

FORESTRY SECTOR PLANNING
AND
DEVELOPMENT IN BANGLADESH

By

Monoj Kanti Roy

**A sub-thesis submitted to the Australian National University in partial fulfilment of
the requirements for the degree of Master of Forestry**

Department of Forestry

November, 1987

STATEMENT OF ORIGINALITY

Except where specific acknowledgement is given, this sub-thesis is my original work.



Monoj Kanti Roy

ABSTRACT

The meaning of development, and the effective ways of achieving it, are the subject of disagreement and conflict amongst development economists. This vagueness of the concept of development has a great influence in using forestry as an instrument for development. The two major approaches regarding the role of forestry in development, namely "forest industrialization approach" and "basic need approach", originated from two major streams of thought focussing on economic growth and income distribution respectively. In this study, it is argued that a world wide 'blue-print' for development (either for the country or for its forestry sector) will not work. Instead, here it is argued that each developing country should choose its own development strategy, depending on prevailing circumstances in that particular country.

The two major approaches, first emphasising economic growth and then income distribution, have been reflected in the planning processes of Bangladesh. Bangladesh as a part of Pakistan followed an "industrialization path" till 1970. Then Bangladesh as an independent nation followed a "development as distributive justice path", but with no effective result. This was mainly because state machineries were unaware of the necessary steps to implement this new strategy, making the overall quality of life worse for the majority of the people in Bangladesh.

Similarly, in the forestry sector two major approaches regarding the role of forestry in development have also been reflected, since 1960. Bangladesh as a part of Pakistan in the 1960s and then as an independent nation has followed an "industrialization approach" to forestry till 1980. Then following a major shift in development thinking regarding the role of forestry in development in 1978, a "Basic needs or Social Forestry approach" gained importance in sector planning

mainly amongst planners. Again, because foresters were unaware of various steps necessary to implement the newer approach, programs aiming at "social forestry" followed the conventional approach of forest management of managing vast areas public forest land by keeping people and their needs out. As a result, the dualistic nature of the forestry sector, which was largely a creation of the conventional approach of forest management and which became more pronounced in the 1960s and the 1970s as a result of "forest industrialization approach" to forestry, was not changed in the 1980s. So there is a striking similarity between problems associated with the overall development processes and problems associated with the development of the forestry sector of Bangladesh.

From the development perspective, it is apparent that the ultimate objective of an appropriate development strategy for Bangladesh is to improve overall quality of life of its people ensuring their access to basic needs. To achieve this national objective, it is necessary for the forestry sector to adopt a strategy for future supply to meet future demand with due emphasis on the creation of employment opportunities for the people to ensure their access to the basic needs. However the determinants of future demand are, in most cases, uncertain for a developing country like Bangladesh. Again, these uncertainties have a great influence on future development strategy for the sector and this study analyses this aspect. This study has shown how the most appropriate development strategy for the forestry sector within a developing country will vary depending on different situations. This strengthens the initial idea that each country should choose its own path depending on the prevailing circumstances.

After anticipation of future demands, alternative forecasts of the future supply situation have been prepared and presented. Considering the dualistic nature of the forestry sector, here two extreme supply options are tested to assess future supply-demand balance for each option. The two options were formal forestry (with the village forest growth rate remaining at an estimated 5% per year

increment) and village forestry emphasis (in which the village forest growth would be doubled to 10% per year). After analysing the consequences of each option, a third supply strategy is prescribed here to meet future demand which will give attention to the development of both village forest and public forest depending on the regional supply-demand situation. Then this third option is tested for its impact on the creation of employment opportunities, as this is important from the development perspective of Bangladesh, and proves its suitability from this aspect over other supply options.

This finally confirms the original supposition that for sound development planning it is important to analyze the situation first and then to take measures according to the gravity of the situation, rather than to attempt a world wide blue print for development by generalizing the problems of all developing countries.

ACKNOWLEDGEMENTS

I express my profuse gratitude to Dr. R. N. Byron under whose supervision this study has been carried out. His criticisms and comments have been extremely valuable for the completion of this study.

Appreciation also goes to all staff (both academic and non-academic) of the Department of Forestry for their co-operation during my study here, but in particular to Prof. D. M. Griffin, Dr. K. R. Shephard, Dr. M. U. Slee, Ms Paula Reid for their invaluable help.

I am indebted to the Australian International Development Assistance Bureau for providing me generous scholarship for my study in ANU. I am also thankful to all staff of ACT regional office of AIDAB for their co-operation during my stay in Canberra. I am also grateful to the Government of Bangladesh, and in particular to the Forest Department for nominating me for this scholarship.

I am very grateful to my parents for their personal sacrifices for my education. Finally, I thank my wife Shikha for her encouragement and sharing of my agonies during my study and son Momo, who for the most of the time I saw asleep on returning home from a long working day.

PREFACE

In this sub-thesis, I have proposed a rational planning process for the forestry sector of Bangladesh within the the development framework of the country. This study is based on the hypothesis that each developing country including Bangladesh should choose its own development strategy depending on the situations prevailing in that particular country, rather than to follow an international 'blue-print' for development prescribed for all developing countries by generalizing their problems.

This study is divided into three major parts, comprising seven chapters. The first part reviews theories of development and their reflection in interpretation of the role of forestry sector in development. In the second part, the past development processes of Bangladesh are discussed in brief to reveal how far these processes are reflected in the development of the forestry sector of the country, to identify problems associated with the forestry sector planning for development of Bangladesh.

The final part concentrates on future demand and supply situations of forest produce, as the first two parts led to the conclusion that provision for forest produce to meet the every day need of the majority of the people of Bangladesh should get priority in the forestry sector planning of Bangladesh. There must also be due emphasis on creation of employment opportunities, to make some contributions in ensuring a majority of the peoples' access to basic needs.

TABLE OF CONTENTS

Statement of Originality	ii
Abstract	iii
Acknowledgements	vi
Preface	vii
Table of Contents	viii
List of Tables	xii
List of Graphs	xv

PART 1 FORESTRY AND DEVELOPMENT (THEORETICAL BACKGROUND)**Chapter 1 THE CONCEPT OF DEVELOPMENT**

1.1 Introduction	1
1.2 Development as Economic Growth	2
1.3 Development as Modernization	5
1.4 Development as Distributive Justice	7
1.5 Development as Socio-economic Transformation	9
1.6 Discussion	14

Chapter 2 FORESTRY IN DEVELOPMENT

2.1 Introduction	16
2.2 Industrialization Approach	17
2.3 Forestry for Local Needs or Social Forestry	21
2.4 Discussion	23

PART 2 FORESTRY AND DEVELOPMENT IN BANGLADESH'S CONTEXT

Chapter 3	THE PROCESS OF DEVELOPMENT IN BANGLADESH	
	3.1 Introduction	25
	3.2 Economic Geography of Bangladesh, till 1947	26
	3.3 Development Processes in East Pakistan (1947-71)	27
	3.4 Development Processes of Bangladesh 1972-80	30
	3.5 Development Processes of Bangladesh in the 1980s	33
	3.6 Discussion	35
Chapter 4	THE PROCESS OF DEVELOPMENT OF THE FORESTRY SECTOR	
	4.1 Introduction	39
	4.2 History of Forest Management in Bangladesh	40
	4.3 The Development Process during Pakistani Regime	41
	4.4 The Development Strategy for the Sector during the 1970s	46
	4.5 The Development Strategy for the Sector in the 1980s	49
	4.6 Discussion	54

PART 3 FORESTRY SECTOR PLANNING IN BANGLADESH

Chapter 5	FUTURE DEMAND SITUATION	
	5.1 Introduction	59
	5.2 Future Demand Situation	59
	5.3 Forestry Sector Simulation Model	60
	5.4 Demand Projection	63
	5.4.1 Optimistic Scenario	63
	5.4.2 Compromise Scenario	69
	5.4.3 Pessimistic Scenario	73

5.5 Comparison of Demand Scenarios	76
5.6 Choice of Scenario	85
Chapter 6 SUPPLY SITUATION	
6.1 Introduction	87
6.2 Future Supply Situation	87
6.3 Supply Parameters	
6.3.1 Forest Stock, Growth, Density and Encroachment in 1980	88
6.3.2 Natural Forest Area Logged	92
6.3.3 Natural Forest, % Cut as Big and Small Logs	93
6.3.4 Rate of Exploitation of Village Forests	94
6.3.5 Plantations Establishment	95
6.3.6 Clearfelling and Thinning of Other Plantations	98
6.3.7 Projected Plantation Yield from Other Plantations	100
6.4 Supply Projection and Supply-Demand Balances	101
6.5 Future Policy Options	110
6.6 Development Impacts	114
6.6.1 Assumptions for Labour Impacts	
6.6.1.1 Village forest growth	115
6.6.1.2 Logging	117
6.6.1.3 Other activities	118
6.6.2 Projected Demand for Labour	119
6.7 Conclusion	121
Chapter 7 SUMMARY AND CONCLUSIONS	
7.1 Forestry and Development (Theoretical Background)	123
7.2 Forestry and Development in Bangladesh's Context	125

7.3 Forestry Sector Planning	
7.3.1 Future Demand Situation	127
7.3.2 Future Supply Situation	129
7.3.3 Developmental Impacts	130
7.3.4 Limitations	131
7.4 Areas for Future Research	132
References	134
Appendix A	141
Appendix B	143
Appendix C	149

LIST OF TABLES

Table 3.1	The Growth of GDP in East Pakistan	29
Table 3.2	Change in Poverty level (% of total population)	32
Table 4.1	Forest Areas of Bangladesh	39
Table 4.2	Profit and Loss of BFIDC	44
Table 5.1	Demand Parameters and Simulation Model Assumptions	61
Table 5.2	Supply Parameters and Simulation Model Assumptions	62
Table 5.3	Population in Million (Demand scenario 1)	64
Table 5.4	Literacy Percent (Demand scenario 1)	64
Table 5.5	Consumption/cap (Cft) or /Lit Person (lb) of Forest Produce	65
Table 5.6	Percent Growth of Per Capita Fuelwood Consumption (Demand scenario 1)	66
Table 5.7	Percent Growth of Per Capita Sawntimber Consumption (Demand scenario 1)	66
Table 5.8	Annual Rate of Consumption Growth of Consumption of Other Forest Products (Demand scenario1)	67
Table 5.9	% National Roundwood Equivalent from Local Sources (Demand scenario 1)	68
Table 5.10	National Demand for Logs in Million Cft. of Roundwood Equivalent (MCF of RWE) for Demand Scenario 1	69
Table 5.11	Population in Million (Demand scenario 2)	70
Table 5.12	Literacy rate in Percent (Demand scenario 2)	71
Table 5.13	Percent Growth in Per Capita Fuelwood Consumption (Demand Scenarios 2 and 3)	72
Table 5.14	% National Roundwood Equivalent (RWE) from Local Sources (Demand Scenarios 2 and 3)	72

Table 5.15	National Demand for Logs in Million Cft. of Roundwood Equivalent (MCF of RWE) for Demand Scenario 2	73
Table 5.16	Population in Million (Demand Scenario 3)	74
Table 5.17	Literacy rate in Percent (Demand Scenario 3)	74
Table 5.18	National Demand for Logs in Million Cft. of Roundwood Equivalent (MCF of RWE) for Demand Scenario 3	75
Table 6.1	Forest Stock, Density, Growth Encroachment in 1980	91
Table 6.2	Natural Forest Area Logged Per Year in Thousand Acres	93
Table 6.3	Natural Forest, % Cut as Big Log	94
Table 6.4	Natural Forest, % Cut as Small Log	94
Table 6.5	% Cut as Big and Small Logs from Village Forests in 1980	95
Table 6.6	Exotic Plantation, Area Established in Thousand Acres	96
Table 6.7	Regionwise Area Distribution of Plantation to be raised in 1985-90	97
Table 6.8	Other Plantation, Area Established in Thousand Acres	98
Table 6.9	Other Plantation, Area Clearfelled in Thousand Acres	99
Table 6.10	Other Plantation, Area Thinned in Thousand Acres	99
Table 6.11	Projected Plantation Yield Per Acre in Thousand Cft.	101
Table 6.12	Total National Supply and Supply-Demand Balance in Million Cubic Feet of Roundwood Equivalent (MCF of RWE) for Supply Scenario 1	101
Table 6.13	Total National Supply and Supply-Demand Balance in Million Cubic Feet of Roundwood Equivalent (MCF of RWE) for Supply Scenario 2	102
Table 6.14	Labour Requirements to Double the Growth Rate of Village Forests (Labour Scenario 1)	116

Table 6.15	Labour Requirements for Village Forest Growth for Supply Scenario 3 (Labour Scenario 2)	116
Table 6.16	Labour Requirements for Logging and Transport of 1 Million Cubic Feet of Logs from Different Forest Types	117
Table 6.17	Labour Requirements for Other Forestry Activities	118
Table 6.18	Labour Requirements in Thousand Man Years for Labour Scenario 1	119
Table 6.19	Labour Requirements in Thousand Man Years for Labour Scenario 2	120

LIST OF GRAPHS

Figure 5.1	Total national demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for different demand scenarios	78
Figure 5.2	Demand for fuelwood in million cubic feet of roundwood equivalent (MCft. of RWE) under different demand scenarios	78
Figure 5.3	National demand for sawn timber in million cubic feet of roundwood equivalent (MCft. of RWE) under different demand scenarios	79
Figure 5.4	National demand for industrial forest product in million cubic feet of roundwood equivalent (MCft. of RWE) under different demand scenarios	79
Figure 5.5	Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under different demand scenarios	81
Figure 5.6	Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under different demand scenarios	82
Figure 5.7	Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Chittagong region under different demand scenarios	83
Figure 5.8	Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Central region under different demand scenarios	84
Figure 6.1	Total supply of logs under two supply scenarios in million cubic feet of roundwood equivalent (MCft. of RWE)	103
Figure 6.2	National supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for two supply scenarios	103

Figure 6.3	National supply-demand balances for small and big logs in million cubic feet of round wood equivalent (MCft. of RWE) for two supply scenarios	104
Figure 6.4	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under supply scenario 1	105
Figure 6.5	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under supply scenario 1	105
Figure 6.6	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Chittagong region under supply scenario 1	106
Figure 6.7	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Central region under supply scenario 1	106
Figure 6.8	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under supply scenario 2	108
Figure 6.9	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under supply scenario 2	108
Figure 6.10	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) in Chittagong region for supply scenario 2	109
Figure 6.11	Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) in Central region for supply scenario 2	109
Figure 6.12	Labour requirements in thousand man years for two labour scenarios	121

CHAPTER 1

1. THE CONCEPT OF DEVELOPMENT

1.1 Introduction

The meaning of development, and the most effective ways of achieving it, are still the subject of disagreement and conflict amongst development economists. Previously development was thought to be a purely economic phenomenon, but now is regarded as a complex phenomenon which no single discipline can hope to encompass alone. At present, development is considered as a normative concept, almost synonymous with improvement and accordingly development is better understood as a 'process of improvement with respect to a set of values or, when comparing the relative levels of development of different countries, as comparative states of being with respect to such values' (Colman and Nixon, 1978). Now the question is what are these values. From a country's viewpoint, particularly third world relevance, Seers (1969) considered abolition of poverty, reduction in unemployment and reduction of income inequality as three indicators of development. Thus development is precisely defined as 'expanding opportunities and the human capacities needed to exploit them, along with a general reduction of mass poverty, unemployment and inequality' (Uphoff and Ilichman, 1972 p43). In 1977 Seers added 'self reliance' to his three initial indicators of development.

Many other criteria of development have also been proposed in the literature of development economics e.g. G.N.P. per capita or structural differentiation. According to the followers of GNP approach, GNP per capita is the single most important criterion for development and its rapid growth leads to the solution of all socio-economic problems of a nation. The opponents of the GNP approach (i.e. supporters of structural differentiation) claimed it can not be taken for granted that a rapid growth in GNP per capita would reduce poverty,

unemployment and inequality, which as said earlier are considered as essential indicators of development.

As there are fundamental differences in the definition and objectives of 'development' among development economists, four major ways of interpreting development have been identified in the literature, (Mabogunje, 1980) namely:

1. Development as economic growth.
2. Development as modernization.
3. Development as distributive justice.
4. Development as socio-economic transformation.

All these interpretations of development differ in objectives, in approach and also in ideology. An attempt is made in the subsequent sections to illustrate those four interpretations of development.

1.2 Development as Economic Growth

In the post World War 2 period, Europe experienced an economic recovery in a few years with the help of massive American capital and technical assistance under the Marshall Plan. Basically it was assumed that a similar version of the Marshall Plan could be applied all over the world to promote development. Development thus became synonymous with rapid, aggregate economic growth through industrialisation.

The thinking of the 1950s and the 1960s mainly focused on the concept of Rostow's stages of growth in which the process of development was viewed as a series of successive stages of growth through which all countries must pass. This concept was based on an economic model (Harrod-Domar Model) in which it has argued that the right quantity and mixture of saving, investment and foreign aid were all that was necessary to enable the third world nations to

proceed along an economic growth path that historically was followed by the more developed countries. (Todaro, 1985)

From this perspective, Lewis (1954, p225-226) asserts that "the central problem in the theory of economic growth is to understand the process by which a community is being converted from a five percent to twelve percent saver- with all the changes in institutions and in techniques which accompany the conversion".

As a result, a prescription was given to developing countries for more saving and if it was unable to meet the required level, to fill the gap with foreign aid to maintain the required level of economic growth for development. Developed countries were assigned with tasks to supply 'missing components' of development like capital and foreign exchange to the developing countries for their development.

In the meantime, the boom in LDC population and the dependency of the majority of these populations on agricultural or rural sectors encouraged development economists to develop a growth model exclusively related to LDCs which have surplus labour and which function within the framework of a capitalist system. According to Fei and Ranis (1964) the distinctive features of the economies of underdeveloped countries are 'the predominance of an agricultural sector characterized by widespread disguised underemployment and high rates of population growth, side by side with a small but hopefully growing industrial sector'. According to them 'in such a dualistic (two-sector) setting the heart of the development problem may be said to lie in the gradual shifting of the centre of gravity of the economy from the agricultural to the industrial sector' (Fei and Ranis, 1964 p7). So in a third world country it is the agricultural sector which is called upon to supply the manpower and a substantial portion of the savings fund to fuel the development process. Hence, many third world countries were encouraged to embark on the industrialization process by releasing labourers from

agriculture. The cases of Pakistan, India and Ghana are commonly put forward as prime examples for this.

As a whole, all these theories based on Rostow-Harrod-Domar model (with some modification for LDCs) ignored the fact that the Marshall plan worked for Europe under certain structural, institutional and attitudinal conditions favourable for proper utilization of resources (provided by USA) which are totally absent in most third world countries. Furthermore, these third world countries are part of a highly integrated and complex system in which even the best and most intelligent development studies can be nullified by external forces beyond the countries' control. (Todaro 1985)

The result of this development strategy is the well-known phenomenon of a dual economy found in most underdeveloped countries channelling most of the resources to a modern, technologically developed, capital-intensive industrial sector which encompasses a small portion of the people, whereas the traditional agricultural sector receives comparatively little resources for development and is dependent on the age-old and inefficient technology.

It has been found that many countries of Latin America (for example, Brazil) attained the rates of economic growth prescribed by the development theorists, but the condition of the general masses worsened during the period due to large scale poverty, unemployment and income inequality. Thus the development theorists began to look for new interpretations of development, new theories and policy recommendations.

1.3 Development as Modernization

As a result of an immense gap between fact and theory, the narrow economic interpretation of development has been modified. An increasing number of disciplines were included and development theory has gradually grown towards a more independent and interdisciplinary field of research.

In spite of increasing complexity of development theory as it grew more interdisciplinary, development was seen in an evolutionary perspective, and the state of underdevelopment was defined in terms of observable differences between developed and underdeveloped countries. So in addition to economic growth, development is interpreted as a much wider process of social change, known as modernization.

