level of 30.65 per cent, it is still higher than the national average growth rate.

Among the districts during 1971-81, West Garo Hills and South Garo Hills districts recorded much lower rates of growth of population than the state while all other

districts experienced higher rates of growth than the state average. In 1981-91, Jaiñtia Hills recorded the highest rate of growth of population with 40.97 per cent and South Garo Hills experienced the lowest growth rate of 23.61 per cent. During 1991-01, the decadal growth rate in Ri Bhoi district was the highest (51.44%) and in the East Khasi Hills district the growth rate was the lowest (22.86%). During the period from 1971 to 2001, the growth rate was the highest in West Khasi Hills (167.02%) and lowest in South Garo Hills (83.59%). Here one point to be noted is that during all the sub-periods all the districts have higher growth rates than the national average except during 1971-81 and 1981-91, when the growth rates in South Garo Hills were lower than national average and during 1971-81 the figure of West Garo Hills was also lower than the national average. Moreover, during 1991-2001 growth rate was increasing in Ri Bhoi and South Garo Hills, while in other districts it was declining.

Looking at the average annual exponential growth rate of population for the state it has been found that it always remained above 2 per cent since 1971 onwards, and declined marginally during 1991 to 2001. Whereas at all India level, the average annual exponential growth rate declined at a faster rate and reached 1.95 per cent per annum during 1991 to 2001 as compared to 2.67 per cent of the state of Meghalaya. In terms of average annual exponential growth rate also all the districts follow a similar trend as that of decadal variation.

Based on these observations, we can say that the growth of population in the state has been much higher and faster as compared to all India average and the growth is associated with noticeable inter-district variation. Thus, both in absolute terms as well as in terms of the growth rate, the state had continued to witness (though the density is still

low, considering the poor technology and economic growth) what we may think whether it can be designated as Population Explosion or not.

#### 4.4.4: Density and Sex Ratio of Population in Meghalaya

The density of population in the state of Meghalaya is very unevenly distributed. Table-4.5 shows the districtwise variation in the density of population in Meghalaya. An inter-district comparison shows that East Khasi Hills and West Garo Hills have been more densely populated districts; while Jaiñtia Hills, West Khasi Hills and South Garo Hills districts on the other hand, have low density of population.

**Table-4.5**  
**District-wise Variation in Density of Population in Meghalaya (1951- 2001)**

State/District	1951	1961	1971	1981	1991	2001
Jaiñtia Hills	17	21	30	41	58	78
East Khasi Hills	81	103	119	149	191	241
West Khasi Hills	13	17	21	31	42	56
East Garo Hills	24	30	39	52	73	96
West Garo Hills	48	62	67	82	108	140
Ri Bhoi	N.A	N.A	22*	48*	54	79
South Garo Hills	N.A	N.A	27*	34*	42	55
Meghalaya	27	45	45	60	79	103
All India	117	134	177	216	267	313

Sources: *Census of India*, 2001; *Basic Statistics of North Eastern Region*, 1981 and 2002.

Note: \* values are estimated by the scholar.

The density of population in the state has also been increasing rapidly since 1951. From a small figure of 27 persons living per square kilometre in 1951, the density of population rose to 45 persons per square kilometre in 1971 and then to 103 per square kilometre in 2001. However, still now the density of population in the state is much lower than the national average, which is 313 per square kilometre, according to 2001 Census Report.

Since 1951, there is a sharp increase in the density of population in all the districts of Meghalaya. In Jaiñtia Hills, the density of population was only 17 persons per square kilometre in 1951 but has increased to 78 persons per square kilometre in 2001. In East Khasi Hills, we observed rapid increase in population especially due to urbanisation. Here the density of population in 1951 was 81 persons per square kilometre and increased to 241 persons per square kilometre in 2001. In West Khasi Hills, the density increased from 13 persons per square kilometre in 1951 and rose to 56 persons per square kilometre in 2001. In East Garo Hills and West Garo Hills districts, in 1951, the density of population was only 24 and 48 persons per square kilometre and rose to 96 and 140 persons per square kilometre respectively in 2001. Even in the newly districts like Ri Bhoi and South Garo Hills also, the density of population has increased sharply from 54 and 42 persons per square kilometre in 1991 to 79 and 55 persons per square kilometre in 2001. Only East Khasi Hills and West Garo Hills districts stand above the state average in terms of density of population. The density of population thus varies significantly across different districts of the state. However, the coefficient of variation in density of population decreased from 69.13 per cent in 1951 to 57.37 per cent in 2001. But the range of variation increased from 68 to 186 during 1951 to 2001. The density in East Khasi Hills has always been the highest because of the availability of socio-economic activity, educational scope and better infrastructure.

Table-4.6 shows the districtwise variation in sex ratio of population in Meghalaya since 1951. The sex ratio in Meghalaya has always been higher than that of all India average since 1951, except in 1961 when it was marginally lower. It has been observed from the table that sex ratio has increased in the state since 1961, whereas it has

**Table-4.6**  
**District-wise Sex Ratio and its Decadal Growth in Meghalaya (1951-2001)**

District/State	1951	1961	1971	1981	1991	2001	Percentage Decadal Variation						
							1951-61	1961-71	1971-81	1981-91	1991-01	1951-71	1971-01
Jaintia Hills	954	1015	999	978	973	996	6.39	-1.58	-2.10	-0.51	2.36	4.72	-0.30
East Khasi Hills	950	898	916	951	948	981	-5.47	2.00	3.82	-0.32	3.48	-3.58	7.10
West Khasi Hills	948	927	956	949	951	968	-2.22	3.13	-0.73	0.21	1.79	0.84	1.26
East Garo Hills	958	976	930	941	958	966	1.88	-4.71	1.18	1.81	0.84	-2.92	3.87
West Garo Hills	945	951	968	1096	959	968	0.63	1.79	13.22	-12.50	0.94	2.43	0.00
Ri Bhoi	921	870	893	921	941	941	-5.54	2.64	3.14	2.17	0.00	-3.04	5.38
South Garo Hills	965	971	909	967	963	942	0.62	-6.39	6.38	-0.41	-2.18	-5.80	3.63
Meghalaya	949	937	942	954	955	972	-1.26	0.53	1.27	0.10	1.78	-0.74	3.18
All India	946	941	930	934	927	933	-0.53	-1.17	0.43	-0.75	0.65	-1.69	0.32

Source: (i) *Census of India, 2001, Primary Census Abstract, Meghalaya, Series -18*  
(ii) *Basic Statistics of North Eastern Region, 2002*

continuously declined at all India level till 1991, after which, we observe a marginal increase. This is in consonance with the existing notion of the matrilineal society of Meghalaya. At all India level, the much hyped campaign against gender discrimination, sex determination, etc. failed to increase the sex ratio to the desired level.

The percentage decadal variation of sex ratio in the state since 1951 has been varying significantly. During 1951-61, the variation in sex ratio in the state was negative (-1.26 per cent) and during 1971-81 it rose by 1.27 per cent. In the period, 1981-91, it increased marginally by 0.10 per cent and during 1991 to 2001 it increased by 1.78 per cent. By taking into account the two sub-periods (1951-71 and 1971-2001), the percentage decadal growth rate of sex ratio in the country was -1.70 per cent in 1951-71 and 0.32 per cent in 1971-2001, whereas the figures in the state were -0.74 and 3.18 per cent respectively during 1951-71 and 1971-2001.

More or less the similar type of variation in sex ratio emerged in the different districts of Meghalaya. In 1971, sex ratio in Jaiñtia Hills (999), West Khasi Hills (956), and West Garo Hills (968) were above the state average sex ratio which was 942. In the other districts, the sex ratios were below the state average. Almost in all the districts we observe rising sex ratio, except in Ri Bhoi district where it has remained constant at 941 during 1991-2001. According to 2001 Census, the Jaiñtia Hills district had the highest sex ratio of 996 and Ri Bhoi district recorded the lowest sex ratio of 941 among all the districts of Meghalaya. However, all the districts recorded comparatively higher sex ratio than the national average of 933 in 2001. The rise in sex ratio is due to: (i) the improvement in medical facilities that resulted in improvement in females' life expectancy, (ii) fall in high death rate of women during the pre-pregnancy and post

pregnancy periods, (iii) out-migration of male workers and (iv) non-discrimination among sex in case of birth because of matrilineal society.

#### **4.4.5: Literacy of Population in Meghalaya**

Literacy is considered to be an index of socio-cultural and economic advancement and is recognized as a basic need for the development of human resource in an area. Education is an instrument of social change and economic development as it imbibes knowledge and enhances skill of the people. It raises the power of motivation and level of aspirations to achieve the desire goals. Education provides a creative way not only by importing new knowledge for socio-economic development but also by showing new paths of social values to the people. The quality of population can be judged from the level of literacy and the level of technical training attained by the people in the country. It is experienced that the more a country is developed, the more are the people of it educated and the less they are victimised and exploited. Not only this, it is education that has the supremacy to promote gender quality and empowering of women. Education helps reducing gender inequality and exploitation of women, which have been engulfing the whole world alarmingly.

The literacy rate of Meghalaya is increasing progressively over the years. As per Census of India 2001, the literacy rate of the state is 62.56 per cent, which was only 29.49 per cent in 1971 (table-4.7). In spite of a rapid increase, the literacy rate in the state is still lower than the national average. Looking at the sex-wise growth of literacy since 1971, it is noticed that for the males it has gone up to 65.43 per cent from 34.12 per cent in 1971 and in case of females it has gone up to 54.61 per cent from 24.56 per cent. It



may however be mentioned that literacy rate relates to the persons for the age group of five and above up to 1971 Census. From 1981 onwards, the literacy rate shown in the table relates to the person of the age group seven years and above.

**Table-4.7**  
**Percentage of Literacy in Meghalaya and India (1971-2001)**

Year	Meghalaya			All India		
	Persons	Males	Females	Persons	Males	Females
1971	29.49	34.12	24.56	29.48	39.52	18.70
1981	34.08	37.89	30.08	36.23	46.89	24.82
1991	49.10	53.12	44.85	52.21	64.13	39.29
2001	62.56	65.43	54.61	64.84	75.26	53.67

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

**Table-4.8**  
**District-wise Percentage of Literacy in Rural and Urban Areas to Total Population in Meghalaya (1971-2001)**

District/State		Rural				Urban			
		1971	1981	1991	2001	1971	1981	1991	2001
Jaiñtia Hills	P	17.20	19.98	24.15	37.06	51.58	65.84	64.83	<b>74.28</b>
	M	18.72	19.51	48.71	35.54	55.91	70.15	51.89	<b>75.23</b>
	F	15.69	20.46	51.28	38.59	47.05	62.00	48.10	<b>73.37</b>
East Khasi Hills	P	26.59	31.87	36.91	53.02	66.11	63.63	70.49	<b>76.33</b>
	M	29.97	33.07	51.98	52.94	70.80	67.73	55.90	<b>78.80</b>
	F	23.20	30.10	48.01	53.10	60.52	59.10	44.09	<b>73.85</b>
West Khasi Hills	P	27.21	30.43	25.45	47.99	51.78	53.25	50.52	<b>63.93</b>
	M	30.43	32.42	52.92	49.25	55.97	53.66	*	<b>64.13</b>
	F	23.84	28.32	47.07	46.69	46.50	46.33	*	<b>63.72</b>
East Garo Hills	P	30.13	31.92	35.98	45.19	43.43	52.68	*	<b>66.46</b>
	M	35.21	37.26	57.96	49.92	42.13	59.29	*	<b>69.02</b>
	F	24.66	26.26	42.03	40.30	32.16	40.70	*	<b>63.73</b>
West Garo Hills	P	28.20	*	*	36.60	63.78	*	*	<b>73.52</b>
	M	60.42	*	*	41.88	48.47	*	*	<b>76.66</b>
	F	39.58	*	*	31.15	51.52	*	*	<b>70.23</b>
Ri Bhoi	P	*	*	*	50.66	*	*	*	<b>58.87</b>
	M	*	*	*	53.37	*	*	*	<b>60.58</b>
	F	*	*	*	47.78	*	*	*	<b>57.07</b>
South Garo Hills	P	*	*	*	40.98	*	*	*	<b>69.17</b>
	M	*	*	*	46.50	*	*	*	<b>71.61</b>
	F	*	*	*	35.16	*	*	*	<b>66.37</b>
Meghalaya	P	23.40	26.98	32.60	44.20	65.22	62.30	67.68	<b>73.48</b>
	M	27.68	30.20	54.79	46.54	69.93	66.72	54.58	<b>75.74</b>
	F	<b>18.94</b>	<b>23.64</b>	<b>45.20</b>	<b>41.78</b>	*	<b>58.82</b>	<b>45.41</b>	<b>71.19</b>

Source: *Census of India*, 1981, 1991 and 2001

Note: P= Persons, M= Males and F= Females and \* indicates that data are not available

From table-4.8, it is observed that in all the districts of Meghalaya, the rural literacy rate have been increasing rapidly since 1971 except in West Khasi Hills, where it declined during 1981 to 1991. Moreover the difference between male and female literacy rates has been declining over time in both the rural and urban areas. But the gap between the rural and urban literacy rates has been widened though both have been increasing over time. This is particularly because of the better educational facilities available in the urban areas, less poverty and better utilisation of educational awareness campaign in the urban areas, that is, total literacy campaign, etc.

#### **4.4.6: Spatio-Temporal Growth of Urban Population in Meghalaya**

Over time we observe increasing concentration of population in urban places, a process termed as urbanisation. This process involves the movement of people from rural to urban areas (commercial and administrative centres) in search of employment, education and a better standard of living. The pattern of urbanisation in Meghalaya has been unique in a sense that it was the form of functions that determined the emergence of urban nodes in the state (Gopalakrishnan, 2000, p.59). Just as population growth varies across the states, so do the level of urbanisation. Economic development everywhere is generally associated with the growth of urbanisation.

The process of urbanisation has some positive as well as negative implications. Of the adverse implications of urbanisation, especially when it results in the growth of cities and towns, the most serious is its impact on the environment. The expansion of urban areas depletes productive agricultural land. Moreover, raising income levels of the people results in increased consumption and utilisation of resources that contributes to the deterioration of the environment. Water, which is becoming a scarce resource, is

increasingly polluted with urban and industrial waste, unless those are properly managed. Moreover at the time of urban expansion, destruction of forest areas takes place. Along with that, the management of urban sewage has become an important issue in many countries. Again, when rural-urban migration takes place, initially the low income families stay at the out skirt and slum areas without basic civic facilities and they put more pressure on local environment including the forest for their survival and development. As far as the state of Meghalaya is concerned, it is still underdeveloped and large number of the people is still live in the rural areas (80.42 per cent, according to 2001 Census). That means the process of urbanisation has been very slow in the state.

**Table-4.9**  
**District-wise Distribution of Rural-Urban Population in Meghalaya (1971 to 2001)**

District/State	Rural (in Percentage)				Urban (in Percentage)			
	1971	1981	1991	2001	1971	1981	1991	2001
<b>Jaiñtia Hills</b>	92.14	91.74	90.66	91.62	7.86	8.26	9.34	<b>8.38</b>
<b>East Khasi Hills</b>	67.75	64.65	65.25	57.98	32.25	35.35	34.75	<b>42.02</b>
<b>West Khasi Hills</b>	*	97.60	93.49	88.31	*	2.40	6.51	<b>11.69</b>
<b>East Garo Hills</b>	*	96.86	93.64	85.67	*	3.14	6.36	<b>14.33</b>
<b>West Garo Hills</b>	94.90	89.34	89.88	88.62	5.10	10.66	10.18	<b>11.38</b>
<b>Ri Bhoi</b>	*	*	*	93.16	*	*	*	<b>6.84</b>
<b>South Garo Hills</b>	*	*	*	91.44	*	*	*	<b>8.56</b>
<b>Meghalaya</b>	<b>85.46</b>	<b>81.93</b>	<b>81.40</b>	<b>80.42</b>	<b>14.54</b>	<b>18.07</b>	<b>18.60</b>	<b>19.58</b>

Source: *Census of India*, 1971, 1981, 1991 Series-1 Paper-2; *Census of India*, 2001.

Note: \* indicates that data are not available.

District-wise distribution of rural-urban population in Meghalaya since 1971 is shown in table-4.9. Though population has been increasing significantly in some urban centres, the pace of urbanisation in Meghalaya is rather slow. At present, there are in total 16 urban centres in Meghalaya, of which seven are the district headquarters and the rest are the sub-divisional headquarters/towns. Of these urban centres/towns, Shillong Urban Agglomeration is the biggest and is classified as the Class-I Town with a population of

267662 (2001 Census). Other towns in the state fell within Class III and Class IV category.

Before 1971, Shillong Urban Agglomeration was the capital of the then undivided Assam. During 1971, urban population in the state was concentrated mainly in Shillong Municipal, Shillong Cantonment, Mawlai, Nongthymmai, Jowai and Tura. But, between, 1971 and 2001, with changes in the number of districts (from two in 1971 to seven in 1992) new urban centres have emerged. In 1981, there were 12 towns in the state (5 Statutory and 7 Census Towns) and increased to 16 (10 Statutory Towns and 6 Census Towns) in 2001.

In 1971, total number of urban population in the state was 1.47 lakhs. In 1981, it was almost doubled to 2.41 lakhs, (a rise of 63.98 per cent), which further increased to 3.30 lakhs in 1991 (an increase of 36.76 per cent). In 2001, the urban population figure reached to 4.54 lakhs that is an increase of 37.59 per cent over 1991. The growth rate of urban population has been declining over time. Shillong Urban Agglomeration, itself has recorded significant decrease in growth rate from 42.32 per cent in 1971-81 to 15.80 per cent in 1991-2001. However, in the towns like Jowai, Mawlai and Shillong Cantonment, the growth rate increased during the period 1971-81 to 1981-91 and declined thereafter. Nongthymmai, Pynthorumkhrah and Madanriting observed a substantial growth since 1981-91 onwards. Sohra has shown only a marginal increase, from 28.47 per cent in 1981-91 to 28.76 per cent in 1991-2001 and all other towns show a decline in growth rate during this period as is observed from table-4.10. The deceleration in growth of urban population, especially of the large town in Meghalaya may be due to the saturation of opportunities available in the urban area and non expansion of activities. Also because of

growing opportunities and activities coupled with the rising infrastructure in rural areas, migration of population from rural areas has been declining.

**Table-4.10**  
**Population and Growth Rate of Urban Areas in Meghalaya, 1981-2001**

District	Urban Areas/Towns/Cities	Urban Population			Growth Rate	
		1981	1991	2001	1981-91	1991-01
<b>Jaiñtia Hills</b>	Jowai (M)	12923	20601	25057	59.41	<b>21.63</b>
<b>East Khasi Hills</b>	<b>Shillong (UA) (1-7)</b>	<b>174703</b>	<b>231143</b>	<b>267662</b>	<b>32.31</b>	15.80
	1. Shillong (M)	109244	131728	132867	20.58	<b>0.86</b>
	2. Shillong Cantt. (CB)	6620	11075	12396	67.30	<b>11.93</b>
	3. Nongthymmai (CT)	21558	26816	34292	24.39	<b>27.88</b>
	4. Mawlai (CT)	20405	30442	38303	49.19	<b>25.82</b>
	5. Pynthorumkhrah (CT)	10711	14322	22115	33.71	<b>54.41</b>
	6. Madanriting (CT)	6165	8927	16318	44.80	<b>82.79</b>
	7. Nongmynsong (CT)	N.A	N.A	11371	N.A	<b>N.A</b>
	Sohra (CT)	6097	7833	10086	28.47	<b>28.76</b>
<b>West Khasi Hills</b>	Nongstoin (TC)	3880	14339	23106	269.56	<b>61.14</b>
	Mairang (TC)	N.A	N.A	11492	N.A	<b>N.A</b>
<b>East Garo Hills</b>	Williamnagar (MB)	4290	12004	18247	179.81	<b>52.01</b>
	Resubelpara (MB)	N.A	N.A	17660	N.A	<b>N.A</b>
<b>West Garo Hills</b>	Tura (M)	35257	45740	58978	29.73	<b>28.94</b>
<b>Ri Bhoi</b>	Nongpoh (TC)	N.A	N.A	13180	N.A	<b>N.A</b>
<b>South Garo Hills</b>	Baghmara (MB)	4183	6220	8643	48.70	<b>38.95</b>
<b>Total</b>	<b>All Towns</b>	<b>241333</b>	<b>330047</b>	<b>454111</b>	<b>36.76</b>	<b>37.59</b>

Source: *Census of India*, 1981, 1991 and 2001

Note: N.A. means not available, M means Municipality, UA means Urban Agglomeration, CB means Cantonment Board, CT means Census Town, TC means Town Committee and MB means Municipal Board.

#### **4.4.7: Age-Sex Structure of Population in Meghalaya**

Population differs greatly in the way members are distributed in the various age groups and sex categories, as the age and sex composition of population are important factors both biologically and socially (Banerjee, 1994, p. 47). The age structure of the people is legally the outcome of the regime of fertility and mortality that prevailed in the past. One of the implications of population growth is ageing. In developed countries, the proportion of the population in the older age groups is very high and increasing (because of slower fertility rate); while in the developing countries it is still lower and increasing at

a moderate rate. The rise in dependency ratio in the age structure of the population has been observed in those countries where declines in fertility and mortality occurred much earlier and at a faster rate. The spatial distribution of population of Meghalaya according to age and sex structure is given in table-4.11. It is observed that the percentage of females is higher in Meghalaya in the age group of 0-14 years than that of their male counterparts from 1971 to 2001. The higher percentage of females in the 0-14 age group indicates the rising percentage of new born females than that of males. Though the percentage of both male and female in 0-14 year's age group to total population has been declining up to 1991, it again increased in 2001. The percentage of total population in the age group 0-14 years has decreased from 43.55 per cent in 1971 to 42.43 per cent in 1981 and further to 26.40 per cent in 1991. However, it again increased to 42.30 per cent in 2001. The decline of population in the age group 0-14 years is an indication of fall in the fertility during 1971 to 1991. The proportion of female in the reproductive age group 15-49 years has increased marginally from 46.39 per cent in 1971 to 48.65 per cent in 2001 period. The percentage of 60+ of the age group in both male and female section remained more or less same throughout the whole period of discussion. Thus, the age structure from 1971 to 2001 period suggests a trend of progressive type of growth of population. There is no discrimination among the sex at the time of birth of a child and the proportion of people in the working age group has increased.

**Table-4.11**  
**Age Distribution of Population in Meghalaya by Sex, 1971 to 2001 (in Percentage)**

Age Group	1971			1981			1991			2001		
	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
0-14	43.55	42.45	44.74	42.43	41.81	43.08	26.40	25.99	26.84	42.30	42.23	42.37
15-19	9.06	8.87	9.27	10.53	10.40	10.66	9.71	9.68	9.75	10.77	10.79	10.76
20-24	8.13	7.64	8.65	8.48	7.80	9.17	8.52	7.99	9.08	8.42	8.03	8.82
25-29	8.44	7.88	9.02	8.36	7.75	8.99	8.66	8.07	9.28	7.94	7.42	8.48
30-34	6.39	6.48	6.28	6.30	6.51	6.07	6.39	6.50	6.28	6.37	6.35	6.39
35-39	6.08	6.73	5.38	6.09	6.51	5.65	6.06	6.42	5.68	6.52	6.71	6.32
40-49	8.61	9.37	7.79	8.40	9.07	7.73	8.27	8.98	7.53	8.38	8.86	7.88
50-59	5.08	5.60	4.54	4.10	5.35	4.45	4.68	5.01	4.34	4.61	4.87	4.34
60+	4.63	4.95	4.30	4.46	4.78	4.13	4.44	4.78	4.08	4.56	4.59	4.53

Source: (1) *Census of India*, 1981 Series – 14 Meghalaya, Part-III, General Economic Tables and Social and Cultural Tables.

(2) *Census of India*, 1991 Series – 16 Meghalaya, Part-III – B Series, Economic Tables.

(3) *Census of India*, 2001, Primary Census Abstract.

#### 4.4.9: Dependency Ratio of Population in Meghalaya

The impact of population growth on the age structure is better understood in terms of dependency ratio. Normally population is divided into three broad age groups, that is, dependent children (0-14 years), the economically active adult (15-59 years) and dependent old (above 60 years). A high dependency ratio leads to an increase in the demand for food for consumption, housing and shelter and many other necessary activities and also reduces the savings and investments. Whereas the increase of population in the age group of 15-59 years, may aggravate unemployment problem if sufficient opportunities are not created to match the increase. The changes in dependency ratio in Meghalaya calculated from table-4.11 have been presented in table-4.12.

**Table-4.12**  
**Percentage of Main Age Category of Population in Meghalaya**

Year	Category	Dependent Children	Active Population	Dependent Population
		0-14	15-59	60+
<b>1971</b>	Persons	43.55	51.79	<b>4.63</b>
	Males	42.45	52.57	<b>4.95</b>
	Females	44.74	50.93	<b>4.30</b>
<b>1981</b>	Persons	42.43	52.26	<b>4.46</b>
	Males	41.82	53.40	<b>4.78</b>
	Females	43.08	52.71	<b>4.13</b>
<b>1991</b>	Persons	26.40	52.29	<b>4.44</b>
	Males	25.99	52.65	<b>4.78</b>
	Females	26.84	51.94	<b>4.08</b>
<b>2001</b>	Persons	42.30	53.00	<b>4.56</b>
	Males	42.23	53.02	<b>4.59</b>
	<b>Females</b>	<b>42.37</b>	<b>52.99</b>	<b>4.53</b>

Source: *Census of India*, 1981 Series – 14 Meghalaya, Part-III, General Economic Tables and Social and Cultural Tables; *Census of India*, 1991 Series – 16 Meghalaya, Part-III – B Series, Economic Tables; *Census of India*, 2001, Primary Census Abstract.



From the table, we observe no significant change in dependency ratio in Meghalaya. Though the percentage of dependant children declined during 1971 to 1991, it again increased during 1991 to 2001.

#### **4.4.9: Changes in Birth and Death Rates of Population in Meghalaya**

It is also necessary to have a look at the birth rate and death rate while analysing the growth of population. In Meghalaya, the birth and death rates have been fluctuating throughout the years, while they have shown a downward trend at the all India level. Based on the data of the Sample Registration System issued by the Registrar General Office, the birth rate in Meghalaya stood at 18.0 per cent in 1976 and increased to 31.2 per cent in 1980, which again rose to a high level of 39.1 per cent in 1985 and eventually fall again to 32.4 per cent in 1991. The birth rate continues to decline thereafter and reached a level of 29.0 per cent in 1995. However, in 1996, it was 30.4 per cent and thereafter it declined again to 24.7 per cent in 2003. Though the birth rate ultimately showed a declining trend over the years, it was higher than that of the national average. The death rate, on the other hand, was 15.5 per cent in 1976 and declined rapidly to 8.3 per cent in 1983 and again increased to 12.7 per cent in 1985. From 1985, the death rate fell through the years and after some fluctuations it finally reached to a level of 6.8 per cent in 1993. Thereafter again the death rate in the state showed an increasing trend and reached to 9.2 per cent in 2000 and again fell to 7.4 per cent in 2003. In 2003, both birth rate and death rate in the state was lower than that of all India average. Comparing the natural growth rate of the state with that of the country, it is observed that in almost all the years the natural growth rate of the state was higher than that of the country. The natural growth rate of the state indicates a similar trend to that of the decadal growth rate

of population in the state. The rate was always above 20 per cent except a few years and natural rate of growth has been higher than the all India natural rate of growth. Comparing with the total growth of population in the state we can say that the growth of population in Meghalaya has been largely due to natural rate of growth and not migration.

