CHAPTER I

INTRODUCTION

1.1 Natural Resources and Development

The existing literature on the theories and models of economic development has duly recognised the vital role of natural resources besides human and capital resources in the process of a nation's economic growth. Classical Economists recognised the dynamic and distinctive contribution of natural resources to the development process (Higgins 1966:87)*. Though the modern models of development do not attach preponderant importance to natural resources, they do recognise the fact that natural resources are a necessary, if not a sufficient, condition for progress (Hodder 1971:8). Soils, minerals, forests and power - solar, wind and water - are the natural resources which facilitate the process of development (Sahu 1986:1).

The experiences of developed countries also confirm the role of natural resources in developmental activities. For instance, abundant natural resources have helped North America to develop into a superpower within three centuries and England has also attained its pre-eminent position through the use of its natural resources. In fact, development in all advanced countries is based

*Throughout the thesis the convention of paranthetical documentation has been observed. A consolidated bibliography is given at the end of the thesis.
on a significant degree of exploitation of the non-renewable and exhaustible resources of non-European lands (Randall 1987:6). Even countries with sufficient capital and human resources have to depend on natural resources for development. The continued progress of such countries depends on substantial changes on the basis of the economic activity like the rate of technical innovation and the sustainability of capital for exhaustible resources.

The Indian experience also shows that human survival has been made possible by the direct utilisation of common natural resources (Jodha 1986:27). For instance, a novel attempt has been made to use locally available natural resources for improving the level of living and the purchasing power of the people. The Gandhian ideology of sustained development without overexploitation of natural resources showed a good strategy for economic development (Chowdry 1989:1). Thus, it is clear that the sustainable management of natural resources holds the key to development, prosperity and good quality of life, and a good common future (Anon 1990:11).

1.2 Forests in the Global Context

Forests form an important and integral component of natural resources. In fact, forests represent a complex form of vegetation on the earth's surface and, if left undisturbed, are a dominant feature of the landscape. Forests cover about 31 per cent of the world's land surface (Sedjo and Marion Clawson 1984:144), and have contributed
much to man's comfort and enjoyment as well as to his economic development down the ages.

1.3 Economic Functions of Forests

Forests contribute to the well-being of mankind in several ways. They provide wood and other products to meet the domestic and industrial requirements of man. In 1980 the total world production of round wood was 11,71,766 cu.m. (Sedjo 1989), about 40 per cent of which was produced in the temperate regions of North America, Europe, the USSR and Oceania. It is estimated that forests worth about 1,15,500 million dollars are utilised annually in the world, and that more than 1,500 million people in developing countries depend on wood for fuel. Forestry provides a ready basis for the development of industries such as railway, housing, furniture, pulp and paper, rayon, fibre, packaging, particle boards, plywood, carved wooden articles, wooden utensils and safety matches (Pant 1986:376). The primary forest products contribute to a substantial income representing a significant element in the world economy.

The potential for employment generation in the forest sector is also considerable. Forestry and forest industries are estimated to provide employment to 17-18 million people. Millions of farmers derive their income from their wood lots or communities gain from their communal wood lands. Forestry, by providing employment and income, enhances the economic status of the vulnerable sections of society,
thereby contributing to their social amelioration. Thus, forestry influences the socio-economic life of the people.

Further, forests perform a number of protective functions which will ensure environmental and ecological stability. Forests and associated vegetation act as protecting covers which secure the maximum absorption of rainfall, regulate stream flow, and help to prevent flooding and silting. They help to improve the efficiency of water use in irrigation, and to ensure a steady supply of water to modern cities and industries. They provide against erosion and protect agriculture in adjoining areas. They can act as barriers against land falls and avalanches. Thus, the interaction between forests and the environment is great and this function of forests is now reckoned to be more important than their productive function.

In addition, forests also provide fodder for livestock and a habitat for wildlife. It is estimated that more than three million cattle depend on forests for grazing. Thus, forests indirectly help in the world's production of milk and meat. Forests provide areas for rest and restoration of life as well as contribute to the beauty of the landscape.