The main contributions to modernization theory came from subjects like sociology and political science (in addition to economics). Many social and political scientists gave definitions of development from their perspective. From a sociological viewpoint, 'economic development may be considered as being associated with a transformation of social behavior from a form which, in its economically relevant aspects, is oriented towards ascription, particularism and functional diffuseness to form a social behavior oriented towards achievement, universalism and functional specificity' (Hoselitz, 1962 p59). Nash (1977) summarises the sociologists' views by defining "modernity" as 'the social, cultural and psychological framework which facilitates the application of tested knowledge to all phases and branches of production' and "modernization" is the 'process of transformation towards the establishment and institutionalization of the framework of modernity' (p16-28). In practice, modernization was very much the same as westernization i.e. the underdeveloped country should imitate those institutions that were characteristic of the western countries. On the other hand, "political modernity" which was to be achieved by "political development" was

modelled on the parliamentary democracy of the British type or U.S type. (Blomstorm, 1984)

As a result of this meaning of development, many developing countries, in addition to perceiving economic growth, gave emphasis to the building of school and colleges, expansion of enrolment at all levels of education, and in adult education, extension of the coverage of mass media particularly through radio and television, building of health centres and medical establishments, and provision of recreation centres, etc.

This modernization paradigm has been subject to strong criticism, since the enhanced appetite for the consumption of certain modern goods and services which it stimulated created considerable dissatisfaction with traditional goods and services specially in the rural areas. As a result of this, urban areas of the developing countries (where those modern facilities are available) experienced a massive inflow of people from the rural areas (where modern facilities were absent). But in the absence of sufficient growth in industry, those urban areas failed to give employment opportunities to those people. So development as modernization has accelerated income inequalities between individuals and between various parts of a country (e.g. urban and rural areas). Most underdeveloped countries came to exhibit more sharply the picture of a small minority of extremely wealthy individuals living off, as it were, the backs of a large, poverty stricken and destitute majority (Mabogunje, 1980 p39). Bangladesh as a part of the then Pakistan to some extent also experienced this pattern of development in the sixties.

1.4 Development as Distributive Justice

By the end of the 1960s, with widespread poverty and destitution, it was realised that economic growth and modernization had not helped in improving the standard of living of the majority of the population of the third world countries. This realisation helped focus attention on other aspects of development, especially the income distribution problem, and development was seen as distributive justice.

Regarding this income distribution issue in LDCs, there are two schools of thoughts. Firstly, the preoccupation was the influence of growth on distribution; studies of Kuznets (1955), Kravis (1960), Reder (1969), Adelman and Morris (1973) and Ahluwalia (1976) are of great importance in this regard. The issue of income distribution (in other words distributive or social justice) was seen largely in the light of consumption, and solutions to this problem were thought of in terms of a transfer of resources from the privileged to the disadvantaged groups of society, in the form of taxation and government subsidies. In underdeveloped countries, under this concept the issues of economic growth are considered as the primary concern and problems of distribution are considered as residual matter of subsequent interest. In other words, problems of poverty, unemployment and unequal income distribution are seen as secondary importance to "getting the growth job done" (Todaro, 1985). But later it was realised that there was a production or asset distribution side to the issue of distributive justice and this gave rise to a second school of thought in this regard i.e. the influence of distribution on growth.

This concept was developed first by Singer in 1972 in a paper prepared for the report of the ILO's Employment Mission to Kenya (ILO, 1972). Subsequently on the same issue Chenery et al (1974) published 'Redistribution with Growth' which is an advanced version of the ILO study by Singer.

Redistribution with Growth (RWG) focussed on four basic approaches to increase the welfare of the poorest, namely:

"(a) Maximizing GNP through raised savings and allocating resources more efficiently, with benefits to all groups in society.

(b) Redirecting investment to poverty groups in the form of education, access to credit, public facilities and so on.

(c) Redistributing income (or consumption) to poverty groups through the fiscal system or through direct allocation of consumer goods.

(d) A transfer of existing assets from rich groups to poverty groups, as in land reform." (Ahluwalia and Chenery, 1974 p48)

According to the theme of RWG, in most countries some elements of each of these approaches will be applicable, depending on the initial income and social structure.

Hossain (1983) identified two schools of development theorists on the issue of land distribution: there are reformists such as Ladejinsky, Chenery, Ahluwalia, Ranis, Singer and Lipton; and the second is the neo-radicals such as Myrdal, Griffin and Lehman.

The former school advocated fixation of a land ceiling in the highly land-concentrated societies and subsequent redistribution of surplus land. This would promote equality in land ownership which will in turn generate a high proportion of net output, and production would continue to increase due to much greater application of labour and effort as a result of utilization of family labour in place of hired labour in the pre-reform situation. South Korea, Taiwan and Japan are the best examples of this system of reforms.

The latter school argued that the above system of land reform has little to do with the situation where land is the scarcest commodity. They are in favour of total socialization of land assets and according to them, egalitarian land distribution is only a pre-condition for total socialization. An outstanding example

of this is the case of People's Republic of China, where a land reform programme was completed in between 1950-52 and ultimate socialization took place almost a decade later.

1.5 Development as Socio-economic Transformation

Scholars of a Marxist philosophical persuasion argue that the development of a society must begin from the process of production, which in turn contains two crucial aspects: the forces of production and the relations of production. According to them, to achieve development of any society it is essential for these crucial aspects to correspond to each other. Yet this is not possible without radical structural change of underdeveloped societies; since there is a conflict between these two aspects under normal conditions.

In the light of Marxist philosophy there was a resurgence of the new left in Latin America known as neo-Marxism. Paul Baran (1957) is a leading contributor to this group. In his analysis of political economy of development, Baran used the concept of economic surplus and examined how it had been initially accumulated by now developed West European countries in their initial stage of development by 'unilateral transfer' of wealth from the non-European countries. The colonial powers then utilized that surplus to develop themselves and at the same time utilized that accumulated and multiplied surplus for the exploitation of non-European economies in the name of trade, making those countries further underdeveloped. So, he introduced the idea that 'Underdevelopment was an active process following the development in the centre'. Underdevelopment of India as a result of British Rule as compared to development of Japan (which was never colonised) is an example in this regard.

On the other hand, the idea of centre-periphery structure in the world economy was first implicit in Prebisch's early economic policy writings

concerning Argentina which later became known as the ECLA theories. In his analysis Prebisch came to the conclusion that underdevelopment of Latin America was due to its reliance on exports of primary products. Prebisch also claimed that a continued emphasis on the export of primary products would inevitably lead to a further deterioration of the periphery's terms of trade. In turn, this would affect domestic accumulation of capital.

On the basis of these two intellectual trends i.e. neo-marxism and ECLA theories, A. G. Frank presented his famous 'theory of dependency' in his book 'Capitalism and Underdevelopment in Latin America' first published in 1967. In his book Frank analysed the historical underdevelopment of two Latin American countries, Chile and Brazil. According to Frank's theory, underdevelopment of Chile and Brazil and other third world countries is the result of capitalist development and of the internal contradiction of capitalism itself. In Frank's words 'these capitalistic contradictions and historical development of the capitalist system have generated underdevelopment in peripheral satellites, whose economic surplus was expropriated, while generating economic development in the metropolitan centres which appropriate that surplus, and further, this process still continues' (Frank, 1967 p1). Frank described development and underdevelopment as the opposite faces of the same coin.

This metropolis-satellite structure also exist within each underdeveloped country itself, where expropriation of surplus from satellites for the development of the metropolis bringing further underdevelopment to satellites, are usual phenomena. This process of polarisation also is observed in many developing countries between certain elite groups (e.g. land lords, the military, the bureaucrats, entrepreneurs etc.) and general masses and in most cases these elite groups are responsible for the underdevelopment of the general masses by inhibiting any genuine development efforts which may benefit the poor.

In short, the underdevelopment of the third world countries, which results in a continuing and worsening poverty in those countries, is mainly due to the existence and policies of industrialist capitalist countries of the northern hemisphere and their existence in the form of small but powerful elite or "Comprador" groups within the third world countries (Todaro,1985). Dependency theory argues that only a radical redistribution of the means of production throughout the LDC societies will bring out real economic development. (Douglas, 1983)

The concept of dependency and underdevelopment is not new in the Indian Subcontinent. Some of the Indian philosophers like Dadabhai Naoroji were well aware of this situation and that is why he put forward his famous drain theory in 1901 where he analysed how British administration in India not only sweeps away to Britain the whole profit of the foreign trade, but also drains a portion of the production of India itself. Thus instead of there being any addition from foreign trade to the annual production of India, there is actually a diminution, or drain of resources out of the country to Britain by the way of trade and its profits (Naoroji, 1901(1962) p161). On the basis of this sentiment, Gandhi laid the accusation that 'Britain has risen upon the ruin of India's commerce and industry. The cottage industry of India had to perish in order that Lancashire might flourish. The Indian shipping had to perish so that British might flourish' (Gandhi, 1938(1958) p81-82) and the present day 'dependency theory' is nothing but a reflection of this idea.

However, the theory of dependency did not escape criticisms from development theorists. In one of the first serious discussions of the theory, a non-Marxist economist, Sanjaya Lall in 1975 claimed that dependency theorists usually gave an arbitrarily selective definition of underdevelopment which picked certain features of the broader phenomenon of international capitalist development, but these phenomena are not applicable everywhere. Lall cited

examples of countries like Canada and Belgium which are much more dependent on foreign capital than underdeveloped countries like India and Pakistan; but in spite of this, Canada and Belgium are not categorized as 'dependent countries' like India and Pakistan. Similarly, the argument by Paul Baran as regards underdevelopment of India due to its colonial relationship with Great Britain as compared to Japan which was never colonised is not substantiated enough, due to the existence of underdeveloped Thailand as compared to developed former colonies like South Korea or Singapore. Again, in Lall's opinion it is impossible to distinguish between dependent and non-dependent countries on the basis of certain static criteria. However, he did not deny the existence of the characteristics used by the dependency school to describe dependent countries.

The dependency theory did not escape criticism from Marxists. According to dependency theorists, centre-periphery contact is the root of underdevelopment of the periphery; whereas according to Marxists it is the class structure within the underdeveloped country that is responsible for underdevelopment. Marxists point out in their defense that ".....during the early modern period, a number of European countries had the peripheral role in the center-periphery contact under different class structures of production, with very different resulting patterns of economic development or underdevelopment (Brenner,1977). So, Marxists argued that Frank's comment 'ultra-underdevelopment was characteristic of an export economy ' must be carefully qualified and according to them, 'it was not the fact of production for export which determined export dependence; it was the class structure through which production for export was carried out which determined that increasing production for export would lead to underdevelopment' (Brenner, 1977 p85-86). Brenner(1977) criticised the dependency theorists by saying that they have 'failed to focus centrally on the productivity of labour as the essence and key to economic development' and 'the logical antedote to capitalist underdevelopment is not socialism, but autarky'. (p91)

Some third world countries, which according to the dependency school were doomed to underdevelopment, suddenly showed impressive growth figures during the 1970s with the help of massive foreign capital and proved that dependency is no longer synonymous with underdevelopment. The export of capital no longer blocks development rather it promotes development in some cases. In other words, the centre "permits" development of some of the third world countries and according to dependency literature, the centre determines the process of accumulation in the periphery and the future of such developed countries is still dependent on the same factors that characterized the 'blocked development'. (Blomstorm and Hettne, 1985 p180)

In a paper originally written in Chile in 1972, Frank looks back at the dependency school and its critics. He admitted that the dependency school which was right in the 1960s, had become obsolete now due to the changes in the world economy (Frank, 1977). He confessed that the nature of the problem in the third world is somewhat different, depending on the role each country played in the international division of labour. On this basis Frank identified four possible reactions, namely

a) In industrial economies based on cheap labour (Korea, Taiwan, Hongkong, Singapore) the shortage of capital in a world wide crisis will lead to a lowering of wages and repression, which in all probability, will be maintained by a militaristic, corporativistic state apparatus.

b) The 'Chile model' will be used extensively in raw material producing economies based on cheap labour like Bangladesh, Sri Lanka and several other Latin American countries. In this case the "solution" will consist of generous invitations to international capital to co-operate in the exploitation of dormant resources.

c) The more developed, industrial economies who have already tried the strategy of import substitution (Brazil, Mexico, India) may participate in the international division of labour in other ways e.g. by concentrating on capital accumulation and industrial exports supported by the state.

d) The fourth category consists of old and new sub-imperialistic nations with Brazil as their model. In this group Iran, at least for a while, seemed to have excellent prospects of development based on economic, political and military control of a large region. (Blomstorm and Hettne, 1985 p184-185)

1.6 Discussion

There are, of course, a great many variations around the major streams of thought summarised above. However, the brief sketch may lead us to the theoretical conclusion that the first two approaches of development i.e. development as economic growth and modernization differ from the latter two i.e. development as distributive justice and socio-economic transformation, on the issue of income distribution. According to the first two, economic growth is the synonym for development; modernization differs from the economic growth approach as it is seen as necessary to build up infra-structure and human resources for economic growth. The latter two approaches argue that, in the absence of equity in income distribution, economic growth is possible but not sustainable and again these two differ from one another on the issue of measures necessary for income re-distribution.

However, from an empirical point of view, the process of development is better understood as a result of complex relationships of different factors. These factors are different for different countries. So a world wide 'blue-print' for development in most cases will not work. Instead, each country should choose its own development strategy including desired technology choice, income

distribution, mode of production, trade policy etc. depending on its own circumstances. In practice, it does not happen in most cases due to the lack of commitment by the government in power. Due to internal and external pressures, the Governments of most underdeveloped countries (with few exceptions) in the past failed to adopt an appropriate strategy to promote development of their respective countries.

However, various interpretations of development raised different questions regarding their relevance to Bangladesh. Evidence suggests that country has followed the path of development as economic growth mainly and to some extent development as modernization. The effects of this development strategy will be discussed in some details in chapters three and four. On the other hand, advocates of the "development as distributive justice path" for Bangladesh such as Faaland and Parkinson (1976), Islam (1977), Stepanek (1977), Januuzi and Peach (1981) gave emphasis to redistribution of land through land reform measures. In addition to redistribution of land, Islam (1977) also suggests measures like a large increase in the supply of agricultural inputs and raw material for rural industries, an elastic supply of credit, extensive rural education and training, combined with appropriate price signals and technology for efficient resource allocation and incentives as necessary pre-conditions for the development of the country (Islam, 1977 p262). But at the same time he also confessed that these will involve difficult economic, political and organisational problems. This makes a way for an alternative thinking, a radical path of development as socio-economic transformation for Bangladesh, which suggests that the situation of the country will not improve until an end is brought to the dominance of the "comprador" bourgeoisie and other classes representing basically semi-feudal/semi-colonial interests. (Alamgir, 1978)

CHAPTER 2

2. FORESTRY IN DEVELOPMENT

2.1 Introduction

The vagueness of the concept of development (as reviewed in Chapter 1) has a great influence in using forestry as an instrument for development. Whenever there was a major change in the trend of development thinking, there was a corresponding but delayed change in the thinking of role of forestry in development.

The evolution of theories on the forestry sector's potential contribution to development is well illustrated by the Brazilian experience. During the early 1950s international aid-giving agencies started assisting the forestry sector of Brazil with the first Amazonian inventories, which were then replaced by an education project in the early 1960s. In the late 1960s, the industrial plantations to cater for the forest based industries got priority in Brazilian forestry. This trend continued till the late 1970s when there was a new trend amongst the development planners. To link the forestry sector for the development of a country, they found a solution in community or social forestry. So inventory, education, industrial forestry and community forestry all had their turn as the leading edge of the forestry attack on development (Leslie, 1985). The trend of development of the forestry sector is empirically more or less the same for all developing countries.

However, the role of forestry in development was also a major concern of various World Forestry Congresses (WFC) (Kengen, 1985). According to Kengen (1985), the first three congresses were concentrated on traditional forestry themes like silviculture, forest surveys, forest policy, management and regeneration. With the increasing awareness of development of underdeveloped countries and with the perception of economic growth as "development", forestry

planners started thinking on the role of forestry in development in 1954 in the fourth WFC. Accordingly the theme of the congress was 'The Role and Place of Forested Areas in the General Land Economy and Economic Development of a Country'. This trend continued in the fifth WFC in 1960 and the theme of the congress was 'Multiple Use of Forest Lands'. In this congress, though emphasis was on the industrialization approach together with other issues like future shortages of forest products, forest planners were not sure of the role of forestry in development at that time.

The post 1960 development thinking in the forestry sector was dominated by Westoby and can be divided into two distinct phases; namely (1) the industrialization approach (2) the Forestry for local needs or Social Forestry approach.

2.2 Industrialization Approach

As discussed in the previous chapter, economic growth was taken as a synonym for development during the 1950s and 1960s and it was believed that the most efficient way to promote development was via industrialization. Echoing this view in 1962, Westoby wrote an article entitled 'Forest industries in the attack on underdevelopment' where he first described the role of forestry in the economic development of a country. According to Westoby "Forest industry based on a renewable resource, a resource which all underdeveloped countries possessed or could create; industries with considerable flexibility both as to scale of operation and technology; industries with pronounced backward and forward linkages, ensuring that their growth would exercise a multiplier effect on the whole economy; industries which located near the wood resource, offered the prospect of creating new poles of development, checking the squalid centrifugal development that has scarred so many underdeveloped countries; industries producing a wide range of products, many of which correspond to basic needs; products, moreover,

with a high income elasticity, enhancing prospects of industry viability once under way; products which could substitute for expensive imports or if exported, earn valuable foreign exchange. "

Westoby's theory was well accepted by forestry planners, who accepted that "Forestry had strong forward and backward linkages through industrial use, with the remainder of the economy. Therefore, investment in forestry would promote multiplier effects which would 'trickle down' through these linkages to make the entire population better off" (Kengen, 1985 p34). As a result, the industrialization approach was the specific objective of the sixth WFC held in Spain in 1966. This congress urged developing countries and various aid giving agencies to supply the 'missing component' for development (i.e. capital and technology) to underdeveloped countries, so that underdeveloped countries with plenty of forest resources can establish forest industries and also establish industrial plantations to cater for the future needs of either established or projected forest industries. Kengen (1985) identified authors such as Gregory, Sartorius and Henle, Keay, Mac Gregor, Von Maydell and even FAO in the mid 1970s and even later, who emphasised forest industries to promote economic growth in underdeveloped countries. (p41)

In most cases, the result of this development strategy was disastrous. Modern, capital intensive, labour saving, large scale industries were established in developing countries with the help of foreign aid, both financial and material. Siam Kraft Paper Mill in Thailand, a large scale capital intensive industry (by Third world standards) set up with the help of financial aid and technical advice from developed countries, is one such example in this respect. Sila-on (1978) reported that during first eight years of operation, the paper mill had been on the verge of bankruptcy three times mainly due to transfer of specialized know-how from a developed country, which was unsuitable for a developing country like Thailand. Kenya is another example, where a pulp and paper mill was established with hopes

for enormous benefits in the form of foreign exchange savings and export earnings. Yet it appears to be failing to achieve those objectives due to its capital intensity, inefficient operations, heavy foreign debts etc. (Wamugunda, 1987). The same strategy was also taken by the underdeveloped countries for the exploitation of their previously untapped forest resources. To achieve economic growth, countries like Indonesia, Malaysia and the Philippines allotted their most valuable tropical hardwood forests to concession holders (often transnational corporations) and these concession holders in most cases extracted logs from these valuable forests mainly for exports without concern for the future. These countries received some immediate benefits from those exports, but in most cases, what happened after logging as described by Leslie (1980), was very commonly a sequence of

- Forest destruction by agricultural settlement following the logging operation
- Land degradation through post logging shifting cultivation on too short a fallow cycle
- An almost complete absence of reforestation
- Continuity of large scale poverty.

Thus, according to Leslie (1980) for the forests and the people who are dependant on them, the only obvious lasting effects of this strategy is retrogression. This development strategy generally failed for the same reasons as the general industrial approach (previously successful in developed countries) was a failure for most developing countries.