**Table-4.13**  
**Birth and Death Rates in Meghalaya during 1976 to 2003 (in Percentage)**

Year	Meghalaya			All India		
	Birth Rate	Death Rate	Natural Growth Rate	Birth Rate	Death Rate	Natural Growth Rate
<b>1976</b>	33.5	15.5	18.0	34.4	15.0	<b>19.4</b>
<b>1977</b>	32.5	14.1	18.4	33.0	14.7	<b>18.3</b>
<b>1978</b>	32.0	10.2	21.8	33.3	14.2	<b>19.1</b>
<b>1979</b>	33.2	12.1	21.1	33.1	13.0	<b>20.1</b>
<b>1980</b>	31.2	11.1	20.1	33.3	12.5	<b>20.8</b>
<b>1981</b>	32.6	8.2	24.4	33.9	12.5	<b>21.4</b>
<b>1982</b>	31.1	8.9	22.2	33.8	11.9	<b>21.9</b>
<b>1983</b>	30.0	8.3	21.7	33.7	11.9	<b>21.8</b>
<b>1984</b>	38.3	11.8	26.5	33.9	12.6	<b>21.3</b>
<b>1985</b>	39.1	12.7	26.4	32.9	11.8	<b>21.1</b>
<b>1986</b>	33.4	10.1	23.3	32.6	11.1	<b>21.5</b>
<b>1987</b>	39.9	9.1	30.8	32.2	10.9	<b>21.3</b>
<b>1988</b>	36.4	9.1	27.3	31.5	10.9	<b>20.6</b>
<b>1989</b>	31.9	11.9	20.0	30.6	10.3	<b>20.3</b>
<b>1990</b>	31.8	7.8	24.0	30.2	9.7	<b>20.5</b>
<b>1991</b>	32.4	8.8	23.6	29.5	9.8	<b>19.7</b>
<b>1992</b>	29.8	8.5	21.3	29.2	10.1	<b>19.1</b>
<b>1993</b>	28.5	6.8	21.7	28.7	9.3	<b>19.4</b>
<b>1994</b>	29.5	7.1	22.4	28.7	9.3	<b>19.4</b>
<b>1995</b>	29.0	8.9	20.1	28.3	9.0	<b>19.3</b>
<b>1996</b>	30.4	8.9	21.5	27.5	9.0	<b>18.5</b>
<b>1997</b>	30.2	8.8	21.4	27.2	8.9	<b>18.3</b>
<b>1998</b>	29.2	9.0	20.2	26.5	9.0	<b>17.5</b>
<b>1999</b>	28.7	9.1	19.6	26.1	8.7	<b>17.4</b>
<b>2000</b>	28.5	9.2	19.3	25.8	8.5	<b>17.3</b>
<b>2001</b>	28.3	9.0	19.3	25.4	8.4	<b>17.0</b>
<b>2002</b>	25.8	7.7	18.1	25.0	8.1	<b>16.9</b>
<b>2003</b>	<b>24.7</b>	<b>7.4</b>	<b>17.3</b>	<b>24.8</b>	<b>8.0</b>	<b>16.8</b>

Source: *Basic Statistics of North Eastern Region, 2002; Statistical Hand Book Meghalaya, 2005*

#### **4.4.10: Spatio-Temporal Variation in Labour Force and their Composition in Meghalaya**

The spatial pattern of the distribution of working population in the state of Meghalaya is presented in table-4.14. The table shows that the majority of the total workers (Main and Marginal) in Meghalaya were cultivators (48.14 per cent), followed by those engaged in the tertiary sector (31.98 per cent). Agricultural labourers are accounted for 17.70 per cent of the total workers while the secondary sector accounted for only 2.19 per cent. The trend is observed to be similar for both male and female workers. Interestingly female cultivators accounted for the bulk of female total workers in Meghalaya (52.78 per cent). While at the all India level, the majority of female workers were the agricultural labourers, followed by the cultivators. The tertiary sector in Meghalaya is also accounted for a greater proportion of female workers than at the all India level. During last few decades, we observe a significant growth of the tertiary sector and thus a shift of workers from primary to the tertiary sector, whereas the growth of secondary sector remained at a very low level.

Rural-urban distribution of workers is also presented in table-4.14. The table shows that a large number of total rural workers were cultivators (55.99%), and 53.75 per cent among males and 58.94 per cent among females fell in this category. This was followed by the tertiary sector where 21.72 per cent (25.96 per cent for males and 16.13 per cent for females) and 2.28 per cent (1.67 per cent males and 3.08 per cent females) in the secondary sector. In the urban areas of the state, there are very few cultivators and agricultural workers, and also a smaller proportion of workers (1.69%) are engaged in secondary sector. This is also an indication of low manufacturing activities in the urban

**Table-4.14**  
**Percentage Distribution of Total Main Workers (Main & Marginal) by Activity, Meghalaya and All India, 2001**

State/Country	T/R/U	Cultivators			Agriculture Labourers			Household Industry			Others		
		P	M	F	P	M	F	P	M	F	P	M	F
Meghalaya	T	48.14	44.86	52.78	17.70	15.99	20.12	2.19	1.65	2.95	31.98	37.51	24.15
	R	55.99	53.75	58.94	20.01	18.62	21.85	2.28	1.67	3.08	21.72	25.96	16.13
	U	4.39	3.39	6.51	4.79	3.70	7.12	1.69	1.55	2.01	89.12	91.36	84.36
All India	T	31.71	31.34	32.51	26.69	20.82	39.43	4.07	3.02	6.36	37.52	44.82	21.70
	R	40.14	42.19	36.46	33.20	27.48	43.40	3.77	2.83	5.44	22.90	27.49	14.70
	U	3.21	2.99	4.26	4.71	3.42	11.03	5.10	3.50	12.93	86.98	90.09	71.78

Source: *Census of India, 2001*

Note: P=Persons, M=Males, F=Females, T=Total, R=Rural and U=Urban

**Table-4.15**  
**Rural-Urban Distribution of Main Workers in Meghalaya, 2001 (Percentage)**

T/R/U	Cultivators			Agriculture Labourers			Household Industry			Others		
	P	M	F	P	M	F	P	M	F	P	M	F
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Rural	98.61	98.66	98.56	95.88	95.91	95.84	88.23	83.42	92.02	57.59	56.98	58.93
Urban	1.39	1.34	1.45	4.12	4.09	4.16	11.77	16.58	7.98	42.41	43.02	41.67

Source: *Census of India, 2001*

Note: P=Persons, M=Males, F=Females

areas of the state. The tertiary sector, on the other hand, accounted for about 89.12 per cent (91.36 per cent of males and 84.36 per cent of females) in the urban areas. At all India level, however about 86.98 per cent (90.09 per cent of males and 71.78 per cent of females) of the total main workers are engaged in the tertiary sector in the urban areas.

When we look into the distribution of workers across rural and urban areas, the following conclusions may be drawn (table-4.15). Firstly, the largest proportion of both cultivators (98.61 per cent) and agricultural labourers (95.88 per cent) are found in rural areas. Out of industrial workers, majority are in household industry. Most of the female workers in both the household industries and in the miscellaneous activities are found in rural areas than male workers. In urban areas, the proportion of cultivators (1.39 per cent) and agricultural labourers (4.12 per cent) are very negligible. Those engaged in miscellaneous activities (42.41 per cent) and household activities (11.77 per cent) are relatively more in urban areas.

Broadly speaking, the proportion of total workers in the population is higher in the rural areas than in the urban areas. In general, the total work participation rate in the state has shown a decreasing trend from 1981 onwards. This decrease is more perceptible in the rural areas than in the urban areas where the work participation rate has almost remained at around 30 per cent. In case of male workers, there has been a slight decline in the rate over the years. The work participation rate in the state was 45.92 per cent in 1981 and declining to 41.84 per cent in 2001. The male work participation rate, on the other hand, was 48.34 per cent and that of female was 35.15 per cent in 2001 as compared to 53.96 per cent and 37.49 per cent respectively in 1981 (table-4.16). The percentage of total workers in the rural areas of the state was 48.85 per cent in 1981,

**Table-4.16**  
**Percentage Distribution of Workers in Meghalaya during 1981 to 2001**

T/R/U	Sex	Total Workers			Main Workers			Marginal Workers			Non-Workers		
		1981	1991	2001	1981	1991	2001	1981	1991	2001	1981	1991	2001
Total	Persons	45.92	42.67	41.84	43.43	40.32	32.65	2.49	2.35	9.19	54.08	57.33	58.16
	Males	53.96	50.07	48.34	53.11	49.54	41.30	0.85	0.53	7.04	46.04	49.93	51.66
	Females	37.49	34.93	35.15	33.29	30.67	23.74	4.20	4.26	11.41	62.51	65.07	64.85
Rural	Persons	48.85	45.04	44.11	45.90	42.30	33.60	2.95	2.74	10.51	51.15	54.96	55.89
	Males	55.42	51.02	49.43	54.43	50.42	41.54	0.99	0.60	7.89	44.58	48.98	50.57
	Females	42.05	38.85	38.62	37.06	33.90	25.41	4.99	4.95	13.21	57.97	61.15	61.38
Urban	Persons	32.63	32.30	32.51	32.27	31.64	28.73	0.36	0.66	3.77	67.37	67.70	67.49
	Males	47.55	46.01	42.82	47.33	45.78	40.30	0.22	0.23	3.52	52.45	53.99	56.18
	Females	16.12	17.23	20.98	15.61	16.10	16.95	0.51	1.13	4.03	83.88	82.77	79.02

Source: *Census of India* 1981, 1991 and 2001

which also declined to 44.11 per cent in 2001. Correspondingly, the male work participation declined by around 5.99 per cent (from 55.42 per cent to 49.43 per cent) and the female work participation rate also declined by 3.43 per cent (from 42.05 per cent to 38.62 per cent) during 1981 to 2001 period.

On the other hand, in the urban areas of the state, the work participation rate declined marginally from 32.63 per cent in 1981 to 32.51 per cent in 2001. In case of male workers, there was a decline in participation rate from 47.55 per cent to 42.82 per cent and for female workers there was an increase from 16.12 per cent to 20.98 per cent during the same period. Main and marginal workers have been declining during the same period. In this case also the same trend is observed for both male and female workers in rural and urban areas. In the case of non workers, there has been an increase since 1981, except in 2001 for urban non workers. On the other hand, female non workers have declined marginally from 83.88 per cent in 1981 to 79.02 per cent in 2001.

#### **4.4.12: Conclusion**

It is observed that during 1971 to 2001, there has been a tremendous growth of population in Meghalaya. The decadal growth rate of population in the state was always higher than the average national growth rate. The highest growth rate in the state has been found during the period of 1981-91 (32.86 per cent). The annual exponential growth rate was also above 2 per cent since 1971. The density also has been enormously increased from 45 persons per square kilometre in 1971 to 103 persons per square kilometre in 2001. The sex ratio also has been found to be higher than the sex ratio of the country as a whole since 1971. The proportion of female in the children age group has increased over time leading to an increase in over all sex ratio. This is in conformity with the matrilineal

society (as noted earlier) in Meghalaya. Also percentage of people in the working age group has increased over time. But there has been no significant development in industrial sector. Hence there has been a rise in pressure on primary and tertiary sector. Also work participation rate for that group has declined due to lack of rise in opportunities. However, the literary rate of the state was much lower than that of the national average. This is perhaps due to unavailability of educational facilities to most the people in the state especially those who are settled in the rural areas (more than 80 per cent). Still now most of the people are cultivators and agricultural labourer. Among the cultivators especially in rural areas, percentage of female has increased over time and also in urban other informal activities percentage of female is very high. So there has been increase in pressure on natural resources, especially mineral and forest. As mineral are mostly under private ownership (and hence not accessible to many common people) and there is open access to forest in many cases, stress on forest has increased. Also per capita forest has declined as will be shown later. These changes, to a great extent, have been hampering the development of the economy and thereby leading to an increase in the incidence of poverty, which furthered the degradation of forests in the state of Meghalaya.

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## **Chapter 5**

### **The Nature and Changes in Incidence of Poverty in Meghalaya**

#### **5.1: Introduction**

This chapter is devoted to the analysis of nature and changes in incidence of poverty in the state of Meghalaya. The state, in spite of having huge natural resources, has been suffering from acute poverty for a long period of time. Though several measures have been undertaken at the government level, still now a substantial part of population has been suffering from poverty leading to malnutrition, illiteracy, low standard of living and thus low human development. In terms of human development, the state ranked 24<sup>th</sup> at all India level and 4<sup>th</sup> among all the seven North Eastern states. However, there is a wide variation in rural and urban Human Development Index (HDI). In 1991, human development ranking of the state for urban areas was 10 and the same for rural areas was 24 among all the states of India (Planning Commission, 2002).

The economy of the state is primarily agricultural and population has been growing at the rate higher than all India average (as already mentioned in the previous chapter). Therefore, the dependence of people on agriculture has been rising (still now around three-fourth of the main workers is engaged in the primary sector) as the rate of industrial growth is very slow in the region. The primary factor of agriculture is land, which is naturally fixed and hence dependence on land has been mounting (per capita availability of land has declined from 2.2 hectares in 1971 to 0.97 hectares in 2001). Moreover, the technology adopted by the farmers of the region has not been changing very fast like that of other regions of the country. Hence productivity has

not been increasing at the desired level. From table-5.1, it is observed that annual per capita production of foodgrain in Meghalaya was 118.77 Kgs in 1972-73 and declined to 115.9 Kgs in 1980-81 that further declined to 86.0 Kgs in 1990-91 and thereafter remained almost constant. Per-capita production of foodgrain in North-East India as a whole was 156.03 Kgs in 1972-73 that decreased to 143.80 Kgs in 1980-81, which again increased to 154.77 Kgs in 1990-91 and thereafter again declined to 152.61 Kgs in 2000-01. However, in India as a whole, the per-capita production of foodgrain was 177.0 Kgs in 1972-73, which continuously increased to 189.13 Kgs and 208.2 Kgs in 1980-81 and 1990-91 respectively. Then we observe reduction in per capita production to 190.76 Kgs in 2000-01, which may be due to the saturation in application of fertiliser, irrigation and chemical inputs that leads to rise in short term productivity of soil and in the long term is very difficult to maintain unless judicious management of land use takes place (as it raises salinity, water logging problems etc.).

**Table-5.1**

**Per Capita Production, Productivity and Area under Foodgrain in Meghalaya  
vis-à-vis North-East India and India (1972-73 to 2000-01)**

State/Region	Year	Per Capita Production (Kg)	Yield (Kg/Hectare)	Area (Thousand Hectare)
Meghalaya	1972-72	118.77	1042	115.4
	1980-81	115.9	1425	124.4
	1990-91	86.0	1147.0	133.0
	2000-01	87.54	1549.6	131.0
North-East India	1972-72	156.03	989	3088.7
	1980-81	143.8	1116	3427.0
	1990-91	154.77	1315	3713.9
	2000-01	152.61	1509.1	3893.0
All India	1972-72	177.0	813	119277.4
	1980-81	189.13	1023	126666.8
	1990-91	208.22	1392	127518.1
	2000-01	190.76	1635.6	119783.0

Source: *Census of India*, 1991 and 2001; *Basic Statistics of North Eastern Region*, Various Issues.

Therefore, we observed that in North-East India as a whole, per-capita production of foodgrain changed in the similar way as happened in India as a whole

during the decade of 1980s. Thereafter it declined in both cases. But in Meghalaya we observed continuous decline except a marginal increase during 1990-91 to 2000-01. The yield has increased from 1042 Kgs per hectare in 1972-73 to 1549.6 Kgs per hectare in 2000-01 in Meghalaya i.e., an increase of 48.71 per cent. Whereas, it increased from 989 Kgs per hectare to 1509.1 Kgs per hectare during 1972-73 to 2000-01 in case of North-East India as a whole i.e., an increase of 52.59. During the same period the yield increased from 813 to 1635.6 Kgs per hectare i.e., by around 101.2 per cent in India as a whole. Therefore, though the total production of foodgrain increased in Meghalaya, increase in population and slower adoption of modern technology has caused reduction in per-capita production.

The result is that people especially the poorer are becoming more and more dependent on forest for their livelihood. The area under cultivation increased from 30 thousand hectares in 1976-77 to 193 thousand hectares in 1985-86 and then further to 207 thousand hectares in 1997-98. This increase has been largely at the cost of forest area. Per capita forest area in Meghalaya was 0.84 hectare in early 1970s which decreased to 0.53 hectare in early nineties and then further to 0.41 hectare in 1999 (Government of Meghalaya, 1980 and Ministry of Environment and Forest- *State of Forest Report*, 1999). Also the number of livestock population including Cattle, Buffaloes, Pigs, Goats, Sheep, Horses and Ponies has increased from 760.3 thousand in 1972 to 1005 thousand in 1982, which further increased to 1421.4 thousand in 1997 and in 2003, the total livestock reached to 1552 thousand. Therefore, there was a sharp increase in pressure on pasture land by over 104 per cent during 1972 to 2003. It is understood that with the rise in incidence of poverty, use of neighbouring forest resources increase and hence it leads to acceleration in degradation of the forest. Also, due to closure of some timber industries, after of Supreme Court ban on felling of

trees (1997), many people became unemployed (De, 2004). But because of poverty, illicit felling of trees have been going on; which also engaged by the corrupt machinery. Also recently, harvesting of timber is allowed at the local level for the sustenance of the people and thus many of the closed saw mills have started operating again (as mentioned in the next chapter).

Therefore, the study of nature and changes in variation of poverty is important to have an idea about it, so that appropriate policies can be adopted to remove poverty along with maintaining sizable forest area to support the socio-economic system of the state.

Literatures available on poverty show that India has the world's largest number of poor people. Of its total population of more than 1 billion, an estimated 350-400 million are below the poverty line, 75 per cent of them are in the rural areas and more than 40 per cent of the population is illiterate. India has 30 per cent of the world's births, 20 per cent of the world's maternal deaths, and 25 per cent of the world's child deaths. A child is born every 2 seconds in India. More than half of India's children are malnourished. Only 15 to 20 per cent of Indian children grow to their full potential. 40 per cent of the elderly live below the poverty line and 90 per cent of them are neither covered by any state pension nor have any family to take care of them. There are more than 126 million child labourers in India ([www.medicine.creighton.edu/projectcure/poverty/20in%india%.htm](http://www.medicine.creighton.edu/projectcure/poverty/20in%india%.htm), visited on 25/5/06).

Rapid population growth aggravates poverty in the developing countries by producing a high ratio of dependent children for each working adult. Also very low or zero population growth has been creating problems to the developed countries like Japan, Sweden, Switzerland, Netherlands, etc and even developing country like China

where dependency ratio has been rising owing to proportional increase in ageing and strict regulation on birth control. Rising shortage of working labour is the growing concern of those countries. This leads to a relatively high percentage of income being spent on immediate survival, i.e. for food, housing, and clothing, leaving little money for investment in the economy and for the development of education, government services, or infrastructure. Thus lack of available capital continues to frustrate the attempts of many developing countries to expand their economies and reduce poverty (Population Media Centre, 2003).

Devi, et al (2000) said that feeding a growing world population a diet that improves over time in quality and quantity is technologically feasible. But the economic and environmental costs incurred through bolstering food production may well prove too great for many poor countries. The course of events will depend crucially on their governments' ability to design and enforce effective policies that address the challenges posed by mounting human numbers, rising poverty and environmental degradation. Whatever be the outcome, the task ahead will be made more difficult if population growth rates cannot be reduced (Devi, et al, 2000, p. 87).

Thus, poverty is not a recent phenomenon in India. Of late theoretical and empirical explorations in development studies have focused attention on the distributional aspects of economic growth. This is sought to be understood in terms of the inter-relationship between economic growth, income inequality, poverty and welfare obtaining among the various regions and the socio-economic groups therein at national and international level. Poverty amid plenty is the tragic experience of the world. Poverty is the cruelty of life. It may be characterised as the phenomenal dearth of attaining even the basic necessities of life. It is the poverty that makes the people unhappy and destitute. It is often said that poverty and illiteracy are the two sides of

the same coin. In the present day socio-economic scenario, sometimes it is said that poverty is a symptom of structural imbalances. Moreover, low productivity, low level of living, low income; all these reinforce each other as explained in the theory of vicious circle of poverty. Population growth along with low per capita income, productivity, etc resulted in a low level equilibrium trap in the developing nations and in order to break the trap a big effort is needed simultaneously through checking population growth and sticking poverty along with technological upgradation (Leibenstein, 1957). Thus development can be viewed as a multidimensional process involving the reorganisation and reorientation of the entire economy and social system. In addition, to improve the level of income and output, it is essential to have radical changes in institution, social and administrative structure with the popular attitudes (Bhattacharjee, 1999, p. 3). A favourable socio-economic condition of the state is highly conducive to alleviate poverty to a considerable extent, although not in its entirety. It is the ultimate mission of any state to achieve economic development for growth and survival. Economic development of the state cannot be conquered unless and until the people of it are educated; poverty is removed economically as well as there is attitudinal change of the people.

## **5.2: Identifying the Poor**

Perhaps the first question to be asked in a discussion of poverty is how should we identify the poor? The chronically poor have a number of characteristics, that is, (a) they have few assets (land, human capital, access to credit); (b) a disproportionate number of the chronically poor in many developing countries are indigenous people; (c) their nutritional status and access to health services is poorer than the rest of population, (d) monotonous food habit and repetitive food intake; (e) proportionately

higher number of children in a family; (f) excessive pressure on land for generating livelihood; (g) higher propensity for migration to urban, semi-urban or cities in search of livelihood; (h) over-dependence on the primary sector; (i) poor housing conditions along with drinking water and sanitation; and (j) high mortality rates among mothers and children and (k) fear of ghosts, supernatural powers, superstition, etc. (Sikdar and Das, 2003, p. 9).

The cause of poverty may be identified by their social and economic class, people who lack physical assets or have assets of only low value – the landless workers, the small peasants who owned dry, un-irrigated, poor land, also lack in human capital, i.e., people with low educational and healthcare attainments, low paying insecure jobs without access to retaining, far from the capital city, the stage they have reached in the age cycle – young families with children or old, by the fact that they suffer from barriers to entry into jobs or capital markets, such as discrimination on grounds of race or sex, which is one aspect of social exclusion, family size and age of the head of the family – household with many children and other dependants, single parent, female-headed families, widow or by the reason of the year – poverty rising in the rainy season or by the fact that they are temporarily or chronically handicapped, to which some of the just mentioned conditions provide clues. Thus, poverty has many dimensions, some of which reinforce each other. Another dimension may be the poor natural resource condition in case of the people who are highly dependent on such resources for their sustenance. Therefore, the size and consumption of household's relative price changes, post tax incomes and social services provided free, may obscure some of these. Many of these conditions give strong hints and some may give definite information about whether poverty is likely to be permanent or temporary (Streeten, 2003, pp. 2-3).



The causes of poverty are understood differently by different people. However, there are three main such misunderstandings which are as follows:

1. **Poverty as a result of fate** – According to this understanding poverty is considered as being predetermined, as being the result of forces beyond the control of man. Poverty and poor will always be with us. It is understood as a punishment by the poor themselves. In this perspective, the remedy to poverty will be charity and relief work to alleviate the sufferings caused by poverty. While charity is needed, it does not answer the real problem. Little effort is made to identify and tackle the root cause of the problem (Pulloppillil, 2000, p. 257).
2. **Poverty as a result of backwardness** – According to this view, people are poor because the country is poor. Also due to lacking of the technology, education, etc. the country remain poor. The remedy is to modernise education, industry and agriculture, etc. Out of the modernising process, something will progressively trickle down to the poor (Pulloppillil, op cit).
3. **Poverty as a result of injustice and an unjust social order** – A third understanding of poverty considers the root cause of poverty and underdevelopment as injustice, an unjust social order. All these things hamper the growth of the people. They could be political structures, economic structures, social structures or cultural structures. The grim situation is the result of persistent growth of poverty engendered by unequal socio-economic and political forces (Pulloppillil, op cit).

### 5.3: Measurement of Poverty

Different studies on the estimation of poverty differed with respect to the poverty line employed; the price deflator use to express the base year poverty line at

current prices; the methodology employed for computing the value of the poverty index and the poverty index used.

The measurement of poverty involves two distinct parts. The first part is the specification of the poverty line, which should be the value of consumption basket considered to represent the socially accepted minimum standard of living. The measures of poverty thus depend upon how we determine the poverty line. The simplest method of determining the level of poverty is the level of income or the consumer expenditure as necessary to meet the minimum needs of the people's life. This was set up by the Planning Commission in 1962 where it was decided that the per capita monthly expenditure of Rs. 20 for the rural population and Rs. 25 for the urban population at 1960-61 prices, should be called as the national minimum or the Poverty Line (Dandekar, 1996, p. 195). Thus people having income below that level at 1960-61 prices are called poor. Further, poverty is multidimensional; income poverty is only one aspect of the deprivation of the right to essential development assets and opportunities. Education, health, nutrition, water, sanitation, unemployment, social and political participation are additional elements of the deprivation of capacity and empowerment. The minimum development goals set targets for progress in a variety of dimensions beyond income poverty.

Once the poverty level is determined; the second step is that of determining an index of poverty. Most of the studies have used the proportion of the people below the poverty line as the index of poverty. But more important is the distribution of incomes of the poor. The three measures commonly used are: the head count index (H), the poverty gap index (PG) and the squared poverty gap index (SPG). H, interpretable as the measure of the incidence of poverty, is given by the proportion of the population below the poverty line; PG, interpretable as a measure of the depth of poverty,

measures the average poverty gap as a proportion of the poverty line (where the average poverty gap is defined as the mean consumption deficit below the poverty line, counting a zero deficit for the non-poor and the mean is formed over the whole population); and SPG, the average of the square poverty gap as a proportion of the poverty line (poverty gap defined as for the PG index), is sensitive to distribution amongst the poor and can be interpreted as the measure of severity of poverty.