1.4 Forests in the Context of India's Development

In agriculture-based developing countries like India, forests occupy a place of pride and the economic and cultural life of the people for a long time have centred largely around forests. India
has about 75 m.ha. of forest land, which accounts for 50 per cent of the cultivated area and nearly 22.73 per cent of the total geographical area of the country. Forests have a growing stock of over 1,96,44,16,000 cu.m. the value of which, excluding its contribution to oxygen exudation, soil conservation, and environmental and ecological stability, was estimated at over Rs. 10,00,000 million at the 1983-84 price and the contribution of forestry to the Gross National Product (GNP) was 1.15 per cent (Pant 1986:378). The revenue from forestry was estimated at Rs.3,200 million, which constituted 1.71 per cent of the national income. The wood using industries paid about 0.90 per cent of all wages and salaries in India (Sharma 1980).

Forestry in India, as elsewhere, has conferred multiple benefits on the socio-economic life of the nation. The rapid growth of population, especially the urban population, and the constant rise in the per capita income have increased the timber requirements of the community. Construction of new houses and buildings, and industrial products also contribute to increase in timber demands, which can be met only from an increased production of forests. Hence, forest wood becomes a significant factor in the planned development of the country.

Forests have a potential for earning foreign exchange. India with its favourable climate, cheap labour and other factors, can produce industrial wood and package materials at much cheaper rates than it is possible in other countries, thus leading to an increase in India's exports which may help in redressing her adverse trade
balance. By helping import substitution, forests can reduce the pressure on the foreign exchange to the extent of Rs.50 million per year. If forests are properly developed, the country can meet its newsprint requirements, which would mean a considerable saving on foreign exchange.

Forests can also contribute to a faster industrialisation of the country, thereby helping diversification of the economy. Processing of forest products can start a chain reaction of establishing a number of supporting or complementary industries such as those using by-products. Further, forest products provide the scope for establishing small units which play a crucial role in the development of the country. Thus, the growth of forests has a marked impact on the industrial development of the country.

Moreover, forests contribute to higher agricultural production in many ways. In protecting the land against the evils of erosion, aridity and other climatic factors, forests help agricultural output. They regulate water supply, ensure a sustained feeding of springs, tend to contain violent floods, and make the flow of water in the rivers continuous. Absorption of excess agricultural labour by forestry can directly contribute to greater productivity and development.

Unemployment and poverty are the twin evils of Indian society. The agricultural sector in its present form cannot solve these problems and the forest sector provides an alternative solution.
Collection and processing of minor forest produce can provide seasonal employment to a large extent. This can relieve unemployment found among the unskilled and semi-skilled labour in rural areas. The effective and rational method of soil conservation, afforestation, intensive management and efficient utilisation of forest resources also create employment opportunities.

In addition, forest-based industries also have a vast employment potential. Most forest industries are labour-intensive thus, providing considerable employment in forest-related activities. It is estimated that forests provide daily employment to about 15 lakh persons, engaged as woodcutters, sawyers, carters, carriers, craftsmen and so on.

Forests also happen to be the homes of India's submerged humanity, namely, the tribals numbering about 40 lakhs. They are ecologically and economically a part and parcel of the forest environment. Forests provide fodder for about 180 million cattle, 60 million buffaloes and 120 million other livestock. More than 500 types of animals live in the forests.

Moreover, forests and wood industries can provide additional new investment for industrial expansion and raising the standard of living. In other words, the contribution of forests to capital formation is also high when compared to agriculture, which is still subject to many uncertain factors.
Forests constitute an effective ecological unit and environmentally are of very vital significance. They influence local and regional climates by moderating them, maintaining the soil mantle, purifying the air, and helping a continuous flow of clean water (Mahajan 1981:57). Thus, forests provide enormous services through direct and indirect means for the betterment of human beings, and hence they should be preserved for our further benefit also.

1.5 Problem Setting

Forests in India stretch from the Tropical to the Alpine Zone on the one side and from the Dryscrub to the Evergreen type on the other. The Union Territory of Andaman and Nicobar Islands (ANI) occupies a special place in the forestry economy of India. Forests in these islands are unique in possessing great biological diversity. The reserved and protected forests cover 7,171 sq.kms., which constitutes 86 per cent of the total geographical area (8,293 sq.kms.) of the islands (Mathews 1983:61), and in this, ANI occupies a premier position in the whole country (Singh et al. 1987). For the entire nation, only 22.73 per cent of the total geographical area is under forests. Except for areas cleared for settlement and small islands making them bare or almost devoid of vegetation, the entire land area of the islands is covered from the sea coast to the hill tops with luxuriant lushgreen tropical rain forests.
Forests in these islands support more than 200 species of timber of which only 40 are recognised to be commercially usable. Forests generated 68 per cent of the State revenue and contributed 11 per cent to the State Domestic Product (SDP) in 1987-88 at current price, which was much higher than the contribution of forests in other States and Union Territories of India. The contribution of forests to the local economy of ANI is substantial in terms of its economic and ecological benefits too.