On the other hand, the industrialization approach in most cases ignored the need of local people for forest produce, by giving too much emphasis on maximum long term, commercial exploitation of the forest resources to supply raw materials for established (or projected) forest industries. Fuelwood, bamboo and wood for construction purpose did not receive much attention, from forestry planners as it was thought at that time they had no decisive role in promoting economic growth. In this regard, Wamugunda (1987) reported that as a result of success in raising industrial plantations, a considerable surplus of saw logs over

domestic needs was being built up as planned in Kenya. Yet the present demand of fuelwood in Kenya is 30 million m³ of roundwood against a sustainable volume of 5 million m³ of roundwood and the country is proceeding towards ecological disaster as a result of shortage of fuelwood. In Tanzania, until recently, the major forestry development was the establishment of plantation of exotic species and this activity has accelerated in the 1960s. 70,000 ha of fast growing plantations were established till 1982 to meet a major share of Tanzania's industrial wood need. On the other hand, 90% of the country's total fuelwood supply (which constitutes almost 85-95% of the country's total wood consumption) comes from unmanaged forests, woodlands and savanas (Lundergan, 1982). In India, the rise of Industrial forestry was considered as the continuation of the colonial policies of reducing the resources available to forest dwelling communities and surrounding villages, though that was against the Gandhian tradition of rural development which encourages peoples' participation in the resource management. This denial of peoples' right over forest aroused vigorous protest movements in different parts of India (e.g. 'Tree war' in Bihar, 'Chipko' movement in the Himalayas etc.) (Dargavel et al, 1985). In Brazil, in the 1960s, industrial plantations were established in the private sector at the government's expense under the name of 'fiscal incentive' schemes by displacing a large number of small farmers from their land. These forests were established without any assurance that markets will develop for the wood, and caused great costs in other sectors. (Kengen, 1985)

It is also interesting that while "development as industrialization and economic growth" was losing ground among development economists in the early 1970s, as discussed in Chapter 1, the forest industrialization approach continued to receive priority till much later, and still has its ardent advocates. (see Leslie, 1977)

2.3 Forestry for Local Needs or Social Forestry

Following a major shift in development thinking from economic growth to income distribution, the "Forestry for local needs" approach began receiving priority over industrialization in forestry. This process started in the seventh WFC held in Argentina in 1972, where it was first realized that forest resources of underdeveloped countries, if properly managed, may play an important role to raise the living standard of their own people in addition to contributing to the world's expanding need for forest products. Though the central theme of the congress was 'Forest and Socio-economic Development', this congress did not come up with any definite proposal on how to relate forestry activities with social development and as a result economic development via industrialization predominated over social development in their proceedings also.

Then, Westoby attacked the industrial approach to forestry in his famous address as a guest speaker in the tenth technical session of the eighth WFC held in Indonesia in 1978. The central theme of the congress was 'Forests are for People'. In his address Westoby denounced the industrialization approach by saying that 'Forest and forest industry development which had been externally oriented, aimed at satisfying the demands of developed countries instead of satisfying the basic needs such as fuel, building materials etc. of their own people. As a result forest industries had made little or no contribution to socio-economic development in the underdeveloped world, rather had served to promote socio-economic underdevelopment' (Westoby, 1978). Westoby's thinking, though it was new in the forestry circle, only echoed Frank's 'dependency theory'.

According to Westoby (1978) 'the role of forestry in development must be to support the industrial sector to promote and diversify the agricultural economy and in effect must be carried out by rural people themselves. Instead of the present managerial role of foresters, their role should be to stimulate process, offer guidance and suggestions, impart techniques and carry out training'. Westoby

did not reject totally forest industry, but according to him any such priorities must be subordinated to basic domestic needs.

Again, Westoby's new hypothesis was well accepted by forestry planners and accordingly various international organizations and donor agencies have changed their line of actions. World Bank (1978) has started (or at least claims to have started) to emphasise people-oriented instead of industry-oriented projects. FAO introduced the concept of 'Forestry for Local Community Development' to add social objective to the usual productive and protection objectives of forest management. FAO has sought (or atleast claims to have sought) an approach to the management of forest lands, in which their potential to contribute to local needs for food, fuel, income etc. is integrated with their timber and environmental outputs (Arnold, 1982). Some others used the term 'Social Forestry'. IUFRO in their 1981 congress, highlighted the need for increased support of forestry research related to third world needs like increasing fuelwood supplies, increasing the productivity of multipurpose tree species generating income and employment through forestry etc (WRI and IIED, 1986 p80). All these new projects aimed towards meeting basic human needs with special attention to poverty ridden people of underdeveloped countries. In short, fuelwood, fodder, bamboo, charcoal, timber for construction purpose etc. instead of forest industry were to receive priority in forestry planning.

2.4 Discussion

From the above discussion it is clear that each of these two approaches to forestry was based on, and part of, a major phase in development thinking. The industrialization approach was based on initial thinking of development as a synonym for economic growth and the local needs approach was based on later thinking of development on the issue of income distribution. So, the failures achieved in using forestry as an instrument for development, stem from the misconception of development.

The problem with the concept of development as discussed in Chapter 1, is that it is multidimensional and the approaches discussed in earlier sections deal with one or two of these dimensions. So, to follow one path at the expense of others may not solve the problem, rather the situation may deteriorate.

If it is inquired why the industrialization path did not work in the past, one can conclude that the original approach - that forest industries have strong forward and backward linkages with the economy - was not necessarily wrong. It was the deviation from the original approach in the execution stage which was wrong. In most cases, forest industries with weak or no forward and backward linkages with the rest of the economy, were established in underdeveloped countries and as a result these industries made little or no contribution to the development of that country. In some cases (though cases are very few) where forest industries had strong linkages to the rest of the economy, they definitely made a positive contribution to the development of that country (e.g. Malaysia). That is, the industrial mechanism does work where it fits the situation. So, to choose the social forestry (or local needs) path at the expense of industrial path all over the world may create further problems in future. In some cases, if properly planned and managed, the industrial path still may be the best solution, again in some cases the social forestry path or a combination of two paths may be the solution. The basic fact is that any single path is not true for everywhere. As

discussed in chapter one, the nature of development of a particular country will decide which path has to be followed. Leslie (1985) in his article 'Reflections on Twenty Years of Forestry for the Third World Development' identified two phases of development: 'Phase 1 or holding phase, is one of stopping things from getting worse and phase 2 or advancing phase, is one of making things get better. The duty of the planner would be to decide which phase of the development problem he is trying to deal with, using forestry as the instrument. Social forestry would seem to be more appropriate to the holding phase, industrial path to the advancing phase and again there must be a wide transition zone along the range of development situations in which two phases merge and overlap'.

Due to the existence of this transition zone it is not wise to suggest that either the industrial or social forestry path alone will be sufficient to cope with development problems of developing countries. As Leslie (1985) concluded 'development should be achieved only by making solutions to fit the situation, rather than forcing the situation to accept the solution'.

However, various theories regarding the role of forestry in development raise different questions regarding their relevance to Bangladesh. The country has followed the industrialization approach till the 1980s and still there are ardent follower of this path, mainly amongst foresters with whom management of the formal forestry sector lies. The effects of this strategy will be discussed in more detail in Chapter 4. The social forestry approach gained some importance in the 1980s, initiated mainly by planners, and this will also be discussed in detail in Chapter 4.

CHAPTER 3

3. THE PROCESS OF DEVELOPMENT IN BANGLADESH

3.1 Introduction

Chapters 1 and 2 provided the theoretical background to suggest an appropriate development strategy for Bangladesh. Now, it is necessary to know about the past development strategy of the country and its overall impact on the quality of life of people. This chapter will focus on the overall process of development in Bangladesh and the next chapter will focus on the process of development of the forestry sector of Bangladesh.

Bangladesh appeared on the world map as a sovereign state on December 16, 1971 following the war of liberation which started from the 26th of March in the same year. The area constituting the country passed into British hands in 1757. The British ruled the country as a part of the then British India for one hundred and ninety years. With the termination of British rule in 1947, it constituted the eastern wing of Pakistan and was known as East Pakistan till March 26, 1971.

Bangladesh lies in the north eastern part of South Asia between 20° 34' and 26° 38' north latitude and 88° 01' and 92° 41' east longitude. The country is bounded by India on the west and the north and India and Burma on the east and Bay of Bengal on the south. The area of the country is 143,998 Sq. Km. and the population according to the last census in 1981 was 89.91 million with a population density of 680/Sq. Km. It is one of the most densely populated countries in the world (only after city states of Hongkong and Singapore). Bangladesh is a People's Republic with Dhaka as its capital. The country is divided into four administrative divisions which are further subdivided into 64 districts. Each district consists of several Upa-Zillas (sub-districts) and those Upa-zillas are at

present the focal point of administration. There are in total 460 Upa-zillas in the country.

A complete review of the process of development in Bangladesh is an exhaustive task and beyond the scope of this subthesis. In this chapter a brief overview of the overall process of development will be discussed, under four headings, namely

- (1) Economic geography of Bangladesh, till 1947
- (2) Development processes of Bangladesh as East Pakistan
- (3) Development processes of Bangladesh in the 1970s
- (4) Development processes in the 1980s

3.2 Economic Geography of Bangladesh, till 1947

Bangladesh's geography has ensured from early times that agriculture should be the mainstay of the economy. But handicrafts and industries such as textiles, sugar, metal work, jewelery, woodwork, boat and shipbuilding etc. based on the local raw materials and indigenous skills were important in the economic geography of the past. From about 1870, however fundamental changes in the age-old economic system began to reshape the economic geography. The industries of the then East Bengal (now Bangladesh), facing competition from modern industries of Europe, began to decline and in the course of fifty years completely disappeared. Modern industries did not develop here to replace the old skilled craftsmanship and as a result, hordes of industrial workers were driven to the land (Ahmad, 1976 p60). As a result of this deliberate British policy to de-industrialize India in an attempt to build up British industries as discussed in Chapter 1, by the first quarter of this century the economy of East Bengal became solely dependent on agriculture.

Towards the end of the 19th century, with the establishment of modern machine industry in India and the rise of Calcutta region in this respect, the present Bangladesh area receded into the background and was regarded mainly as a producer of agricultural goods and associated raw materials which were funnelled to the Calcutta-Hooghly industrial belt. The Bangladesh region at the time of partition of British India in 1947 was a hinterland of the industrial nucleus of Calcutta.

3.3 Development Processes in East Pakistan (1947-71)

Bangladesh, as the eastern province of Pakistan experienced large scale economic exploitation by West Pakistan. Central Government operated from West Pakistan had overall control over the economy and the regional government of East Pakistan had little to say in this regard in the absence of true democratic government. Most of the foreign aid received by the country and also the financial resources of East Pakistan in the form of export earnings, were diverted to the development of West Pakistan.

The per capita GDP in East Pakistan grew only 6.2% between fiscal year 1950 and fiscal year 1968. This represents an annual compounded rate of only 0.3%. As a consequence of this meagre growth and of an inequitable interwing allocation of development resources, per capita GDP in the East eroded seriously in the fifties and the sixties and it fell from 91% of that of West Pakistan in 1953 to only 59% in 1968 (Stepanek, 1979 p7).

As discussed in Chapter 1, Pakistan was an ardent follower of the industrialization path; so in development planning emphasis was always given to maximizing overall growth through accelerated industrialization, and it was argued that pre-occupation with the problem of income distribution would slow down the rate of growth. In the name of promoting growth, income was redistributed in

favour of the West Pakistani capitalists and traders through various fiscal measures. As a result of this strategy West Pakistan experienced a massive industrialization. Modern facilities were set up there through a great many industries. The little industrialization that Bangladesh had, could be explained in the following way. (a) There were industries whose location was limited by the availability of raw materials (e.g. jute and paper). These were developed either directly under West Pakistani ownership or public sector ownership, to be transferred later to the private capitalists in West Pakistan. (b) There are marginal cases of Bengali capitalists who also benefited from the system. (Khan, 1972 p22)

These industries were established under protectionism and monopoly and due to the low labour wage rate, most of the benefits from these industries were in favour of their entrepreneurs who were mostly West Pakistani capitalists. In some cases, output of these industries were prepared for the West Pakistani market and enjoyed considerable protection from the government. As a result, these industries did not try hard to increase their efficiency to make their products internationally competitive. In general, the social profitability of these industries was much less than private profitability and in some cases social profitability was negative (Khan, 1972 p75). So, there is serious doubt about the efficiency and real utility of most of the large scale industries set up in the past in the then East Pakistan.

Table 3.1 shows the growth of GDP between 1949 and 1970 and contribution of various sectors to GDP. Though the share of capital intensive large scale industries in East Pakistan's GDP increased appreciably, the labour intensive small scale cottage industries declined over that period. As a result people became more and more dependent on agriculture, though that sector's contribution to the country's GDP declined appreciably during this period. This suggests a decrease in income of people employed in the agriculture sector.

Table 3.1 The Growth of GDP in East Pakistan

Year	GDP in million Rs.	GDP per- capita. in Rs	Sectoral share of GDP in million rupees				
			Agriculture	Large-scale industries	Small-scale industries Power	Construction Transport	Services
1949/50	12,374	293	8067.85	74.24	408.34	692.94	3130.62
1969/70	22,317	316	12341.3	1339.02	647.19	2856.58	5132.91

Source: Khan, A. R. The Economy of Bangladesh, 1972 Page17

In the agriculture sector, during this period the output of rice (the main agriculture crop of the country and which accounts for 30% of the country's total GDP) increased from 7.5 million tons in 1950 to 10.75 tons in the second half of the 1960s mainly due to double cropping rather than by increase in yield (Faaland and Parkinson, 1976). As noted earlier, in development planning priorities were given to the industrial sector over the agricultural sector and also to aggregate economic growth over growth of individuals' income. In the agriculture sector, most of the development resources were diverted to expensive irrigation and flood control projects. So agricultural output increased in some selected areas where the projects were taken. During the late 1960s, output of agricultural crops, particularly rice, increased in some limited areas of the country through new seed technology. But this new seed technology caused an unfavorable income distribution against the poor farmers and later was severely criticized by development planners. Though there was an increase in output of rice, import of foodgrains increased from 0.5 million ton a year in the 1950s to about 1.25 million ton a year in the 1960s (Faaland and Parkinson, 1976). There was also evidence that per capita consumption of rice and other commodities declined considerably during this period.

The First Five Year Plan (FFYP) in independent Bangladesh correctly identified the factors responsible for the poor growth in agriculture during 1950-70. These were :

- (a) lack of appropriate development strategies
- (b) lack of incentives to the sector
- (c) lack of right technology
- (d) low level of investment
- (e) low absorption of high productivity inputs
- (f) ineffective implementation of development programme
- (g) inadequate physical and institutional infrastructure (FFYP p85).

Table 3.1 above also indicated that in between 1950 and 1970, the economy grew at a rate of less than 3% which was more or less equal to the population growth. So per capita income was more or less steady during this period. The growth rates of agriculture, small scale industries and services sector were less than that of population growth. As a result the standard of living of the majority of people, engaged in these sectors, declined during this period. Meanwhile, the large scale industries sector experienced appreciable growth, accumulating capital in favour of few industrialists for the reasons described earlier in this section.

3.4 Development Processes of Bangladesh 1972-80

During this period Bangladesh had two economic plans; the First Five Year Plan (FFYP), 1972-77 and interim Two Year Plan (TYP), 1978-80. The objectives of FFYP and TYP were stated in imprecise terms - reconstruction of war torn economy, overall economic growth, food self-sufficiency, population control, creation of employment, reduction of poverty and income inequality, social justice etc. (Douglas, 1983). The emphasis was given to agricultural development in FFYP (at least on paper) to replace the traditional and greatly unstable agriculture by a modern agriculture capable of sustainable growth. At the same time, the planners were also aware of the fact that increased agricultural output through modern technology may make rural incomes more unequal. So planners suggested measures

to achieve rural income distribution, e.g. co-operatives of disadvantaged groups in society, a labour intensive rural works programme to generate substantial volume of employment, changes in cropping patterns and establishment of rural industries. Planners also recognized that the above measures in themselves are not sufficient to significantly increase rural equality, so they suggested radical land reform measures at a later stage. In their view, distribution and tenure systems were fundamental factors determining rural employment and income distribution in a predominantly agricultural society (FFYP P89). These ideas were consistent with development as distributive justice as discussed in Chapter 1, ranging from distribution of income through various fiscal and administrative measures to the extent of redistribution of land through radical measures.

In fact these objectives were political and never materialized. Participation of disadvantaged groups into income generating activities through co-operatives did not happen due to lack of political will, which was quite natural as these politicians are part of "comprador" groups of the country as argued by the dependency theorists in Chapter 1. Later in 1975 the idea of co-operatives was completely abandoned. Government after 1975 launched an area development in the name of self reliance, but it had a little scope to provide employment and income benefits for the disadvantaged groups of the society due to its institutional and managerial shortcomings.

The strategy adopted for agricultural growth was in fact, not very different from that taken in the late 1960s i.e. getting the 'growth job done' as discussed in Chapter 1 had priority over the income inequality problem. So, the essential feature of the agricultural strategy was to increase yield through High Yielding Varieties (HYV) by using modern inputs and agricultural credit in a package deal. Though during this period agriculture grew at a rate of 3.1% (SYFP,1983 p7), mostly better-off farmers with access to credit and modern inputs benefited from this strategy and the condition of the rural masses worsened

during this period as creation of new employment opportunities fell well short of the actual growth of the labour force. Since the growth of agriculture was the slowest of all sectors, employment conditions were worse for rural areas. On the other hand, real income of the working population in 1979-80 was about 20% below that of 1969-70 which led to a further accentuation of poverty and degradation of material life of the common man (SFYP,1983 P15). This phenomenon is clearly illustrated in the following table of change in poverty level .

Table 3.2 Change in poverty level (% of total population)

	1963/64	1968/69	1973/74
Absolute poverty level (those who unable to meet 90% of accepted minimum nutritional requirement)	40	76	79
Extreme poverty level (those who unable to meet 80% of accepted minimum nutritional requirement)	5	25	42

Source: Table 1.10, SFYP (1983) p16

The change in the pattern of land holding between 1960 and 1977 also supported the above finding. Between these years the percentage of land held by pure share croppers declined from 1.11% to 0.41%, and their shares in the number of farms declined from 1.63% to 0.56% and at the same time, the share of small farmers (holding less than 2.5 acres of land) rose from 16.25% to 18.75% and their numbers declined in percentage terms from 51.63 to 49.73 indicating thereby an improvement in their wealth and material well-being (SFYP,1983 p16). In case of rural urban income distribution, this was always in favour of the urban sectors for the past two decades and as a result there was a tendency for the rural people to come to urban areas for employment. So during this period urban centers experienced an unplanned growth.

3.5 Development Processes of Bangladesh in the 1980s

During this period Bangladesh has had two economic plans: the Second Five Year Plan (SFYP) 1980-85 and on going Third Five Year Plan (TFYP) 1985-90. These plans were part of the national perspective plan (1980-2000), the objectives of which were determined by the socio-economic imperative of endemic poverty, unemployment and malnutrition, alarming growth of population, illiteracy and above all dependency on foreign aid.

The perspective plan envisaged an equitable growth policy to eliminate poverty by creating employment for all and also to improve overall quality of life of the people by ensuring adequate supplies of the basic needs. Ensurance of due rights of the agricultural labourers and share croppers in farm produce through land reform was another important strategy of the proposed perspective plan.

Accordingly, the main focus of the SFYP and TFYP was on the reduction of poverty through growth of income and employment. Growth achieved during the SFYP period was only 3.8% as against a target of 5.4% (TFYP,1985 p8). During this period growth of consumption was only 1.8% against an official population growth of 2.4% (unofficially it is more). So consumption per capita declined during that period. This was mainly due to lack of employment and income among the majority. So elimination of poverty and access to basic needs by the majority of the people - two major objectives - were not achieved. This reduced rate of consumption growth affected industrial growth, which was only 4.8% against a target of 8.4% (TFYP,1985 p9). Overall, the employment situation appeared to have remained unaltered or rather worsened during the plan period. It is too early to comment on the achievements of the TFYP, but achievements in the earlier years of the plan are not very different from those of earlier plans.

In the case of rural development, which was one of the main objectives of SFYP, various experiments were carried out during the plan period and even

before that. All these primarily focussed on local participation in development activities and these included Swanirvar Gram Sarker, Swanirvar Bangladesh with its variants like Canal Digging, Grameen Bank, Swanirvar Credit Program and above all the two-tier Co-operatives some of which eventually disappeared. All these approaches were characterized by two extreme features, either they were personally oriented lacking an institutional basis or too structured to be pervasive to local level initiative. To overcome this situation decentralization of the administration to the Upa-Zilla system took place under Administrative Reform Act, 1982 and an Upa-Zilla Parishad (Council) was established in each Upa-Zilla. This has been done in an effort to ensure a harmonious development of local communities in a national perspective. To encourage local participation in development and promote local initiative a number of development subjects were transferred to the local Parishads financed from central grants. To ensure that such development activities fall within the overall national development priorities, a guideline has been issued, which provides a flexible choice for allocation of local government funds to different activities.