Similarly, different expenditure levels have been stipulated for defining the rural and urban poor because of the differences in the cost of living. The Planning Commission has fixed those at the per capita monthly expenditure levels of Rs. 49 for rural areas and Rs. 57 for urban areas (rounded to the nearest rupee) at October 1973 – June 1974 all India prices. They corresponded to a norm of per capita intake of 2400 calories per day in rural areas and 2100 calories per day in urban areas. The Planning Commission followed the ‘food-energy method’ in deriving the rural and urban poverty lines, which thus corresponded to levels of per capita total expenditure at which the calorie norms were attained in the rural and urban sectors (Datt, 1998, p. 192). The Gini-coefficient and Sen’s measure of poverty, etc. are also used by different analysts wherever is required. Normally, the distribution of income of the poor is analysed along the aforesaid three dimensions and then aggregated to arrive at poverty line.

#### **5.4: Poverty Line**

During the 1970s, development economists measured poverty within and across countries by establishing a common poverty line. The concept of absolute poverty – a minimum level of income required to satisfy basic physical needs – was created. Naturally, the minimum subsistence level varies country wise and regionally.

The Planning Commission also updates the poverty line based on the rate of inflation. During the Sixth Five Year Plan it was Rs. 3500 per annum for a family of five. It has been revised during the Seventh Five Year Plan to Rs. 6400. The poverty line was updated again in 1992 to Rs. 11000/- per annum. Expenditure replaced income as the measuring criterion during that period. For the purpose of analysing poverty and rural development in Meghalaya, an expendable sum of Rs. 274.35 /- per capita per month (Rs. 16461.00 per annum for family of five members) has been used as the poverty line to measure the incidence of poverty by Thomas (Thomas, 2004, p.160). The poverty line again revised to Rs 211.30 and Rs 274.88 respectively for rural and urban areas in 1993-94 and thereafter again to Rs 327.56 and 454.11 in 1999-2000 for rural and urban areas respectively.

However, in most cases due to political reason or loopholes in the estimation procedure, the incidence of poverty is over estimated. Many of the people whether poor or not, who live in far interior villages, earn directly from the forest, materials of daily use and those are not marketed. The values of those items form a part of their income, which are not taken into consideration in most of the studies. If we consider those, the actual poverty would be lower than the figures supplied by different sources.

A person having income below that stipulated figure is assumed to be poor. Here in our study we have considered the head count ratio to measure the extent of poverty in Meghalaya as well as in the study area, where primary survey has been done. The data have been taken from the secondary sources available from various issues of Basic Statistics of North Eastern Region and also from the Planning Commission of India. In the income of the people the values of materials collected from the forest by the people have also been taken into account. In the estimation of

poverty for those villages, we have considered Rs 327.56 per capita monthly income as the benchmark of poverty line.

### **5.5: Level of Poverty in Meghalaya**

Poverty is a malady that has been affecting a section of the people even in the rich countries. The difference is that the welfare system in those countries might be better as compared to the poor countries. In 1973-74, 50.25 per cent of the population in the state of Meghalaya was poor and living below the poverty line (table-5.2). But during 1999-2000, it has decreased significantly to 33.90 per cent. Though the poverty level in the state is lower than in some other North Eastern States, it is much higher than the national average (26.10 per cent). The rate of change of the poverty level in the state over time is much slower than the national level variation.<sup>1</sup> This indicates that the poverty alleviation programmes have not been much successful in the state of Meghalaya. The problem also remains grave because of high population growth in the state as already been mentioned. According to Human Poverty Index 1991, the state ranks 28<sup>th</sup> at all India level. In case of urban poverty, the state ranks 14<sup>th</sup>, whereas in case of rural poverty the state ranks 31<sup>st</sup> among all the states of India. It indicates that there is a wide gap in income distribution between rural and urban people. Not only that, the ranking has been lowered over time. In terms of rural, urban and combined figures, the rank in 1981 was 29, 11 and 26 respectively. This indicates that some other states are developing faster leaving Meghalaya behind or relegating the state to a lower order. The rural situation is the worst compared to all other states

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<sup>1</sup> Here one point to be noted is that the number of families surveyed for the estimation of poverty in North-East India is very less and hence most of the time Planning Commission accepts the figure obtained from Assam as the representative of all the North-Eastern states. But it is too unlikely that the incidence of poverty in Assam and other states of North-East India will be the same as there is high degree of variation in resource condition, production, productivity, industrial structure, income of the people and consumption behaviour of the people across all the North-Eastern states and hence the level of poverty.

except Bihar and therefore needs attention from the planners as well as government authority.

From table-5.2, it is noticed that in 1973-74, the number of population living below the poverty line was 50.25 per cent and in 1987-88 it was recorded at 34.60 per cent, which was less than that of all India average. The national average figures were 54.93 and 39.34 per cent in 1973-74 and 1987-88 respectively. Though population growth was faster during 1970s due to higher immigration (owing to Bangladesh War), the state had been able to reduce the poverty level in the same way as happened at all India level. Such reduction in the level of poverty in the state during 1973-74 to 1987-88 might be because of the fact that population density was very low and the increase in population accelerated the use of unutilised natural resources like land, mineral and forest. Hence income of the people had increased and there was still very low stress on such resources. Also it may be due to the successful introduction of the poverty eradication programmes and general economic development in the state. But in 1993-94, number of persons living below the poverty line again rose to 37.90 per cent. Whereas in 1999-2000, it declined to 33.90 per cent; however, it was still higher than that of all India average, which was 26.10 per cent.

**Table-5.2**

**Percentage of Person Living Below the Poverty Line in Meghalaya and India**

Year	Meghalaya	India
1973-74	50.25	54.93
1987-88	34.60	39.34
1993-94	37.90	36.00
1999-00	33.90	26.10

Source: *Planning Commission*, 2002

In the later part when most of the forest, land and other resources have been accessed and utilisation almost saturated at the available technology, it became increasingly difficult to increase income of the people. Though the percentage rate of

poverty has declined over time, it has not been satisfactory and still a large number of people were under chronic poverty. In spite of decline in percentage of people living below poverty line, in absolute sense it increased from around 508379 in 1973-74 to 786081 in 1999-2000. The reasons for this are relatively higher population growth, low level of land productivity, scarcity of capital, technological backwardness and also decline in productivity of forest and jhum land. Thus, vicious circle of poverty is still prevailing in the state.

#### **5.6.1: Rural Poor**

Agriculture constitutes the main occupation of the people of Meghalaya. Land is the basic resource of the rural people. Its ownership, size and use determine the economy of the households. Therefore, unemployment and poverty tend to vary with the size of the land holding. Hence, the marginal and the small farmers suffer a lot from poverty during the non-agricultural seasons. Economic backwardness of the rural people in the state of Meghalaya is due to the dependence on the indigenous occupations.

However, growth of population, sub-division and fragmentation of land holding, pressure of population, tough competition from machine-made goods, lack of technical knowledge of modern system of production, lack of money capital, lack of impressive industrialisation process, and influx of outsiders on the trade meant for the people of the state may be identified as the causes of poverty and unemployment in the rural areas. Land is generally owned by the community or by the private people and subject to annual shifting cultivation in many areas except in government owned forests and other small land holdings. Due to rapid growth of population and increase of pressure on land, poverty also increased in rural areas. This further has hampered

the environmental degradation of the state to a large extent.

Table-5.3 shows that 62.67 per cent of the total population in the state was living below the poverty line in 1973-74 and during 1987-88, it declined to 39.35 per cent; however, it was still higher than that of all India average. In 1993-94, population living below the poverty line in rural area again rose to 45.01 per cent and it comes down to 40.04 per cent during 1999-2000. On the other hand, population living below the poverty line in rural areas in the country was 56.44 per cent in 1973-74, which declined to 53.07 per cent in 1977-78 and further declined to 27.09 per cent in 1999-2000. Though there is a reduction in rural poverty by 36 per cent in Meghalaya during 1973-74 to 1999-2000, it is much lower than the reduction at the national level during the same period, which was around 52 per cent. This is because of relatively higher growth of population that led to the reduction in land-man ratio and hence dependence on wage-income raises their inability to find wage employment throughout the year has been increasing.

**Table-5.3**  
**Population below the Poverty Line in Rural Areas (in Percentage)**

Year	Meghalaya	All India
1973-74	62.67	56.44
1977-78	59.82	53.07
1983	42.60	45.65
1987-88	39.35	39.09
1993-94	45.01	37.27
1990-2000	40.04	27.09

Source: *Compendium of Environmental and Statistics*, 1997, 1999 and 2000; *Basic Statistics of North Eastern Region*, 2002.

### **5.6.2: Urban Poor**

Poverty is not only a rural phenomenon, it is also a major concern in the urban areas, as can be seen from the settlement pattern and the living conditions of a significant part of the urban population. It is agreed that the increase rural to urban



migration transfers rural unemployment, underemployment and poverty to urban areas. It is indicated that the majority of migrants to the cities and developing centres are generally absorbed in the social fabric of the cities. Towns and cities in the state give us a misleading picture. They are the fortress of wealth surrounded by hungry victims of poverty. The rural population generally finds extremely difficult to adjust in a new urban environment and to get reasonable means of income for their survival, as they do not have the skill to find better jobs. With their income, they cannot afford to have a better shelter and avail of social services as these are beyond their capacity. In order to survive, they have to get themselves engaged as a domestic helper, unskilled construction labour and such other occupations, which do not require any specialised skill and thus income is very poor. Slumming of towns and cities are increasing much faster leading to overcrowding, congestion, insanitation, strain on civic services and degradation of the (urban) environment. These areas are the ones, which absorb the poor who migrates from the rural areas as well as smaller towns. In the coming decade, face of poverty would become increasingly urban because of the large influx of the people. The urbanisation of poverty will accentuate the demand for shelter and other basic infrastructures. The failure to meet this demand thus would have dire political and social consequences also.

Poverty leads to the disadvantaged coming in immediate contact with waste in urban areas due to inadequacy of shelter and necessities to earn livelihood. Apart from that the urban poor also depends on surrounding forest for fuel wood and making cottages. The disadvantaged in the urban area have to deal with such waste. In this connection, it affects the health and well-being of the poor in the urban areas, who do not have any house or shelter. Thus, the poor are both agents and victims of environmental degradation in urban area. They suffer mainly by the consequences of

degradation, whether caused by their own actions or by consumption (direct and indirect) on the part of higher income groups. Moreover, the poor have no alternative when the environmental resources they depend on are degraded. The environment is an integral part and irreplaceable aspect in their life support system. Undependable food supplies, usage drinking water, polluted air, unsanitary conditions contribute significantly to reduce life expectancy and high child mortality. These conditions, in turn, contribute to population growth as the poor make fertility decision to compensate those (Gupta, 2000, pp. 76-77).

**Table-5.4**  
**Percentage of Population below the Poverty Line in Urban Areas**

Year	Meghalaya	All India
1973-74	39.92	49.01
1977-78	32.71	45.24
1983	21.73	40.79
1987-88	9.94	38.20
1993-94	7.73	32.36
1990-2000	7.47	23.62

Source: *Compendium of Environmental and Statistics*, 1997, 1999 and 2000; *Basic Statistics of North Eastern Region*, 2002.

Table-5.4 shows that during 1973-74 to 1999-2000, the percentage of population below the poverty line in the urban areas of Meghalaya has declined significantly. Here, urban poverty has declined significantly from 39.92 per cent in 1973-74 to 7.47 per cent in 1999-2000, i.e. by 81 per cent. However, the country after more than 50 years of Independence is still facing high urban poverty. The table revealed that at all India level during 1973-74, 49.01 per cent of urban population was living below the poverty line that declined to 23.62 per cent during 1999-2000, i.e. a decline of around 52 per cent. The comparatively lower rate decline in urban poverty at the national level is an indication of the shifting of rural poor to urban areas as the rate of rural-urban migration in the other parts of the country is much more (as there is

more scope for job opportunities) than in Meghalaya. Another implication is that whatever programmes has been undertaken in Meghalaya, are mostly concentrated to the urban centres because of several other problems (communication, unrest, etc).

### **5.7: District-wise Variation in Poverty in Meghalaya**

There is wide inter-district variation in incidence of poverty. At the time when targeted public distribution system was started in India (1997), the Community and Rural development department of Government of Meghalaya identified the number of rural families living below poverty line. Till 2002, the same figure was considered to identify the rural poor for the targeted public distribution. Data obtained from Community and Rural Development Department, Government of Meghalaya on the rural families living below poverty line in all the districts are presented in table-5.5.

**Table-5.5**  
**District-wise Variation in Rural Poverty in Meghalaya (1997-2002)**

District/State	Rural Family	Number of Rural BPL Family	Percentage of Rural Families BPL
Jaintia Hills	34142	15086	44.19
East Khasi Hills	76656	42284	55.16
West Khasi Hills	41320	26822	64.91
East Garo Hills	31949	10911	34.15
West Garo Hills	75500	47542	62.97
Ri Bhoi	27211	11376	41.81
South Garo Hills	14087	9941	70.57
Meghalaya	300865	163962	54.50

Source: Community and Rural Development Department, Government of Meghalaya, Shillong

The table shows that during 1997 to 2002, highest percentage of rural families living below poverty line were in South Garo Hills (70.57), followed by West Khasi Hills (64.91) and the lowest was in East Garo Hills (34.15). However, the percentage of rural BPL families in the state as a whole during 1997-2002 was 54.50. This indicates that the incidence of rural poverty according to state Community and Rural Development was higher than the percentage of population lying below the poverty

line in rural area (40.04) in 1999-2000 as estimated by Planning Commission. There is a variation in estimation of poverty level in the state during these periods, according to two different sources. Though the Planning commission figure shows that the percentage of population living below poverty line in rural areas of Meghalaya declined to around 40 per cent in 1999-2000, in 1997 more than 40 per cent of families in all the districts except East Garo Hills were under poverty and it has been chronic in the districts of South Garo Hills, West Khasi Hills and West Garo Hills (Community and Rural Development Department, Government of Meghalaya). Here, one reason might be to exert the inflated figure for obtaining more concessions and relief materials.

### **5.8: Poverty Alleviation Programmes in Meghalaya**

Poverty alleviation programmes in the state of Meghalaya has not been much successful, especially in rural areas. The persistence of poverty is a deep rooted problem in Meghalaya and the same has been accompanied by inequitable distribution of income and skewed distribution of assets across different sections of the community. Most of the minerals in the state are owned by a few private individuals. Similarly, many of the forest areas are owned by the Lyngdohs, Syiems etc like king or private individuals. Except minor forest produces, the poorer in many cases have to be at the mercy of them for harvesting materials especially commercial items from those areas. Thus, to reduce poverty, social investment is needed to expand opportunities, capacities and participation in order to bring the people out of clutches of poverty. Also to achieve the minimum developmental goals, poor people must be empowered to take steps to improve their lives and the government must assist them by ensuring the services they need in this regard. Anti poverty strategy in India

comprises of a wide range of poverty alleviation and employment generation programmes (IRDP, NREP, PMRY, SGSY etc) many of which have been in operation for several years and have been strengthened time to time to generate more employment and opportunities, create productive assets, impart technical and entrepreneurial skills and raise the income level of the poor people in the state as well as in the country as a whole.

The poverty alleviation and employment generation programmes in the state of Meghalaya, especially in rural areas had also been one of the major objectives of the Five Year Plans. Programmes like Integrated Rural Development Programme (IRDP), National Rural Employment Programme (NREP), Prime Minister's Rozgar Yojana (PMRY), Indira Awaas Yojana (IAY), Employment Assurance Scheme (EAS), Swarnajayanti Gram Swarozgar Yojana (SGSY), Sampoorna Grameen Rozgar Yojana (SGRY), National Family Benefit Scheme (NFBS), and many others have been implemented in the state of Meghalaya for eradication of poverty, nutritional insufficiency and unemployment.

**Table-5.6**

Outlay and Expenditure of Various Schemes during 1987-88 to 1988-89 (Rs in Lakhs)

Scheme	Outlay		Expenditure	
	1987-88	1988-89	1987-88	1988-89
IRDP	192.00	182.00	195.69	233.92
NREP	78.00	109.80	60.58	68.37
RLEGP	70.49	85.00	48.35	58.74
DWCRA	4.04	4.04	7.74	1.34
TRYSEM	0.00	0.00	2.01	9.94
Total	344.53	380.84	314.37	372.31
Per Head of the Poor (Rs)*	56.0	62.0	51.19	60.62

**Source:** Community and Rural Development Department, Government of Meghalaya

**Note:** For the calculation of per head of poor in Meghalaya, number of population in 1991 has been considered.

Table-5.6 shows the plan outlay and expenditure through major five mentioned programmes in Meghalaya during 1987-88 and 1988-89. During those two

years the total outlay of those five programmes was Rs 344.53 and Rs 380.84 lakh respectively. Whereas, the total expenditures were Rs 314.37 and Rs 372.31 lakh in those two respective years. However, in term of per capita expenditure for the poor people in Meghalaya the figures were only Rs 51.19 and Rs 60.62. If we consider the other programmes related to poverty eradication, it would be little more.

The programmes and amount sanctioned and disbursed in 2002-03 (through different banks) for the creation of assets, generation of employment and uplift the poorer through major three schemes are presented in table-5.7.

**Table-5.7**

Bank Finance for Rural Development in Meghalaya, (as on 31.03.2003) (Rs in Lakhs)

Scheme	Target	Sanctioned		Disbursed	
	No	No	Amount	No	Amount
PMRY	2000	1637	1418.94	1334	974.83
SGSY	0	549	128.11	493	117.01
SJSRY	620	360	144.20	347	123.45
Total	2620	2546	1619.25	2174	1215.29
Per Head of the Poor (Rs)*	--	--	215.23	--	154.66

**Source:** (i) State Level Bankers Committee Meeting

(ii) Directorate of Economics and Statistics, Government of Meghalaya.

**Note:** For the calculation of per head of poor in Meghalaya, number of population in 2001 has been considered.

The amount sanction through PMRY, SGSY and SJSRY by the banks in 2002-03 was Rs 1418.94, Rs128.11 and Rs 144.20 lakhs respectively. Therefore, in total through these major three schemes Rs 1619.25 was sanctioned. However, only 1215.29 was disbursed by the banks during that financial year. Swarna Jayanti Shahari Rozgar Yojana (SJSRY) is the centrally sponsored schemes funded on a 75:25 basis between the Centre and the States. This scheme aims towards employment generation and improvement of the physical and social environment especially of the urban poor. In terms of per capita sanctioned and disbursement, the figures in 2002-03 were Rs 215.23 and Rs 154.66. Though sanctioned amount has increased by several times (to more than 3 times) from 1988-89 to 2002-03 per capita

disbursement has not increased at the same rate (only by 2.5 times). This is mainly because of rise absolute size of poverty, although in percentage terms poverty declines. However, despite these programmes and expenses of huge money in the state (in absolute figure), poverty, unemployment or underemployment is still prevalent.

### **5.9: Conclusion**

Despite the direct poverty alleviation and employment generation programmes initiated in India viz. IRDP, NREP, RLEGP, JRY, etc. the state of Meghalaya has not been able to reduce poverty, unemployment or underemployment significantly as compared to other states of India. Still now about one-third of the population is living below the poverty line, which means that the basic minimum needs of such population has not been met. This is clear from inter-state comparison of variation in poverty level, where we find the lowering of position of Meghalaya either in human poverty index ranking or human development ranking. Though poverty has been reduced substantially in the urban areas compared to all India average; reduction in rural poverty has been very slow; which indicates the concentration of development programmes in the urban centres.

It is clear that rapid population growth has eaten up the fruits of the expected benefit and also the corruption in the bureaucracy to siphon off allocated money at the top level disallowed it to trickle down to the actual beneficiaries and hence reduced the overall economic progress and development of the state. Moreover, the amount of allocation is also not sufficient as the cost of any project is much more in Meghalaya than the plain areas. Also because of poor infrastructure and lack of monitoring, many of these programmes have not reached in time to the villagers and works have been

mostly concentrated in town and its nearby areas. Moreover, due to lack of information and ignorance the rural poorer cannot create pressure (political and social) on the authorities and loose the access to such benefits. Finally, the banks are also increasingly becoming less interested to advance through such schemes due to poor recovery experienced earlier.

Therefore, it is natural that incentives for long term management natural resources especially forest is still absent in rural Maghalaya, as people are still highly dependent on it but many of them are not the legal owner. Except a few cases, where at personal level people maintain their own forest area for their own long term interest. However, the maintenance of forest resource is essential for the sustainable livelihood of the poorer. The degraded forest resources in turn, still affecting the labour productivity of the poor and thus the productivity of the natural resources, including forest on which they act upon. Thus we find in Meghalaya a closely linked and self-perpetuating negative spiral in which poverty accelerates environmental degradation and degradation results in or exacerbates poverty.

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## **Chapter 6**

# **The Spatio-Temporal Variation of Forest Cover in Meghalaya**

### **6.1: Introduction**

Forest is one of the important renewable natural resources that have an important implication for the social, economic and cultural life of Meghalaya. Approximately 75 per cent (according to 2003 State of Forest Report) of the geographical area of the state is under forest cover. Though the percentage of area under forest cover is more than 60 as stipulated by the National Forest Policy 1988, if we look at the quality of the forest, we observe degradation at various levels. The variation has not been uniform all over the state. Whereas the maintenance of the good forest cover is essential not only for restricting soil erosion, conservation of water or containing deforestation; but also for the survival of many (especially the poorer) and the growth of the state's economy.

Forest supplies both timber and non-timber products along with its ecosystem and tourism services. The poorer in the state primarily collect food, fodder, and the litters for fuelwood, graze their cattle and also collect materials for building their cottages. Also apart from those, materials collected from the forest are exchanged in the market for acquiring other essential items for their survival. Therefore, poorer depend heavily on their surrounding forest resources for their survival. As per capita income is less, access to education, health care, etc. of those people are relatively lower and therefore tendency of population growth among them is higher that further increased pressure on surrounding forests. Therefore, many people blame poverty as one of the important reasons for the degradation of forests. Also poorer are the worst sufferer of degradation of forest as their income and livelihood depends mostly on it.

Again, once forest is degraded, its productivity decline and therefore per capita availability of the materials collected by the people decline, which leads to further increase in degradation. Therefore, incidence of poverty rises and tendency of population growth among them increase. Further, the poor people think more children as their more insurance in the old ages and they also need more human labour to collect materials from distance forests when the neighbouring forest is degraded (Goodstein, 1999). Therefore, the time devoted by the children for education also declines and health becomes more insecure. Thus, a vicious cycle type relationship between incidence of poverty and quality of the surrounding forests is observed. Also in many cases, we observe out-migration of the people from the degraded area in search of their basic needs. Therefore, poverty alleviation has been identified as one of the important remedies to environmental and forest destruction (World Bank, 1987 and 1988). Though poorer are highly dependent on their surrounding forests, especially the common forests, they are not always responsible for the degradation as in many cases they have limited access because of lack of property rights. Even in many cases, due to their indigenous knowledge and for survival they are found to judiciously manage and invest in such resources. Rather it is the non-poor who in many cases have better access to the forest resources and therefore overexploit it for their commercial activities and making huge profits (DFID and UNDP, 2000). The external social cost of their activities is imposed on the poorer; who are dependent heavily on such resources.

Three main reasons have been identified as the major causes of destruction of forests: (i) Drastic use for the collection of fuel, fodder and timber, (ii) Extension of agricultural land and also urban areas for meeting the growing needs of the rising population and (iii) Expansion of logging industries. Data available on world

deforestation rates from *mongabay.com* show that during 2000-2005, the percentage of forest cover degradation was the highest in Nigeria (55.7%) and followed by Vietnam (54.5%), Cambodia (29.4%), Sri Lanka (15.2%), Malawi (14.9%), Indonesia (12.9%), North Korea (9.3%), Nepal (9.1%), Panama (6.7%), and Guatemala (6.4%). Moreover, countries including India, Bangladesh, Bhutan, Brunei, Cambodia, Malaysia, Myanmar, etc. also have lost one per cent of its forests every year. The main causes of deforestation in these countries are the industrial logging, clearing and conversion of forest land for agricultural purposes, fuel-wood collection by the people, etc. During that period, Brazil recorded the highest area of tropical deforestation in absolute sense and that has been mainly due to the conversion of forest land to agricultural land (especially soybean cultivation) and expansion of cattle ranchers in the Amazon area. The second highest deforestation during that period has been observed in African countries and that was mainly due to the subsistence activities.

Also, property rights or ownership pattern has important connection with the pattern of degradation. If a forest is common forest, then it will be prone to overexploitation (Hardin, 1968). On the other hand, if the forest is privately owned, then it will be prone to underutilisation (Buchanan and Yoon, 2000). Moreover, if the forest is managed on a cooperative basis or through participatory management system, then it can be utilised judiciously (Hardin, 1968; Anand, 2000). For example, in many cases, Joint Forest Management or Participatory Management System has helped not only reducing the level of degradation but also improving the forest resources in many parts of India (De, 2003). Moreover, the faulty government policy in many cases leads to the destruction of the forests.

## **6.2: Forest in North East India**

In India around 76 million hectares of land is under recorded forest cover, which accounts for less than a quarter of its total geographical area. During last few decades, there has been a severe destruction and degradation of forests. Estimates show that only during the decade of nineties (1989 to 1999) half of the recorded forest area in the country (38 million hectares) has been degraded. The North East India is not an exception in this regard. Forest in North East India, which accounts for more than a quarter (around 26 per cent) of India's total forest cover, is also subjected to rampant exploitation. It has great importance not only for its market value and other uses but also because of the existence of rich biodiversity. For its great biological diversity the region has been identified as one of the eighteen hotspots in the world.

Management of Indian forest is mainly guided by the Indian Forest Act, 1927, Forest Conservation Act, 1980 and Forest Policy of 1952 and 1988 as well as some other forest management rules and promulgated at the state (e. g., Assam Forest Regulation 1891 that follows the forest rules of other North Eastern states) or local level (e. g., Garo Hills District Forest Act of 1958, Mikir Hills District Forest Act of 1957 etc.) from time to time (Thomas et al 1993). According to the Indian Forest Act, 1927 there are following three major distinctions of forests.

### **Reserved Forest**

The forest areas in the country that have been reserved by the government as reserved forest for its extensive use, where all rights and privileges of the local communities are not permissible unless it is recorded at the time when the process of reservation had taken place. The most important and valuable timber and biodiversity rich forests are kept in this category. An estimated fifty per cent of India's forests belong to this category.

### **Protected Forest**

Those forest areas, which have not been explicitly reserved by the state and local rights and privileges, are admissible unless explicitly stated otherwise. During the colonial period many protected forests were converted into reserved forest category and currently protected forests are generally restricted to the comparatively more degraded remnants of many older forest patches and now cover around one-fifth (20 per cent) of India's forest area.

### **Unclassified State Forest**

Unclassified forests are those forests that are not yet brought under the classification of aforesaid two categories. It might be due to the fact that these forests were too inaccessible or too degraded and having very little timber value. While these areas are supposedly owned by the state and in reality these are mostly, controlled by local communities. This category of forest covers the smallest area at the all India level. However, it covers a substantial area in the north eastern region of India. In fact, excluding Assam, in all the North-Eastern states area belonging to this category of forest varies from 35 per cent to over 50 per cent (De, 2003).