The socio-economic life of the tribals is to a large extent linked with the development of forests. In view of the multifarious linkages between forests and the ANI economy, the Government has paid considerable attention to the development of forests-based on the forest policy of India (1952). Thanks to this policy and widespread forest management practices, the growth of forests has been exerting enormous influence on the life and environment of the Union Territory. In fact, forests have become the 'backbone' of ANI. However, this facet of ANI has not been brought home by experts or researchers.

Studies on ANI forests have been few and far between and mostly sketchy and explorative. They are of general nature and do not trace the process of growth of forests in this area. Some have discussed the flora and fauna of the forests while others have traced the history and aboriginals of these islands. The studies by NCAER (1963), FAO (1977), and the Government of India (1981) attempted to explore the existing forest resources in the Union Territory. Sahu et
al. (1986) highlighted the revenue contribution of forests while studies by Nair (1986) and Saldanha (1989) attempted a situation analysis of forests in ANI and offered solutions to make forests economically viable. Besides, Reddy (1982) and Samuel (1982) explored the ecological and transportation problems of the islands respectively.

Thus, the existing literature shows the inadequacy of research in this area compared to the contribution of the forests to the socio-economic betterment of the people and the economy of ANI. More specifically, no serious attempt has been made by economic researchers to analyse the extent of forest utilisation and its contribution to SDP, employment and income generation and consequently to socio-economic improvement and standard of living of the people of the region although there is great potential for empirical research in these areas. This study attempts to fill this void by exploring the important issues relating to the growth of forests and its impact vis-a-vis the forest policy of the Government.

More specifically, this study addresses itself to the following vital issues concerning the forests of ANI:

i) the extent of forest utilisation and the factors promoting or retarding it in the Union Territory;

ii) the magnitude of the financial contribution of forests to SDP and revenue - whether the revenue derived from forests is spent on forest development and how far forests have contributed to the
development of other sectors in the Territory - in other words, the forward and backward linkages;

iii) the degree of merchantability as measured by the trends in production, marketing and regeneration, and the policy of the Government in this regard;

iv) the contribution of forests to the socio-economic development of the locals and other dependants vis-à-vis the forest policy; and

v) the policy of the Government towards forest development and its management - whether the policy thrust has changed over time or remained invariant.

1.6 Objectives

In the light of the above issues, the present study attempts to focus on the following specific objectives:

i) to assess the trend and present status of utilisation of forest resources;

ii) to assess the contribution of forests to the overall development of Andaman's economy;

iii) to analyse the production and marketing structure of forestry and regeneration activities in the islands;

iv) to assess the impact of forests on the socio-economic conditions of the people; and

v) to analyse forest management practices and policy measures of the Government and to provide a perspective for the future.
1.7 Hypotheses

The problem chosen and the objectives specified helped to formulate the following hypotheses for empirical testing.

i) The rate of forest utilisation over the years shows a declining trend of forest cover (area under forests).

ii) Forests contribute to SDP, state revenue and the development of other infrastructural aspects of the economy. There are positive linkages between forest utilisation and the development of other sectors.

iii) The uneven utilisation of forests between different forest working divisions results in an inequitable outturn of forest products.

iv) While forest utilisation improves the socio-economic conditions of the local dependants, it also affects their environment.

v) Improvement in forest management depends largely upon policy initiatives and there is scope for further development.
1.8 METHODOLOGY

1.8.1 Data Base

1.8.1.1 Secondary Data

Both primary and secondary data were collected to accomplish the objectives of this study and to test formulated hypotheses. Since four-fifths of the objectives centred around published or official data, the study relied mainly on secondary sources. In order to collect the secondary data, various departments in ANI were approached. However, a major portion of the secondary data was collected mainly from the Forest Department and the Statistical Bureau of Andaman Administration. The secondary data collected for a period of four decades from 1950 to 1990 pertained to land utilisation, SDP and revenue derived from forests, employment, industrial growth, infrastructure, forestry products, disposal of logs and sawn timber, regeneration, plan allocation, and actual expenditure.