Though it is too early to comment on this system of administration, from the experience of other countries, it can be said that local government is a synonym for local development provided local government is represented by all sections of people of the society. At present, though the Upa-Zilla system consists of elected members in the large, it is likely that such representation will come to reflect the dominant character of the traditional rural society represented by rural elites, which cast serious doubt about the effectiveness of the new system.

3.6 Discussion

From the foregoing sections, it is evident that theoretically there were two trends in development planning in Bangladesh since 1947. Pre-independence development efforts followed the industrialization path, largely by-passing rural communities. Post-independence development efforts at least theoretically, followed a "development as distributive justice path" and focussed on agriculture and rural development. Accordingly, the underlying objective of all the post independence development plans was to alleviate poverty by ensuring employment and minimum basic needs to the population.

During the post-independence period, failure to achieve development objectives was the norm in each plan period. The most striking feature is in every five year plan, emphasis was given to agriculture especially in food self-sufficiency, but to-date it was not achieved. Productivity of land is still extremely low, about one-third of South Korea and Japan. This failure in achievement raises different questions about the appropriateness of different development strategies followed by different governments in the post independence period. It is also true that shortage of development resources and natural climatic disasters are some of the main reasons for failure to achieve targets, but it is also true that during sectoral allocation, development planners always deviated from their original commitment to the agriculture sector in each of the plans. In sectoral allocation, less priority was given to agriculture in comparison to its contribution to GDP, though the marginal efficiency of capital in agriculture was higher than it is elsewhere in the economy. (Douglas, 1983 p23)

This urban bias in development planning favouring the formal urban sector is more likely for a developing country like Bangladesh, as support from urban industrialists and urban elites is a must for the government for its existence. Also this planning strategy is possibly more accepted by rural elites,

another important powerbase of the country, as they want little change, to maintain the rural social hierarchy.

Different development plans in independent Bangladesh recognized that since agriculture is the occupation of the rural population (constituting 90% of the country's population), the long term employment opportunity (one of the major problems of development) depends on the distribution of land as the access of rural households to employment depends on the access to land. Accordingly, each time development planners advocated land reform measures, in fact these measures were not taken, except for an enunciation of a face saving Land Reform Ordinance in 1984. But this Ordinance suffered from serious drawbacks to normalize the situation.

In reality, the strategy adopted for agricultural development so far during different plan periods was mainly spreading of the new-seed technology. This was not very different from the pre-independence development strategy of giving importance to overall growth over individuals' income, and mainly better-off farmers with access to modern inputs increased their yields. The situation became worse in the 1980s, when more and more agriculture credits were disbursed as mainly rich farmers had access to those loans, creating an adverse income inequality situation. This situation was also realized in TFYP by the following statement. 'The proportion of households having less than prescribed minimum caloric intake (2273Kcal.) has increased from 59% in 1975/76 to 76% in 1980/81' (TFYP p104). Third plan also confessed that the volume of the unemployed has continuously swelled since independence in 1971. Due to intense competition in the labour market, the agricultural wage has declined day by day. Low agriculture wages lowered the productivity of labour and low productivity of labour is one of the main reasons for low productivity of agricultural land and hence low wages. Consequently, the rural non-farm sector appeared to be locked in a circle of low income depending on low demand and low level investment and

technology. As a result, the daily wage for non-farm employment was far below that of unskilled agricultural labour and these were mainly viewed as extended family labour and there has been increasing marginalization of female and child labour. Due to the existence of child labour, children are considered as a source of income for a poor family. These attitudes of poor families are responsible for rapid population growth and mass illiteracy. So all the indicators of development such as the level of income, illiteracy, population growth etc. are trapped in a vicious circle in the case of Bangladesh. On the other hand, the slow growth of the rural sector where 90% of the population live, slowed down the growth of the urban industrial sector due to lack of demand in the internal market and non-existence of foreign market due to adverse terms of trade.

To overcome this situation, a comprehensive development plan covering agriculture, giving the majority of the people access to the production system (i.e. land through effective land reform measures) is essential for Bangladesh. It is also true that even with the fullest development of possibilities of labour absorption on farm, there will still remain a large surplus of labour for whom employment opportunities need to be created in the non-farm sector. Development of rural industries based on locally available materials and indigenous resources close to the markets of their product and labour should be another priority to employ surplus labour from the agriculture sector. Emphasis should be given for agri-support and agro-processing industries and consumer good industries to satisfy rural demand mainly. This will create a strong multiplier effect throughout the economy. Interestingly, the necessity of this strategy was realized in different development plans of Bangladesh but never materialized.

In conclusion, two major approaches of development i.e. development as economic growth and development as distributive justice as discussed in Chapter 1, have been reflected in the planning processes of Bangladesh, since 1947. As discussed in earlier sections, Bangladesh as a part of the then Pakistan followed the

industrialization path till 1970. Following a major shift in development thinking from economic growth to income distribution in the early 1970s, Bangladesh as an independent nation in 1971 theoretically rejected the industrialization path and chose the path of distributive justice for her development. As discussed in previous sections, various development plans in the independent Bangladesh reflected this view. But state machineries and others with whom the execution of various development plans lie, either due to their previous knowledge of development as economic growth or due to their class structure (argued in the radical path as discussed in Chapter 1), were unaware of various steps necessary for the new development strategy (i.e. development as distributive justice). As a result, whether knowingly or not, various development plans aiming at distributive justice followed the economic growth path during execution, making the overall quality of life worse for the majority of people in the independent Bangladesh.

CHAPTER 4

4. THE PROCESS OF DEVELOPMENT OF THE FORESTRY SECTOR

4.1 Introduction

In the previous chapter, the process of development of Bangladesh has been reviewed. In this chapter, we review the process of development of the forestry sector in the country and how it relates to the overall development of Bangladesh.

The abundance of natural vegetation in Bangladesh is directly related to its physical and climatic conditions, such as heavy and well distributed rainfall in combination with sufficient heat and soil cover. But due to population pressure every available hectare of land of the country is in great demand for production of food and other crops, and this has led to the gradual removal of natural vegetation.

According to official estimates, forests occupy 22,070 Sq. Kms excluding village or homestead forests (Byron, 1985), about 15% of the total area of the country. But the actual forest area would be much less than this, since a considerable portion of official forest area has already been lost to encroachment. However, official area statements of four significant forested areas of the country are given in table 4.1.

Table 4.1 Forest areas of Bangladesh

Name of forest	Area in 'ooo' ha.
1. The Hill Forests of Chittagong, Chittagong Hill Tracts and Sylhet including hill plantations	589
2. The Sunderban Forests including coastal plantations	625
3. The Sal Forests	93
4. The Unclassified State Forests	900

Source: Byron, 1985

Beside these, there is an estimated total standing volume of 2650 to 2900 million cft. of timber in the Village or Homestead Forests (Hammermaster,

1981). A map showing the forest area of Bangladesh is incorporated as figure A1 in appendix A.

4.2 History of Forest Management in Bangladesh

The history of Bangladesh forest management dates back to 1658 A.D., when the Sunderbans was recognized as a source of revenue, and this trend continued for next 200 years (Ministry of Information and Broadcasting, 1977-78). Then during the British period, the Indian Imperial Forest Service was formed in 1864 A.D., headed by Dr. Dietric Brandis, a renowned German forester, to develop the more stressed forest resources at that time. The technical input to this sort of forestry was brought from German forestry but adapted to the Indian situation. This kind of forestry was completely different from that practiced in Great Britain at that time (Dargavel et al, 1985). It was characterized by allocation of large tract of forests to the types of production primarily needed to support the colonial and imperial economies and these tracts are known as Reserved Forests and were managed by a group of professional foresters trained initially in Germany and later in Britain and India.

The era of so-called scientific management of the forests in this part of the then British India started from 1875, when the present Sunderban Forests were declared reserved. however, in 1862, some stations had been established on the main rivers in Chittagong region (including CHT) to collect revenues from forest produce from this region. In 1871, almost the entire forest area of CHT was notified as Government Forest. The first reservation in the Chittagong region was in 1893, while forest of Sylhet was notified as reserve forest in 1914. The Sal forests originally belonged to the local landlords. At the request of these landlords, the management of Atia Forests of Tangail and Mymensingh was taken over by the Government in 1925, followed by Bhawal Forests of Dhaka in 1934 (Ministry of Information and Broadcasting, 1977-78).

The major product of forestry was timber from reserve forest to support the colonial and imperial economies, where the 'minor' products were fuelwood, basic local construction materials from forests managed on a small scale by small holders, peasants and so on; even though these 'so-called' minor products were a major source of sustenance to the local communities. The main activities of the forest service were limited to collection of revenue from timber mainly, felled by selection felling in Government Forest. Though the first artificial plantation in this part of the country was started in 1873, till 1947 only 4,779 hectares were artificially planted mainly with Teak (*Tectona grandis*). These plantations were mainly raised in clearfelled land (clearfelled for extraction of timber) by forest villagers with nominal or no cost. (Forest Statistics of Bangladesh, 1983).

4.3 The Development Process during Pakistani Regime

The forestry practices during that time (1947-71) were not different from the colonial period. The process of managing vast publicly owned forest lands by personnel from a distinguished forest service continued during this period. These personnel were trained in Pakistan and input to this sort of training was brought from Dehra Dun, India. Up to 1960, the activity of the sector was mainly limited to realising revenue for forest produce extracted from Government forest at a speed greater than that during the colonial period, as more forest produce was required to support the urban economy at that time as a result of cessation of supply from Assam forests after the partition of India. The same technique of raising plantations in clearfelled forest land with no or nominal cost continued and from 1947-60, only 13,163 ha plantation was raised, mainly with Teak. (Forest Statistics of Bangladesh, 1982)

After 1960, following 'Westoby 1' philosophy, the forestry sector of East Pakistan took the strategy to utilize any existing resource that could be found as a base for western, capital-intensive, export-oriented industries. A number of

forest based industries were set up during that time in the then East Pakistan near the source of materials. These industries were justified as import substitution and for regional export to West Pakistan. Starting with the huge public sector paper mill at Karnaphully (KPM) (later transferred to West Pakistani ownership like other industries as discussed in Chapter 3) the industry kept growing through the setting up of newsprint factories in Khulna (KNM) and in the late 1960s, an additional paper mill in North Bengal (NBPM). The justification of these highly capital-intensive industries as enterprises using indigenous raw materials (in most cases not wood, for example bamboo in KPM, and bagasse in NBPM) was not wholly convincing, since 45% of all raw materials for these industries were imported from abroad. Once again, the independence of Bangladesh has meant an export surplus valued at 110 million taka (Khan, 1972 p71). The initial work of establishing another pulp mill in Sylhet (SPPM) started during this period and the work was completed in 1975 after independence of Bangladesh (Proceedings of the Forestry Review Workshop, 1984 p67). The pulp produced in this mill (according to original design, primarily from reeds and jute sticks) would be used by three other paper mills in the country, so in this regard it was import substitution to reduce the demand for imported pulp.

In 1967, a Rayon Complex was built at Karnaphully Paper Mill (KPM), to produce rayon using bamboo as raw material. The economic outlook for these industries, designed originally for the highly protected West Pakistani market was not promising; costs of production in these industries were very high by international standards. With the loss of the protected Pakistani market in 1971, the installed capacities of these industries were well in excess of the needs of the Bangladesh market. As a result, all these industries are presently selling their produce to export market at a price well below the cost of production and to the domestic market at high prices (well in excess of import prices of equivalent products) while still incurring heavy losses. At present though capacity utilization is high for KNM and KPM, it has never risen much beyond 50% in the case of NBPM

and 70% in the case of SPPM mainly due to lack of demand and unavailability of raw materials. Although this sector is generating some foreign exchange by exporting its product, the unit cost of the pulp imported for blending is usually much higher than the unit value of the final product exported due to adverse terms of trade and inefficiency of those industries. So these industries have contributed more to imports rather than to promoting exports (Byron, 1985 p56). The employment benefits of these industries are also not impressive. For example, in KNM, the cost of employment of one person at an annual payment of Tk 34,000 was Tk 121,000 for the government in the form of subsidy (Douglas, 1983 p165).

During the 1960s, one hard-board, one particle-board and a number of plywood mills were established. Though these industries are of poor and obsolete design, the economic outlook for these industries other than particle board is not as bad as for paper industries. At least, these industries have the ability to sell their products on domestic markets at a price reasonable by international standard. The plywood industry concentrates on the production of tea-chests and produces an acceptable quality of produce for this purpose. So ply industries comparatively have a positive effect on the country's scarce foreign exchange as tea is the one of the major foreign exchange earners for the country. As it is not possible to produce international or export standard of plywood by these industries, the future of this industry is entirely dependent on the international tea market (Melhuish, 1982). In spite of this, most of these comparatively labour intensive small scale industries are economically profitable. All these small scale industries have more contribution to the country's economy than the large scale pulp and paper industries. So the 'Westoby 1' philosophy as discussed in Chapter 2 works better for small scale industries than for large scale industries due to the former having better forward and backward linkages with the rest of the economy. This also supports Leslie's claim as discussed in Chapter 2 that 'Westoby 1' does work where it fits the situation.

Another important advance in the forest industry sector, following the 'Westoby 1' philosophy was the establishment of a publicly owned corporation known as East Pakistan Forest Industries Corporation (EPFIDC later, after 1971, BFIDC) to promote the development of wood and timber based industries. But initially it embarked on a project for the extraction of timber from inaccessible areas of CHT using capital intensive modern equipment instead of traditional labour intensive technology, and also programs for proper marketing of this produce after processing in their mills. The important components of this corporation are the timber extraction project, the biggest saw mill of the country with an annual capacity of about 500,000 cft. of sawn timber (Douglas,1983, p172), one complex which produces particle-board, fibre-board, furniture etc., a wood seasoning plant, a preservation plant and a rubber plantation project to establish and manage publicly owned rubber estates of the country (Ministry of Information and Broadcasting, 1977-78 p10-14).

BFIDC since its establishment in the 1960s has been unprofitable for the government, in spite of getting timber from the government forest at a heavily subsidized rate and also selling their product at higher prices (as compared to international standards). This is mainly due to high costs of logging and transport, lack of infrastructure, wrong choice of technology, poor quality control and inefficient marketing, as well as general mismanagement.

The annual profit or loss of BFIDC for various years in the 1970s are given in table 4.1 for example. The actual loss would be much higher, if the normal market price of raw materials supplied from public resources were considered.

Table 4.2 Profit and Loss of BFIDC

Year	Profit(+)/Loss(-) in million Taka
1969-70	-3.01
1976-77	+0.01
1977-78	-5.95
1978-79	-17.81
1979-80	+1.14

Source: Forest Statistics of Bangladesh,1982 p71-72

Other activities in the forest industry sector include establishment of numerous match industries in the private sector mainly to fulfill the domestic demand of both wings of the then Pakistan. At present, the installed capacity of the match factories is well in excess of the needs of the Bangladesh market with the loss of Pakistani market in 1971, and again the products from these industries have no foreign market, because of their inferior quality. In spite of this, these industries are comparatively labour intensive and most of these units are economically profitable.

On the other hand, after 1960 there was also a change in the activity of the Forest Department, whose previous role was mainly to collect revenue and to some extent to supervise plantations raised by forest villagers. It was assigned the duty of raising large scale plantations by spending resources. The existing natural forest was considered as low-yielding and unprofitable and conversion of this natural forest into artificial Teak forest gained momentum during the 1960s. As a result of this, the best natural Dipterocarp forest areas of the country (where accessible) were replaced by the artificial Teak forest. BFIDC was assigned the duty of clearing the best natural forest in comparatively inaccessible areas of CHT with modern equipment to facilitate artificial regeneration. In the 1960s, 51,197 ha of natural forest were converted into artificial plantation mostly with Teak (Forest Statistics of Bangladesh, 1982 p32). Later this replacement of natural semi-evergreen forest by deciduous Teak forest was considered as environmentally hazardous.

Some efforts were also taken to raise fast growing species to meet the raw material demand for newly established industries but with no success. Species were planted with no silvicultural knowledge and also with no specific end uses. On the other hand, raw materials for most of the large scale industries (except KNM and KHM) were other than timber and also in most cases specific areas were allotted to them to get their supply. As a result, the Forest Department was also not sure at that time about what to grow, where, and for what purpose.

4.4 The Development Strategy for the Sector during the 1970s

As noted in Chapter 3, during this period Bangladesh had two economic plans, namely the FFYP(1973-78) and the TYP(1978-80). The objectives as stated in the FFYP were to bring all available and potential forest lands under regular management of the forest service and to replace existing low quality and so called overmature hill forests by high quality fast growing species on the basis of sustained yield and also to raise plantations in degraded forest lands and in newly accreted lands in coastal areas. Accordingly development resources were allotted mainly for raising plantations with a view to meeting the future demand of raw materials for forest industries and to some extent for clearfelling and subsequent replanting of poorly-accessible forest areas of CHT. Though one of the objectives of the plan was to make full use of homestead wasteland by tree planting, effective measures were not taken to achieve this objective except expansion of nursery facilities in some urban areas for distribution of seedlings to the people. The beneficiaries were mainly urban people. With the emergence of Bangladesh in 1971, though there was a need for a new development strategy for the sector, in fact there was a continuation of the more or less colonial approach to forestry, of managing vast tracts of publicly owned forest land by a bureaucracy, keeping people out. Though it was said in the plan that emphasis should be given to fast growing species in 50% of the afforested or reforested land, in most cases slow growing Teak plantations were raised.

The first five year plan, though focussed on development of forest resources, considered only publicly owned forest for this purpose. The aim of the plan was to maintain 1965-70 level per capita consumption of forest produce. This was estimated as only 0.55 cft./capita for fuelwood (TFYP p200), by considering Government forest as the only supplier of forest produce and at the same time completely overlooking the rural forestry sector, which according to a later study

(Douglas, 1981) contributes 80% of the fuelwood supply of the country. As a result, the 1965-70 consumption level was far below the actual per capita consumption of 2.75 cft. according to the later study (Douglas, 1982 p33). Due to this ignorance, the potential of the rural forestry sector, the most important forest resource of the country, was totally ignored in the FFYP.

The importance of the rural forestry sector was also ignored in the National Forest Policy announced in 1979. This policy was formulated on the basis of the First National Forestry Conference held at Dhaka in February, 1977. The main features of that policy were:

1. To manage all the forest land of the country by a centralized 'National Forest Service'.
2. To express great concern over rapid deterioration of tree cover in the vast tract of USF and CHT due to repeated "Jhumming" (Shifting cultivation).
3. To expand forestry activity in newly accreted coastal land and USF area under the management of the 'National Forest Service'.
4. To protect and recover forest land from so-called encroachers.
5. To amend and update forest law for better policing of forests.
6. To expand public recreational facilities.

Regarding rural forestry sector, there was a recommendation for a motivational drive for tree planting through the forest service in the policy. This 'National Forest Policy' expressed the views of traditional foresters regarding the role of forestry in development, overlooking the overall development strategy at the national level. This was simply due to the ignorance of the people within the sector regarding the role of forestry in development. The people within the sector considered timber and (after 1960 following the 'Westoby 1' philosophy) raw materials for the wood based industries as their prime concern. Commodities like fuelwood, bamboo (called poor man's timber) etc. which play an important role in rural life were considered as minor produce (more appropriately "out cast products") by the foresters and attracted little attention from them. Thus, it is not

surprising that foresters and the forest service "moulded" to the old model of forestry, could not adjust to changes in development policies and new ideas on the role of forestry for development.

Then during the mid 1970s people outside the forest service started thinking about the forestry sector specially about fuelwood, due to its scarcity and subsequent rise in its real price. A number of studies were carried out regarding actual per capita consumption of fuelwood. Results from various studies varied widely, but it was realized that village forest have an important role in the supply of basic fuelwood requirements of the country. Later it was confirmed by a FAO/Planning Commission study that the prime supplier of the forest produce for the country was not the publicly owned vast tract of forest land which attracted all the attention and development resources in the past, but it was the village forest raised and managed by the rural people without any patronage from the government. As a result, the officially announced 'National Forest Policy' which gave all its attention to government forest lands and overlooked village forests, was outdated at the time of its declaration in 1979.