Another important category of forest is there, called village forest (under Indian Forest Act, 1927, section 28) but was not given much emphasis. However, it covers a large part of forest area in North-East India, where ownership lies mainly with the community. The harvesting and maintenance are controlled by the local communities.

According to National Forest Policy 1988, 33 per cent of total area of the country should be under considerable forest cover for the maintenance of a better ecological balance. Whereas, only less than a quarter of the country's land is under forest department, 19 per cent of land area has forest cover, of which, only one-eighth

(around 12.5 per cent) has dense forest (of crown cover more than 40 per cent by definition). According to that policy the hilly districts should have more than 60 per cent of good forest cover for restricting soil erosion, water conservation and containing deforestation. So far the North-Eastern states are concerned; the standard norm is maintained in many cases, at least on record. But if the exact tree cover and the rate of deforestation of the last few years are considered then it is not very difficult to understand, what the situation would be, unless serious attempts are made to contain the rampant exploitation.

The percentage of geographical area under forest has decreased in almost all the North Eastern states except Mizoram and Tripura, though the figures are still higher than the national average. Whereas the percentage of forest cover under dense forest has increased in all North Eastern states except Mizoram during last few years. However, in case of area under open forest (where area with less than 10 per cent crown density is considered), we observe considerable degradation of forest land during the same period in all North Eastern states except Assam and Mizoram (De, 2003, pp. 175-178).

In Meghalaya, approximately 1.48 per cent of Net State Domestic Product was contributed by forestry and logging activities in 1993-94 and it increased to 2.02 per cent in 1996-97, after which it declined to 1.82 per cent in 1999-2000 (Government of Meghalaya: *Meghalaya District Gross Domestic Product 1993-93 to 1999-2000*). Because of ban since 1997 these activities has not increased in the same way as happened to Net State Domestic Product. But in absolute figure the earning from forestry and logging has increased from Rs. 1931 lakhs to 3051 lakhs during 1993-94 to 1999-2000. Not only that, the cultural life of the inhabitants of the state is also highly influence by the forest. Finally, the tourism activities of the state are also to a



certain extent based on forest resources. This chapter, is thus, devoted to explain the spatio-temporal variation of forest cover in Meghalaya.

The awareness of the importance of forests to the environment is changing the management of forest around the world. Over the past two decades, forests have emerged as a major consideration in global discussion on Sustainable Development. Since the United Nation's Earth Summit held in Rio de Janeiro, Brazil, in 1992, remarkable progress has been made in advancing the worldwide consensus on addressing forest issues. Owing to the tremendous increase in the human and livestock population in many parts of the globe, rapid industrial development and fast urban growth, the forest ecosystems in underdeveloped, developing, as well as in the developed regions of the world have come under increased biotic stress during the last few decades. Besides, road construction, mining and quarrying and extension of cultivation have contributed significantly to the degradation of forests in many regions, particularly in developing and underdeveloped countries of the world (Tiwari, 2002, p. 34). With the growth of population, the forest resources are also diverted to other uses. Over-consumption of forest resources in many cases has led to environmental problems as well as loss of critical habitats and species. The increase of exploitation of forest resources by the growing population in many areas exceeds supply and this, in turn, enhances the rate of deforestation, de-regeneration and even desertification of these resources. Maiti et al (2002, p. 2) had pointed out that development, *par se*, in an environmentally sensitive area was pushed on without proper attention to the future. The rich stock of natural forest in the North Eastern Region traditionally contributed to the maintenance of atmospheric balance of the whole country and this was congenial to the livelihood of the native population. The unplanned and unrestricted flow of population from different states of India as well as

from the neighbouring countries told upon the health of the region as such exodus involved destruction of the natural resources, especially forest. The cultivation practices especially jhum, gathering of forest resources and survival friendly preservation of biodiversity was heavily disturbed.

### 6.3: Changes in Forest Cover of the Region

Data on total forest cover are not available for the periods of 1970s and 1980s. Whatever data are available from the Ministry of Forests and Environment and State of Forest Report during those years are of recorded forest cover and hence not comparable with the figures of total forest cover available for the period of 1990s. Hence here the changes of total forest cover during 1991 to 1999 are considered. The changes in forest cover in North East India have been displayed in table-6.1. The table shows that there has been a continuous decline of area under forest cover in North Eastern Region as a whole during 1991 to 1999. However, the variation is not uniform across all the states of the region. It has declined in all the states of the region except Arunachal Pradesh and Tripura. Though the area under forest cover has increased in Arunachal Pradesh and Tripura, the rate of decline in other states together is much more and hence there is an overall decline in the region.

**Table-6.1**  
**Forest Cover in North Eastern Region during 1991-1999**

State	Forest Cover (in Sq. Km)				
	1991	1993	1995	1997	1999
<b>Arunachal Pradesh</b>	68757	68661	68621	68602	68847
<b>Assam</b>	24751	24508	24061	23824	23688
<b>Manipur</b>	17685	17621	17558	17418	17384
<b>Meghalaya</b>	15875	15769	15714	15657	15633
<b>Mizoram</b>	18853	18697	18576	18775	18338
<b>Nagaland</b>	14321	14348	14291	14221	14164
<b>Tripura</b>	5535	5538	5538	5546	5745
<b>Total</b>	165777	165142	164359	164043	163799

Source: Forest Survey of India, 1997 and 1999; Basic Statistics of North Eastern Region, 2002

The changes of forest cover in the entire region are shown in the table-6.2. Table-6.2 shows that during 1991 to 1999, Tripura and Arunachal Pradesh were the only states in the region showing a gain of 210 and 90 square kilometres in forest cover (this had happened may be due to the operation of the Joint Forest Management and afforestation programmes), whereas all the other states registered decrease in forest cover. The highest loss of forest cover was recorded in Assam to the tune of 1063 square kilometres, whereas in Meghalaya the loss of forest cover was 242 square kilometres. During the period of only eight years (1991-99), the loss of forest cover for the entire region was 1978 square kilometres. In Meghalaya, during 1991-93 the loss in forest cover was very fast (106 Sq. Km) and it gradually declined to 24 Sq. Km. in 1997-99. So there is a loss in forest cover of over 1.5 per cent during 1991 to 1999. However, in terms of crown density about 40 per cent of the forest cover is degraded as per the *State of Forest Report, 2003*. The density of forests is decreasing and the situation is getting worse with further degradation of degraded forests.

**Table-6.2**  
**Changes in Forest Cover in North Eastern Region during 1991-1999**

State	Changes of Forest Cover (in Sq. Km)				
	1991-93	1993-95	1995-97	1997-99	1991-99
<b>Arunachal Pradesh</b>	-96	-40	-19	+245	+90
<b>Assam</b>	-243	-447	-237	-136	-1063
<b>Manipur</b>	-64	-63	-140	-34	-301
<b>Meghalaya</b>	-106	-55	-57	-24	-242
<b>Mizoram</b>	-156	-121	+199	-437	-515
<b>Nagaland</b>	+27	-57	-70	-57	-157
<b>Tripura</b>	+3	Nil	+8	+199	+210
<b>Total</b>	-635	-783	-316	-244	-1978

Source: *Forest Survey of India, 1997 and 1999; Basic Statistics of North Eastern Region, 2002*

Actually, demand for fuel-wood, timber and industrial uses (including paper, plywood, railways sleepers, building, and furniture) have been growing faster than its supply due to population growth in spite of substitution of timber by concretes in the building construction, fuel-wood by LPG etc. However, the rate of degradation has

been declining over time especially after Supreme Court ban on felling of tress, as it is evident from the table. But still now the degradation is continued in the state.

**Table-6.3**  
**Per-Capita Forest Area in North-East India (Hectare)**

State	1991	1999	Percentage Change
Arunachal Pradesh	7.95	6.276	-21.05
Assam	0.11	0.088	-20.0
Manipur	0.963	0.802	-16.7
Meghalaya	0.894	0.674	-24.6
Mizoram	2.732	2.065	-24.4
Nagaland	1.184	0.712	-39.87
Tripura	0.201	0.180	-10.45
Total of NER	0.525	0.427	-18.67

Sources: Ministry of Forest and environment and Census Reports

Note: (i) For the calculation of per capita figure of 1999, population of 2001 is considered.

(ii) NER means North-Eastern Region of India.

From table-6.3 we observed that per capita forest area has declined significantly in all the North-Eastern states during 1991 to 1999. The decline was the highest in Nagaland, where population growth rate was also the highest in the region. The decline was the lowest in Tripura, which recorded the population growth during 1991-2001 among all the North-East Indian states. The decline in Meghalaya was the second highest among all the North-Eastern states during 1991 to 1999.

#### **6.4: Forest Cover in Meghalaya**

Data available from the *Ministry of Environment and Forest* show that the area under forest cover in Meghalaya was about 15633 square kilometres in 1999. The figure in 1991 was around 15875 square kilometres. Therefore, during the decade of 1990 there has been considerable decline in the area under forest cover in Meghalaya. The decline of forest cover in the state has been noticed on that part of the forest area, which has been repeatedly under shifting cultivation, extension of mining, extension of road construction, rising of urbanisation, etc. For meeting the growing need of rising population the fallow period of shifting cultivation has declined drastically

from 17-20 years to 2-3 years (De, 2003). The ultimate result is decline in productivity of soil that further deepens the pressure on forest. The grasslands are being degraded because of overgrazing of livestock population in some parts of the state and also led to these environmental consequences. The change of forest cover in Meghalaya was shown in table-6.4.

**Table-6.4**  
**Changes of the Forest Cover in Meghalaya (in sq. km)**

<b>Year</b>	<b>Total Forest Cover</b>	<b>Changes of Forest Cover</b>
<b>1991</b>	15875	-
<b>1993</b>	15769	-106
<b>1995</b>	15714	-55
<b>1997</b>	15657	-57
<b>1999</b>	15633	-24

Sources: (i) *Compendium of Environment and Statistics, 1998*;  
(ii) *Basic Statistics of North Eastern Region, 2002*;  
(iii) Ministry of Environment and Forest (1999), *Forestry Statistics India 1996*

The increase in population pressure on land reduces the area under forest cover in the state though not significantly in terms of physical area but significantly in terms of quality. On the other hand, the demand for forest products and services by the growing population has been increasing. The demand for fuel-wood, timber and industrial uses (including paper, plywood, railways sleepers, building, and furniture) have been growing faster than its supply. However, the rate of degradation has been declining over time especially after Supreme Court ban of felling of tress, as it is evident from the table. But still now the degradation is continued in the state.

#### **6.4.1: Classification of Forests in Meghalaya**

According to the species character, forests in the state of Meghalaya can be broadly classified into four categories.

1. The Sal Forests of the Northern belt of the Khasi Hills and the border area of the

- Garo Hills near the Brahmaputra valley;
2. The Evergreen and Semi-Evergreen Forests in the Southern belt extending up to the border of Bangladesh;
  3. The Pine Forests in the Central Plateau of the Khasi and Jaiñtia Hills, and
  4. The Bamboo Forests growing amidst Sal Forests, Evergreen Forests and Semi-Evergreen Forests.

Also the forests in Meghalaya can be categorised as recorded forest and actual forest cover. The classification is given in table 6.5.

**Table-6.5**  
**Geographical Area, Recorded and Actual Forest Cover of Meghalaya and India (Sq. km. in 1999)**

State/Country	Total Geographical Area	Recorded Forest		Forest Cover	
		Area	Percentage of total Area	Area	Percentage of total Area
Meghalaya	22429	9496.4	42.34	15633	69.69
All India	3287263	7652310	23.28	633397	19.27

Source: *Basic Statistics of North Eastern Region, 2002*

From table-6.5, it is observed that the recorded forest area of the state was around 9496 square kilometres in 1999, which was 42.34 per cent of its total geographical area. Whereas total area under forest in the same year was 15633 square kilometres and the percentage of area under recorded forest area in Meghalaya was much higher than that of all India average, which was only 23.28 per cent. The percentage of area under total forest cover in Meghalaya (69.69) was much higher than that of all India average (19.27 per cent) in 1999. So, the recommended norm of 60 per cent of area under forest cover was fulfilled in this hilly state. Though the state has some good forest cover having crown density more than 60 per cent, about 40 per cent of the forest cover is degraded. As per the record there has been a decrease in the forest cover of 242 square kilometres in the state during 1991 to 1999. The density of

forests has also been decreasing and the situation is getting worse with further degradation of degraded forests.

The classification of forests in the state of Meghalaya can also be made under the categories of (1) Reserved Forests (2) Protected Forests (3) Unclassed Forests (4) Clan/Community Forests and (5) Private Forests, etc. The recorded forests, on the other hand, include (i) Reserved Forests (ii) Protected Forests and (iii) Un-classed Forests as shown in table-6.6. Out of 9496.4 Sq. Km. recorded forest in Meghalaya, only 993 Sq. Km. is owned and managed by the State Government as Reserved Forest, which accounts for only 4.43 per cent of the total geographical area. All Un-classed forests accounting for about 31.86 per cent is under the direct control of the District Council. Private forests (1.71%) are owned by individual persons, Syiem, Lyngdoh, Sirdar of Khasi and Jaintia Hills and by Nokmas of Garo Hills.

**Table-6.6:**  
**Classification of Recorded Forest Cover in Meghalaya, 1993**

Forest By Class	Total Area (in Sq. Km)	Percentage to the total forest area	Percentage to the total geographical area
Reserved Forest including Govt. forest, National Parks & Sanctuaries	993.0	10.46	4.43
Private Forest	384.0	4.04	1.71
Protected Forest	179.0	1.88	0.80
Village Forest	25.9	0.28	0.12
Community Forest	768.0	8.09	3.42
Un-classed Forest	7146.5	75.25	31.86
Total Forest	9496.4	100.00	42.34

Source: Chief Conservator of Forest, Government of Meghalaya.

Again, the recorded forests in the state of Meghalaya have been subdivided into reserved, protected and un-classed forests. In 1972, the total recorded forest area was 809 Sq. Km. (3.60 per cent) and increased to 8427 Sq. Km. (37.57 per cent) in 1980 (table-6.7). Also in 1984, the total recorded forest was 8510 Sq. Km. (37.94 per cent) and rose to 9496.4 Sq. Km. (42.34 per cent) in 1999. Recorded forest in the state

during the period from 1972 to 1999 shows an increasing trend. However, forest cover in the state as a whole has declined. The distribution recorded forest is in table-6.7. The table shows that there has been a very slow increase in area under reserve forest as compared to recorded forest in Meghalaya. Also, area under protected forest has declined over time. Recorded unclassified forest area has increased significantly, which is the major portion of recorded forest in Meghalaya. The unclassified forest mostly owned by the communities, individuals and maintained by either District Council, communities, individual etc. However, in most cases the local inhabitants have almost common access to such forest or in some cases they have to take permission of local authorities for harvesting such forests.

**Table-6.7**

**Distribution of the Recorded Forest Area in Meghalaya (in Sq. Km.)**

State	Reserved	Protected	Un-classified	Total	Percentage of Total Geographical Area
1972	706	103	0	809	3.60
1980	706	12	7709	8427	37.57
1984	706	12	7792	8510	37.94
1999	981	12	8503	9496	42.34

Source: (i) *Basic Statistics of North Eastern Region*, 1980, 1990 and 2000  
(ii) Forest Survey of India (State of Forest Report, – 1999), Dehradun

**6.4.2: District-wise Forest Cover in Meghalaya**

**Table-6.8**

**District-wise Forest Area of Meghalaya**

District	Geographical Area (Sq. Km)	Total Forest Area (Sq. Km)	Percentage of Forest Area to District Geographical Area	Percentage of District Forest Area to Total State Forest Area
Jaiñtia Hills	3819	909.70	23.82	11.02
East Khasi Hills	2818	326.60	11.58	3.96
West Khasi Hills	5247	2039.24	38.86	24.71
East Garo Hills	2603	2369.86	91.04	28.71
West Garo Hills	3699	790.96	21.38	9.58
Ri Bhoi	2378	825.19	34.70	9.99
South Garo Hills	1865	992.06	53.19	12.02
Meghalaya	22429	8253.61	36.80	100.00

Source: NRSSC, 1993



District-wise figure of forest area as obtained from the National Remote Sensing Agency is presented in table-6.8. The table shows that percentage of area under forest cover is the highest in East Garo Hills and the lowest in East Khasi Hills. Here, however, the figure of total forest cover does not tally with the figure obtained from Forest Survey of India Report (NRSSC, 1993).

Table-6.9 also shows the satellite imagery figures of degraded forest and under jhum re-growth across the districts of Meghalaya. It shows that the percentage of degraded forest at that time was the most in East Garo Hills and lowest in West Khasi Hills.

**Table-6.9**  
**Degraded Forest/Jhum Re-growth Land of Meghalaya**

District	Degraded/Jhum Re-growth Land (Sq. Km)	Percentage to Total Geographical Area
Jaiñtia Hills	315.20	8.25
East Khasi Hills	138.32	5.65
West Khasi Hills	299.95	8.36
East Garo Hills	222.73	4.24
West Garo Hills	241.04	9.26
Ri Bhoi	220.23	5.92
South Garo Hills	91.15	4.92
Meghalaya	1528.62	6.81

Source: NRSSC, 1993

**Table-6.10**  
**District-wise Wasteland Areas of Meghalaya**

District	Wasteland (Sq. Km)	Percentage to Total Geographical Area
Jaiñtia Hills	1173.35	30.72
East Khasi Hills	596.64	21.71
West Khasi Hills	812.81	15.49
East Garo Hills	307.27	11.80
West Garo Hills	269.33	7.25
Ri Bhoi	276.25	11.28
South Garo Hills	201.90	10.91
Meghalaya	3637.58	16.21

Sources: (i) Based on Satellite Imagery of NRSSC (1993) estimated.

(ii) Sarma, S. (2003), *Meghalaya, The Land and Forest*, P. 176, Geophil Publishing House, Guwahati.

Table-6.10 shows the wasteland in Meghalaya as estimated by NRSSC (1993). The largest proportion of wasteland (30.72 per cent) has been indicated in the Jaiñtia Hills district. Rat-hole mining of coal and other minerals followed by jhum cultivation is considered as chief factor for its wasteland. The area under forest cover also has been affected due to erosion and also the loss of top soil has increased to a great extent. However, West Garo Hills has the least wasteland with 7.25 per cent only.

### **6.5: Ownership Pattern and Management Administration of Forests in Meghalaya**

The idea of regulation of rights and restriction of privileges of the user in the forest by the neighbouring population was introduced as a measure for preservation of forests. Therefore, the national forest policy envisaged, subject to the preservation of natural forests on the hill slopes and commercially vulnerable timber, even clearing of forests for cultivation wherever such a need arose. The rapid increase of population gave a new look to the forest resource base for the industrial sector. The forest policy, therefore, was revised in 1952. This policy took note of the need for checking denudation, establishing free lands, providing facilities for the industrial use and maximum revenue consistent with its primary goal. Although Meghalaya possesses rich forest resources, the pattern of ownership of forest stands in the way of setting up of forest based industries. However, there is a scope for setting up of small industries such as saw-mills, furniture and others. In recent past, cutting down of trees for timber, charcoal and clearing forests for old-age practice of shifting cultivation has left the state almost with bare hills. Efforts should be made to plug this vacuum by taking up afforestation and social forestry programmes in the state on a wide range. In 1982, the new concept of social forestry in the country came into to promote the economy through forestry sector. Since then the Government of Meghalaya started

afforestation work in all categories of degraded and barren lands irrespective of ownership of the land.

Earlier it has been shown that only a fraction of recorded forest in Meghalaya is under the control of the State Forest Department. The major portion of areas is under the direct or indirect control of Khasi, Jaintia and Garo Hills District Councils. The reserved forests are supposed to be managed under prescription of the working plans prepared by the State Forest Department and the protected forests are mainly managed for preservation of the catchments areas of water sources.

There are three kinds of forests under the jurisdiction of the District Councils: (i) Unclassed State Forests which are under the direct control of District Councils, (ii) Clans/Community Forests and (iii) Private Forests. The control of District Council on second and third category of forests is limited only to collection of royalty on timber exported by the owner outside their own area of trade. The Autonomous District Councils in Meghalaya are constitutional creation of the Sixth Schedule of the Constitution of India. One such provision, Para (3b) of the Sixth Schedule provides for the Autonomous District Councils to enact laws for control and management of forests in the state. The land tenure system is customary and it differs from one District Council to another depending upon the customs of the Tribal Community inhabiting the areas (Tiwari et al, 1999, pp. 10-11).

**Forest Ownership in Garo Hills:** In Garo Hills, land can be grouped into three categories – The Government land like the Reserved Forest and National Parks, the erstwhile Zamindari estate known as B-Mahal and Akhing land of the Nokmas. The B-Mahal areas are directly administered by the District Council while the Akhing land is in the hands of the respective Nokmas or clan chiefs who look after the land under mutual understanding with the District Council.

**Forest Ownership in Khasi and Jaiñtia Hills:** In the Khasi and Jaiñtia Hills the ownership of the forests and their management is still continued in traditional pattern. A detailed classification of the forest lands ownership of Khasi and Jaiñtia Hills are described as below:

**Private Forests (Law Ri Kynti)** - These forests belong to a clan or joint clans and are grown or inherited on recognised private lands.

**Forests Cared For (Law Ri Sumar)** - These forests belong to an individual clan or joint clans and are inherited on village or common raid land. In the event of joint ownership of the land, that is, land owned by two or three clans, the conditions vary according to the ownership of the land. The Government of Meghalaya extends help in imposing a similar condition for improvement of forest land. For this, the Government is growing trees under an agreement and maintains it and also has to part with a portion of the produce of these forests, which are used for commercial purposes where District Council gets a substantial royalty from them.

**Sacred Groves (Law Kyntang, Law Lyngdoh, Law Niam)** – These forests are set aside for religious purposes and are managed by the Lyngdoh (a religious head), or other person to whom the religious ceremonies for the particular locality are entrusted. The ever well managed forests are believed to be inherited by the deities of the Khasis and Jaiñtias. These forests are of two types; (a) Those belonging to individual families and (b) Those belonging to a village or group of villages. In the religious beliefs, this is the most scientific way to maintain ecological balance, ensure water supply, stop soil erosion and provide pollution free air to nearby villagers. In other words, these sacred groves are considered to be granary of forest resources of Meghalaya. It is estimated that about 105.11 square kilometres of land is under sacred groves.

**Restricted Forests (Law Adong)** – These are village forests reserved by the villagers themselves for conserving water sources etc. for the use of villagers. The villagers set aside these forests for certain specific purposes. These purposes are (i) firewood for cremation, (ii) timber for public construction like school building, club, meeting hall, (iii) reconstruction or repair work of individual families affected by natural calamities such as earthquake, heavy rain and storm, landslide, fire accidents, etc. These forests are managed by Sirdar or Headman with the help of village Durbar.

**Protected Forests** - These are areas/forests declared protected by the District Council for the growth of trees for the benefit of local inhabitants under the District Council Act, 1958.

**Village Forests (Law Shnong)** – These forests are reared, maintained and managed by the village as a whole and thereby used by all the members of the village concerned. Each family has a right to draw upon such forests as and when needed. Now a day, with the increase of population, these forests have become scarce and each family is now required to get an allotment from the Village Durbar.

**Clan Forests (Law Kur)** – These categories of forests belong to one or joints clans. If any family do not contribute the expenses incurred in the maintenance of the forest or do not share the expenses of litigation, they will have no claim to the forest share. These kinds of forests are available in the West Khasi Hills district.

**Community Forests (Law Raid)** – These forests are customarily owned by the Syiemship or the Sirdarship or the Durbar Hima and they look after these forests. The produce of these forests go to the owner, that is, the Syiem or Sirdar or the Durbar Hima.

**Unclassed Forests** - These forests known as un-classed state forests before the adoption of the constitution of India, are directly controlled and managed by the

government and included any other forest not falling under any of the above categories.

As mentioned earlier, the patches of Sacred Forests either belong to clan/community or individuals or are under the direct control of the clan councils or local village Durbars/Syiemships/Daloiships/Nokmaships. They represent the unique forest ecosystem of the region and are very rich in flora and fauna, testifying the efficacy of traditional forest management systems in the state. No timber or forest produce from Law Lyngdoh, Law Kyntang and Law Niam shall be removed for sale, trade or business. But if any timber or forest produce is required for religious purposes, a free permit for the purpose shall be obtained from the Chief Forest Officer or any Forest Officer authorised by the executive committee on his behalf, with the recommendation of the Lyngdoh through local administrative heads. The Chief Forest Officer or the Authorised Forest Officer of the District Council shall grant a free permit in the prescribed form specifying therein the quantity of timber or other forest produce, provided that no tree shall be felled unless they have been marked by an officer of the District Council. No tree shall be felled or removed from the sacred groves except for purposes in connection with religious functions or ceremonies recognised and sanctioned by the Lyngdoh or the authorized persons (Tiwari et al, 1999, pp. 12-14; Thomas et al, pp. 13-16).

#### **6.6: Joint Forest Management (JFM) in the Context of Forestry in Meghalaya**

The forest lands in India are administered by the state governments. Though the government or district council has monopoly over the majority of forest land, which is also a source of revenue for the government, millions of people are dependent on forests for their livelihood and a number of industrial houses also

depend on forests to create wealth and thus claim their respective stakes on forest produce and forest lands.

In view of the conflicting claims on a single resource and continuous degradation of forest resource over a period of 100 years, many changes in policies took place. The policy shift in 1988 forest policy compared to the earlier forest policies was in favour of the rural community living in the vicinity of forest. The policy actors working for the support of the reforms in forest public domain were eventually able to crack the monopolistic control of the forest department on the land. The forest policy 1988 fully protects the right of the people especially the poorer and tribal who live in and around forests. Their domestic requirements of fuel-wood, fodder, minor forest produce and construction timber should be first charge on forest produce. The concept of people's participation, and the phenomenon of large foreign funding to support forestry projects were already in vogue ever since the time of the introduction of Social Forestry (Suneja, 2002, pp.56-59). JFM in this regard is an alternative option where local inhabitants are involved by the Forest Department to utilise their indigenous knowledge and providing them incentives in the form of minor forest produces and share of final timber product as well as short term opportunities so as to protect or regenerate the degraded forest. Here, Non Government Organisations play the role of intermediaries to encourage the local inhabitants and make them aware of ill effects of deforestation, assuring benefits of protecting forest as well as settling the disputes if any between the beneficiaries and the Forest Department. The projects in many cases already started yielding better results (as happened in Tripura, West Bengal) (Mukherjee, 1995). However the ultimate result depends on the strength of understanding among the beneficiaries, cooperative attitudes of all sides and absence of corrupt practices. Because of homogeneity of

social groups or people in different clans there is much scope for success of JFM or community and farm forestry in Meghalaya. However the state is yet to show any remarkable progress in this respect.