1.8.1.2 Primary Data and Sampling Procedure

With a view to assess the impact of forests on the people, primary data were collected from a sample of locals and forest dependants of ANI. The sampling procedure adopted is described below.

A stratified two-stage sampling design was adopted: the 1981 census village formed the first stage units and the households were the second stage units. Out of 86 villages and one town which
had a population of 500 or more persons (according to 1981 census), the study chose 53 villages and a town randomly (The list of villages selected is given in Appendix I). Since this study attempted to analyse the impact of forests on the migrated people (refuges, repatriates, and the settlers), the sample respondents were selected from the entire islands.

From the villages and town chosen, 225 respondents were selected randomly. The respondents were stratified into nine categories, namely, cultivators (32), agricultural labourers (7), livestock/forests/fishing (36), mining and quarry (11), manufacturing (27), construction (20), trade (11), transport (5), and other services (76). The number of respondents selected was in proportion to their ratio in the total work force.

1.8.2 Tools of Data Collection

Interview schedule was used to collect primary data from the sample respondents and documentary questionnaire was used to collect secondary data from the records maintained in the offices mentioned earlier. The interview schedule was pre-tested and some of questions which did not evoke responses from the respondents were deleted and the final schedule was prepared. The researcher met the respondents in person and collected information in the interview schedule, which was used to elicit the following information from the respondents: particulars of migration, age, education, housing
condition, size of family and dependency ratio, pattern of income, expenditure, savings and indebtedness, the nature of economic improvement after migration, the current problem and future plan, and the extent of dependency on forests. The relationship of respondents with forest officials and the impact of deforestation on the lifestyle of the people were also collected.

1.8.3 Tools of Analysis

The data thus collected were analysed with the help of statistical techniques, such as ratios, co-efficient of variation, and simple and multiple regression and growth rates - linear and compound. Further, diagrams and other statistical tools were also used in this study.

1.8.4 Models

The contribution of forestry to SDP was assessed with the help of the following function:

\[ SDP = f(FSDP) \quad \text{-------(1)} \]

In its linear form, function (1) becomes

\[ SDP = a_0 + a_1 FSDP + e \quad \text{-------(2)} \]

where,

SDP = State Domestic Product

FSDP = Contribution of Forestry to SDP

\( a_0 \) = The Regression Constant
\[ a_1 = \text{The Regression Co-efficient, and} \]
\[ e = \text{Error term} \]

Equation (2) helps to assess the general contribution of forestry to SDP. However, forestry contribution originates from the different products of forests and regeneration activities. The major forest produce, minor forest produce and regeneration exert varying influence on SDP. With a view to assess the relative roles of these factors, the following model was specified.

\[ \text{SDP} = f(\text{MP, mp, R}) \quad \text{-------(3)} \]

where,

\[ \text{SDP} = \text{State Domestic Product} \]
\[ \text{MP} = \text{Major Produce} \]
\[ \text{mp} = \text{Minor Produce, and} \]
\[ \text{R} = \text{Regeneration} \]

In its linear form, function (3) becomes

\[ \text{SDP} = a_0 + a_1 \text{MP} + a_2 \text{mp} + a_3 \text{R} + u \quad \text{----(4)} \]

where,

\[ a_0 = \text{Constant} \]
\[ a_1-a_3 = \text{Regression Co-efficients, and} \]
\[ u = \text{Error term} \]

The close relationship between forest revenue and state revenue was examined with the following function:
SR = f (FR)  

The linear form of function (5) is:

SR = $a_0 + a_1 FR + e$  

where,

SR = State Revenue
FR = Forest Revenue
$a_0$ = Regression Constant
$a_1$ = Regression Co-efficient, and
$e$ = Error term

The impact of forest revenue on the growth of the economy was assessed with the help of the following three functions:

SDP = f (e)  

$e = f (FR)$  

.. SDP = f (FR)

where,

SDP = State Domestic Product
$e$ = Revenue Expenditure, and
FR = Forest Revenue.