As a result of realization of the importance of forestry activities outside the official forestry sector in the late 1970s, policy issues like replenishment of homestead forests, plantation on marginal land, and better community involvement in the forestry activities received some importance together with other traditional forestry activities in the TYP. But during development resource allocation, only 5% of the total development resources of the sector was allocated for that purpose. So the TYP, though theoretically it realized the importance of rural forestry, remained entirely biased to official forestry sector during resource allocation.

The situation remain unchanged during the decade, though there was a realization about the importance of the rural forestry sector at the end of the decade. During this decade development resources were allocated almost entirely for the

purpose of raising plantation on public forest land and for extraction of forest produce from the public land to meet the demand of raw materials for forest based industries. Though in writing, emphasis was given to raising fast growing species, in practice the plantations raised were mostly with Teak. The official target of raising plantations was achieved mostly on paper (a later study revealed that only 40% of the officially reported plantations were successful and physically existed) (TFYP p205). On the other hand large scale forest based industries and BFIDC as discussed earlier remained unprofitable throughout the decade. More stress was given to achieving the 1969-70 production level for these industries, in spite of shrinkage of demand for their products at the loss of Pakistani market, incurring heavy loss of public money. Virtually no criticism or analysis of this situation existed, and drain on scarce public funds continued unabated.

4.5 The Development Strategy for the Sector in the 1980s

As a result of the realization of the importance of the rural forestry sector by the planners in Bangladesh and the international reassessment of the role of forestry in development following 'Westoby 2' philosophy, a change in thinking regarding the role of forestry also took place in this country. By this time, as a result of work by an FAO/Planning Commission Project, some of the basic data regarding the relative contributions of government forest and privately managed homestead forests and also that of various forest industries to the country's economy were available. This also helped planners to think more deeply regarding problems associated with the forestry sector.

There was a high level forest policy seminar with participation of senior Government officials from the Planning Commission, the Forest Department, other areas of the Ministries of Agriculture and Industry. A clear polarization

between planners and foresters regarding how to fit the forestry sector within the development framework of the country has been observed. Personnel from FAO gave emphasis to working out how to make forest industries appropriate to rural development and to working out how to sustain fuelwood supplies to these people (Arnold, 1982 p7). National planners also expressed the same views as regards the valuable role of forestry in the process of rural transformation and development. According to them, the sector should give due attention for production of fuelwood and wood for simple structural purposes and to do so specific measures should be needed to direct income and consumption benefits towards the disadvantaged group of society (Salam, 1982 p8). Their views are not different from both national and international development perspectives as discussed earlier in Chapters 1 and 3. On the other hand, senior officials from the Forest Department, though they began to realize the importance of rural forestry sector, at the same time were skeptical about turning down the traditional approach of forestry. The then Inspector General of Forests (Head of the Forest Directorate) expressed his views in the same seminar by saying that Reserved Forest should be earmarked for industry and environmental balance and at the same time he turned down the possibility of afforestation by private enterprise for industrial purposes, although some of the forest industries were badly suffering from lack of raw materials (Hamid, 1982 p14-15). So the colonial approach to forestry and to a lesser extent, the industrialization approach to forestry had priority in his development thinking, though there was a major change in development approach from growth to distributive justice both internationally and even nationally.

The seminar however expressed its great concern over serious depletion of homestead forests and its implications for quality of life of the mass of people and felt an urgent need for replenishment of the same through rural forestry programmes. Other issues like planting of fast growing species with specific enduse, instead of the present practice of slow growing species, and also giving more attention to the needs of people in the vicinity of government forest areas were also

accepted as future policy directions for the sector. The participation of poor and landless groups in forestry activities on a profit-sharing basis wherever practicable was also accepted as a future policy. In the seminar there was a willingness from the planners to consider the option of planting Government Sal forest to fast growing fuelwood regimes with the landless people on a priority basis. But forest officers were very conservative to accept this idea on the plea that it may have adverse effect on the environment and water balance (Chowdhury, 1982 p36); though it was hardly believed that the clearing of already degraded plain forest land had any adverse effect on the environment and water balance. The same polarization regarding the development approach of forestry amongst planners and foresters, was also observed in the Second National Forestry Conference held at Dhaka in 1982.

However, the forest policy seminar and the 2nd National Forestry Conference had a great influence in determining the priority for the forestry sector in the SFYP. Accordingly, the SFYP gave emphasis on rural forestry (development of homestead wood lots and raising plantations on roadsides, railway sides, canal banks and also in degraded government forest lands with the participation of people) together with other traditional forestry activities like maximization of production of forest products, development of forest resources in government forest land etc. Although rural forestry gained importance in the objectives of the forestry sector, during resource allocation it received only half of the development resources allocated for raising plantations under the direct control of the Forest Department (TFYP p201). Even the objectives of raising plantations by the participation of people were not achieved. Only 7,200 acres of degraded forest land were officially reforested against a plan target of 20,000 acres under this programme (TFYP p201) and it is too early to comment on the success of this plantation. These plantations were raised by departmental staff and people's participation (as sought in the Plan) was totally lacking. Two other components of the rural forestry program such as strip planting (i.e. planting by the side of roads, railways, canals, rivers etc.) and village forestry (i.e. enrichment plantation in the homestead areas) also

faced similar set back due to lack of people's participation. Where planting was actually done, it was done by the forest department alone, without any participation from local people (other than working in those plantation as hired labour) and the local people considered these plantations as encroachment of their territory by the forest officials which casts serious doubt about the future success of these plantations. Interestingly, in the case of large scale forest based industries, more and more emphasis was given to produce exportable products in the SFYP, in spite of its negative effect on the economy (SFYP p188).

So in spite of the realization of the importance of a newer approach to development of forestry by the planners, both the colonial approach of raising plantations by the departmental staff, driving people out of the land, and also the industrialization approach had priority in the implementation stage in the plan period. In spite of this, SFYP is comparatively more committed to the newer development approach of forestry than earlier ones.

The overall objectives for the forestry sector in TFYP were to increase per capita consumption of forest products and to meet raw material demand for wood based industries. To achieve these objectives, the following strategies were set :

1. To increase state and homestead forest production of both timber and non timber crops through afforestation, reafforestation and social forestry programs.
2. To accelerate the programme for development of short rotation species to protect more valuable fruit and timber crops in the rural areas; and
3. To exploit optimally forest resources without disturbing the ecological balance to meet the demand for timber, fuelwood fodder, rubber and raw materials. (TFYP p203)

Priority areas for forestry activities were identified as village/rural forests, public forest, mechanical extraction and processing. Development programmes included social forestry programmes which include farm forestry, wood

lot plantations and strip plantations; raising plantations in Government forest land to meet raw material demand of wood based industries, also to meet domestic requirements of fuel and timber and to maintain ecological balance; and development of infrastructure to facilitate mechanical extraction of timber from CHT. It was expected in the plan that farm forestry will be practiced in homestead areas by farmers themselves with professional advice from local extension officials; on the other hand, wood lot and strip plantations would be raised on public land by the disadvantaged groups of the society on a profit-sharing basis under the guidance of the Forest Department. The plan also saw the necessity of reorganizing the Forest Department for effective implementation of social forestry programmes. (TFYP p204)

In the case of large scale wood based industries (namely pulp and paper), there was less emphasis on producing an exportable surplus as compared to earlier plans. According to this plan, emphasis will be given to exploring new product lines to produce special quality paper for the domestic market (TFYP p244).

During resource allocation, the rural forestry sector (including wood lot and strip plantations) had higher priority compared to earlier plans and received at least 30% of the total development resources for the sector, against 36% for raising plantation under direct control of the Forest Department (TFYP P208). In that sense, TFYP is more committed to rural forestry than the earlier plans and in the case of forest industry sector it was realized for the first time that production for export without realization of economic consequences is not good for the country.

4.6 Discussion

The era of so called scientific management of forest resources was initiated by British rulers to serve their interest. The activity of the forest service (created by British as a tool for so called scientific forest management) was mainly limited to supplying timber from natural forest to support colonial and imperial economies and also to earn revenue for the British empire. Only a small portion of this earned revenue was spent for the further development of the resources. The nominal plantation raised during this time was better understood as a process carried out by forest villagers with nominal or no cost involvement in the land previously cleared for extraction of timber. This is a part of colonial exploitation of undivided India by the British as described by some political philosophers of India (as discussed in Chapter 1).

The situation remained unchanged during the first half of the Pakistani regime. British rulers were replaced by West Pakistani rulers. Then in the 1960s following 'Westoby 1' philosophy (as discussed in Chapter 2), wood based industries were established in the public sector and later ownership of most of them was transferred to West Pakistani entrepreneurs like large scale industries of other sectors (as discussed previously in Chapter 3) and the era of capitalist exploitation by West Pakistani industrialists began. Like other large scale industries as discussed earlier in Chapter 3, these wood based industries had access to cheap raw materials (made available from government forest land at a highly subsidized rate) and labour source of the then East Pakistan and output from these industries were sold in highly protected domestic markets of both wings of Pakistan. On the other hand, 45% of all raw materials of these industries were imported by the industrialist for which they got import licences which was at that time very profitable due to overvaluation of the Pakistani currency. So the industrialists made profits from the import of raw materials on the one hand, also by selling produce at a high prices in domestic markets. Again profit earned by these industries had very little multiplier effect for the economy of East Pakistan, because these profits were mostly reinvested

elsewhere by the industrialists in West Pakistan. So the forward and backward linkages of these industries to the rest of the economy as claimed in 'Westoby 1' philosophy in Chapter 2 were absent or very small.

During the 1960s the Government forestry sector also commenced raising large scale industrial plantations as was the international "conventional wisdom" at that time. This was seen at that time as conversion of low yielding natural forest into artificial plantation of species of high economic importance. Though Forest Department (the custodian of Public forest land) claimed that they were aware of ecological balance, this was not considered during this conversion. As a result natural semi-evergreen forest was converted in most cases into deciduous exotic Teak plantations without considering any ecological implications. The plantation work was largely concentrated on Kassalong Reserve Forest, the only important catchment area of the Karnaphully River falling within the political boundary of the country. Many observers now have seen siltation in Kaptai Lake (a large lake created by an artificial dam on the lower reaches of river Karnaphully) largely due to this conversion of natural forest.

In independent Bangladesh, the forestry sector attracted more development resources than before independence, like other sectors of the economy. But till 1980 most of these development resources were utilized for raising plantations in publicly owned forest land by the Forest Department. During plantation-raising, the Forest Department did not pay heed to the needs of people in the vicinity of the forest area. As a result local people in most cases remain hostile to these plantations and also to government forest land. This hostility by local people in combination with lack of silvicultural knowledge, fund constraints for maintenance of plantations, corrupt practices of forest staff etc. contributed to widespread failure of the plantations. This hostility of local people (initiated to a large extent by the activity of the government) led to encroachment of government forest land.

On the other hand, large scale forest industries mainly based on raw materials other than timber, faced acute shortage of raw material due to unavailability of these materials (due to increased alternate uses of so-called minor produce for other day to day purpose such as fuel, construction etc.). To meet this situation the Forest Department has gone for large scale industrial plantations together with Teak plantations, but with little success as noted above. By this time these industries, with the loss of the highly protected West Pakistani market and due to adverse terms of trade, became unprofitable. In spite of unprofitability of these industries, attempts were made by the government to achieve full capacity utilization and excess products of these industries were sold in foreign markets at a price lower than the production cost, bringing further negative effects to the economy. Efforts were also taken for the export of Teak timber grown on the public forest land, but it is of inferior quality and high cost. So the overall contribution of the official forestry sector may have been negative during that period. More interestingly, in some cases plantations were raised in places far from an industry to meet its demand, so sometimes successfully raised plantations seem to be unprofitable due to high costs for extraction. Pulp wood plantations in Sylhet are an example where the Forest Department was demanding Tk 10/- per cft., whereas it was not feasible for SPPM to pay more than Tk 2/- for the same. (Proceedings of the Forestry Review Workshop, 1984 p68)

In the 1980s as a result of a change in thinking regarding the role of forestry in development as discussed in Chapter 2, a change in policy was also observed in the forestry sector planning of Bangladesh. But initiation for such change came from outside as discussed earlier. As a result, the rural forestry sector gained some theoretical importance over the official forestry sector in sector planning. Peoples' participation in forestry activities was also encouraged theoretically and a tendency for more spending of development resources for rural forestry was observed during the decade, but still this sector was underestimated during resource allocation as compared to its contribution to the economy. Even the allocated

resources were not properly utilized for the development of the sector. Peoples' participation, an important component of rural forestry, was absent in most cases. The Forest Department, with whom responsibility of implementing such programmes lies, has not undergone any changes since the colonial period to cope with the new situation. More interestingly, administrative decentralization took place in other sectors (as noted in Chapter 3) for more efficient implementation of development programmes, but Official Forestry sector was kept out of it and still is manned by a centralized Forest Department. As a result, various development programmes prepared by the centralized Forest Department in most cases overlooked the actual field situation. The centralized Forest Department was out of touch with what the planners wanted, prepared their own schemes instead, and still could not implement them because they are out of touch with field reality. This may be another reason for the failure of various people-oriented forestry programmes in the past.

The result of this development strategy which has not undergone appreciable changes for the last hundred years, is clearly seen in the dualistic nature of the forestry sector. On the one hand, large tracts of public forest land managed by the centralized Forest Department have attracted almost all development resources and have supplied only 15% of the total wood consumption. At the other hand there is neglected village forest resources which without any development resources supplied almost 85% of the country's total wood consumption (Byron,1984a). In the past, these resources were so neglected that they were not taken into account during GDP estimation. This results in underestimation of the total sector and contribution of the sector was considered as only 2.3% against 12% as claimed by Byron(1984c) and attracted less development resources from the government. The village forest resources without any effort from Government for planned development deteriorated day by day due to increased demand for the produce. Due to deterioration of the main forest resources of the country and due to increasing demand, per capita availability of forest produce is falling against the basic objective of increasing (or at least

checking deterioration of) per capita consumption of forest produce (as said in every plan in independent Bangladesh).

The same dualism also exists in the forest industry sector. Here capital intensive, large scale forest industries mostly in the public sector (as a result of nationalization in 1972) received most of the development resources with a negative effect to the economy. On the other hand small scale industries employing most of the people working in the sector are running by the private owner on profit sharing basis. For this they received no development resources. Here also the government is committed to rural development as said in Chapter 3, but in fact is favouring large scale industries in spite of their negative effect on the economy.

In conclusion, two major approaches regarding the role of forestry in development as discussed in Chapter 2, are also reflected in the forestry sector planning of Bangladesh since 1960. Bangladesh as a part of the then Pakistan and after that as an independent nation followed the industrial forestry path till 1980. Following the major shift in development thinking regarding the role of forestry in development, the planners in the forestry sector of the country, also theoretically rejected the industrialization approach and gave more importance to the social forestry approach; SFYP and TFYP of the country also reflected this view. But like other sectors (as discussed in Chapter3), foresters with whom the responsibility of execution of various forestry programs lie either due to their class structure, or pre conceived knowledge of the traditional forest management system, were unaware of various steps necessary for the newer approach. As such, whether knowingly or not, various forestry programs aiming at the newer approach in the 1980s followed the conventional approach of doing forestry programs by foresters alone without seeking peoples' participation (though it is an essential criterion for the success of any social forestry programs), resulting in no change in the dualistic nature of the sector.

CHAPTER 5

5. FUTURE DEMAND SITUATION

5.1 Introduction

From previous chapters it is evident that the ultimate objective of an appropriate development strategy for Bangladesh will be to improve the overall quality of life of the majority of its people ensuring their access to basic needs. For this it is necessary to ensure the supply of basic needs and at the same time ensure the access of the majority of people to those basic needs. Accordingly, the objective of a rational forestry sector plan that will play a role in overall development of the country will be the assurance of supply of forest produce according to future demand with an emphasis on creation of employment opportunities for the people. This creation of employment opportunities should be the priority of any development strategy in an overpopulated country like Bangladesh to ensure the access of general masses to the basic needs. Now to ensure future supply it is necessary to anticipate the future demand for forest produce. The projection of future demands for forest produce is the subject of this chapter.

5.2 Future Demand Situation

The facts about the forestry sector of a country like Bangladesh are not precisely known. The future demand and supply situations which are most important for sound sector planning are also uncertain and in most cases nothing but estimates. Future demand will depend on various factors outside the sector like population growth, rate of urbanization and growth in the literacy rate, as well as some factors inside the sector (like availability of substitutes and their relative prices and qualities) and these factors are almost unknown for Bangladesh).

Realizing this situation, Edelman, Byron and Manson developed a Forestry Sector Simulation Model for Bangladesh in 1983. This simulation model incorporates and encapsulates the major findings of all activities of UNDP/FAO Forestry Projects in Bangladesh upto that time, and is designed to be used for forestry sector planning and for policy analysis. It is a simplified statement of the forestry sector system in Bangladesh. In this chapter, this model is used to project alternative future demand situations for forest produce. A brief description of the model is given first.

5.3 Forestry Sector Simulation Model

The simulation model consists of demand and supply accounting frameworks linked through a physical balance equation. The basis of demand and supply projections are a specified set of different parameters as summarized in tables 5.1 and 5.2, along with related assumptions that are fixed in the model. This model calculates a demand and supply situation for each fifth year between 1980 A.D and 2010 A.D. (Byron et al 1983a, 1983b and 1983c)

In this model, the whole country is divided into four regions as shown in fig A2 in appendix A to avoid the possibility of attaining a huge surplus of wood in one region and a deficit of wood in another region since, in reality, the surplus could not satisfy a corresponding deficit in another region due to limitations of transport infrastructure and/ or the high cost of transportation. Accordingly, in this model once national demand is determined, it is disaggregated into four regions to avoid this possibility, i.e. it is a regional supply and demand balancing model. This model described in Byron et al is in fact an expanded and improved version of that by Byron, (1981) where detailed definitions of 'rural poor and rich' and 'urban poor and rich' for example, can be found.

Table 5.1 Demand parameter and model assumptions

User input requirements	Model assumptions
A. Literacy rate by stratum	In percent for each of four population strata (urban rich and poor, rural rich and poor) at each of seven points in time (1980, 1985, 1990, 1995, 2000, 2005, 2010) the model assumes the urban rich to be the richest 30% of the urban population, and the rural rich to be the richest 30% of the rural population.
B. Annual growth rate of per capita fuelwood consumption	In percent for each of the population strata for each of six 5-year time intervals (1980-85, 85-90, 90-95, 95-2000, 00-05, 05-10).
C. Annual growth rate of per capita sawntimber consumption	In percent for each of the 4 population strata for each 5-year interval.
D. Per capita wood product consumption	For each of the 4 population strata in the base year (1980) in cft. per capita for 7 wood products (fuelwood, posts and poles, sawntimber, matches, plywood, particle board and hardboard); in pounds per literate individual for 2 others (newsprint and other papers).
E. Annual growth rate of wood product consumption.	In percent for plywood, particleboard and hard board; posts, poles and matches are assumed by the model to remain constant over time on a per capita basis.
F. Regional share of total demand	In percent of roundwood equivalent of total national demand for each of the 9 wood products in the base year (1980) for the 4 forestry regions of Bangladesh (as shown in fig. A2).
G. Population	In millions for each of the 7 points in time for total, urban and rural populations separately.