### **6.8: Conclusion**

The degradation of forest cover in the entire North-Eastern Region during the period of 1990s was at an alarming rate and that was highly associated with the inter-state variation. The degradation has been more in the open and unclassified forest areas. Within Meghalaya the rate of degradation is very high in the district of East Khasi Hills. Here the degradation is primarily because of the rapid growth of population coupled with the high incidence of poverty especially in rural areas. The results already shows how the per capita forest cover changed over time and it is found that the state having higher rate of population growth observed larger reduction in per capita forest cover and vice versa. In spite of low population density in the region, the forest cover in North East India has shown consistently decreasing trend during 1991 to 2001, whereas even in comparatively more densely populated states like West Bengal and Haryana, forest cover has increased over the years because of awareness among the people and also of successful campaign. Moreover, the economic activities are mostly based on the forest resources as there are very limited industrial activities in the region. Though due to Supreme Court ban (1997) on the felling of trees some of sawmills have been closed, still illegal felling has been continued for the survival of the people and the continued logging business activities that are also supported by the corrupted bureaucrats. Recently, the local authorities are also allowing extraction of forest on a limited scale in order to tackle the problem of rising unemployment and sustenance of the people and hence many of the close



sawmills have started operating again. In total, there has been an increase in forest based small-scale industries from 131 in 1986-87 to 943 in 2004-05 (Directorate of Economics and Statistics, Government of Meghalaya). Reddy et al (2001) also identified jhum practice as one of the reasons for decline in forest area. C. C. H. Rao (1994) also identified rapid population growth especially after the formation of Bangladesh as another reason for the degradation of forest in the region.

With the rise in population the requirement of land for cultivation has increased for meeting the rising needs of the growing people. The area under cultivation has increased from 30 thousand hectares in 1976-77 to 193 thousand hectares in 1985-86 and ten further to 207 thousand hectares in 1997-98. This increase has been largely at the cost of forest area. Per capita forest area in Meghalaya was 0.84 hectare in early 1970s, which decreased to 0.53 hectare in early nineties and then further to 0.41 in 1999 (Government of Meghalaya, 1980 and Ministry of Environment and Forest- *State of Forest Report*, 1999). Percentage of main workers engaged in forestry, logging, fishing, plantation, orchards etc. increased from 2.66 in 1971 to around 6.4 in 1991. Also the number of livestock population including Cattle, Buffaloes, Pigs, Goats, Sheep, Horses and Ponies has increased from 760.3 thousand in 1972 to 1005 thousand in 1982, which further increased to 1421.4 thousand in 1997. Therefore without considering the composition of livestock one can safely argue that there was an increase in pressure on pastureland by almost 86.95 per cent during 1972 to 1997.

The forest resources in Meghalaya thus have been threatened due to overgrazing, commercial household needs, encroachment, unsustainable practices like unscientific cultivation (shifting cultivation and burn cultivation) and development activities. Excessive fuel-wood removal, indiscriminate felling of trees for timber

needs inadequate natural regeneration have also threatened to the rich biological diversity and widest variety of biomass (Sarma, et al, 2002, p. 88). Talking of JFM in the North East, although there are a few encouraging success stories, notably from Tripura, its implementation in the region, by and large, has been very slow. While Tripura has initiated JFM soon after the circular of Government of India of 1990, the states of Arunachal Pradesh, Assam, Mizoram and Nagaland have notified the enabling resolution, while Manipur and Meghalaya are yet to make any mark on this aspect.

Finally, on consideration of the level of economic development and complex social and political linkages, the state of Meghalaya is faced with immense and consequential environmental problems. Its prevention has become more of its necessity and a compulsion than a mere initiative. The linkages among different factors and their impact on the changes in forest resources in Meghalaya has been elaborately explained in the later sections of this study, which would throw light on the possible solutions to the problem of degradation of forest resources along with the development of the economy of the state.

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## **Chapter-7**

# **Implication of Changing Forest for the Economy of Meghalaya**

### **7.1: Introduction**

Unlike mineral resources, which are non-renewable, forest resources can always be renewed, provided that man has directed his energy and skill in the right direction. Forests provide essential and indispensable needs of the rural population in the form of small timber, fuel, fodder, grazing, and a variety of minor forest produce such as grass, fencing material, bark, fibre, edible flowers and roots, gum and honey, etc. In rural areas, forests even supply food and shelter to the people, especially to the poorer as well as animal population. Moreover, forests yield a variety of produce of commercial and industrial importance such as timber for buildings, pit props and supports for mining, raw material for forest-based industries like pulp and paper, plywood and boards, rayon, matches, shellac, medicinal plants, and essential oils (Chauhan and Chuahan, 1998, pp. 53-54).

Actually the dependence or linkage between forest and human being is not unidirectional. It is a both-way dynamic relationship. If people depend much on forest and continuously extract it without leaving much time for the regeneration or do not take proper care for the re-growth, after a certain time the forest is bound to degrade. Again, if the forest is degraded, its capability to supply materials for human consumption declines and hence the economy of the people affected. On the other hand, if the population size and its requirements (depends on the pattern of

consumption and availability of cheaper substitutes) are less compared to the initial capacity of the forest, quality of the forest and biodiversity become richer and richer and thereby can continuously meet the demand of the people. Thus taking queue from the inverted-U hypothesis it can be stated that the degradation first rises with the initial phase of development of the economy and after the economy reaches a particular level of development degradation declines with further development (Grossman and Krueger, 1995). Historically we observe, even with a small population, the aspiration of the people to become rich at quickest possible time and development of the civil society led to large scale deforestation till the time they realised and learned how to manage the resource in a scientific way for the sake of their own welfare.

## **7.2: Spatio-Temporal Changes in Contribution of forest to the Economy of Meghalaya**

The economy of Meghalaya as already mentioned is basically rural based. Most of the activities are agro and forest based. As expansion of agriculture and other activities have been affecting forest, its impact on the economy also has been changing over time. By importance we mean the contribution of forest to income, employment, which can be direct or indirect. Here basically the direct impact is explained through the changes in peoples' dependence on forest or people engaged in forest or related activities, income earned from the forestry and logging activities and the quantity and value of major materials earned from the forest. However, forest has many other contributions as noted earlier, in the form of facilitating soil and water conservation and hence maintaining the productive value of soil; bio-diversity, temperature and maintaining environmental balance and finally to the tourism of a region. Similarly, forest has indirect impact on those activities, which are dependent on the primary forest produces but are difficult to estimate. Value of preventing soil erosion can also be done

through the comparison of long term loss in output of a degraded area due to deforestation with the productivity of an area having good forest cover, which is beyond the scope of our study. Secondary information regarding all those matters is not available. Hence the variation in direct contribution to employment, income and major aggregate outputs over time is considered in the present section.

### **7.3: Observation:**

From the Census Reports we observe that the percentage of main workers in Meghalaya engaged in livestock, forestry, hunting, plantation and orchards were 2.66 in 1971, which sharply increased to 6.53 per cent in 1981 and then remain at around 6.4 per cent in 1991. Number of forest based small scale units in Meghalaya were only 131 in 1986-87 (Directorate of Economics and Statistics, Government of Meghalaya) and in 2004-05 it increased to 943 including the workshops of wooden furniture, cane and bamboo works etc (Directorate of Economics and Statistics, government of Meghalaya). Total number of persons employed in such units was about 1010 in 1986-87 and increased to 5125 in 2004-05. But because of paucity of data, inter-district comparison is not possible.

In order to know the importance of forestry in the economy of Meghalaya, the percentage of Net Domestic Product (NDP) comes from forest resources and its related activities is considered. Since it is very difficult to calculate multiplier effect of extraction from forest resources on allied activities, we just considered the value of direct utilisation of such resources, as available from secondary sources (Department of Forest, Government of Meghalaya).

Data on population, NSDP, value of major output of the forest and its contribution to NSDP of Meghalaya are available for the period 1980-81 to 2004-05.



From those, the exponential growth rate of each of them is estimated by using semi-log linear trend and compared. The result yields:

$$1. \text{Ln Population} = 7.17 + .0264 t^* ; R^2 = 0.996 \\ (78.23)$$

$$2. \text{Ln NSDP} = 11.04 + .0572 t^* ; R^2 = 0.987 \\ (41.54)$$

$$3. \text{Ln Per Capita NSDP} = 8.475 + .0308 t^* ; R^2 = 0.943 \\ (19.44)$$

$$4. \text{Ln Output of Forest} = 6.696 + .0509 t^* ; R^2 = 0.7651 \\ (8.655)$$

$$5. \text{Ln Percentage Contribution of Forest to NSDP} = .26 - .0006 t ; R^2 = 0.042 \\ (-1.006)$$

Note: Figures in the parentheses represent t-values and coefficients of t are growth rates. \* indicates that the value is significant.

The equations show that the exponential growths of NSDP, population, output of forest all are significant during 1980-81 to 2004-05. But the growth rate forest output and NSDP are almost same and standard errors of the coefficients are different. Therefore, we observe insignificant trend of percentage contribution of forest to NSDP.

**Chart-7.1**

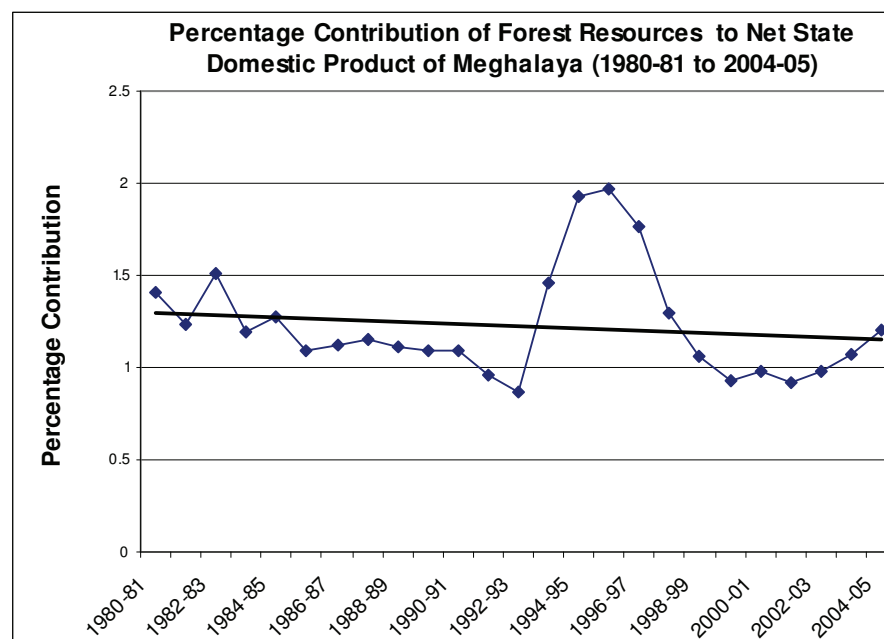


Chart-7.1 shows the over time changes in contribution of forest resources to Net State Domestic Product of Meghalaya since 1980-81. A sudden increase in contribution during 1995-1997 is observed, which may be because of the fear of losing own forest by the people after the imposition of Supreme Court ruling on felling of trees (the process of which was going on at that time) and thus the people disheartened and the incentive to preserve and improve forest resource was lost. Therefore rampant exploitation took place at that time before it stabilised in 1998-99 and again started increasing gradually through illicit harvesting in many cases. However, for this whole period, district level data are not available and hence inter-district comparison is not possible. Only during 1993-94 to 1999-2000 district-wise data are available, the explanation of which is followed now.

Approximately, 1.48 per cent of Net State Domestic Product was contributed by forestry and logging activities in 1993-94 and it increased to 2.02 per cent in 1996-97, after which it declined to 1.82 per cent in 1999-2000. Because of ban during these periods the forest-based activities have not increased in the same way as happened in case of Net State Domestic Product. Also the productivity of forest has declined. The district-wise pattern of percentage contribution of Forestry and logging to Net Domestic Product is presented in table-7.1.

**Table-7.1**

**Contribution of Forestry and Logging to Net District Domestic Product and NSDP in Meghalaya during 1993-94 to 1999-2000 (in Percentage)**

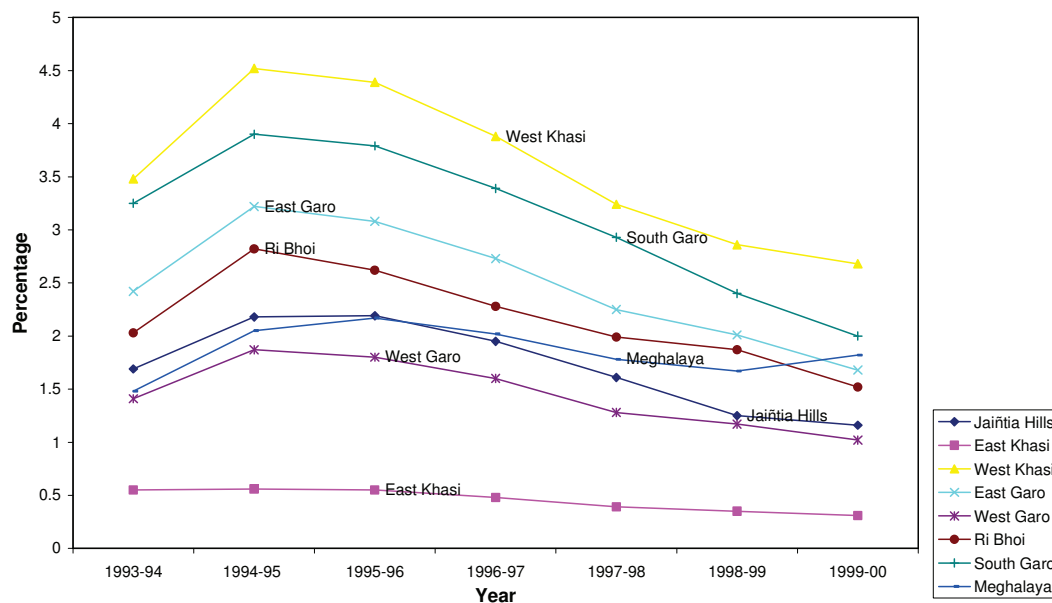
State/Year	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
<b>Jaiñtia Hills</b>	1.69	2.18	2.19	1.95	1.61	1.25	1.16
<b>East Khasi Hills</b>	0.55	0.56	0.55	0.48	0.39	0.35	0.31
<b>West Khasi Hills</b>	3.48	4.52	4.39	3.88	3.24	2.86	2.68
<b>East Garo Hills</b>	2.42	3.22	3.08	2.73	2.25	2.01	1.68
<b>West Garo Hills</b>	1.41	1.87	1.80	1.60	1.28	1.17	1.02
<b>Ri Bhoi</b>	2.03	2.82	2.62	2.28	1.99	1.87	1.52
<b>South Garo Hills</b>	3.25	3.90	3.79	3.39	2.93	2.40	2.00
<b>Meghalaya</b>	1.48	2.05	2.17	2.02	1.78	1.67	1.82

Source: Government of Meghalaya: *Meghalaya District Gross Domestic Product, 1993-94 to 1999-2000*, Directorate of Economics and Statistics, Shillong

The table shows that the contribution Net District Domestic Product in 1993-94 was the lowest in East Khasi Hills (0.55 per cent) and highest in West Khasi Hills (3.48 per cent). In 1999-2000, the contribution was ranging from 0.31 per cent in East Khasi Hills to 2.68 per cent in West Khasi Hills. Therefore, there has been significant decline in contribution of forestry and logging to Net Domestic Product. The chart-7.2 represents the over time changes in percentage contribution of forestry and logging to Net Domestic Product at the district as well as state level.

**Chart-7.2**

**District-wise Percentage Contribution of Forestry and Logging to Net Domestic Product in Meghalaya since 1993-94**



It is observed that the percentage contribution always been highest in West Khasi Hills and lowest in East Khasi Hills in 1990s. Actually, East Khasi Hills recorded highest population growth and therefore highest density because of its vicinity to the mainland through Guwahati and better communication and other facilities. Therefore, the forest of this district has been accessed (used for domestic and commercial purposes) since much before the other districts and much of forest has been already extracted and degraded by the inhabitants as well as transported to the nearby states.

Also, because of relatively better off district, per capita District Domestic Product is higher in East Khasi Hills is higher than any other district and much of it comes from the available alternative opportunities and hence relatively lower contribution of forest, which also declined but at a relatively slower rate. On the other hand the other districts are remote and there communications are poor, there is lack of alternative opportunities, per capita District Domestic Product has been much lower and many of the forests were not commercially used from earlier years. Therefore, contribution of forest has been relatively higher and though it has been declining the rate is comparatively lower.

**Table-7.2**  
**Exponential Rate of Growth in Contribution of Forestry and Logging to**  
**Net District Domestic Product during 1993 to 2000**

State	Growth Rate	Standard Error of Y Estimate	Value of t-statistic	R <sup>2</sup>
Jaintia Hills	-0.091	0.1759	-2.74	0.60
East Khasi Hills	-0.1073	0.0798	-7.113	0.91
West Khasi Hills	-0.072	0.1428	-2.65	0.584
East Garo Hills	-0.084	0.1610	-2.76	0.604
West Garo Hills	-0.0804	0.157	-2.71	0.595
Ri Bhoi	-0.0702	0.1588	-2.34	0.522
South Garo Hills	-0.096	0.1427	-3.56	0.717
Meghalaya	0.000437	0.1453	0.0159	5.06E <sup>-05</sup>

Source: Directorate of Economics & Statistics, government of Meghalaya.

The annual exponential rate of decline is estimated by semi-logarithmic equation and presented in table-7.2. The table shows that there is significantly negative trend in contribution of forestry to each District Domestic Product during 1993 to 2000. The rate of decline is significant for all the districts except Ri Bhoi at 5 per cent level of significance. The decline is the highest in East Khasi Hills, followed by South Garo Hills and Jaintia Hills districts. Where as exponential rate of decline is the lowest in Ri Bhoi district. In Jaintia and South Garo Hills, the decline and degradation of forest resource is also due to large scale open cast mining of coal. However, very little

exponential trend of contribution is observed for the state as a whole because of its dwindling feature during this small period of time.

District-wise variation in absolute net output from forestry and logging in Meghalaya is presented in table-7.3. Though, in terms of percentage, contribution of forest in every district declined, in absolute figure the earning from forestry and logging in the state has increased from Rs. 1931 lakhs to 3157 lakhs during 1993-94 to 1996-1997. The value then declined to Rs. 3051 in 1999-2000. There is a wide variation in extraction of forest resources across the districts of Meghalaya. In 1993-94 the range was from Rs. 173 lakhs in Ri Bhoi to Rs. 427 lakhs in West Khasi Hills. In 1999-2000, the figure was Rs. 271 lakhs in Ri Bhoi and Rs. 677 lakhs for West Khasi Hills, i.e., range of inter-district variation increased significantly.

**Table-7.3**  
**Districtwise Variation in Net Output of Forestry and Logging in Meghalaya**  
**during 1993-94 to 1999-2000 (Rs in Lakhs at 1993-94 Prices)**

State/Year	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
<b>Jaiñtia Hills</b>	313	449	531	515	480	500	497
<b>East Khasi Hills</b>	318	310	363	352	331	345	341
<b>West Khasi Hills</b>	427	615	728	692	650	677	677
<b>East Garo Hills</b>	253	362	429	416	389	405	399
<b>West Garo Hills</b>	341	489	579	560	522	455	542
<b>Ri Bhoi</b>	173	248	293	284	270	279	271
<b>South Garo Hills</b>	206	295	350	338	316	330	324
<b>Meghalaya</b>	1931	2768	3273	3157	2958	3080	3051

Source: Government of Meghalaya: *Meghalaya District Gross Domestic Product, 1993-94 to 1999-2000*, Directorate of Economics and Statistics, Shillong

The triennia total outturn of major forest products since 1979-82 to 1997-2000 is displayed in table-7.4. The outturn of industrial wood and fuel-wood in Meghalaya was 47.029 and 1284.7 thousand metric tones respectively during 1979-80 to 1981-82, which increased to 155.141 and 3475.7 thousand metric tonnes respectively during 1997-98 to 1999-2000. In case of bamboo, the outturn during 1979-82 was 184 thousand numbers and rose to 5682 thousand numbers during 1997-2000. The outturn

of broomstick was only 194 thousand metric tonnes during 1979-82 that increased to 10189 thousand metric tonnes during 1997-2000.

**Table-7.4**  
**Outturn of Forest Produce**

Year	Industrial Wood (‘000 m <sup>3</sup> )	Fuel wood (‘000 MT)	Bamboo (No. Thousand)	Broomstick (MT)	Tezpatta (MT)
1979-80 to 1981-82	47.029	1284.7	182	194	--
1988-89 to 1990-91	11.576	2453.9	1200	1521	--
1997-98 to 1999-00	155.141	3475.7	5682	10189	3426

Source: Government of Meghalaya, Directorate of Economics and Statistics, *Meghalaya Socio-Economic Review*, 2003.

Thus there are significant quantum jumps of harvesting of industrial wood, fuel-wood, bamboo, broom stick and also of grazing field as seen earlier due to heavy rise in number of cattle and other livestock.

Agriculture is the main occupation of the people of Meghalaya and a large section of rural farmers practice jhum/shifting cultivation by clearing and burning the forest. Once they leave a particular place and migrate to other area for the same, re-growth of forest in the left degraded patch takes place. But if many people follow the same and the number of people in this category increases, the fallow period declines (the area gets less time to regenerate), as happened in North-East India, particularly in Meghalaya and cause degradation of soil and its productivity. Here fallow period has declined significantly from 25-30 years to 2-3 years and thus the resilience of the ecosystem also being increasingly broken down (Singh and Singh, 1992, P. 294; Singh *et al*, 1986, P. 48). From table-7.5 it is observed that percentage of maximum families practising jhum in 2001 was in South Garo Hills (44.13 per cent), which is followed by East and West Garo Hills (30.25 and 18.93 per cent). In East Khasi Hills only 0.57 per cent of families follow shifting cultivation. In the state of Meghalaya as a whole, 12.28 per cent of families have been practising the age-old jhum cultivation. Whereas percentage of forest area under shifting cultivation is observed in West Garo Hills

(around 14.6 per cent) and followed by South Garo Hills (around 7 per cent). Therefore, along with mining, shifting cultivation also contributed to the degradation of forest in South and West Garo Hills. In the East Khasi Hills, because of relatively better advancement in education, urban contact as well as growing population and less availability of forest; adoption of modern technology is comparatively more and many people already practising settled cultivation and commercially to earn more.

**Table-7.5**  
**Districtwise Population Depending on Jhum Cultivation in Meghalaya, 2001**

State/District	% of Rural Population Practice Jhum	Total Family practice Jhum	Area under Jhum (Sq. Km)	% of Forest Area under Jhum	% of Families practice Jhum
<b>Jaiñtia Hills</b>	2.52	1366	11.74	1.290535	<b>2.74</b>
<b>East Khasi Hills</b>	0.94	721	6.20	1.898347	<b>0.57</b>
<b>West Khasi Hills</b>	10.31	5374	46.19	2.26506	<b>10.74</b>
<b>East Garo Hills</b>	32.20	13630	117.15	4.94333	<b>30.25</b>
<b>West Garo Hills</b>	19.77	18086	115.45	14.59619	<b>18.93</b>
<b>Ri Bhoi</b>	12.11	4351	27.40	3.320447	<b>12.48</b>
<b>South Garo Hills</b>	43.66	7900	67.87	6.84132	<b>44.13</b>
<b>Meghalaya</b>	<b>13.87</b>	<b>51428</b>	<b>442.00</b>	<b>5.355232</b>	<b>12.28</b>

Source: Ministry of Environment and Forest, Government of India.

However, one thing is clear from the data that the presence of forest that is either owned by community or Government, due to customary right most of the poor farmers follow subsistence shifting cultivation. Without forest it would not be possible for them to cultivate in that way as most of them are unable to purchase modern inputs due to lack of resource or availability in the remote areas. The correlation between the inter-district variation in area under jhum cultivation and number of families is 0.9723 is almost perfect correlation. Also the linear regression result shows significant positive impact of growing population on the expansion of area under jhum i.e., rising stress on forest over time.

$$\text{Area under Jhum} = 4.71 + 0.007 \text{ Population}^* ; R^2 = 0.9454$$

(9.30)

Figure in the bracket represents t-value, which is highly significant.

#### **7.4: Conclusion**

From the rising number and percentage of main workers engaged in forestry and allied activities, rising forest based industries and employment thereof as well as rising quantity of triennia total outturn of forest produce it is clear that forest has always played an important role in the socio-economic life of Meghalaya. However, over time with the growth of the economy along with growing population and persistence poverty, percentage contribution of forest to the economy has declined, which has been largely due to the large scale decline in quality and productivity of forest (even harvesting of larger area does not yield proportionate increase in output) and also partly due to rising availability of other alternative opportunities. The contribution to the economy has been associated with the wide inter-district variation due to differences in the pattern of degradation and availability of forest resources.

Though we have a rough idea about the contribution of forest to the state's income and employment, from that information it is very difficult to have an idea of implication of forest to the majority of people especially the poorer, who are highly dependent on forest product for their livelihood. Many of these poor people are attached to the forest life, derive their daily sustenance and there are hardly any data on that aspect. Therefore, it is worthwhile to have an analysis of consumption and livelihood pattern of those people with various categories of incomes to know the nature of dependence of those people on the forest and forest based products. The inter-linkage has been better explained at the micro level through the collection of primary data as explained in the next chapter.



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## **Chapter 8**

### **Relationship Among the Growth of Population, Incidence of Poverty and the Degradation of Forest in Meghalaya**

#### **8.1: Introduction**

The linkages between population, poverty and environmental quality or the degradation of forests have long been the subject of debate and concern. It is interesting to investigate to what extent does the growth of population affect the environment or how is the degradation of forests affected when population increase? Various assessments have assigned the major responsibility in the loss of forest cover either to population growth (usually defined as the growth of landless farmers on the perimeter of the forests) or logging, or other commercial resource extraction, including the spread of cattle ranches. All of these factors, are however, linked to population growth occurring somewhere – the local growth to the inhabitants of the countries where the forests are found; the logging and cattle ranching to increase global demand for tropical woods and beef. This growth clearly relates both to population and economic growth worldwide (Engelman, 1997, p. 18).

Since much of the population still depending directly on land-based subsistence production, especially in the region like the state of Meghalaya, the relationship between population and land degradation (especially forest land) is also very much of interest. The relationship between population, poverty and environment could hardly be direct since, as some have argued, low living standards in the rural areas contribute to increased pressure on natural resources, which in turn aggravate poverty. However, some argue that environmental degradation and rapid population growth are both cause and consequence of poverty. The increasingly complex issues

in environmental degradation intertwined with issues in population change, poverty and food security need to be better understood, especially in Meghalaya, where these linkages are understudied.

A growing population requires more food, which increases the demand for agricultural land in the rural areas. Also, an expanded industrial sector will compete for land with the agricultural sector, which might put additional pressure on land and soil quality. The question is how increased population affects the level of poverty of the poor and how large an impact on forest degradation has resulted from increases in the poor population in the agricultural sector and more in-migrated people in the industrial sector (and/or out-migration of poor people to the non-agricultural sector). The impact of population on agricultural production includes less land per capita, more intensive use of land, and higher dependency ratios per household and income generation and hence poverty. The reverse causality resulting from the complexity of the inter-linkages among population, poverty and forest degradation is also an issue.