In their linear forms, functions 7 and 8 become

SDP = $a_0 + a_1 e + u$  

$e = b_0 + b_1 FR + u$

where $a_0$ and $b_0$ are constants

$a_1$ = Regression Co-efficient of 
- Expenditure
\( b_1 = \) Regression Co-efficient of Forest Revenue
\( u = \) Error term

The linear regression functions were estimated for 7 and 8. The direct influence of forest revenue on SDP was assessed from the products of regression co-efficients of expenditure and forest revenue \((a_1b_1)\).

To Study the impact of growth of the economy on forest revenue, the following model was used:

\[ FR = f(SDP) \quad \text{(12)} \]

In its linear form function (12) becomes

\[ FR = a_0 + a_1 SDP + e \quad \text{(13)} \]

where,

- \( FR = \) Forest Revenue
- \( SDP = \) State Domestic Product
- \( a_0 = \) Constant
- \( a_1 = \) Regression Co-efficient
- \( e = \) Error term

With a view to understand the process of deceleration, a polynomial function of the following form was used:

\[ \ln yt = a_0 + a_2 t + a_3 t^2 + u \]

If \( a_2 \) and \( a_3 \) are significantly different from zero, then the rate of growth is not constant. The growth rate is accelerating if \( a_3 > 0 \), and decelerating if \( a_3 < 0 \).
The polynomial functional form can also be used for the calculation of the year of the optimum. For an optimum
\[ \frac{d (\ln y)}{dt} = 0 \]
\[ a_2 + 2a_3 t = 0 \]
\[ \therefore t = -\frac{a_2}{2a_3} \]

The value of \( t' \) can be used for the calculation of the year in which the growth rate accelerates or decelerates. The years of deceleration in the subsequent analysis are calculated in this way (Kanan and Pushpangadan 1988).

1.8.5 Period of Study

The study related to the period 1950-1990 in the case of secondary data while the primary data were collected during December 1989 - May 1990.

1.9 Scope and Limitations of the Study

This work represents a maiden attempt on the forest economy of ANI. It has wider scope than what has been attempted so far. It tries to provide a historical analysis of growth of forests, its contribution to the economy and the life of the people of ANI. It also examines the effectiveness of forest policy in achieving the declared objectives of the Government in the area of forestry. The findings of this study would throw light on the existing situation in its entirety and consequently will help the economic planners and policy-makers of
ANI to identify priority areas in their developmental efforts. In this sense, this study has significant policy implications.

However, the study is hedged with certain limitations. Since this study uses historical data from secondary sources, the weaknesses associated with such data may be found in this study also. In addition, the study uses aggregate data and hence the possibility of aggregation error cannot be ruled out. Even among the secondary data, certain kinds of data on variables like employment, prices of various forest products, and cost involved in forest production could not be obtained by the researcher as they were not available. Even the time series data on SDP are not available as the administration has not made any serious attempt to estimate them. Data are available only for seven years. Non-availability of secondary data on vital aspects has been a serious constraint to the researcher. Owing to lack of time series secondary data, the study could use only very simple techniques and models. Regarding primary data there was no recorded information and the respondents had to recollect some of the information from memory. Hence recall bias is also unavoidable. Therefore, generalisations from the findings of the study should be made with caution. In view of these limitations, the conclusions drawn from this study should be applicable only to the area studied or to other similar situations; wider generalisations to other dissimilar areas are not desirable.
1.10 Organisation of the Thesis

The thesis is divided into eight chapters. The first chapter focuses on the problem, objectives, hypotheses, methodology, scope and limitations of the study. The second chapter presents a review of literature and explains the concepts related to the study. Chapter three provides an economic profile of the study area. Chapter four traces the trends in the utilisation of forests and the contribution of forestry to State income, revenue potential, employment, industrial development, and growth of other sectors of the economy. Chapter five provides an analysis of production, marketing and regeneration activities of forests.

The impact of forest utilisation on the people of ANI is assessed in chapter six. This chapter highlights the inter-dependence of local people on forests and how their life system has changed in tune with forest utilisation. This chapter also examines the indirect consequences of forest utilisation on them. The people's involvement and participation in forest preservation is also discussed.

The seventh chapter evaluates the present forest management practices of the Andaman Administration in regard to forest maintenance and utilisation. Plan allocations for different forest schemes are also examined. The last chapter provides summary, conclusion and policy implications.