Source: Table 1 The Bangladesh Forestry Sector Simulation, Edelman et al 1985

Table 5.2 Supply Parameters and Model Assumptions

User input requirements	Model assumptions
A. Forest stock of natural forests, 1980.	Area in thousand acres for each of the 4 forestry regions of Bangladesh in the base year (1980).
B. Average potential standing volume per acre of natural forest, 1980.	In thousand cubic feet of roundwood for each of the 4 forestry regions in the base year (1980).
C. Total area lost to encroachment	In thousand acres in the base year for each forestry region.
D. Forest stock of village forests, 1980	In million cft. of standing volume in each region.
E. Village forest growth rate	In percent per year for each forestry region in the base year; thereafter held constant.
F. Area of natural forest logged	In thousand acres for each forestry region at each of the 7 points in time (1980, 1985, 1990, 1995, 2000, 2005, 2010).
G. Percent of natural forest potential standing volume per acre logged as big logs	For each forestry region at each point in time; big logs yield all wood products except pulpwood, posts, poles and fuelwood.
H. Percent of natural forest potential standing volume per acre logged as small logs	For each forestry region at each point in time; small logs yield only posts, poles, fuelwood and pulpwood.
I. Percent of village forest potential standing volume per acre logged as big logs	For each forestry region at each point in time; big logs yield all wood products except for posts, poles and fuelwood.
J. Percent of village forest potential standing volume per acre logged as small logs.	For each forestry region at each point in time; small logs yield only posts, poles, fuelwood and pulpwood.
K. Area of exotic plantation established	In thousand acres for each forestry region at each point in time; exotics include Eucalyptus and other high yielding varieties.
L. Area of other plantations established	In thousand acres for each forestry region at each point in time; this refers to traditional local slow growing species.
M. Area of other plantations clearfelled	In thousand acres for each forestry region at each point in time.
N. Area of other plantations thinned	In thousand acres for each forestry region at each point in time.
O. Projected yield from plantation per acre	In thousand cft. for each forestry region from both clearfelling and thinning of both big and small logs (includes all plantation excluding exotic plantation); these per acre yields are assumed to be constant.

Source: Table 2 Bangladesh Forestry Sector Simulation, Edelman et al 1985

5.4 Demand Projection

As stated earlier in this chapter, future demand for forest produce will depend on various factors both inside and outside the sector. Like other developing countries, these factors are not known precisely for Bangladesh. As a result of uncertainties regarding almost all of the factors relating to future demand of forest produce, here future demand for forest produce is projected for three different scenarios. In one extreme is the demand scenario 1, an optimistic one where it is expected that everything will proceed in right direction as desired by the government in various development plans (various official development targets such as population growth, literacy percent etc. will be achieved). At the other extreme is the demand scenario 3, a pessimistic one where it is expected that nothing will improve in the future (i.e. population growth, literacy percent etc. will follow the past trend with slow growth in urbanization). The demand scenario 2, is a compromise between the above two extremes, where it is assumed that there will be some achievement in population control and growth in the literacy rate but not as per expectation of the perspective plan.

5.4.1 Optimistic Scenario (Demand Scenario 1)

Population data for the country upto 2000 A.D used in this scenario are taken from the official Government Perspective Plan for the period 1980-2000 A.D. after which it is assumed population growth will follow the trend of this plan. So it is assumed that the population growth rate will be 1.1% annually for the period 2000-2005 A.D. and after that period the annual growth rate will be 1% upto 2010 A.D. The growth of urbanization is assumed as 5.12% in five years and this is in accordance with the findings of the Population Census, 1981. The projected urban and rural population of Bangladesh from 1980-2010A.D (at 5 years interval) is given in table 5.3

Table 5.3 Population in million

Year	Total	Urban	Rural
1980	87.2	13.24	73.96
1985	98.1	19.91	78.19
1990	110.2	28.01	82.19
1995	120.3	36.74	83.56
2000	128.3	45.75	82.55
2005	135.48	55.25	80.23
2010	142.39	65.36	77.03

The literacy rate used in this scenario is also taken from the perspective plan's predictions for the period 1980-2000 A.D., and then assumed that this trend will continue. The national literacy rate is then disaggregated into literacy rate for four strata of population (as implicit in the model) in table 5.4 to some extent arbitrarily keeping in mind percent literacy rate of rural and urban population, assuming a very fast growth of literacy in urban-poor, rural-rich and rural poor strata .

Table 5.4 Literacy percent

Year	National	Urban-rich	Urban-poor	Rural-rich	Rural-poor
1980	26	85	30	45	12.5
1985	40	90	40	55	27.5
1990	52	95	52.5	65	40.0
1995	65	95	65	75	55.0
2000	75	95	75	80	67.5
2005	80	98	80	85	75.0
2010	85	98	85	90	80.0

The data on per capita consumption of forest produce for the base year 1980, based on FAO/UNDP study by Douglas et al (1980) and Melhuish (1982)

as used in the simulation model, are also used in this scenario, since these are most authentic data available till now and are given in table 5.5.

Table 5.5 Consumption/Cap (Cft.) or /Lit Person (Lb.*)

Product	Urban-R	Urban-P	Rural-R	Rural-P
Fuelwood	0.35	0.74	3.36	2.12
Posts/Poles	0.15	0.10	0.98	0.28
Sawntimber	3.80	0.07	0.82	0.04
Newsprint*	4.41	1.11	0.88	0.33
Paper*	4.10	1.25	2.00	0.80
Matchbox	0.02	0.02	0.02	0.02
Plywood	0.04	0.00	0.02	0.00
Particleboard	0.03	0.00	0.01	0.00
Hardboard	0.10	0.00	0.04	0.00

Another important set of demand parameters is the expected growth rate of per capita consumption of various forest produce. For fuelwood consumption, negative growth is assumed as shown in table 5.6. In spite of negative growth in fuelwood consumption, it is assumed that overall energy consumption will increase due to increased availability of alternative sources of energy like natural gas and electricity (as Government intended to supply more natural gas for domestic use and also to cover more areas under the rural electrification program) and also due to the use of more heat conserving techniques as a result of increased literacy. This decreasing tendency in fuelwood consumption is not uniform for four strata. The maximum reduction in per capita consumption of fuelwood would be experienced by the rural rich as they consume at present more than others in the country, followed by rural-poor and urban-poor. In the case of the urban-rich, this reduction will be minimal as at present, per capita consumption of fuelwood for urban-rich strata is almost one tenth of that of rural-rich strata and also one-sixth and half respectively of those of rural and urban poor strata.

Table 5.6 Percent Growth per capita Fuelwood Consumption

Year	Urban-R	Urban-P	Rural-R	Rural-P
80/85	0	0	0	0
85/90	-2.0	-5.0	-5.0	-2.0
90/95	-2.0	-5.0	-5.0	-3.0
95/2000	-2.0	-5.0	-5.0	-3.0
2000/05	-2.0	-5.0	-10.0	-5.0
05/10	-2.0	-5.0	-10.0	-5.0

For sawn timber consumption it is assumed that all four strata will experience a growth in consumption as shown in table 5.7, as a result of improvement in the overall quality of life of people in Bangladesh as expected in the perspective plan. Here maximum growth will be experienced by rural poor strata, as they are at present minimal users of sawn timber, followed respectively by urban-poor and rural rich-strata. In case of urban-rich the growth will be least as they are at present the major user of sawn timber and also to some extent, due to their greater use of alternative products like hardboard, particle board and plywood.

Table 5.7 Percent Growth of Per Capita Sawn Timber Consumption

Year	Urban-R	Urban-P	Rural-R	Rural-P
1980/85	2	5	5	5
1985/90	2	5	5	5
1990/95	2	10	5	10
1995/2000	2	10	5	10
2000/05	2	10	5	10
2005/10	2	10	5	10

Growth of consumption of forest products for the periods 1980-2010 A.D. are the same as used in the original simulation model and are given in table 5.8. Since at present both urban and rural poor are non-users of this product, the growth of consumption of this product will have negligible effect on overall national demand of forest produce.

Table 5.8 Annual Rate of Consumption Growth of other Forest Products

Product	Percent
Plywood	2.5
Particleboard	7.5
Hardboard	2.0

In the model it is necessary to disaggregate the projected national demands and so the assumed percentage of national demand for roundwood for various end uses, to be met from local sources, is given in table 5.9. The data given in the "master data" file of the simulation model are in accordance with recent trends and would be used for all products except sawn timber. For sawn timber it is assumed that the present situation of meeting 35% of the national demand for logs for sawn timber from the village forest of central region, (due to the very small area of degraded reserved forest in this region) could not continue due to manifold increase of demand for sawn timber under this scenario. Alternatively, it is possible to increase the supply of sawn timber to a great extent from Chittagong region by opening up presently inaccessible forest areas of this region due to infrastructural development which would also favour more interregional movement of forest produce. So it is assumed that under this scenario, regional share of demand for sawn timber for Chittagong region would be increased from the present level of 27% (as per master data) to 37%, where as that of Central region would be decreased from the present level of 35% to 25%. The regional share of demand of sawn timber for Sunderban and Western

regions would remain unchanged under this scenario, as it is assumed in Sunderban region natural forests (i.e. Sunderban Forests) are exploited at their sustainable capacity, so there would be no scope for considerable increases in supply in future from this region. On the other hand, for the Western region it is assumed that the present level of regional share of demand of a minimal 10% could be met in the future, even in the face of steep rises in demand for sawn timber.

Table 5.9 % National Roundwood Equivalent from Local Sources

Products	Western	Sunderban	Chittagong	Central
Fuelwood	38	15	6	41
Posts/Poles	40	13	8	39
Sawntimber	10	28	37	25
Newsprint	0	80	0	0
Paper	0	0	40	0
Match	10	10	20	60
Plywood	0	0	75	25
Particleboard	0	40	60	0
Hardboard	0	40	60	0

Projected national demand for forest produce in million cubic feet (MCF) of roundwood equivalent (RWE) is given in table 5.10. National demand in product units and also regional demand for logs (total, small and big) in RWE for different regions for the period 1980-2010 A.D. are simulated and are given in tables B1.1 -B1.5 in appendix B.

Table 5.10 National Demand (MCF of RWE)

Product	1980	1990	2000	2010
Fuelwood	192.5	188.2	134.7	71.7
Posts/Poles	37.8	43.5	45.7	45.3
Sawntimber	47.9	103.5	200.3	366.5
Newsprint	2.9	6.8	11.4	16.0
Paper	5.3	12.0	19.3	25.5
Match	1.7	2.2	2.6	2.8
Plywood	0.8	1.5	2.4	3.6
Particleboard	0.4	1.2	3.4	8.6
Hardboard	1.5	2.6	4.0	6.0
Total	290.8	361.5	423.8	546.1

5.4.2 Compromise Scenario (Demand Scenario 2)

In scenario 2, the population data, according to the findings of the National Population Census, 1981 for the period 1980 - 2010 A.D. have been used assuming a medium rate of both mortality and fertility decline. After 2000 A. D, it is assumed that population will grow at an annual rate of 1.8% upto 2005 A.D and then at a rate of 1.6% per annum upto 2010 A.D. This scenario assumes the same growth rate for urbanization as scenario 1. The projected total population and also urban and rural populations for the period 1980 - 2010 A.D. (at five yearly intervals) under this scenario is given in table 5.11

Table 5.11 Population in million

Year	Total	Urban	Rural
1980	88.50	13.43	75.07
1985	100.47	20.40	80.07
1990	113.01	28.73	84.28
1995	126.40	38.58	87.76
2000	139.69	49.81	89.88
2005	152.68	62.26	90.42
2010	165.35	75.90	89.45

In this scenario, the growth in literacy is projected at a very nominal rate. From three previous census reports it is observed that the literacy rate increased from 17% in 1961 to 20.2% in 1974 and then decreased to 19.7% in 1981. According to the official source, this decrease in literacy rate is mainly due to a stricter definition of literacy for the 1981 census (Census 81, p80). Accepting this official version for the apparent decrease in literacy, it is assumed here that literacy will increase at an annual nominal rate of 1% upto 1990 A.D. and after that at an annual rate of 1.5% upto 2000 A.D. and for the rest of the period the rate will be 2%. In this way literacy will increase from 19.7% in 1981 to 30.5% in 2010 A.D. Then literacy for different strata is estimated assuming urban literacy will increase only slightly from 34.8% in 1980 to 36% in 2010 A.D. due to slight increase in literacy for urban rich from 80% in 1980 to 85% in 2010 A.D. and at the same time rural literacy rate will increase from 17% in 1980 to 25% in 2010 due to considerable increase in literacy rate for rural rich from 40% in 1980 to 55% in 2010. The literacy rate for both urban and rural poor will remain almost constant at 15% and 7% respectively. 1981 census data is used for literacy rate of total and also urban and rural population for the year 1980 assuming no growth in the literacy rate between 1980 and 1981. Then literacy rates for urban and rural populations were to some extent arbitrarily disaggregated between rich and poor strata. The

literacy rate for different strata and also total literacy rate for the simulation period is projected in table 5.12.

Table 5.12 Literacy rate in percent

Year	Total	Urban-R	Urban-P	Rural-R	Rural-P
1980	19.7	80	15.4	40	7.1
1985	20.5	80	14.6	40	7.1
1990	21.5	80	13.1	42	7.0
1995	23.2	80	14.1	45	7.1
2000	25.0	80	15.5	48	7.3
2005	27.6	85	15.0	55	7.9
2010	30.5	85	15.0	55	7.9

The data given in table 5.5 under scenario 1 for per capita consumption of various forest product will be used in this scenario. Regarding growth of consumption of various forest products, it is assumed in this scenario that the aim of the planning is to check any deterioration of existing per capita consumption levels of forest produce, in other words to check further deterioration of overall quality of life of the people. So during the simulation period, there will be no growth in consumption of different forest produce except some decline in fuelwood consumption for the urban rich group. This is mainly due to more access for the people of this group to other alternative sources of energy like natural gas and electricity. This is in accordance with the existing trend in Bangladesh. The per capita growth in consumption of fuelwood is given in table 5.13. Growth of consumption for all other products would be zero under this scenario.

The regional shares of the national demand for various forest products are assumed to be the same as those given in the master data under this scenario and as given in table 5.14

Table 5.13 Percent growth in per capita fuelwood consumption

Year	Urban-R	Urban-P	Rural-R	Rural-P
980/85	0	0	0	0
1985/90	-1.0	0	0	0
1990/95	-1.0	0	0	0
1995/00	-1.5	0	0	0
2000/05	-1.5	0	0	0
2005/10	-2.0	0	0	0

Table 5.14 %National RWE from Local Sources

Product	Western	Sunderban	Chittagong	Central
Fuelwood	38	15	6	41
Posts/Poles	40	13	8	39
Sawntimber	10	28	27	35
Newsprint	0	80	0	0
Paper	0	0	40	0
Match	10	10	20	60
Plywood	0	0	75	25
Particleboard	0	40	60	0
Hardboard	0	40	60	0

Projected national demand for forest produce in round wood equivalent is given in table 5.15. National demand in product units and also regional demand for logs (total, small and big) in RWE for different regions for the period 1980-2010 A.D. are simulated and are given in tables B2.1-B2.5 in appendix B .

Table 5.15 National Demand (MCF of RWE)

Product	1980	1990	2000	2010
Fuelwood	195.3	227.7	254.1	267.8
Posts/Poles	38.3	44.6	49.8	52.6
Sawntimber	48.6	76.1	111.5	152.6
Newsprint	2.5	4.4	7.2	10.9
Paper	4.5	7.0	10.7	15.4
Match	1.8	2.3	2.8	3.3
Plywood	0.8	1.2	1.6	2.0
Particleboard	0.4	0.6	0.9	1.1
Hardboard	1.5	2.2	3.0	3.9
Total	293.8	366.1	441.4	509.5

5.4.3. Pessimistic Scenario (Demand Scenario 3)

In scenario 3, the population projection by Faaland and Parkinson (1976) for the period 1980- 2000 A. D on the basis of past trends, is used. After that it is assumed that population will grow at an annual rate of 2% for the rest of the simulation period (i.e. upto 2010 A.D.).

In this scenario, growth of urbanization is assumed to be half of that given in the population census of 1981, i.e. only 2.56% in five years (assuming that the projected urbanization in the 1981 census findings was made on the basis of rapid urbanization in between 1974 and 1981, mainly due to wider definition of urban area used for the 1981 census, and this rate will not continue under this scenario). Projected total population and also those of urban and rural areas under this scenario for the period 1980-2010 A.D. are given in table 5.16.

Table 5.16 Population in millions

Year	Total	Urban	Rural
1980	93.0	14.12	78.88
1985	106.1	18.82	87.18
1990	121.0	24.56	96.44
1995	134.8	30.80	104.00
2000	150.0	38.13	111.87
2005	165.6	46.33	119.27
2010	182.8	55.83	126.97

Assuming zero growth in literacy from 1974 to 1981, it is further assumed that literacy rate will remain constant over the period under this scenario. It is also assumed that, during this period people in the rural-rich strata will experience a slight increase in literacy rate, but literacy rates for poor people of both urban and rural areas will decline considerably over that period. In the case of the urban- rich strata, it will remain constant over that period. Total literacy rate and also literacy rate of different strata under this scenario are given in table 5.17.

Table 5.17 Literacy rate in percent

Year	Total	Urban-R	Urban-P	Rural-R	Rural-P
1980	19.7	80	15.4	40	7.1
1985	19.7	80	11.8	40	7.1
1990	19.7	80	9.0	40	7.1
1995	19.7	80	6.9	45	5.0
2000	19.7	80	5.1	45	5.0
2005	19.7	80	3.7	50	2.9
2010	19.7	80	2.6	50	2.9

All other assumptions for deriving demand under this scenario will remain the same as scenario 2.

Projected national demand for forest produce in roundwood equivalent is simulated and presented in table 5.18. National demand for various forest products in product units are given in table B3.1 in appendix B. Regional demands for both big and small logs together with total log demand for different regions are also given in appendix B in tables B3.2-B3.5.

Table 5. 18 National Demand (MCF of RWE)

Product	1980	1990	2000	2010
Fuelwood	205.3	255.4	301.8	349.3
Posts/poles	40.3	50.1	59.2	68.6
Sawntimber	51.1	74.0	101.1	134.6
Newsprint	2.6	3.9	5.6	7.8
Paper	4.7	6.6	9.1	12.1
Match	1.9	2.4	3.0	3.7
Plywood	0.9	1.2	1.6	2.0
Particleboard	0.4	0.6	0.8	1.1
Hardboard	1.6	2.2	2.9	3.7
Total	308.7	396.5	485.0	582.7

5.5 Comparison of Demand Scenarios

Alternative future demand situations under the three scenarios are presented graphically in figures 5.1 - 5.8. In figure 5.1, total national demand for roundwood under three scenarios, it is observed that demand situations in scenarios 1 and 2 do not differ appreciably; and upto 2000 A.D., demand under scenario 1 would be slightly less than that under scenario 2 and after that it would be slightly greater than under scenario 2 due to increased demand of sawn timber under this scenario. The demand for round wood under scenario 3 would be much greater than those under scenarios 1 and 2 over the whole period mainly due to increased demand for fuelwood for the increased population under this scenario.

From figure 5.2, it is apparent that demand for fuelwood will gradually decrease under scenario 1 due to slower growth in population (in comparison to the two other scenarios) and also due to negative growth in fuelwood consumption. On the other hand, demand for fuelwood under scenarios 2 and 3 would increase over the same period. This tendency would be much more for scenario 3 than scenario 2 due to increased population and less urbanization under scenario 3 than under scenario 2.

The opposite trend is observed in the case of demand for sawn timber and industrial products in fig 5.3 and fig 5.4 respectively. From these figures it is revealed that demand for both sawn timber and industrial product are much more under scenario 1 than those under other two scenarios. This is mainly due to an increase in per capita consumption growth of these products under this scenario and this would surpass the population growth under scenarios 2 and 3.

The demands for sawn timber and industrial forest product under scenarios 2 and 3 do not differ appreciably as seen in figure 5.3 and 5.4 respectively, but demands under scenario 3 are less than those under scenario 2 in both cases. In this case, in fact increased demand for these products by increased

population is offset by the increased rate of urbanization under scenario 2, as urban people are the main users of this product. So the overall composition of national demand for roundwood for various end uses would vary greatly scenario to scenario.

The demands of roundwood for fuelwood are 13%, 52.5% and 60% of total national demand for roundwood under scenarios 1, 2 and 3 respectively in 2010 A. D., whereas in 1980 demand of roundwood for fuelwood constituted almost 66% of national demand for roundwood. Similarly, the demand of round wood for sawn timber are 67%, 30% and 23% of national demand under scenarios 1, 2 and 3 respectively in 2010 A.D., whereas in 1980 it was only 16.5 % for all the scenarios. The demand for roundwood for industrial products is of less significance, as it constituted less than 1% of total national demand for roundwood even in 2010 A.D.