The impact of population size on natural resources becomes significant when a growing population increasingly impinges on a resource base that is inelastic in supply like land, major minerals and also forest to a certain extent. This implies a diminished in per capita availability of resources and a negative impact on living standards. The impact on the environment is often viewed in terms of the concept of carrying capacity, which is defined as the maximum number of individuals that can be supported by a given habitats, and that is usually related to the availability of a limiting resource (Reidhead, et al, 1997, p. 47).

To meet the human wants and enhancing the quality of life, that is, development, in the context of growing population, tends to put increasing demands on the environment. Thus, there is a clear link between population, environment, and

sustainable development. Maintaining a balance between the productive potential of the ecosystem with minimal or no damage to its environment and the increase in human welfare, which has to cope with increasing numbers, is very critical issue facing by a contemporary society or economy. Focus on increase in production to cope with the increasing population should ensure that production itself that does not degrade resources beyond their regenerative capacity. The interrelationship between population and environment is a complex one. People modify their environment, population, in turn, is affected by changes in the environmental conditions. While these interrelationships unfold over time, the socio-economic context that plays an important role in mediating them. In a similar fashion, political, social, and economic institutions also play an important role in the overall changes of the environment.

The link between poverty and environment has often been mentioned in the sustainable development literature. The literature that treats the link usually focuses on the vicious circle between poverty and environmental degradation. Malthus was the first to formulate the model on the inter-linkage between population growth and the resource constraints. As a result of rapid population growth, poverty increases and it also induces changes in cropping pattern and extension of cultivation to fragile marginal lands, where the yield is very low that further impoverishes farmers. Existing literature offers two major viewpoints about the precise relationships between population growth and environmental changes. Ehrlich (1968), Ehrlich and Ehrlich (1990), Mink (1993), Subedi (1997) take the view that environmental deterioration is the direct consequence of population growth. They argue that population growth causes a disproportionate negative impact on the environment and that redistributing population would be a dangerous pseudo solution to the population problem.

This signifies that the use/misuse, utilisation, and the assessment of the carrying capacity is manifested through existing technology, affluent/poverty, consumption levels, and efficiency (or misconduct) of existing social, economic, and political institutions (Subedi, 1997, p. 193).

About 80 per cent of the population in Meghalaya still live in rural areas and agriculture is their main occupation. The people have constantly looked for additional land for expanding their cultivation to support the increasing population as well as to improve their economy. In this process, people have been extending cultivation even to the steep hill slopes and clearing forest, raising tendency of soil erosion and affecting the environment. Net-cropped area has increased from 174 thousand hectare in 1976-77 to 219 thousand hectare in 2003-04. Also pressure on forestland increased due to rising number of families under shifting cultivation (as shown in chapter-7). Moreover, there has been increasing demand for timber and non-timber forest products, which is clear from the rising aggregate outputs from the forest in Meghalaya (chapter-7). Also, apart from cutting and clearing of forests for agriculture, a large amount of trees have been cut annually for fuel-wood, as firewood is the major source of energy especially in the rural areas.

The resource base in the region has been shrinking and environmental conditions are rapidly deteriorating with heavy population growth and unsustainable consumption patterns of the poor people and their life-styles. This leads to the decline in the forest cover as shown in chapter-6. The degradation of forest cover contributes to poverty through worsened health and by constraining the productivity of those resources upon which the poor rely, and poverty restricts capacity of poor to acting in ways, which are damaging to the environment (Neena, 2000, p. 289).

Gill (1999, p. 22) has recognised the deteriorating impact of growing human

population on the environmental condition and the resulting fragile environment of Jammu and Kashmir. He opined to contain the population growth that was essential to sustain the population there without causing undue stress and damage to the physical environment. However, now it has been widely accepted that if the environment is significantly being degraded and the degradation is not accounted for, then the development will be wrongly measured. Sustainable development, therefore, is not just about protecting the environment but it is about how we can best make productive use of our natural resources in order to eliminate poverty and improve human welfare as well as quality of life (Aluko, 2004, pp. 62-63). These interests have arisen to growing awareness of, and fear about environmental degradation effected by the increasing pressures on resource caused by population growth and by increasing inequalities in access to resources. Despite this growing awareness, it is only in recent times that concerted attempts are being made to address the problems resulting from environmental deleterious and unequal development. These efforts thus require a multidisciplinary approach to understand the ways in which environmental degradation has contributed to the entrenchment of poverty especially in the state of Meghalaya.

Forests meet essential and indispensable needs of the rural population in the form of small timber, fuel, fodder, grazing, and a variety of minor forest produce such as grass, fencing material, bark, fibre, edible flowers and roots, gum and honey, etc. In rural areas, forests even supply food and shelter to the people as well as animal population. Forests yield a variety of produce of commercial and industrial importance such as timber for buildings, pit props and supports for mining, raw material for forest-based industries like pulp and paper, plywood and boards, rayon, matches, shellac, medicinal plants, and essential oils (Chauhan and Chuahan, 1998,

pp. 53-54).

Meghalaya has a pool of renewable and non-renewable resources. But to a large extent the exploitation of these resources has failed to meaningfully alleviate the poverty of most of the population in the state. The exploitation of the resources required particular attention because, by its very nature (due to open access or extent of rural poverty), this is unsustainable. In this chapter the inter-linkages among population, poverty and forest in Meghalaya has been explained. However, some people have argued that the market if work freely, would take care of any resource problem. But in Meghalaya the market never works freely and fairly and hence provides improper signal.

Firstly, markets are monopolistic in many cases in the local areas and secondly, due to infrastructural problem, there is lack of information and huge lag in effects of changes in prices. Moreover, the speed of development and adoption of technology is very slow in the state. Hence, with the rise in prices, we observe very slow substitution of forest-based materials by non-forest based and environment friendly technology. Also, still now in the rural areas forest based products (as collected from wild forest without paying anything or purchased from local area) are relatively cheaper and people mostly use forest-based products in their daily life. Still fuel-wood and charcoal is used at large for cooking and keeping the room warm in winter (that is shown through primarily collected data later). Also, most of the houses especially of the poorer are made of forest-based resources. Moreover, timber is used largely in housing and other construction works in the urban areas also, though concretes are being increasingly used over time. Because of population growth total requirements are also being increased (even with substitution) over time. In spite of rise in price of timber it is still in use because of its suitability to socio-economic and

climatic condition. Spread of education is assumed to raise awareness among the people and improve management of forest resources and economic condition or poverty also dominates in explaining the nature of consumption and extraction of forest resources and thus considered in the present analysis.

First of all a brief review of some available earlier studies on such linkages has been done. Thereafter, the correlation between inter-district variation in population growth, density of population, rural literacy rate, income from forest and degradation of forest has been calculated. The correlation results of pairs of relevant variables are presented in a two-way correlation table. From the correlations among the variables, we tried to find out the dynamic linkage if exists and its nature in the state of Meghalaya. But, as the district-wise data on over time changes in poverty is not available and hence correlating changes in poverty with that of forest or population is not possible; we took recourse to primary data to better analyse the inter-linkages among those variables.

## **8.2: A Brief Review of Some Earlier Studies on Linkages**

Plethora of studies are available on the inter-linkage among population, poverty and environmental and resource degradation. Various studies provide different dimensions of inter-connections and thus found different factors responsible for the environmental degradations at various places. In the literature, various factors have been identified as responsible for degradation of resources at various levels depending on the social and economic conditions in different regions. These are population growth, poverty, institutional mechanism, market failure, public policies, lack of awareness and many more. Therefore, there are debates regarding to what extent poverty is responsible for population growth and environmental and resource



degradation and vice versa. Though review of available literature is provided in detail in Chapter-2, here a brief review of studies on linkages is given.

Malthus (1798) first raised voice against the growth of population to outrun the available food supply. The negative impact of population growth on the available food supply, resources and nature was highlighted in his famous book *An Essay on the Principles of Population*. Since 1960s we observe a series of writings by Ehrlich (1968), Meadows et al (1972), Ehrlich and Ehrlich (1990) etc., who were of the opinion that the world would be falling short of critical natural resources after some time if population continues to grow. They argued that if the existing patterns of population growth and resource use continued, it would lead to environmental break down and economic collapse. Even the renewable natural resources like forest, fishery can be exhausted if the population exceeds the carrying capacity and thus rate of extraction is higher than the rate of regeneration. Therefore the Club of Rome stressed on maintaining a balance between the population growth and exploitation of resources for the maintenance of ecological balance and sustainable development of the economies.

On the other hand, free market economists (the neoclassical) and Julian Simon (1981, 1996), Simon and Myers (1994) etc were of the opinion that population growth is not a danger, but a benefit. The world is not running at the risk of shortage of resources. Population growth in many ways helps economic development and better management of resources through their effort and improving knowledge, innovation. Human being continuously learns how to overcome the bottlenecks imposed by the nature. Johnson (2000) also tried to prove through evidences that in spite of huge population growth in the last century the level of well-being has increased manifold and that has been mainly due to the advancement of technology.

During the last Century especially after 1950 maximum growth of population is recorded because of several scientific developments that led to drastic reduction in mortality and manifold increase in food supply in the world. Still now, Malthusian catastrophe that was expected to happen much before and the world to return to a subsistence level have not been observed. The progress was supposed to halt because of over dependence on agriculture (that was subject to diminishing returns) and economic growth was supposed to be outstripped by the growth in population. The interesting point to note is that at the time of Malthus, most societies were constrained by the agricultural limits and the world population was what India's population today. Still now we did not observe any such catastrophe, rather we are living on an average in a better world today with better food security, fewer famines, lower mortality rates, enhanced life expectancy, better amenities and access to resources and most of those have been possible due to the advancement of education and technology in different fields. Whatever famines and food insecurity we observe today are mostly localised and occur largely due to war, political unrest, market distortions, loss of entitlement and sometimes due to crop failure (that sometimes may be because of unplanned or unsustainable use of land resources).

At the same time, during the second half of 20<sup>th</sup> Century we observe rising pollution level at many parts of the world, global warming, acid rain, ozone layer depletion, declining forest resources, rising mortality due to lack of access to safe drinking water, falling long term land productivity, loss of biodiversity etc. Those may be not only due to the growth of population but also for the application of advanced technology (but not environment friendly) to meet the increasing need of the growing population and thus raise question about perception and measurement of development.

Here it is to be noted that rising population, when total population is well below the carrying capacity, growth of population normally helps better utilisation of resources with given technology and other parameters. If it crosses that limit, it would lead to rise in pressure on and thus depletion of resources. Definitely, technological development enhances the scope for use of any resource, its productivity and the capability to tolerate and bear more people (i.e., enhance carrying capacity) over time but there is uncertainty whether the same can grow at the required pace all the time and uniformly. It also varies with the variation in consumption basket that changes along with the changes in standard of living and adjusted by the people with technological invention and innovation (De, *op. cit*). However the concept of carrying capacity is of very little relevance to those who have been optimistic (Simon, Johnson, Solow, Hartwick etc.) and think each and every constraint would be solved through market, if everybody is free and the markets are perfect, which is very difficult to ensure.

Dreze and Sen (1989) have also identified the incidence of poverty and the population growth as the principal reason for the degradation of resources.

Bhagat and Hassan (1994) have shown that the changes in major environmental parameters and degradation of resources in the world during the last Century especially after 1950 was mainly due to the rapid growth of consumption of fossil fuel, industrial production and the growth of the economy, which haven been much higher than the rate of growth of population. Therefore, the degradation of natural resources is not only due to the growth of population but also due to the rapid growth of consumption of resources coupled with the advancement of technology and the later one is much more important than the former one (Macneill, 1989, p. 105). The rise in per capita consumption of such resources in North America and Western

Europe have been much higher than that of other parts of the world, though the rate of population growth was comparatively lower in North America and Western Europe.

Therefore population may be one of the reasons but not the only reasons for the degradation of forest. Ownership pattern may be the other reason. If the resource whether forest or any other is a common resource it will be prone to over-utilisation and hence subject to rapid degradation (Hardin, 1968). Though a major part of forest in Meghalaya is under the community ownership, in most cases there is open access.

By using panel data at the cross-country level and using regression analysis, Cropper and Griffiths (1994) show that economic growth would not necessarily solve the problem of degradation of forest. Deforestation in developing countries are also due to market failure arises out of undefined property right, zero private cost of deforestation and as most of the poor people has no property right they do not have the incentive to make efficient use of forest land. But higher population growth leads to higher deforestation and thus in their opinion, controlling population growth is the best method of reducing the rate of deforestation.

Though poorer are often blamed for the degradation of the forest, actually they are not always responsible for that, as in many cases they do not have even proper access due to lack of property right. Also because of their indigenous knowledge and for survival, sometimes they are found to better manage and invest in such resources. It is rather the non-poor who has better access to such resources; damage much of the forest resource. The rich overexploit the forest to make profit whereas the poorer are highly affected due to such degradation (World Bank, 1987 & 1988).

Boyce (1994) also argued that it is not poverty but a combination of greed, power and wealth that causes environmental degradation in many developing countries. Many studies also pointed towards logging activities as the principal

activity responsible for unsustainable deforestation in many parts of Asia, Central Africa and South America (Somanathan, 1991; Anderson, 1989; Repetto, 1990; Cropper and Griffiths, 1994). During 1980s also in Meghalaya to a certain extent, due to attractive benefit in the logging industries many of the community forests were privatised that had been harvested unsustainably<sup>1</sup>.

Also there are studies that show that agricultural and pastoral encroachment has been the primary forces behind unsustainable deforestation and logging has been the catalyst. The infrastructure (road etc) developed due to the expansion of logging opened up forestlands for agricultural and pastoral activities that intensified unsustainable deforestation activities in Amazon basin (Goodland, 1991). Westby (1987), Cruz and Gills (1990) argue that shifting cultivators, agricultural and pastoral encroachment in the wake of logging trails were the major causes of deforestation. Jaganathan (1989) highlighted that market were the main factors causing deforestation in Indonesia. There logging activities were followed by conversion of such land to estates and mixed gardens. Of course poorer were involved in unsustainable activities on such logged lands after being abandoned by previous landlords.

FAO (1993) study also concluded that agricultural expansion driven primarily by population pressures was the principal cause for tropical deforestation in the past. Population pressure as well as government policies, which provided incentives for people to move into these areas contributed to the conversion of large tracts of forestlands into permanent agricultural lands. Also FAO (2005) study shows that the highest rate of deforestation in South America especially in Brazil in the world during 2000-2005 was due to the expansion of soybean plantations and cattle ranches. During the same period the second largest net loss in forests were observed in Africa,

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<sup>1</sup> It came out during the discussion of the Author with some District Council Members in East and West Khasi Hills Districts.

particularly in Nigeria and Sudan, which was largely due to the subsistence activities.

Southgate (1988) as well as Ives and Messerli (1988) also cited population growth as the prime contributor to unsustainable deforestation in tropical Africa and the Amazon basin, through the expansion of agriculture and other subsistence activities. Also some other studies show that poverty intensified population growth are partly responsible for large-scale deforestation.

De (2004) explained the inter-linkages among population, poverty and other indicators of human resource development with degradation of environment especially forest in terms of cause-effect flow diagram. Also by using panel data on degradation of forest, incidence of poverty and level as well as variation in per capita SDP, De (2006) has found a significantly positive correlation between income variation and degradation. Also a positive relation is observed in his study between reduction in poverty and degradation of forest. EKC principle however says that the degradation first increase with the rise in income (i.e., in the early stage of development) and after reaching a peak level it declines with further development (Grossman and Krueger, 1995). He opined that the states of North East India were still low developed having lower per capita income than the national average and hence, they were on the rising phase of EKC. Moreover, whatever poverty reduction had taken place it was at the cost of forest resources, which were easily accessible by the people.

Taking village level primary data in Arunachal Pradesh Kuri (2005) has examined the dependence of people on the forest resources and found that almost one-fourth of family income of the poor households comes from common forests resources. The rapid growth of population in the North East India is also partly due to the influx of people from the neighbouring countries, Bangladesh and Nepal and those

immigrants in many cases are responsible for the damage of forest cover (Singh, 1987, p. 146).

Joshi (1990, p. 147) also argued that poverty and population growth (over 2 per cent per year) has affected the economic growth and development of the state of Meghalaya. Sen (1994, p. 53) in his study mentioned that the growth of population is the cause of several problems such as it intensifies food problem, reduces the quality of life of the people and also the happiness of the human race. Dasgupta also identified the degradation of forest that affects the environment and the resources available for economic development. The main causes of forest degradation are the institutional fashion and poverty. He argued that when population size is higher relatively to the resources available, the more urgent is the need to control the growth of population (Dasgupta, 1994, pp. 39-40). At the local level, the combination of poverty and rapid growth of population is often cited as contributing to environmental degradation -for example, rising population pressure leads to farming to hill sides and other marginal areas causing more soil erosion or heavy cutting of forests for fuel, etc. (Birdsall, 1994, pp. 179-80).

The rate of growth and size of population in the states of North Eastern India has influence on environment, natural resources and existing system of food productions. As a result of this, the region is experiencing depletion of flora, fauna and soil, fragmentation of cultivated land, rise in import of food grains from other regions and some socio-economic and cultural problems (Husain, 1994, p. 118).

Lamin (1995, pp. 78-79) argued that the fast growth of population in the state of Meghalaya is responsible for environment and forest resource degradation. The demand for timbers, fuel-wood and other commercial uses of forests continued to rise rapidly causing adverse ecological change. In rural areas with large number of

population, there is always a tendency to over-exploit the supply of natural resources. Exploitation of forest resources can be attributed to the commercial logging and cultivation purposes, which consequently led to the deforestation and soil erosion (Sanchez, 1998, p. 100). Datta (2000, p. 174) and Dutta (2000, p. 382-83) also blamed high rate of growth of population, lack of planning and uneconomic use of land for shifting cultivation for the loss of forest cover in vast areas of Meghalaya.

### **8.3: Analysis of Secondary Data**

Most of the studies on population, poverty and environment interlinkage North-East India, particularly in Meghalaya are superficial and descriptive, devoid of any scientific investigation or mathematical exposition. Hardly any study is there that explicitly use time series or cross section data to find out the inherent reasons for the degradation of forest in the state through observed linkages. So it is essential to investigate the factors that act as mediators in the linkage so that proper policies can be adopted to target the areas of action. Data on all the variables are not available for long period of time as well as for all the districts of Meghalaya. For inter-district comparison thus regression analysis cannot be done due to very low degrees of freedom. Therefore, through two-way correlation table (as mentioned earlier) the pattern of relationship among inter-district variation in population growth, rural poverty, changes in contribution of forestry to Net District Domestic Product (NDDP), changes in net earning from the forest, variation in literacy rate etc is explained.

In the correlation table, changes in poverty (especially rural poverty) are not incorporated, as district-wise time series figures are not available. But one point to be noted is that, the state itself is a poverty prone state and changes in Net District



Domestic Product or per capita NDDP, which is very low, can be an indicator of economic condition of the people and thus it is considered for the analysis. More per capita NDDP of a district (if distribution does not differ much) implies relatively less poor district and vice versa. Also persistence of jhum cultivation is there that is normally practised by the poor families.

**Table-8.1**

**Two Way Correlation Table**

	Population Growth	Rural Literacy Rate	Growth of Population Density	Growth of NDDP	Growth of Per capita NDDP	Changes in Contribution of Forest to NDDP	Percentage of Family in Jhum Cultivation	Area under Jhum Cultivation
<b>Population Growth</b>	1							
<b>Rural Literacy Rate</b>	0.146	1						
<b>Growth of Population Density</b>	--	--	1					
<b>Growth of NDDP</b>	-0.512	--	-0.487	1				
<b>Growth of Per capita NDDP</b>	<b>-0.774</b>	0.30	-0.715		1			
<b>Changes in contribution of Forest to NDDP</b>	<b>0.5266</b>	-0.60	0.461	0.069	<b>-0.923</b>	1		
<b>Percentage of Family in Jhum Cultivation</b>	-0.107	-0.306	-0.09	0.43	-0.28	0.453	1	
<b>Area under Jhum Cultivation</b>	-0.17	-0.431	-0.24	0.062	-0.354	0.481	0.6714	<b>1</b>
<b>Degradation of Forest Land</b>	0.411	<b>-0.265</b>	<b>0.298</b>	<b>-0.31</b>	-0.511	0.461	<b>-0.52</b>	<b>-0.0479</b>

**Source:** Compiled from the data available from Secondary sources viz. Census of India, Planning Commission and Directorate of Economics and Statistics, Government of Meghalaya

From correlation table-8.1, it is observed that the inter-district variation in growth of population and density of population are significantly inversely correlated to that of NDDP and per capita NDDP and significantly positively correlated with the variation in contribution of forest to NDDP and degradation of forest. Variation in

growth of literacy rate and per capita NDDP are negatively correlated to contribution of forest to NDDP and degradation of forest. These two are also negatively related with the variation in percentage of family under jhum cultivation, and area under jhum cultivation but not significantly. Percentage of family in jhum cultivation, area under jhum cultivation and contribution of forest to NDDP are positively correlated among themselves.

Therefore the results indicate that population growth and rising density significantly and adversely affect and are affected by the growth of NDDP i.e., positively associated with the incidence of poverty if there is resource constraint. Even if natural resources are there, major minerals are owned by a few individuals and thus people especially poorer are more dependent on easily accessible forest. Normally poor people prefer more children for better security and collection from the degraded forest. However, if people become educated, they look for alternative opportunities and stress on forest also declines and hence its share in NDDP as well rate of degradation also declines. But in Meghalaya, the effect of education is not so strong because of presence of chronic poverty. Though inter-district variation in growth of per capita NDDP has significantly negative impact on contribution of forest to total NDDP or degradation of forest (indicating that with economic growth or development, pressure on forest declines), actually growth of per capita NDDP of all the districts are much lower than at all India level (which is also clear from the decline in state level ranking in human development and human poverty index) and hence impact on percentage of family and area under jhum cultivation is not so strong. But when income rises, people become less dependent on forest for food, fodder and other materials and hence degradation is likely to be less. However, if contribution of forest

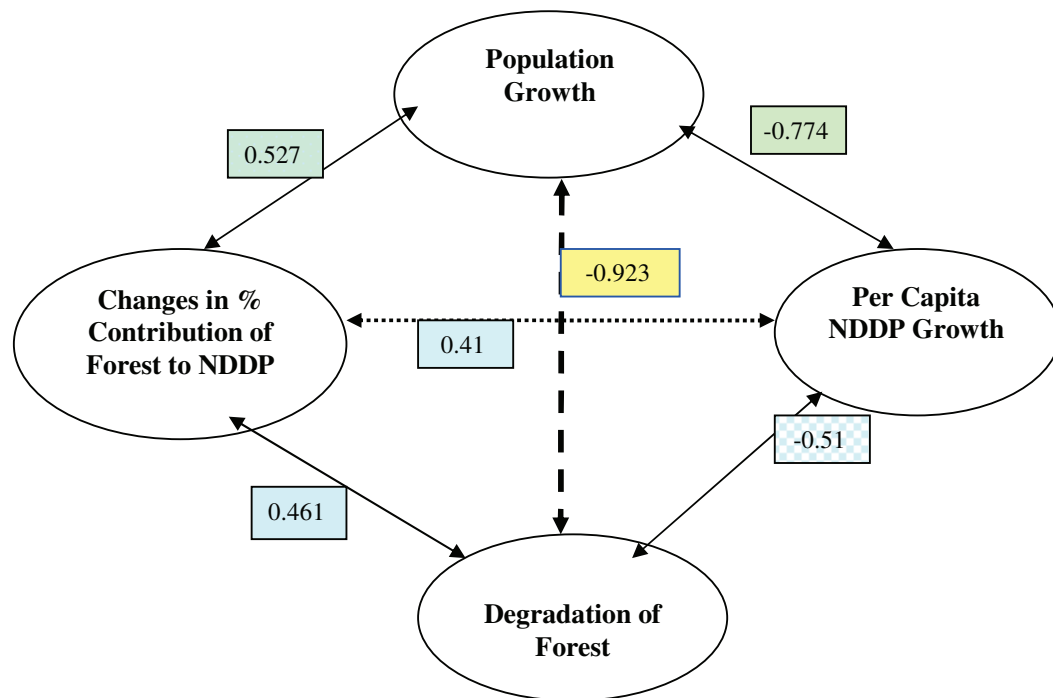
to NDDP rises growth of NDDP will be higher and that is likely to compound degradation.

Here it is observed that percentage of family and area under jhum cultivation are negatively correlated to variation in degradation of forest. Still now many of the families especially in rural areas of some districts are still dependent on jhum cultivation (because of low income and alternative opportunities) and still now density of population in those districts is much lower than all India average and other districts (e.g., East Khasi Hills) where less people are less dependent on jhum but due to more density of population per capita availability of land is very less. Therefore the district where relatively less people are engaged in jhum, due to less per capita forestland fallow cycle is short and hence more degradation is observed (as in East Khasi Hills). But the district with more percentage of people in jhum, due to relatively more per capita land availability, fallow period is relatively longer and hence recorded comparatively low degradation. Moreover, if the people become gradually educated but due to lack of availability or entitlement cannot adopt modern techniques of settled cultivation, they try to judiciously manage the cultivable land. Therefore there is likely to be relatively less degradation of forest. However, rapid population growth in that case can disturb the balancing use of forestland for survival. But given the population growth, the district having better quality of forest and hence larger contribution of forest, will have relatively higher growth of per capita Net Domestic Product.

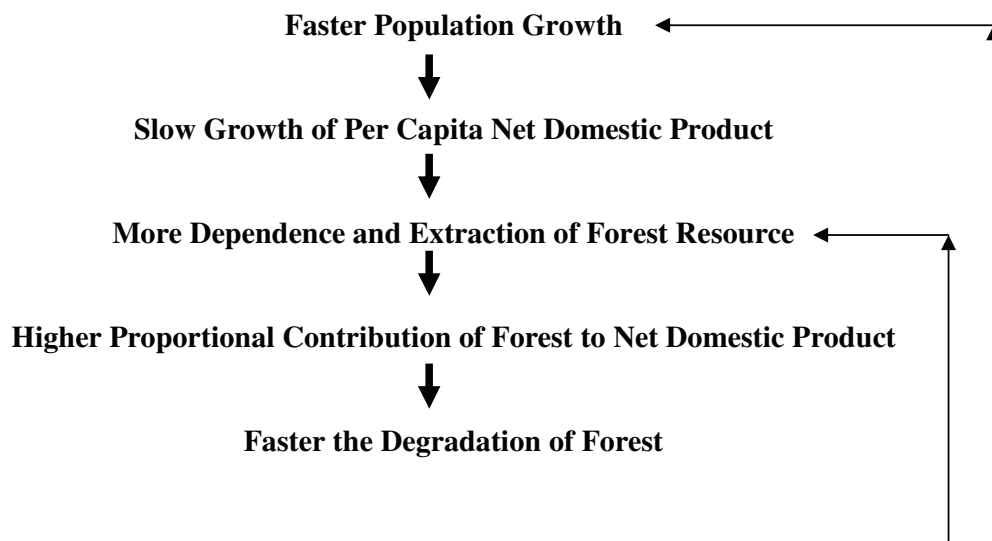
The relation as observed from the correlation table is also shown in the circular flow-chart below. The flow-chart-8.1 indicates how population growth (directly or indirectly) affects and is affected by degradation of forest resources. Similarly, it shows how poverty or growth of per capita income affects and is affected

by degradation of natural resource like forest and also how population growth affects and is affected by the variation in per capita income. So it explains the nature of relationship among population growth, per-capita income and thus incidence of poverty (where income growth is faster, incidence of poverty is likely to decline) and degradation of forest in Meghalaya (especially during 1990s).