So, the structure and composition of future demand for forest produce vary greatly from scenario to scenario and accordingly the steps necessary to fulfil the future demand for roundwood will also vary. This is further understood from a comparison of regional demands for small and big logs under different scenarios.

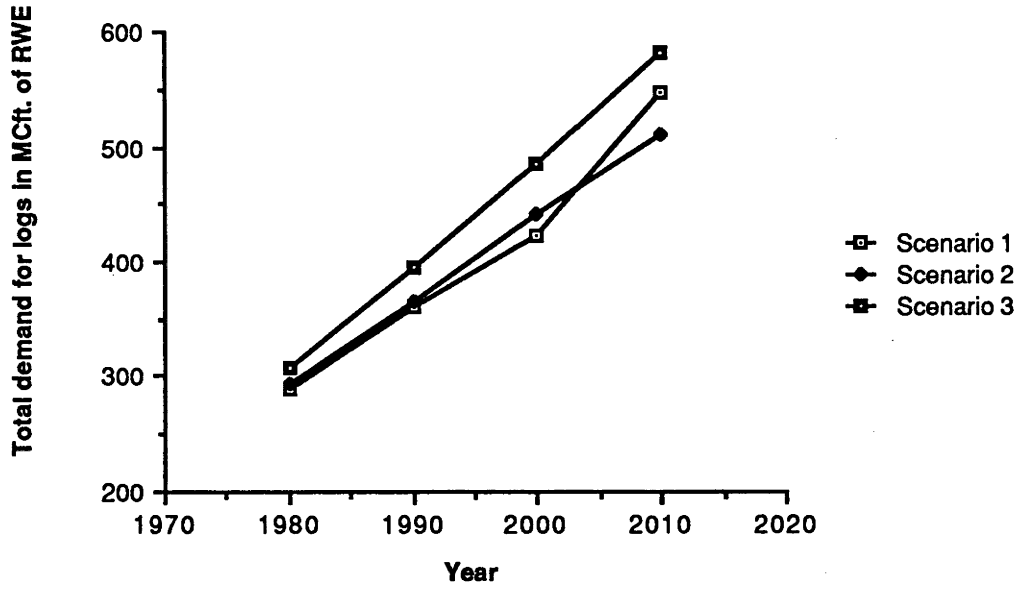


Figure 5.1 Total national demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for different demand scenarios.

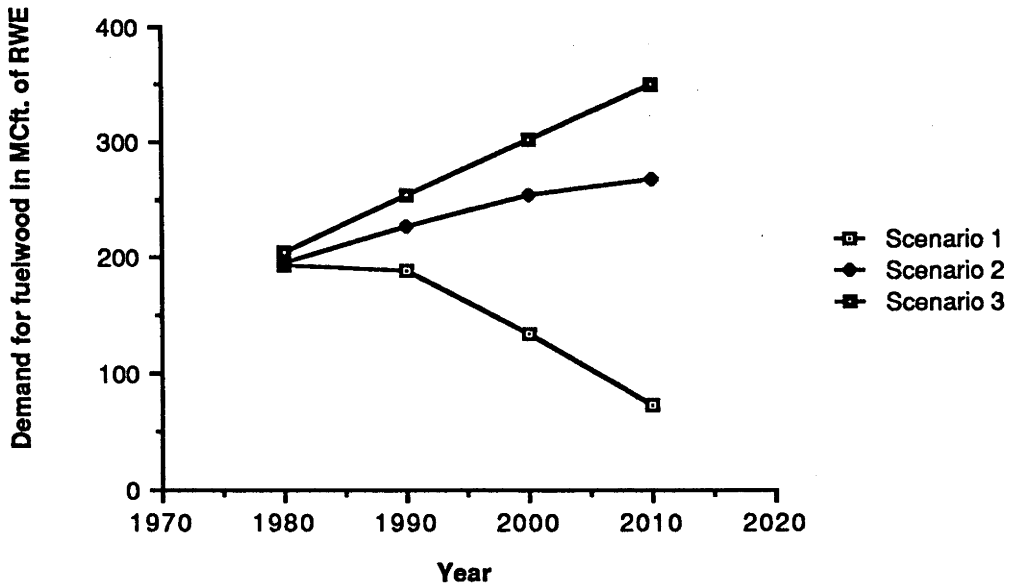


Figure 5.2 Demand for fuelwood in million cubic feet of roundwood equivalent (MCft. of RWE) under different demand scenarios.

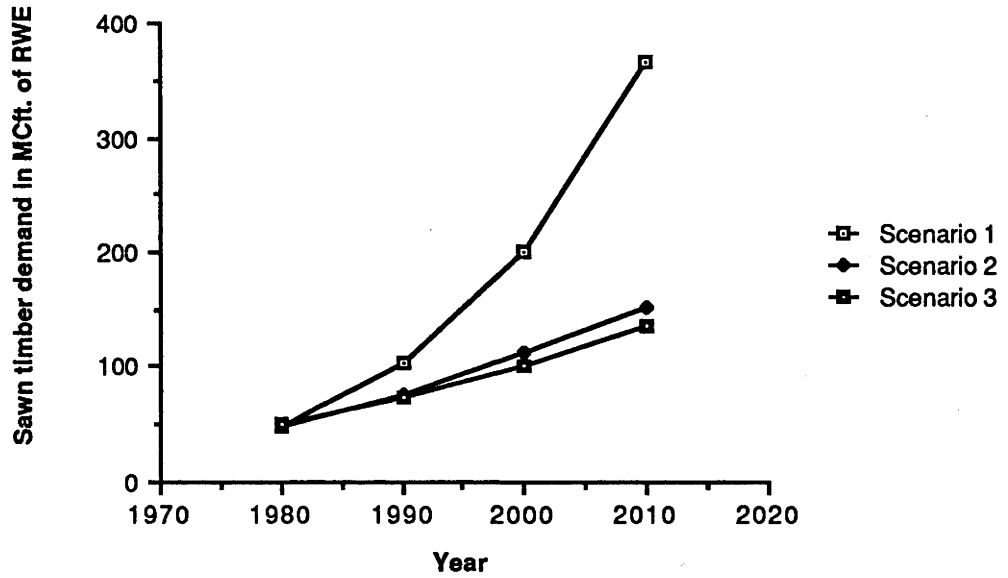


Figure 5.3 National demand for sawn timber in million cubic feet of roundwood equivalent (MCft. of RWE) under different demand scenarios.

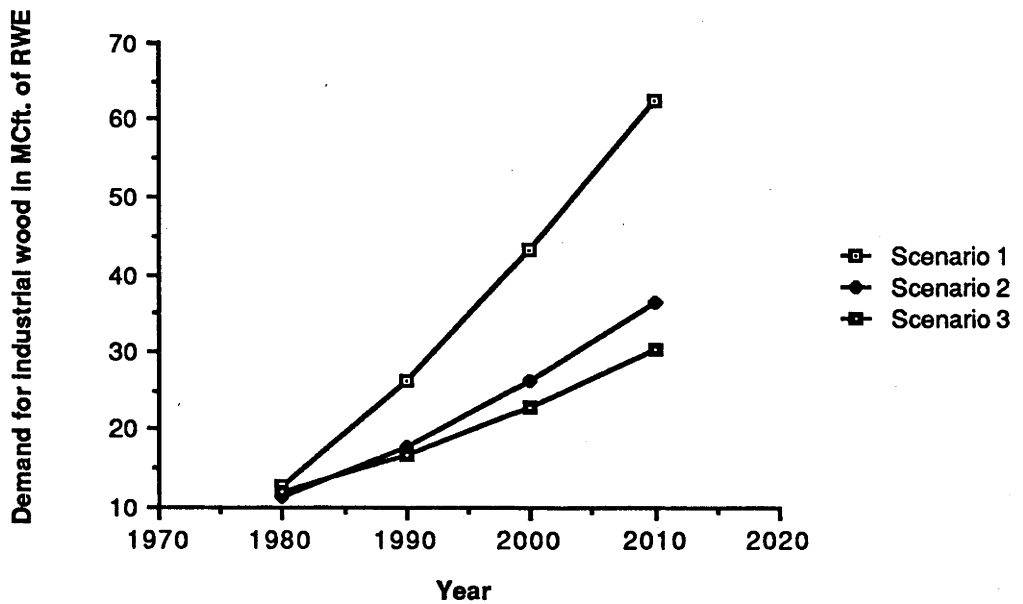


Figure 5.4 National demand for industrial forest product in million cubic feet of roundwood equivalent under different demand scenarios.

Figure 5.5 shows regional demand for total, big and small logs respectively under different scenarios for Western region. In scenario 1 an initial increase in total demand would be followed by gradual decrease in total demand for logs. In scenarios 2 and 3, demand for logs would increase over time and this demand under scenario 3 would be greater than that under scenario 2 and this gap would widen over time, mainly due to increasing demand for small wood under scenario 3, as demand for big logs under the two scenarios would be more or less the same over that period.

Figure 5.6 shows the demand for logs in Sunderban region under different demand scenarios. From the figures, it is apparent that demand under scenario 1 would increase over time at a rate faster than those of two other scenarios. Demand for small log under scenario 1 would decline over time, but manifold increases in demand for big logs would be responsible for increased total demand under scenario 1.

Figure 5.7 represents the demand for logs under different scenarios in Chittagong region and this resembles to a great extent that of Sunderban region. Demand for log under scenario 1 would be much more than other two scenarios due to high demand of big logs (industrial wood) for this region under this scenario, whereas demand for small logs would increase slightly over that period. In this region there would be no appreciable difference in demand for total log and also big and small logs under scenarios 2 and 3.

Figure 5.8 shows the regional demand for logs under different scenarios in the Central region and the nature of demand resembles to a great extent that of Western region i.e. total demand would be much more under scenario 3 followed by scenario 2 and would be minimum for scenario 1. The demand for small logs constituted most of log demand under scenarios 2 and 3 and also there would be considerably less demand for big logs under these scenarios.

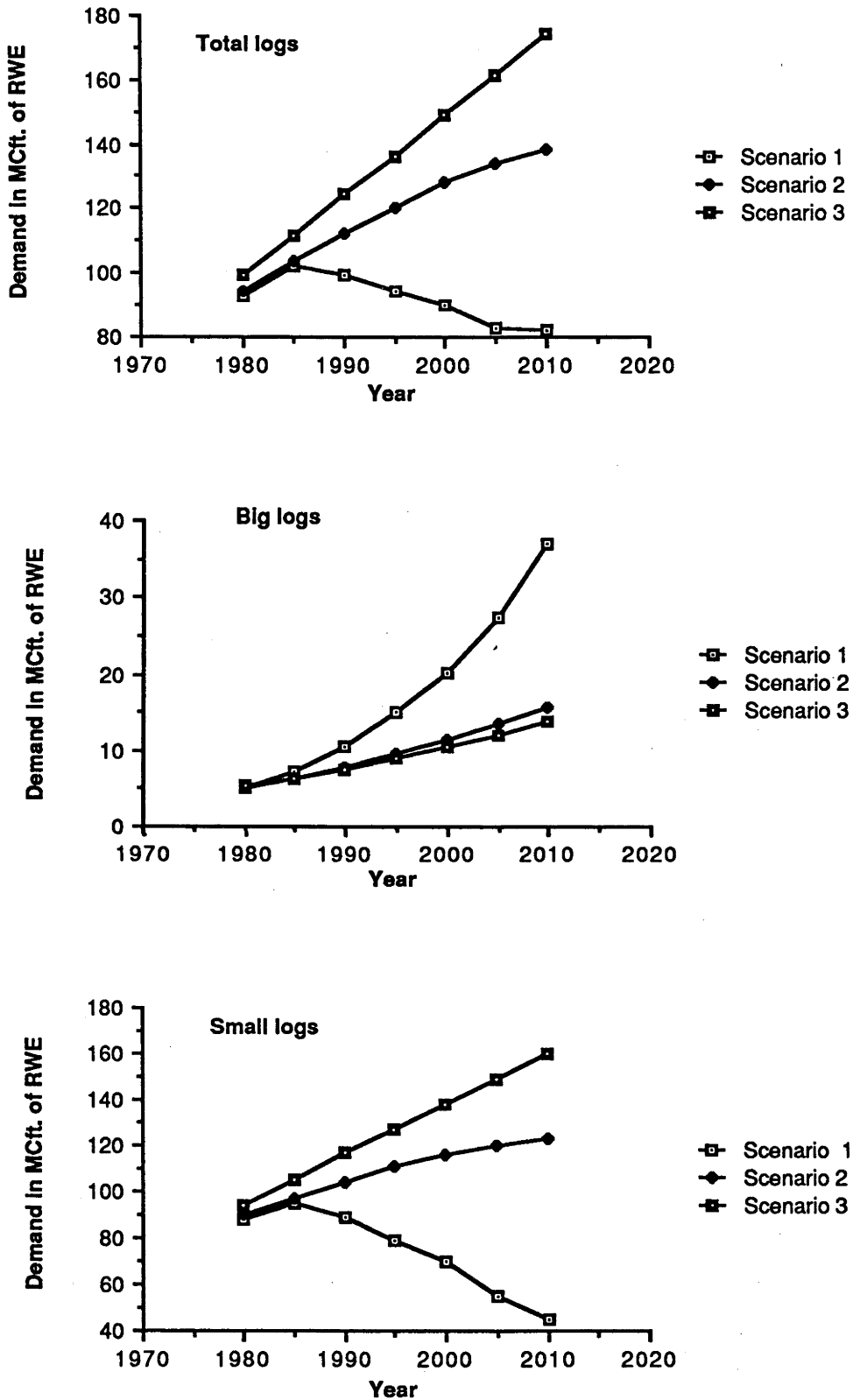


Figure 5.5 Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under different demand scenarios.

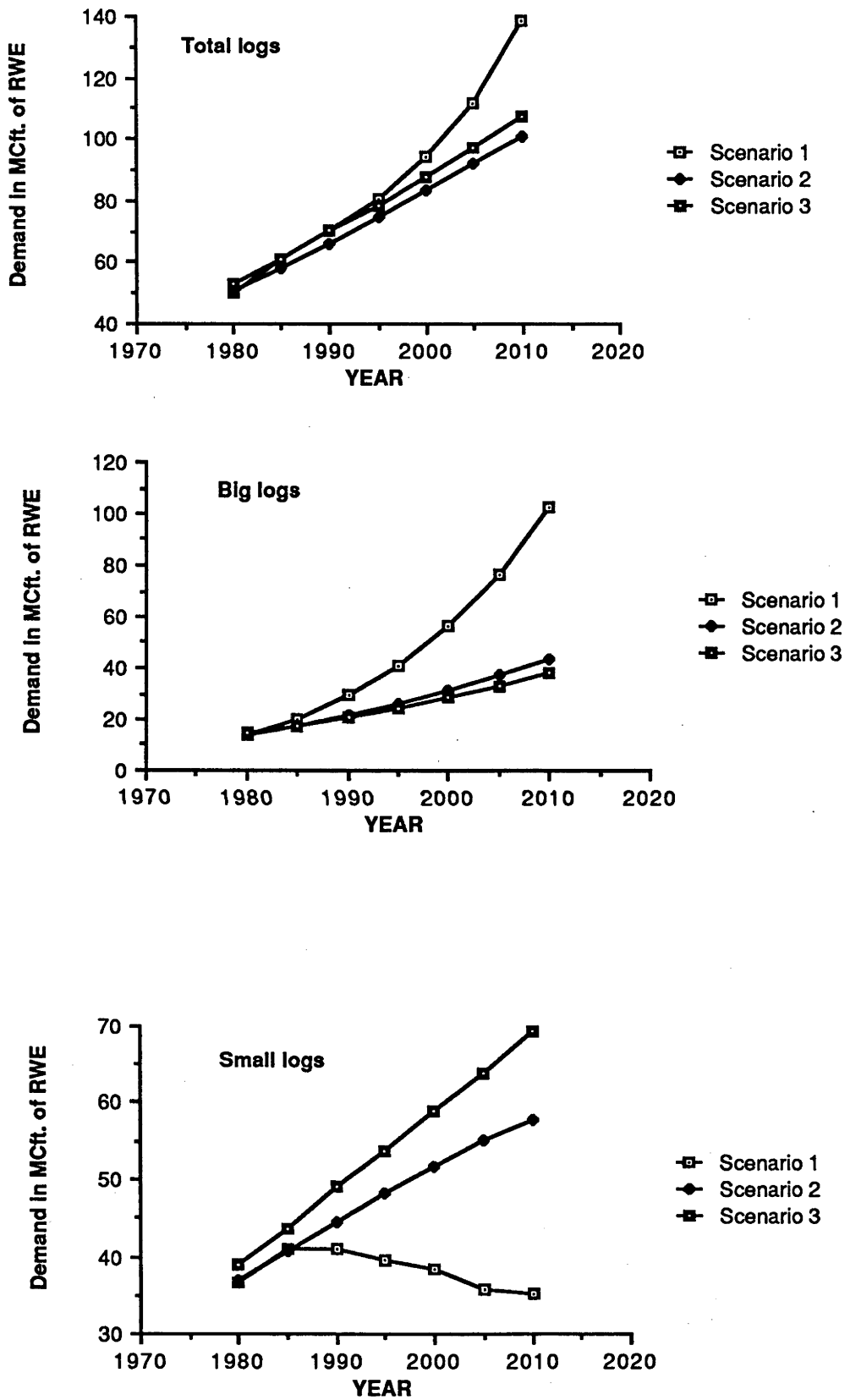


Figure 5.6 Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under different demand scenarios.

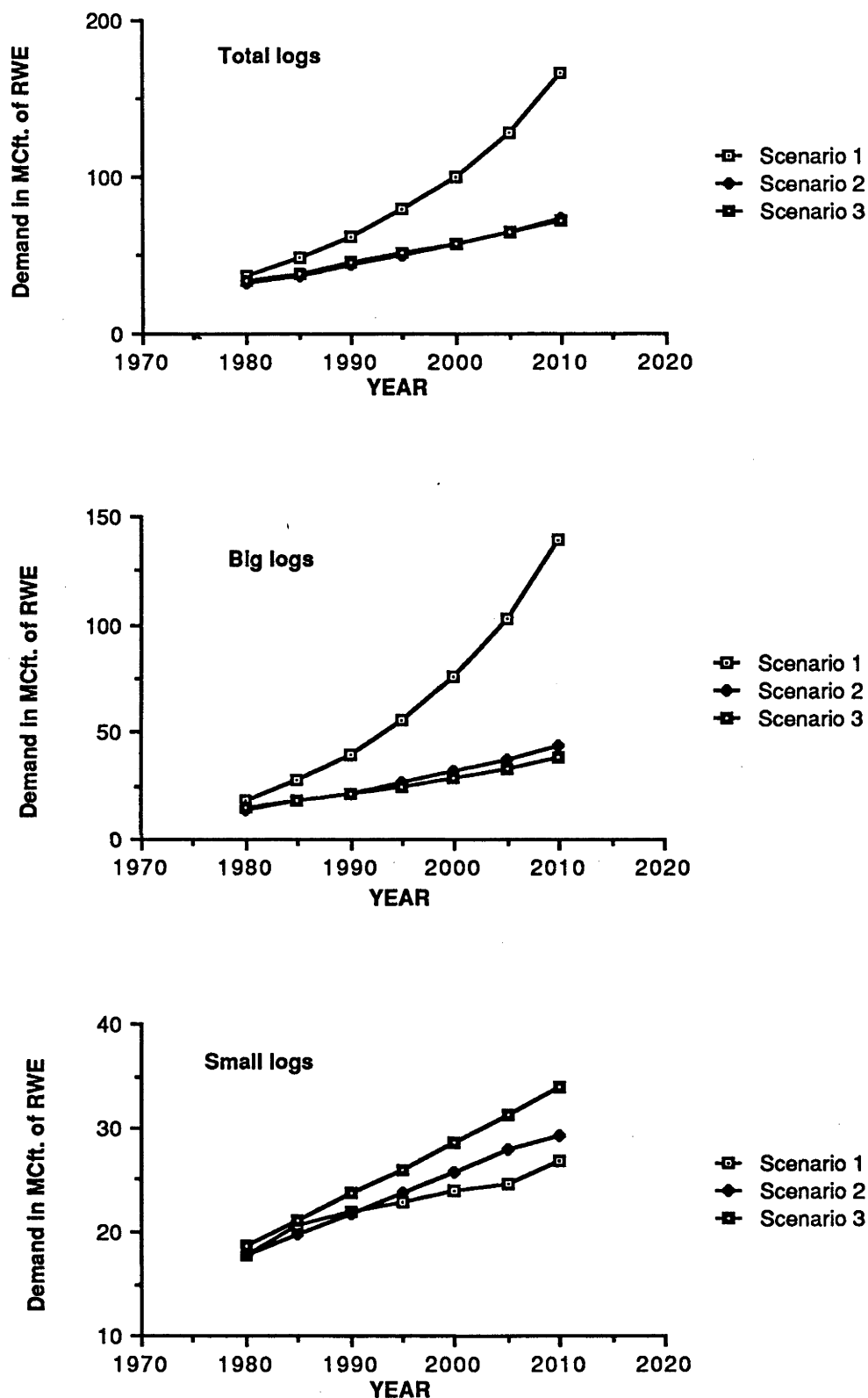


Figure 5.7 Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Chittagong region under different demand scenarios.