**Flow-Chart 8.1**



The relationship can be shown as:





#### **8.4: Analysis of the Linkage on the Basis of Primary Data**

As there was lack of data on exact poverty and the nature of dependence of people on forest, primary data have been collected during January-March 2006, from four sample villages in Meghalaya and from the observations on socio-economic characteristics of the sample households and their utilisation of forest resources we tried to explain the pattern of linkages.

Four villages have been selected purposively (two from East Khasi Hills, one from West Khasi Hills and one bordering East and West Khasi Hills) after having a preliminary idea about their locations, characteristics and level of degradation of the forest resource, distance from their nearest towns and business centres, communication facilities and socio-economic condition of the people. Also, the requirement of time, accessibility and cost for the collection of data has been taken into consideration in this regard. These villages are Mawtawar, Laitjem, Sohiong and Mawlangkhar.

Mawtawar and Laitjem are located in Myllem Community and Rural Development Block and Sohiong in Mawphlang Community and Rural Development Block of the East Khasi Hills district. Whereas, Mawlangkhar belongs to the erstwhile Nongstoin (and now to Mawthadraishan) Community and Rural Development Block of West Khasi Hills district.

Sohiong and Mawlangkhar are situated far away from their nearest towns, approximately 30 and 20 kilometres away from Shillong and Nongstoin respectively. Mawtawar and Laitjem are within 5 and 12 kilometres from their nearest town, Shillong. That means two villages are located nearer to their nearest towns (within 15

KM) and two are far away from their nearest towns (more than 15 KM). Presence or absence of timber industries in and around the village is also taken into consideration while choosing the villages. There is only one saw-mill now operating at Mawtawar. Earlier there were five at Laitjem of which now, only three are in operation and at Sohiong earlier there were five and only two are actively running and there is no timber industry at Mawlangkhar though earlier there was one.

From each village, 40 families have been selected by simple random sampling without replacements i.e., in total 160 families have been chosen as sample units. From each family, information on their social and economic background especially family size and composition, level of education, land holding, occupation, monthly income, method of cultivation (if farmer), monthly consumption items, housing pattern and materials used in housing, land holding, number of cattle owned, materials (food, non food, housing and marketable items) collected from the neighbouring forests have been gathered. Also we have taken note of the nature of degradation of forests in all those four villages. From there we tried to find out the reasons for differences in dependence of people on the forest and the difference in level of degradation. From the personal experience, we observe that Mawtawar and Sohiong recorded very high degradation of forests during past decade. Most part of the primary forests in these two villages have been disappeared because of both subsistence and commercial activities and still now it is going on because these two villages are nearer to business centres and incidence of poverty is also high (though relatively better than the other two villages) in spite of having better urban contact and facilities. Influx of population from the remote villages further compounded the problem. Because of lack of alternative opportunities, education facilities and rising pressure on jhum land; poor people migrate to urban informal sector and settle in the outskirts of the city or stay in

the nearby villages from where they can shuttle everyday to their working place. The degradation of forest in the other two villages, Laitjem and Mawlangkhar, are however less as compared to Mawtawar and Sohiong, though they are relatively poorer and there is less availability of substitutes of forest produce like fuel-wood. Agriculture is their main occupation. However, people are also engaged in other occupation and business activities in these villages but on a very minor scale except in Mawtawar.

### 8.5: Socio-Economic Profile of Sample Villages

The population, family size, the characteristics of their dwelling houses, literacy rate and educational status of the people, their income, etc are first described in this section. Population and its sex composition as observed from the Census of India 2001 are displayed in table-8.2.

**Table-8.2**  
**Total Population in the Sample Villages**

Village	Persons	Males	Females	Sex Ratio per 1000 Male
Laitjem	1134 (36.13)	561 (36.24)	573 (36.01)	1021
Mawtawar	1062 (33.83)	513 (33.14)	549 (34.51)	1070
Sohiong	655 (20.87)	307 (19.83)	348 (21.87)	1134
Mawlangkhar	288 (9.17)	167 (10.78)	121 (7.61)	725
Total	3139 (100.00)	1548 (100.00)	1591 (100.00)	1028

Source: Census of India, 2001

Note: Figures in brackets indicate percentages to total population of the four sample villages.

The total population in the four sample villages surveyed was 3139, of which 1548 are males and 1591 are females. In Laitjem, there are 1134 persons of which 561 are males and 573 are females. In Mawtawar out of 1062 total populations, 513 are males and 549 are females. In Sohiong, out of the total population of 655 persons, 307 are males and 348 are females and in Mawlangkhar, out of 288 persons, 167 are males and 121 are female population. On an average the sex ratio is in favour of females in

the surveyed villages, which is opposite to that of all India level and Meghalaya as a whole. Laitjem and Mawtawar have sex ratios 1021 and 1070. It is the highest in Sohiong (1134) and lowest in Mawlangkhar (725) respectively.

Variation in family size and family-wise age and sex composition in the sample villages are shown in table-8.3. The family size in the sample villages as obtained from the survey data ranged from around 6 to 8.35 persons per family. The number of males and females also comprised of 3 to 5 persons. Also the number of adult and children varies from 3.48 to 4.77 and 2.57 to 3.58 respectively. Sex ratio among the adult and child category also follows similar pattern as that of total population. Among the four villages, Mawtawar has the lowest average family size and number of children per family reflecting the influence of urban contact, educational facilities, and health care hence relatively better human development. On the other hand Mawlangkhar has the highest family size.

**Table-8.3**  
**Family Size in the Sample Villages**

Village	Persons	Males	Females	Adult	Children
Laitjem	6.82	3.30	3.55	3.62	3.20
Mawtawar	6.07	3.13	3.00	3.48	2.57
Sohiong	7.30	3.70	3.60	3.65	3.65
Mawlangkhar	8.35	4.82	4.52	4.77	3.58

Source: Compiled from the field survey

Mawtawar is more advanced among all the four villages in terms of educational achievement as described in table-8.4. Among all the members of the forty families in Mawtawar 52.50 per cent are literate of which 40 per cent are just literate, 5 per cent are secondary passed but less than graduate and 7.5 per cent are graduates and above. It is followed by Laitjem with 32.50 per cent of population literate of which, 5 per cent are secondary passed but less than even high secondary and only 2.5 per cent are graduates. Mawlangkhar records 30 per cent literacy rate of



which merely 2.5 per cent are secondary passed, while Sohiong ranked last with just 10.00 per cent of the people are literate. The fact is that Mawtawar has the benefit of urban influence, while Sohiong and Mawlangkhar are far away from the urban area and no urban influence is observed.

**Table-8.4**  
**Literacy Rate and Education in the Sample Villages (in Percentage)**

Village	Illiterate	Literate				Total
		Literate but < Secondary	Secondary but < H.S.	H.S. but < Graduate	Graduate and Above	
Laitjem	67.50	25.00	5.00	0.00	2.50	100
Mawtawar	47.50	40.00	2.50	2.50	7.50	100
Sohiong	90.00	10.00	0.00	0.00	0.00	100
Mawlangkhar	70.00	27.50	2.50	0.00	0.00	100

Source: Compiled from the field survey

The incidence of poverty as estimated by using the standard of Rs 327.56 per capita monthly income as poverty line for the sample villages is shown in table-8.5. Most of the families in Mawlangkhar (97.50 per cent) are observed to be poor, which is followed by Laitjem (80 per cent) and Sohiong (75 per cent). Only 32.5 per cent of families in Mawtawar are poor. Despite variations in the level of education, all these four villages are suffering from poverty, which is chronic in all but Mawtawar.

**Table-8.5**  
**Distribution of Poor and Non-Poor in the Sample Villages (in Percentage)**

Village	Poor	Non-Poor
Laitjem	80.00	20.00
Mawtawar	32.50	67.50
Sohiong	75.00	25.00
Mawlangkhar	97.50	2.50

Source: Compiled from the field survey

The average monthly income and expenditure of the households in the sample villages are very low compared to national average as shown in table-8.6. The average monthly family income varies from Rs 1870.25 in Mawlangkhar to Rs 3743.75 in Mawtawar. Similarly, monthly family expenditure is the lowest in Laitjem, Rs

1702.40 and it is the maximum in Mawlangkhar, Rs 1867.80. One may be sceptical about the highest family expenditure of the families of Mawlangkhar where about 97.5 per cent of the families are poor. Actually, in the estimation of total family income the imputed values of items collected from the forest either for consumption or building cottages or fuel-wood or for sale are considered. In Mawlangkhar, family size is larger than other village and most of the members go for collecting forest resources primarily for their subsistence consumption. Though in Mawlangkhar these items are mostly not traded the average value of those items in other markets where these are traded are being taken into account. Similarly for the other villages whether the items are traded or consumed are also considered. Moreover, in the expenditure, values of the items collected and consumed are also incorporated. In Mawlangkhar the harvesting and hunting in the forest is carried out mainly for subsistence where as the in Mawtawar extracted resource is used for both subsistence and commercial purposes. However, in the expenditure we have considered only the general consumption expenditure whether the items are collected from forest or not. But the expenditure on fixed asset like housing etc that is received as aid is not considered.

**Table-8.6**

**Monthly average family Income and Expenditure of the Sample Villages ( Rs)**

Village	Family Income	Family Expenditure	Per Capita Income	Per Capita Expenditure	Coeff. of Var. in family income
Laitjem	2126.50	1702.40	311.8	249.62	99.11
Mawtawar	3743.75	1753.60	616.76	288.90	95.79
Sohiong	2446.75	1831.80	335.17	250.93	87.99
Mawlangkhar	1870.25	1867.80	223.98	223.69	48.51

Source: Compiled from the field survey

Though average family expenditure is the highest, per capita monthly expenditure is the lowest in Mawlangkhar (Rs 223.69), which is highest in Mawtawar (Rs 288.9). This is because of the larger family size in Mawlangkhar compared to that

of Mawtawar. Moreover, coefficient of variation in income is the highest in Laitjem (99.11) and lowest in Mawlangkhar (48.51). The values for Mawtawar and Sohiong are about 96 and 88 per cent. So, higher income area has a tendency to be associated with greater inequality in the distribution of income.

Percentage distribution of families according to the job status of the head of households is displayed in table-8.7. From the table it is clear that in Mawlangkhar and Sohiong, number of head of the households in the government service and business activities are nil. Most of them are engaged in the cultivation (75 percent) and equal 12.5 percent are agricultural labourer and engaged in other economic activities respectively in Sohiong. In Mawlangkhar, 57 and 35 per cent are in cultivation and other activities (carpenter, mason or other informal occupation) respectively and the rest are agricultural labourer. 25 and 5 per cent respectively in Mawtawar and Laitjem are in service while 40 and 45 per cent head of the families in those two villages are in other activities. Also 12.50 and 7.5 per cent are working as agricultural labourers and in business in Mawtawar. In Laitjem, cultivators are 35 per cent and 10 per cent are in business and only 5 per cent are agricultural labourer.

**Table-8.7**  
**Distribution of Families According to the Job Status of Head of the Households**  
**in the Surveyed Villages (in Percentage)**

Village	Service	Agricultural Labourer	Cultivator	Business	Other
Laitjem	5.00	5.00	35.00	10.00	45.00
Mawtawar	25.00	12.50	15.00	7.50	40.00
Sohiong	0.00	12.50	75.00	0.00	12.50
Mawlangkhar	0.00	7.50	57.50	0.00	35.00

Source: Compiled from the Field Survey.

The majority of people in the sample families are living in Kachha houses and only few of them live in the Pucca houses, which are described in table-8.8. Over 92 per cent of the families in Laitjem, 77.50 per cent in Mawtawar and 97.50 per cent in

Sohiong live in Kachha houses. However, all the families in Mawlangkhar stay in Kachha houses. For the construction of Kachha houses major portion of the materials (timber, bamboo, leaves etc) are collected from the nearby forest. Those who are relatively better off in terms of job status as well as income and do not collect themselves (either for status and position in the society or higher opportunity cost), purchase those items from others. Only a few in the survey villages live in Pucca houses and most of them belong to Mawtawar.

**Table-8.8**  
**Distribution of Families According to the Character of Dwelling Houses**  
**(in Percentage)**

Village	Kachha	Pucca	Total
Laitjem	92.50	7.50	100.00
Mawtawar	77.50	22.50	100.00
Sohiong	97.50	2.50	100.00
Mawlangkhar	100.00	0.00	100.00

Source: Compiled from the Field Survey

Table-8.9 shows that fuel-wood is the main items that the people of these sample villages are using for their cooking purposes. Only a few of the people are using charcoal, LPG and other cooking materials like kerosene and electricity. Only 2.5 per cent of the families in Mawtawar, which is nearer to town, are using LPG gas and 12.5 per cent are using other cooking materials while 17.5 per cent use charcoal. It indicates that some families in Mawtawar are using combination of two/three types of fuel. In Sohiong and Mawlangkhar, 27.5 and 12.5 per cent of the families use charcoal along with fuel-wood. The figure is only 5 per cent in Laitjem. Therefore, forest is the main source of fuel or energy especially in the rural areas. In the more interior areas even the richer are compelled to use litters and fuel-wood as other sources of fuel are not available.

**Table-8.9**  
**Distribution of Families According to the Use of Fuel for Cooking in the Sample Villages (in Percentage)**

Village	Fuelwood	LPG	Charcoal	Other
Laitjem	100.00	0.00	5.00	2.50
Mawtawar	95.00	2.50	17.50	12.50
Sohiong	100.00	0.00	27.50	0.00
Mawlangkhar	100.00	0.00	12.50	0.00

Source: Compiled from the field survey

From table-8.10 we observed that almost all the families in the village Mawlangkhar go for collecting fuel-wood. But in other three villages the figure varies from 45 to 62.5 per cent though most of the families in those villages also use fuel-wood or charcoal (as seen in table-8.9). It indicates that many of the families in those villages purchase fuel-wood, charcoal (of course that comes from the nearby forest) from the market and many people earn by selling those. Another reason may be that the family size is small in Mawtawar and hence they have less manpower to collect fuel-wood from the relatively more degraded area and some of them have relatively better job opportunities and hence opportunity cost of collecting fuel-wood is more.

**Table-8.10**  
**Distribution of Families in the Sample Villages Collecting Items of Daily Need from the Forests (in Percentage)**

Village	Fruit	Leaves	Fuelwood	Timber	Bamboo	Grass
Laitjem	0.00	5.00	50.00	0.00	0.00	0.00
Mawtawar	0.00	0.00	45.00	0.00	5.00	5.00
Sohiong	5.00	35.00	62.50	5.00	5.00	25.00
Mawlangkhar	15.00	52.50	97.50	20.00	10.00	60.00
Total	5.00	23.12	63.75	6.25	5.00	22.50

Source: Compiled from the field survey

Many of the people in the sample villages used to collect some other necessary items from the forests for meeting a part of their daily needs such as fruits, leaves, timber, bamboo, grass, etc. The table shows that 15 per cent of families of Mawlangkhar and 5 per cent of Sohiong used to collect fruits from the nearby forests.

Also 52.00 and 35.00 per cent used to collect leaves, 97.50 and 62.50 per cent timber, 10.00 and 5.00 per cent bamboo and 60.00 and 25.00 per cent grass respectively in those two villages. On the other hand, families of Laitjem and Mawtawar used to collect mainly fuel-wood (50.00% and 45.00% respectively) and only very few of them collect other items. Whereas the over all collection of fuel-wood and timber is done by the 63.75 and 6.25 per cent of families in the four villages. Apart from those items, people of rural Meghalaya also collect wild roots, stems, bamboo shoots, seeds for consumption and some people also go for hunting. However, wild biodiversity has been declining due to loss of dense forest. Though time series data is not available on those aspects one can safely argue that the availability of those materials must be declining with the degradation of their host, which is forest.

**Table-8.11**  
**Monthly Average Income, Expenditure and Per Capita Income of the**  
**Households that collect materials from the Forests (in Rs)**

Village	No. of HH	Population	Average family Income	Average Family Expenditure	Per Capita Income	Per Capita Expenditure
Laitjem	21	156	1717.29	1711.61	231.17	230.41
Mawtawar	17	106	2955.88	1476.00	474.06	236.72
Sohiong	25	200	2909.84	2026.88	363.73	253.36
Mawlangkhar	39	329	1840.54	1834.80	218.18	217.50

Source: Compiled from the field survey, Note: HH means household.

Table-8.11 shows the average family and per capita income and expenditure of the households that used to collect materials from the forests. In Laitjem, out of 40 households, 21 households who collect material from forest have average family income of Rs. 1717.29. The figures for 17, 25 and 39 families of Mawtawar, Sohiong and Mawlangkhar are Rs. 2955.88, Rs. 2909.84 and Rs.1840.54. The per capita income of those families in the respective villages is Rs. 231.17, 474.06, 363.73 and 218.18 respectively. Similarly average family expenditure of those families varies

from Rs 1711.61 to Rs. 2026.88. Per capita expenditures however are Rs. 230.41, 236.72, 253.36 and Rs. 217.50. Except in Sohiong in other villages' per capita income and expenditure of the families who collect materials from forest are lower than those, who do not collect anything from forest. It is observed when we compare it with the results for all families as shown in table-8.6. It indicates that the poorer collect more for their subsistence from the forest than the relatively better off families.

In Sohiong actually 75 per cent of the families are cultivator and also many of them harvest their clan forest primarily timber, bamboo along with other items, which are sold in the timber industries located in their village. Whereas in other villages especially in Laitjem and Mawlangkhar, people who do not have sufficient alternative opportunities mainly harvest forest for fuel-wood, grass, leaves for their subsistence. In Mawtawar however the earning of the people who collect material from forest is more than those of other villages though they collect mainly fuel-wood and a few collect bamboos. This is because the families who collect forest resource (it is their subsidiary income) in Mawtawar simultaneously earn from other sources as some other family members are engaged in relatively better (mainly informal) opportunities in the nearby town. Also they get better price of the forest products in town.

**Table-8.12**  
**Number of Cattle in the Sample Villages (in Hundred)**

Village	Cow	Goat	Sheep	Pig	Total
Laitjem	0	0	0	23	23
Mawtawar	0	0	0	0	0
Sohiong	53	24	7	28	112
Mawlangkhar	143	23	13	33	212
Total	196	47	20	83	347

Source: Compiled from the field survey

Owning of cattle by the sample households is displayed in table-8.12. The total number of cattle recorded by the people of the sample villages was 347, (196

cows, 47 goats, 20 sheep and 83 pigs). Mawtawar is the only village that has been found without any cattle rearing. Moreover, people of this village are relatively rich and forest in Mawtawar is already degraded compared to other villages and so people will have to go far away for grazing their cattle. But the family size here is smaller and number of children who generally performs this task is less in number and most of the available children are in education and thus very less time is devoted to such activities. Also the opportunity cost of grazing cattle by the high collar job holders are more and hence there is less incentive in rearing cattle. In Laitjem only 23 pigs are recorded. However, maximum number of cattle is reared in Mawlangkhar and followed by Sohiong, which is an indication of deep dependence on neighbouring forest resources of Mawlangkhar.

**Table-8.13**  
**Distribution of Family Members of the Cultivator Headed Families in the**  
**Sample Villages (in Percentage)**

Village	Permanent (1)	Shifting (2)	Both (1+2)	None-of these
Laitjem	20.00	17.50	22.50	40.00
Mawtawar	17.50	5.00	0.00	77.50
Sohiong	37.50	17.50	30.00	15.00
Mawlangkhar	55.00	0.00	35.00	10.00

Source: Compiled from the field survey

Earlier we had seen that maximum families in Sohiong and Mawlangkhar are cultivators (in table-8.7). Both permanent and shifting cultivation have been practised by the villagers, which is shown in table-8.13. Rice is grown in the field especially by those practising permanent cultivation, whereas in shifting cultivation, besides the main crops of rice and maize, other crops such as vegetables, millets, potatoes, sweet potatoes, pulses, chillies, ginger, cabbage, cauliflower and many others are also grown. Table-8.13 also shows that 30 per cent and 35 per cent of the cultivator headed families in Sohiong and Mawlangkhar respectively follow both shifting and settled cultivation. Now many are following permanent cultivation due to lack of forest



resources and that is compounded by the rising population though the productivity is still lower because of non-application of modern inputs. The non-of these, here indicate the children or very old people of the cultivator headed families and to those who are engaged in raising orchids, other plantations or in small business etc.

**Table-8.14**

**Distribution of Families According to Ownership of Land they use (in Percentage)**

Village	Own Land	Community Land	Other Private Land	Own & Other Private Land Both	Other Land
Laitjem	19.44	8.33	58.33	2.78	11.11
Mawtawar	2.78	22.22	69.44	5.56	00.00
Sohiong	16.22	32.43	48.65	2.70	00.00
Mawlangkhar	32.26	00.00	54.84	12.90	00.00

Source: Compiled from the field survey

Distribution of families according to ownership of land is presented in table-8.14. It is noticed that 19.44 per cent of families in Laitjem have their own land for settled cultivation and other purposes and the rest of the people are using community land (8.33%), other private individual land (58.33%) and other land not included in the above category (11.11%). Only 2.78 per cent family use both own and other private land. In Mawtawar, only 2.78 per cent of the people own land, 22.22 per cent uses community land and 69.44 per cent enjoys other private land and 5.56 per cent use both types of land. In Sohiong, 16.22 per cent of the inhabitants have their own land and 32.43 per cent depend on the community or clan land and 48.65 per cent encroach to other private individual land, whereas in Mawlangkhar 32.26 per cent of the people are owning land and 54.84 per cent depend on other private land, 12.90 per cent use both and nobody is found to use community land as there is no community land in this village.

Based on the reply by the people of these villages, it is observed that most of the people in Laitjem agree that in-migration has taken place in that village during last 15 years (because it is nearer to town, though it is also a poor village) from interior

villages for business, cultivation or joining as daily labourer due to lack of sustenance in their native villages. The crisis in the migrants' original village has been due to population growth and simultaneous fall in availability of forest resource (table-8.15). Out-migration of the people in Mawtawar is nil and 100.00 per cent of the people agree that in-migration has been there from interior villages to have opportunities in neighbouring town and other reasons mentioned above. Also 77.50 per cent of the people in Sohiong informed that the people from the village migrated to other parts of the state in search of job and employment opportunities and 85.00 percent of the people in Mawlangkhar are migrated to urban areas and centres for accessing better unskilled job and facilities to improve their standard of living. However, no inmigration has been reported by the respondents of this village. Some people of Sohiong and Mawlangkhar are reluctant to say anything about it. It indicates that the people of Mawlangkhar, who are very poor and due to large family size (hence rising population over time); intensity of dependence on forest increase but income drawn from forest declining and hence people forced to go to other relatively developed or virgin forest areas for the survival.

**Table-8.15**

**Distribution of Families According to their Response on Migration within last Fifteen Years due to forest related reasons (in Percentage)**

Village	Out-migration	In-migration
Laitjem	2.50	97.50
Mawtawar	0.00	100.00
Sohiong	77.50	12.50
Mawlangkhar	85.00	0.00

Source: Compiled from the field survey

From the comparison of tables we find that people of poorer village earn relatively more from forest. However, people of village adjacent to town or having more timber industries also harvest forest and both for sustenance and commercial activities and hence intensify the process of degradation. Though major fuel source in

all the villages is firewood, in the distant village intensity of fuel-wood use is relatively more due to lack of alternative energy resources. For the cultivation or harvesting of forest materials people of all the villages depend both on personal, community and other private land. Government forest land is very less in these areas. To explain the relationship between education, income (poverty) etc on population growth from micro level data or to examine the specific impacts of education, family size, income etc on the dependence of families on forest resources for specific purposes (such as fuel wood collection, earning etc), regression method is followed and explained in the next part.

### 8.6: Regression Result

Here simple linear regression is followed and though education, family size, job status are supposed to be correlated we find no significant correlation among them except between job status and education or family size and income, which is presented in the two-way correlation table-8.16. Hence in some equations we exclude job status or consider only average schooling of the adults' only and record changes in parameters but no significant changes in result is observed.

**Table-8.16**  
**Two-Way Correlation Table**

	<b>Average Schooling</b>	<b>Monthly Family Income</b>	<b>Distance from Town</b>	<b>Land Ownership</b>	<b>Job Status</b>	<b>Family Size</b>	<b>No. of Saw Mill</b>
<b>Average Schooling</b>	1	.0508	-.307	-.0556	-.516	-.1046	<b>.0057</b>
<b>Monthly Family Income</b>		1	-.1989	-.2752	.0785	-.539	<b>-.0709</b>
<b>Distance from Town</b>			1	.0703	.2669	.14232	<b>00</b>
<b>Land Ownership</b>				1	-.0277	-.017	<b>.02009</b>
<b>Job Status</b>					1	.0905	<b>-.02913</b>
<b>Family Size</b>						1	<b>-.01581</b>

Source: Compiled from the field survey

The result obtained by simple linear regression is presented below:

$$\begin{aligned}
 1. \text{FW} &= 0.3316 - 0.078 \text{EDU} - 0.0003 \text{FI}^* + .0521 \text{FSIZE}^* - 0.03125 \text{JOB} \\
 &\quad (-.668) \quad (-1.75) \quad (3.76) \quad (-1.077) \\
 &\quad + 0.1735 \text{LAND}^* + 0.1833 \text{D}^* \\
 &\quad (1.984) \quad (2.42) \quad \underline{R^2 = 0.281, n = 160, df. = 153} \\
 \\
 2. \text{INF} &= 0.072 + 0.0171 \text{EDU} - 0.00012 \text{FI}^* + 0.00502 \text{FSIZE}^* - 0.009 \text{JOB}^* \\
 &\quad (.822) \quad (-4.13) \quad (2.03) \quad (-1.75) \\
 &\quad + 0.0111 \text{LAND} + 0.064 \text{D}^* \\
 &\quad (.7192) \quad (4.78) \quad \underline{R^2 = 0.32, n = 160, df. = 153}
 \end{aligned}$$

**Note:**

{Here FW=Fuel-wood, INF= percentage of family income earned due to forest resources, EDU=Average Schooling, FI=Monthly Family Income, FSIZE=Family Size, JOB=Job Status, LAND=Land Ownership, D = Distance of Village from the nearest town, df indicates the degrees of freedom, figures in the parentheses are the t-values and \* and \*\* indicate that the coefficient is significant at 5 and 10 per cent level of significance respectively}. [Average schooling index per family is calculated in the following way. First we have assigned values 0 for illiterate, 1 for literate but less than secondary passed, 2 for secondary but less than higher secondary, 3 for higher secondary but less than graduate and 4 for graduate and above. After assigning the values for each individual we added to get aggregate value of each family and then dividing by the family size we estimated average schooling index. Similarly the education index for the adults is constructed. For job status, we have put 1 for service, 2 for agricultural labourer, 3 for cultivator, 4 for business and 5 for others. Normally we assume that more combined job status of families will have a negative impact on degradation. Though service holders have relatively less tendency to degrade but here we observe very few people who belong to that category.]

Incorporating the number of sawmills in the villages we find,

$$\begin{aligned}
 3. \text{INF} &= 0.12 - 0.0076 \text{EDU} - 0.00012 \text{FI}^* + 0.005 \text{FSIZE}^* - 0.0082 \text{JOB}^* \\
 &\quad (.38) \quad (-4.19) \quad (2.024) \quad (-1.714) \\
 &\quad + 0.011 \text{LAND} + 0.0602 \text{D}^* - 0.014 \text{SM}^* \\
 &\quad (.75) \quad (4.81) \quad (-4.94) ; \underline{R^2 = 0.402, n = 160, df. = 152}
 \end{aligned}$$

Considering only the average schooling of the adult members and leaving job status of the head of the families we get,

$$\begin{aligned}
4. \text{ INF} = & 0.089 - 0.0019 \text{ EDU(Adult)} - 0.00011 \text{ FI}^* + 0.0043 \text{ FSIZE}^* \\
& (-0.2075) \quad \quad \quad (-4.43) \quad \quad \quad (1.65) \\
& + 0.011 \text{ LAND} + 0.064 \text{ D}^* - 0.014 \text{ SM}^* \\
& (.754) \quad \quad \quad (5.15) \quad \quad \quad (-4.97) \quad ; \underline{R^2 = 0.3892, n = 160, df. = 153}
\end{aligned}$$

Considering job status of the head of household and leaving number of sawmills we get,

$$\begin{aligned}
5. \text{ INF} = & 0.078 - 0.0029 \text{ EDU(Adult)} - 0.00011 \text{ FI}^* + 0.0045 \text{ FSIZE}^{**} - 0.0086 \text{ JOB}^* \\
& (-0.306) \quad \quad \quad (-4.155) \quad \quad \quad (1.61) \quad \quad \quad (-1.671) \\
& + 0.0116 \text{ LAND} + 0.061 \text{ D}^* \\
& (0.75) \quad \quad \quad (4.56) \quad \quad \quad \underline{R^2 = 0.32, n = 160, df. = 153}
\end{aligned}$$

The result indicates that there is very insignificant impact of education on the collection of fuel-wood or percentage of income earned from forest. Actually there is high degree variation in educational level and a very few are educated in the sample villages. Moreover the villagers are poor and hence human development level is also low. The incidence of poverty and lack of other opportunity push them towards forest resources and more so if it is common. Both, collection of fuel-wood and earning from forest are significantly positively affected by family size and negatively related to total family income. Better job opportunity is also negatively related to dependence of people on forest.

Larger family size means more requirements and thus it intensifies harvesting of forest. Moreover we have seen the low educated, relatively poor village has relatively larger family size and hence dependence is more. The negative coefficient of FI indicates that the affluent people will be less dependent on forest. It does not mean that they do not use forest resource. What it indicates is that they devote less time for harvesting forest due to the high opportunity cost of their time. Rather they collect fuel-wood, charcoal and other items from the other people as in the interior villages LPG and other fuel is not available. Also they find some locally collected

items cheaper than at town and hence many of the items available in the nearby forest also find place in their daily menu though the percentage is less for the rich.

Though from the over all sample villages we find inverse relation between income and extraction of forest resource, in one village (Mawlangkhar) we observed average income of the people who extract forest is more than who do not. Actually in that village (which is also far away from town/business centre) forest and agriculture together constitutes the main occupation due to lack of other opportunities. Hence those who collect more they earn more. Moreover, a very few people own land (31 family out of 160 in total) and thus forest and hence they harvest commercially though on a limited scale and their income is therefore much more than the others in that village. That is why the distance here has significantly positive impact on collection of fuel-wood and contribution of forest to family income. Though there is limited commercial activity, it is one of their main earning sources. However, presence of sawmill (some of which are closed now) has negative impact on the percentage of earning from forest. Actually, sawmill are run through large scale commercial extraction of timber, but that is of private forest of the owners in many cases or if community forest then it provides revenue mainly to those who have better access and control over power to use it. The general poor families extract mainly for survival.

### **8.7: Conclusion**

From the correlation table-8.1 and flow-chart-8.2 as well as the regression output of the primary data we can argue and conclude that population growth where technology and industrial development is very poor in the state like Meghalaya, has significantly positive impact on the rate of extraction of forest resources either for

fuel-wood or consumption or generating revenue. The correlation between district-wise variation in population growth and per capita Net District Domestic Product during 1993 to 2000 was significantly negative but correlation of variation in population growth with that of rural literacy rate is insignificant (here we have considered only rural literacy as more than 80 per cent of population in Meghalaya are rural. Though rising educational level is expected to raise the capacity to earn more and reduce demand for more children, and also raise awareness about the need for judicious use and preservation of forest; just mere variation in literacy is not enough and more so if the area suffers from high degree of poverty. The poorer even if little educated is expected to prefer more children for their future insurance and also to extract forest resources for survival where there is no other major source of sustenance (Goodstein, 1999, Pp. 429-460). However, educated people may try to better manage forest resource for their survival. But that is not possible unless property right of those people is secured.

Poverty level in the state has not been reduced significantly relative to other states, which is clear from the over time lowering of position at all India ranking in poverty as well as human development as explained in Chapter-5.

Forest is the source of a part of income and survival of those living around it. So pattern of cooking fuel, cattle rearing and other consumption habits and thus quality of life is also partly shaped by the availability of forest resources. Also a few people earn substantial income from timber collection and that is expedited if there is better access and timber industry is there in and around the village. Even though some of the families who do not collect forest resources by themselves, forest resources become a part of their daily uses. They collect those from the others who collect such materials and sell, as these are relatively cheaper than their substitutes in the villages

and more so when alternatives are not available. So, the relatively better off families also save a part of their income due to availability of forest resources.

From the regression results, we observe rising income has significantly negative impact on the fuel-wood or percentage of income collected by the families from the forest and thus their dependence at the micro level. However, land holding has positive relation with the rate of fuel-wood extraction. One may think that larger the land holding means better economic condition of the family and hence less dependence and hence degradation. But, here whatever the bigger landowners earn is actually from the use of their agricultural land or forest land in the absence of any other opportunity and thus a direct impact on the forest. But the impact on percentage of earning from forest of land holding is not significant. Though at the individual household level, rising income is inversely related to the degradation of forest, from correlation table we observe, the more the contribution of forest, with other things remaining identical (technology, productivity of other sector etc) the faster will be the NSDP growth. It means the area or district that has higher potential for extraction of forest resource, observes better growth of income. So in that case, it is essential to main a good quality forest for the sustainable growth of the economy. Therefore, although in general rising income is supposed to be associated with the reduction in dependence on forest, in the interior villages without alternative opportunity except farming and where forest is common, the income rises proportionately with extraction.

Collection of fuel-wood or other consumption items is positively associated with the family size, which is significant. Actually a smaller family can also extract more if they do it for commercial purposes or if their per capita consumption of such items is higher.



From the regression we also observe significantly positive impact of distance at family level on the fuel-wood extraction or percentage of income earned from the forest. This is because the families of the interior village have less scope of earning from other source and most of them are poor as we have seen from the collected data. Also, alternatives of fuel-wood are not available in the interior areas. However, comparing the four villages on personal observation we find that the village adjacent to town or having saw-mill observes more degradation, which has been mainly due to the large scale commercial harvesting in the earlier years. Hence now people of that village is relatively less dependent on forest as less resource is available and alternative source of income is there either in nearby town or developed within the village.

Moreover, distance of villagers' from the nearby forest affect negatively the amount of collection as more distance requires more time and manpower to collect the same. But here most of the families in all four villages except a few in Mawtawar are located within forest area and thus we have not considered it in our regression as another explanatory variable.

Also though people of Mawlangkhar are highly dependent on forest but degradation (from personal observation) is less as they use forest mainly for subsistence but place like Mawtawar where marketing is the primary consideration degradation is rapid. So even with identical population pressure degradation can be more if extraction is for commercial purposes.

Finally we can say that the best way to preserve forest and improve the condition of the people is to improve economic condition of the people through education and technological development, suitable cultivation approach and also to follow a judicious land use pattern so as to maintain the forest resource and its

productivity, which in turn provide sustainable sustenance to the people and also improve the condition of the poorer. Participatory management has been advocated by many and thus became an alternative option for this. Moreover, education would help in controlling family size and thus population and raise the efficiency and productivity of the people and lead to better management of forest resource that would avail them sustainable benefit. Though good connectivity with the remote areas enhance the chance of commercial extraction, it can help reaching alternative fuel to the interior, increase scope of education and other opportunities to the interior people. If that is associated with simultaneous effort on social forestry, farm forestry, eco-tourism etc then it can help better management of forest. The harvesting should not be stopped as peoples' economic condition is highly dependent on forest. Rather a scientific and judicious approach can help improving living conditions of local people or standard of local economy as well as better forest areas.

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## **Chapter 9**

### **Conclusion and Policy Implication**

#### **9.1: Summary of Findings**

Population is an important factor in determining the level and growth of an economy. On the one hand it determines the supply of labour force whose quality of course depends on the achievement in education, health care, technical know-how etc. Also, rising population and labour force can help in growth of output and income only if there is no dearth of resources to gainfully employ and the production units are on a suboptimal level. But if the economy fails to employ the rising work force and there is limitation of resources or human being fails to raise new resource through research and development then the growth of economy will be limited to the carrying capacity and unemployment will increase. In that case market will also fail resolve the problem. If the consumption pattern and technology remain unchanged then rising population create more demand for food, shelter, educational facilities, health care facilities, housing facilities and thus more drain on natural resources like that of land, water, mineral, forest, etc. Along with that, if per capita consumption also rises over time, it expedites the process of degradation of natural resources.

In Meghalaya we observe substantial growth of population during last few decades, which is associated with high degree of inter-district variation in growth rate. Since 1971, the growth rate of population in the state has always been higher than the national average growth rate. The highest growth rate in the state has been recorded during the period of 1981-91 (32.86 per cent). The annual exponential growth rate has been above 2 per cent since 1971. Among the North Eastern states the growth has



been lower than Nagaland, Mizoram and Arunachal Pradesh but higher than the other North Eastern states. The density also has been enormously increased from merely 45 persons per square kilometre in 1971 to 103 persons per square kilometre in 2001. But still now the density is much lower than the national average. There is high degree of inter-district disparity in density and growth of population. It is the highest in East Khasi Hills and followed by West Khasi Hills due to more facilities and urbanisation. The sex ratio also has been found to be higher than the sex ratio of the country as a whole since 1971. The proportion of female in the children age group has also increased over time, leading to an increase in over all sex ratio. This is in conformity with the matrilineal society in Meghalaya (mentioned in chapter-4). Also percentage of people in the working age group has increased over time. But there has been no significant development in industrial sector. Hence there has been a rise in pressure on primary and tertiary sector. Also work participation rate for that group has declined due to lack of rise in opportunities.

The literacy rate has been rising but still remains much lower than that of the national average. This is perhaps due to the non-availability of educational facilities to most of the people in the state especially those who are settled in the rural areas (more than 80 per cent). Still now most of the people are cultivators and agricultural labourer. Among the cultivators especially in rural areas, percentage of female has increased over time and also in urban other informal activities percentage of female is very high. Because of lack of industrial progress according to the need of rising population and work force, dependence on primary and tertiary sector has increased. Though there has been shift of workforce from primary to tertiary sector in percentage term during last few decades, due to rise in population and thereby demand for food, fodder, timber etc pressure on agriculture increased manifold. But productivity of

agriculture has not increased at the desired rate and thus per capita production of food grain declined over time. The result is more expansion of agriculture to even hilly slopes at the cost of forestland (net sown area has been increased) and that also raises intensity of soil erosion. So there has been an increase in pressure on natural resources, especially mineral and forest. As minerals are mostly under private ownership (and hence not accessible to many common people) and there is open access to forest in many cases, stress on forest has increased steadily. These changes thus have been associated with rising extraction of forest resources and thereby adversely affecting the productivity of forest and also the economy of those, who depend more on forest; leading to an increase in the incidence of poverty, which furthered the degradation of forests in the state of Meghalaya.

The state has been suffering from large-scale poverty especially in the rural areas. Though over time poverty has been declining, the rate of decline is much slower than the national level reduction. Also we find great divergence in rural and urban reduction in incidence of poverty. During the last three decades, reduction in poverty in urban area has taken place at a rapid rate even more than the national level whereas rural poverty has not declined significantly, which is also associated with high inter-district variation. Thus in spite of several direct poverty alleviation and employment generation programmes initiated in India and particularly in the state of Meghalaya, the state has not been able to reduce poverty, unemployment or underemployment significantly as compared to other states of India, which is clear from the over time lowering of all India ranking in human poverty as well as human development. Still now about one-third of the population in the state is living below the poverty line. Though poverty has been reduced substantially in the urban areas

compared to all India average; reduction in rural poverty has been very slow; which indicates the concentration of development programmes in the urban centres.

Rapid population growth has eaten up the fruits of the expected benefit and also the corruption in the bureaucracy to siphon off allocated money at the top level disallowed it to trickle down to the actual beneficiaries and hence reduced the overall economic progress and development of the state. Moreover, the amount of allocation is also not sufficient as the cost of any project is much more in Meghalaya than in the plain areas. Also because of poor infrastructure and lack of monitoring, many of these programmes have not reached in time to the villagers and works have been mostly concentrated in town and its nearby areas. Moreover, due to lack of information and ignorance the rural poorer cannot create pressure (political and social) on the authorities and loose the access to such benefits. The banking system and financial institutions are also increasingly becoming less interested to advance through various poverty alleviation and employment generation programmes due to poor recovery experienced earlier.

Also rapid growth of population has increased the pressure on land. Expansion of agriculture, cattle population, infrastructure demand, etc. has resulted to the loss of areas under forest cover in the state. Soil erosion and degradation of forests was intensified further. Therefore, incentives for long term management of natural resources, especially forest is still absent in Meghalaya, as people are still highly dependent on it. The degraded forest resources in turn, affecting the labour productivity of the poor and thus the productivity of the natural resources, including forest on which they act upon. Thus in Meghalaya we find a closely linked and self-perpetuating negative spiral in which poverty accelerates environmental degradation and degradation results in further poverty.

The degradation of forest cover in the entire North-Eastern Region during the period of 1990s was at an alarming rate and that was highly associated with the inter-state variation (explained in chapter-6). The degradation has been more in the open and unclassified forest areas. In Meghalaya the rate of degradation of forest was the highest in the district of East Khasi Hills, followed by West Khasi Hills and Jaiñtia Hills districts. Here the degradation is primarily because of the rapid growth of population coupled with the high incidence of poverty especially in rural areas. The results show how the per capita forest cover changed over time and it is found that the state having higher rate of population growth observed larger reduction in per capita forest cover and vice versa. In spite of low population density in the region, the forest cover in North East India has shown consistently decreasing trend during 1991 to 2001, whereas even in comparatively more densely populated states like West Bengal and Haryana, forest cover has increased during 1990s because of awareness among the people and also of successful campaign. Moreover, the economic activities are mostly based on the forest resources as there are very limited other industrial activities in the region. Though due to Supreme Court ban (1997) on the felling of trees some of saw mills have been closed, still illegal felling has been continued in the state of Meghalaya for the survival of the poor people and the continued logging business activities that are carried out by the richer section of the people and also supported by the corrupted bureaucrats. Recently, the local authorities are also allowing extraction of forest on a limited scale in order to tackle the problem of rising unemployment and sustenance of the people and hence many of the closed sawmills have started operating again. The forest based small-scale industries in the state of Meghalaya has also increased from 131 in 1986-87 to 943 in 2004-05. The raw materials demanded or supplied to these industries resulted to the loss of forest

resources in the state. However, at the same time it provides job and employment opportunities to the rural poor.

At the same time, rising population has increased the requirement of land for cultivation in the state of Meghalaya for meeting the rising needs of the growing people. Thus the area under cultivation has increased from 30 thousand hectares in 1976-77 to 193 thousand hectares in 1985-86 and then further to 207 thousand hectares in 1997-98. This increase has been largely at the cost of forest area. Per capita forest area in Meghalaya was 0.84 hectare in early 1970s, which decreased significantly to 0.53 hectare in early nineties and then further to 0.41 in 1999 i.e., it reduced by more than 50 percent during three decades. The percentage of main workers engaged in forestry, logging, fishing, plantation, orchards etc. increased from 2.66 in 1971 to 6.39 in 1991. Also the number of livestock population including cattle, buffaloes, pigs, goats, sheep, horses and ponies has increased manifold as shown in chapter-7. Therefore, there was a sharp increase in pressure on pastureland by over 104 per cent during 1972 to 2003.

Thus, in Meghalaya, the forest resources have been threatened due to overgrazing, household and commercial uses, illegal encroachment, unsustainable practices like unscientific cultivation (shifting cultivation) and growing demand for development activities. Excessive fuel-wood collection, indiscriminate felling of trees for timber needs, inadequate natural regeneration has also threatened the rich biological diversity of the state. The ownership pattern and the system of management have also been partly responsible for the degradation of forests in Meghalaya. Many of the forests in the state are owned by the private individuals. But due to poor maintenance most of those forests in the state have also been destroyed. At the same time, forest policy also is not implemented properly, leading to the misuse of these

resources by the people. Although JFM have been implemented in some states of North East, particularly in Tripura, Arunachal Pradesh, Assam, Mizoram and Nagaland, its implementation in the region has been very slow. The states of Manipur and Meghalaya are yet to make any mark on this aspect.

Finally, on consideration of the level of economic development and complex social and political linkages, the state of Meghalaya is faced with immense and consequential environmental problems. Its prevention has become more of its necessity and a compulsion than a mere initiative. From the rising number and percentage of main workers engaged in forestry and allied activities, rising forest based industries and employment thereof as well as rising quantity of triennial total outturn of forest produce, it is clear that forest has always played an important role in the socio-economic life of the people in Meghalaya. However, over time with the growth of the economy along with growing population and persistence poverty, percentage contribution of forest to the economy has declined, which has been largely due to the large scale decline in quality and productivity of forest (even harvesting of larger area does not yield proportionate increase in output; also per capita forest has declined as has been identified in chapter-6) and also partly due to rising availability of other alternative opportunities. Also the contribution to the economy has been associated with the wide inter-district variation, due to differences in the pattern of degradation and availability of forest resources.

It is very difficult to have an idea about the total contribution of forest to the state's income and employment and also the implication of forest to the majority of people especially the poorer, which are highly dependent on forest product for their livelihood, as many of these poor people are attached to the forest life and derive their daily sustenance. Therefore, analysis of consumption and livelihood pattern of those

people with various categories of income (that better explain the dependence of those people on the forest and forest based products) was undertaken with help of household level primarily collected data to explain the linkage.

The regression results also indicate that there is very insignificant impact of education on the collection of fuel-wood or percentage of income earned from forest. Actually there is high degree variation in educational level and a very few are educated in the sample villages. Moreover the villagers are poor and hence human development level is also low. The incidence of poverty and lack of other opportunity push them towards forest resource and more so if it is common. Both fuel-wood collection and earning from forest, is significantly positively related to family size and negatively related to total family income. It is also observed that better job opportunity is negatively related to dependence of people on forest. Larger family size also means more requirements and thus it intensifies harvesting of forest. The results show that the low educated, relatively poor village has relatively larger family size and hence dependence on forest is more. Collection of fuel-wood or other consumption items is positively associated with the family size, which is significant. Actually a smaller family can also extract more if they do it for commercial purposes or if their per capita consumption of such items is higher. The negative coefficient of family income in the regression analysis indicates that the affluent people will be less dependent on forest. However, it does not mean that they do not use forest resources. What it indicates is that the richer devote less time for harvesting forest due to the high opportunity cost of their time or because of social position. Rather they collect fuel-wood, charcoal and other items from the other people as in the interior villages where LPG and other fuel are not available. Also they find some locally collected items cheaper than at town and hence many of the items available in the nearby forest

also find place in their daily menu though the percentage is less for the rich. By this the rich people in the interior village also can save a part of their income due to availability of cheap forest resource.

From the sample villages we find inverse relation between income and extraction of forest resource. Also, we observed average income of the people who extract forest resources in the poorest village is more than who do not. Actually in the village (Mawlangkhar), which is far away from town/business centre, forest and agriculture together constitutes the main occupation due to lack of other opportunities. Hence those who collect more they earn more. Moreover, a very few households own land and forest and hence they harvest commercially though on a limited scale and their income is much more than the others in that village. The distance from town or main commercial also has significantly positive impact on collection of fuel-wood and contribution of forest to family income. Though there is limited commercial activity, it is one of their main earning sources.

Forest is the source of a part of income and survival of those people living around it. So pattern of cooking fuel, cattle rearing and other consumption habits and thus quality of life is also partly shaped by the availability of forest resources. Also a few people earn substantial income from timber collection and that is expedited if there is better access and timber industry.

It is observed that the correlation between district-wise population growth and per capita Net District Domestic Product during 1993 to 2000 was -0.46 but correlation with literacy rate is insignificant. Though rising educational level is expected to raise the capacity to earn more and reduce demand for more children, just mere variation in literacy is not enough and more so if there is high degree of poverty. The poorer is expected to prefer more children, who can extend hands in their family



works and provide insurance to their parents at the old age. Poverty level in the state has not been reduced significantly relative to other states of India.

Though improvement in education is expected to raise scope of income and help better understanding of resource management, if people suffer from chronic poverty, little improvement in education cannot provide much scope for reduction in pressure on forest. However, people may try to better manage forest resource for their survival. But that is not possible unless those people have the property and thus resource security.

## **9.2: Conclusion and Policy Implication**

Rapid growth of population is the cause as well as consequence of poverty and environmental degradation. This has been observed in the state of Meghalaya especially in rural areas with the help of primary data. The linkages between population, poverty and environment, especially forest resources are also associated with many other critical issues including scattered and poor development, inequality in income and resource ownership, property right problem, technological barrier and government policies. The downward spiral of poverty and environmental degradation is a waste of opportunities and of resources. In particular, it is not merely the size of population, but also the consumption pattern, that determines the nature of extraction and degradation of forest. Also in case of management, it is the quality of population i.e., human resource; whose deficiency is prominent in Meghalaya and leading to mismanagement of forest resources. Lack of educational facilities such as formal and informal education, training to raise awareness, information dissemination, communication, are vital to combat environmental degradation and to eradicate the problem of poverty. Policy intervention and respond strategies to reduce poverty

through sustainable management of ecosystems and ecosystem services should be developed in a proper way and also to explore and promote innovative actions to eradicate poverty and to regenerate the resources. The challenge is to identify measures at national and local levels; especially in the state of Meghalaya so that it will help the communities build better institution and partnerships with the poor people. Also the awareness among the people in rural as well as in urban areas of the state may help reducing population growth, incidence of poverty as well the environmental degradation or the degradation of forests and thus achieving the sustainability of development of the state economy.

The wasteful and destructive production and consumption pattern of certain sections (richer section) of the people needs to be regulated. The production of agriculture and other goods for export, which affects internal food supply for the subsistence of poor people, also need to be taken care. Therefore, collective, private and public institutions and government policies play a vital role in determining how rapid growth of population, poverty and the degradation of forests affect the environment.

The critical problem of the state is the cycle of population growth, the vicious circle of poverty and resources degradation. In addition to human degradation, this cycle degrades and threatens to exhaust the renewable resources on which the local people depend. Thus, development and environmental goals are inextricably linked; development that alleviates poverty is essential, if renewable resources, especially the common property resources and sustainable livelihoods for a large section of the population are to be preserved. But if it is not designed in a proper way, it will affect the developmental goals of the economy of the state.

Persistent poverty continues to hinder the implementation of population

controlling measures and accelerate the process of degradation of forests, land and soil. Environmental degradation, in turn, lessens the labour productivity of the poor and the productivity of the natural resources they manage. The population policy thus should not be confined to family planning only because they are affected by other factors also. The best agreement for family planning and environmental protection is that both are critical to sustainable development and thus should go hand in glove along with the external efforts to remove poverty, improve human quality and productivity of resources.

Rapid growth of population and simultaneous rise in aspiration levels have added substantially to rising pressure on the environment and to reduce the major impact on the forest, other facilities such as easy availability of cooking gas and alternative to forest based, building materials may be provided to the growing population especially to poorer at subsidised rate so as to reduce the stress on the environment. Reduced poverty contributes to a healthy civil society, democracy and greater social stability. Although the poor people being too weak are not a source of rebellion but gross inequalities lead to social conflict and disturbances. Thus to eradicate the poverty it is essential to increase human development, increase productivity, reduce human re-productivity; lower the family size that finally would reduce the stress on the environment. We have seen that growth of population; poverty, etc. have an adverse impact on the development of the economy and population and poverty move in the same direction and so also the impact on the environment or forest and hence the breaking of vicious linkage is essential to accelerate the pace of development.

However, the right enjoyed by the people especially the poorer should be fully protected, as they are highly dependent on it. Their domestic requirements of

fuelwood, fodder, minor forest produce and construction timber should be the first charge on forest produce. However, it is essential to incorporate such dependence in the policy formulation and take account of environmental and forest resource changes in the measurement of development aspect. This requires a major shift in the thinking, a careful policy formulation and designing of an appropriate framework to safeguard the natural resources especially common forest resources for promoting sustainable development of the economy of the state.

Finally, we can say that the best way to preserve forest and improve the condition of the people in the state is to improve the economic condition and development of the economy through education, technological development and suitable cultivation approach and also to follow a judicious land use pattern so as to maintain the forest resource and its productivity. This will provide sustainable sustenance to the poor people and also improve their condition and standard of living. Moreover, education would help in controlling family size and thus population and raise the efficiency and productivity of the people and also lead to better management of forest resource that would avail them sustainable development and benefit. Still now, there is no record of land holding by the people of Meghalaya, which is also important to know the level of inequality of land distribution among the families, especially in rural areas. This is because, land especially forest land is the main source of revenue of many families and therefore unless land is measured and recorded it is very difficult to ensure protection of ownership or taking care of it in the policy formulation.

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