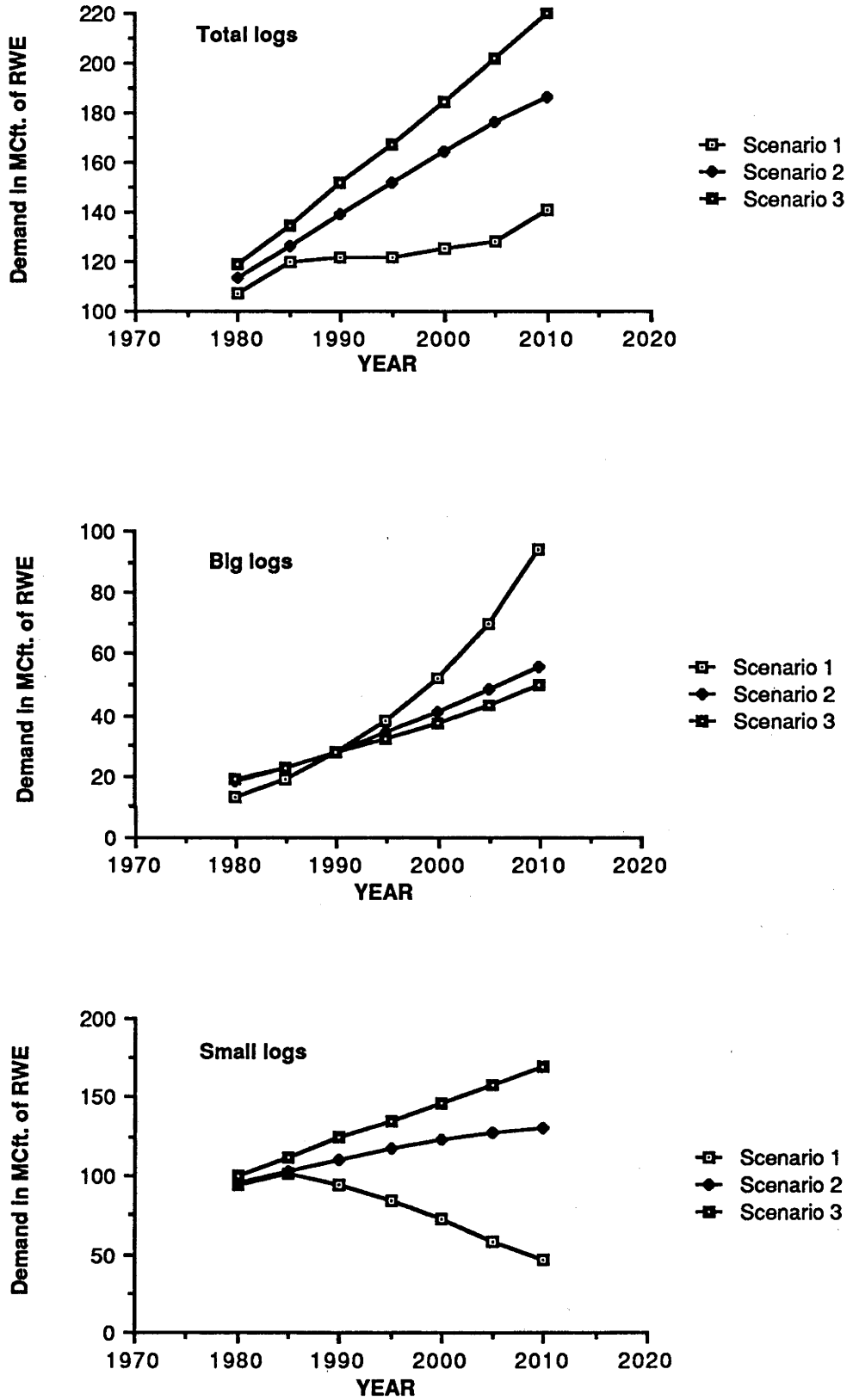


Figure 5.8 Demand for logs in million cubic feet of roundwood equivalent (MCft. of RWE) for Central region under different demand scenarios.

5.6 Choice of Scenario

From the above analysis, it is clear that there is no appreciable difference between scenarios 2 and 3, because increased population in scenario 3 is to some extent counter balanced by a comparatively high urbanization rate under scenario 2. On the other hand, scenario 1 is completely different from the other two scenarios, as regards both total demand and its composition (especially fuelwood compared to sawlog/ industrial wood). The difference in scenarios will also warrant a different strategy to cope with the future demand situation. In the case of scenario 1, effort is necessary to fulfil future increased demand for big logs and particularly in Sunderban and Chittagong regions, where most government forests are situated. However in scenarios 2 and 3 much more attention is necessary to cope with future demand (especially small wood demand) in Rajshahi and Central regions, where there is little government forest area. So the situation is completely different between scenario 1 on one hand and the two other scenarios. Scenario 1 demands comparatively strong effort for growing big logs in regions where most of the forest area is situated. Scenarios 2 and 3, on the other hand demand comparatively strong effort in growing mostly small logs in areas where there is virtually no forest area; at the same time comparatively less effort is necessary for growing trees especially big logs in regions where most of the public forest land exists.

So, as argued in chapter 2, a world wide blue print solution would not solve problems in every situation and this is also true for Bangladesh. The nature and extent of forestry activities necessary for development even vary within a country depending on the situation. So for the sake of sound planning, it is necessary to choose appropriate scenarios, as choosing the wrong scenario would do nothing but aggravate the situation.

As said earlier, the scenario 1 is based on official development planning, like five year plans, and is optimistic, its targets are far from being

achieved. To the people who know the situation of Bangladesh, this scenario is far from the real situation.

On the other hand, scenario 3 which is a pessimistic one, gives a gloomy picture of the country. The population projections are based on the past trend when people did not think about family planning. The situation has changed a lot in the last couple of years. Though there is no decreasing trend in population growth rate at least there is no increasing trend in the population growth rate. So future population on the basis of the past trend would only over estimate the future population. The literacy rate is also considered as constant over the entire period in this scenario 3 based on the past trend, which is also not true. On the other hand slow urbanization does not state the present trend of urbanization, since the creation of Bangladesh. In all, scenario 3 does not speak the real situation of the country.

Scenario 2 is a compromise between two extremes where assumptions have to some extent, a statistical basis (mainly population projection and urbanization upto 2000 A.D.) and also literacy rates are realistic. Considering all these facts, scenario 2 is considered as the most acceptable indicative planning scenario for future Bangladesh.

CHAPTER 6

6. SUPPLY SITUATION

6.1 Introduction

After predicting future demand of forest produce in chapter 5, the next step for forestry sector planning is to suggest a strategy for supplying the forest produce within the development framework of the country. For this it is necessary to assess available supply options for the sector and finally to suggest the most suitable option on the basis of its impact on creation of employment opportunities, to ensure the access of the general masses to the basic needs as desired by the development strategy of an overpopulated country like Bangladesh.

6.2 Future Supply Situation

As stated in chapter 5, supply situations are also uncertain like demand situations and are dependent on various factors like stock, density and growth rate of available forest resources, extent and trend in forest encroachment and also on factors like the future felling rate of existing forest resources and the raising of plantations with fast growing species. For sound planning, accurate data on present forest resources and their growth rate were required, but as in the demand situation, accurate data are virtually unavailable. As a result in this chapter, the best available data have been used for some of the supply parameters like the area of natural forests left and their density; area, density and growth rate of existing plantations; and presently available village forest. The factors like growth and cutting rates of village forests, establishment of exotic plantations etc. are considered as variable factors and are subject to manipulation during the planning process. Some of the factors, like the establishment of other plantations, would have negligible effect on the supply situation, since these plantations will be harvested beyond the plan period (i.e.

beyond 2010 A.D., since these plantations have rotations at least longer than 30 years). Assuming the best estimate for fixed factors on the basis of currently available information, some of the policy options to look for future supply situations are examined in this chapter using the Bangladesh Forestry Sector Simulation Model as discussed in chapter 5.

6.3 Supply Parameters

6.3.1 Forest Stock, Growth, Density and Encroachment in 1980

The data for natural forest areas in different regions are taken from Field Document No 2, UNDP/ FAO/ Planning Commission Project BGD/78/010 (Douglas, 1981 p73) and readjusted for different regions after excluding the area under encroachment.

In this document, an area figure for Sunderban forest is given as 1-1.4 million acres and stock density as 500 - 800 cft./acre. Sunderban forest is managed on a sustained yield basis with a silvicultural system of selection felling followed by natural regeneration with a rotation of 60 years. According to this system the availability of forest produce from this forest assuming a density of 800 cft./acre, would range from 13.3 million cft./annum to 18.62 million cft./annum for an area ranging from 1 million to 1.4 million acres respectively. The higher limit of 18.62 million cft. is more or less similar to average annual removal from Sunderban forests according to official Forest Department sources (Douglas, 1981 p59). If it is assumed that there is no overcutting of produce from Sunderban forest and in future the same amount will be available from Sunderban forest without degrading the forest, then both higher limit of stock density and forest area estimated by Douglas can be used for our purpose.

In the case of forests in Chittagong region, data provided by Douglas for hill forests are readjusted after excluding the forest area of greater Sylhet district. The upper limit of growing stock for this forest area as provided by Douglas (1981, p64) is taken for our purpose assuming maximum possible outturn which includes extraction of all trees up to 12 inch D. B. H. (the more likely option in the future situation of Bangladesh).

For Central region, the area (after necessary adjustment for forest area of Sylhet) and also stock density for Sal Forest as provided by Douglas are taken for our purpose. For Western region, the official area statement for forest of the Northern Division is considered as the forest area for this region.

For the purpose of the simulation model, it is necessary to estimate the natural forest area left in 1980 after excluding the area already lost to encroachment by that time. It is a difficult task as data regarding encroachment are very much lacking and the only way out is to make some assumptions depending on the situation.

For Western region it is assumed that all the forest area of the region is already lost to encroachment and so there is no natural forest area left in the region. For Sunderban region it is assumed that there is no encroachment in the forest area of this region, on the basis of official information that adverse ecological and physical situation has made encroachment almost impossible in this region (though some unofficial sources reported extensive encroachment for shrimp culture in these forests). From various reports it is evident that a considerable portion of forests of Central region is already lost to encroachment. According to Byron (1984a) almost 50% of the Sal forest of Dhaka - Mymensingh zone (the major forest area of this region) has already been cleared (and settled) under temporary, marginal agriculture. Accordingly it is assumed in this paper that 50% of the recorded government forest of this region has unofficially been lost to encroachment. Similarly a considerable portion of forests of Chittagong region has also been lost to

either encroachment or is completely devoid of vegetation. Though the extent of encroachment is far less than that in the Central region, it is significant never the less. In the absence of any reliable data in this regard, it is assumed to some extent arbitrarily that almost 25% of the officially recorded forest area of the region has already been lost to either encroachment or completely denuded of forest. As said earlier for the purpose of the simulation model, natural forest area left in each region in each period is calculated after deducting the area of forest either already lost to encroachment or of denuded of vegetation from the initial area statement given by Douglas, mainly based on the official sources.

As regards the rate of growth of encroachment in forest area, it is hardly possible to get any reliable data. For Sunderban and Western regions, these are assumed as zero as no area is available in Western region for this purpose, and it is physically difficult in Sunderban region. For the other two regions (Chittagong and Central), it is somewhat arbitrarily assumed as 2000 and 1000 acres per annum respectively, as these values have little significance to the future supply situation except the availability of land for various forestry purposes (unless a ceiling is reached, where all natural forests have been encroached). The growth in each period could be based on the forested area left i.e. Initial Area - Area Logged - Area Encroached.

As regards Village or Homestead forest, earlier data collected by Byron (1984b) for various districts are taken for our purpose. It should be pointed that Byron has not included any figure for Chittagong Hill Tracts area, so for our purpose, it is estimated assuming per capita village forest standing volume as 55 cft. (which is similar to per capita standing volume of nearby forested Upa-zillas of Chittagong area). This data is then proportionately adjusted to include trees under 20 cm. D.B.H., in a way so that overall national standing volume of Village Forest coincides with the average of the figures given by Hammermaster (1981) in this regard.

The Village or Homestead forests is the most important forest resource of the country and is available in all the four regions. The future supply situation for forest produce is mostly dependent on this resource. In this chapter two policy options are tested - in one option the village forest is assumed to grow at a rate of 5%, which is considered as a present sustainable growth rate by some experts (Hammermaster, 1981), but according to others this rate is even less than 4% (Douglas 1981, P 54). In the second option, Village forest would be expected to grow at a rate of 10% . In other words, no measures will be taken to accelerate the growth rate of village forest in one option, in another option some extension measures (yet undefined) will be taken to double the present growth rate.

The following table gives the regional forest stock, density, growth and encroachment as required by the simulation model for the purpose of supply projection.

Table 6.1 Forest stock, density, growth, encroachment in 1980

	Western	Sunderban	Chittagong	Central
Natural forest area left (in thousand acres)	0	1400.0	901.0	134.5
Natural forest density (in Th. Cft./acre)	0	0.8	1.4	0.5
Forest encroachment (in Th. acres/annum)	0	0	2.0	1.0
Village forest stock (in million cft.)	760.4	621.5	288.6	1104.5
Village forest growth (in %)				
Supply scenario 1	5.0	5.0	5.0	5.0
Supply scenario 2	10.0	10.0	10.0	10.0

6.3.2 Natural Forest Area Logged

Regarding natural forest area logged, it is assumed that in Western region there will be no logging, as there is no natural forest area left in this region. In Sunderban region, according to the present system of management each year one twentieth of the total forest area will be logged selectively, which is equivalent to clearfelling one sixtieth of the total area (as the official rotation is 60 years). There is no policy option left for this region in this regard.

For the other two regions (Central and Chittagong), there are policy options of converting natural forest into man-made forests and also the changing capability of extracting forest produce especially from inaccessible area of Chittagong region. Though it depends on demand for forest produce, in the Bangladesh situation, production from natural forests can meet only a fraction of the national demand for forest produce and this situation is unlikely to improve in the future. As a result production from natural forest has little impact on the overall supply situation. However, for our purpose it is assumed that during 1980-85 the area logged is 16,800 acres and 2000 acres/year respectively for Chittagong and Central regions (in Sylhet area) and this includes mechanical extraction in CHT area and also timber extraction by private purchasers from clearfelling coupes. This is in accordance with a replanting target of 94000 acres of forest area after logging of natural forest in SFYP (p143). Similarly, it is assumed that 75000 acres of lands will be replanted in TFYP after logging of natural forest (Assuming 70000 acres in Chittagong and 5000 acres in Central regions). It is also assumed that up to 2010 A.D. logging and replanting will continue at the same rate of 15000 and 1000 acres per annum in Chittagong and Central regions respectively.

The extent of natural forest area logged per year for the period 1980-2010 A.D. (at five year intervals) is given in table 6.2.

Table 6.2 Natural forest area logged / year (in thousand acres)

Year	Western	Sunderban	Chittagong	Central
1980	0	23.33	16.8	2.0
1985	0	23.33	14.0	1.0
1990	0	23.33	15.0	1.0
1995	0	23.33	15.0	1.0
2000	0	23.33	15.0	1.0
2005	0	23.33	15.0	1.0
2010	0	23.33	15.0	1.0

6.3.3 Natural Forest, % Cut as Big and Small logs

The next two supply parameters i.e. % cut as big and small logs are assumed somewhat arbitrarily following the present trend. For Sunderban region, it is assumed as 40:60 for big and small logs respectively throughout the period and this trend was also observed in extraction of Sunderban forests for the years 1977/78-1979/80 (Douglas, 1981 p59). For Chittagong region, it is assumed that natural forest of this region is in better shape as regards density and growth and consequently the proportion of big and small logs extracted from natural forest logging is assumed as 50:50 throughout the simulation period. Similarly for the Central region, 20:80 for big and small logs respectively is assumed, considering inferior quality of natural forest of this region.

Tables 6.3 and 6.4 give natural forest % cut as big and small logs respectively.

Table 6.3 Natural forest, % cut as big log

Year	*Western	Sunderban	Chittagong	Central
1980	2	40	50	20
1985	2	40	50	20
1990	2	40	50	20
1995	0	40	50	20
2000	0	40	50	20
2005	0	40	50	20
2010	0	40	50	20

Table 6.4 Natural forest, % cut as small log

Year	*Western	Sunderban	Chittagong	Central
1980	98	60	50	80
1985	98	60	50	80
1990	98	60	50	80
1995	99	60	50	80
2000	99	60	50	80
2005	99	60	50	80
2010	99	60	50	80

6.3.4 Rate of Exploitation of Village Forest

It is very difficult to get any estimate of the present rate of exploitation of village forests, since most of the exploitation has occurred in an informal way. Mostly, village people meet their domestic demand by cutting trees of their homesteads. This is in fact the most important single factor for meeting the present demand for forest produce. In the absence of any estimate, here it is assumed

* It is of little significance, as there is no logging in this region

that besides logs coming from the formal forestry sector, the balance of requirement of logs must have come from village forests to maintain a supply-demand equilibrium in 1980. To do that, % cut as big and small logs from village forests for different regions are estimated for 1980 and are given in table 6.5.

Table 6.5 % Cut as big and small logs from village forest in 1980

	Western	Sunderban	Chittagong	Central
Big log	0.7	1.1	0.7	1.7
Small log	11.8	4.1	1.6	8.5

For our purpose, it is further assumed that this trend will continue up to 2010 A.D.

6.3.5 Plantations Establishment

For the purpose of the model, the next two supply parameters are the establishment of exotic and other plantations in thousand acres per year during the plan period. The establishment of exotic plantations has an important effect on the future supply situation, as it is implicit in the model that these plantations would be raised on a 10 year rotation with an average per annum growth of 700 cubic feet per acre (approx. 50 m³/ha/year), which is too optimistic according to available information. For fast growing exotic species like *Eucalyptus camaldulensis* and *E. tereticornis* suggested growth rate is only 210-490 cubic feet/acre/annum (Davidson, 1984). So in this paper, it is assumed that the growth of exotic plantation would be 350 cubic feet, which is half of that initially assumed in the model. Accordingly, per acre return from exotic plantation is assumed as 1800 and 1700 cubic feet respectively of big and small logs at the end of 10 years rotation for the purpose of our model.

Table 6.6 specifies the area in thousand acres of exotic plantation assumed to be established up to 2010 A.D. in different regions.

Table 6.6 Exotic plantation, area established in thousand acres /year

Year	Western	Sunderban	Chittagong	Central
1980	0.5	0	1.0	0.94
1985	2.0	0	5.0	5.0
1990	2.0	0	5.0	5.0
1995	2.0	0	5.0	5.0
2000	2.0	0	5.0	5.0
2005	2.0	0	5.0	5.0
2010	2.0	0	5.0	5.0

It is assumed that during 1980-85 all the 7200 acres of plantations in degraded government forest land (TFYP p202) were raised with exotic species in Western and Central regions. In Chittagong region during the same period it is assumed that 5000 acres of plantations were raised with exotic species. From 1985, in each year 2000, 5000 and 5000 acres of plantation would be raised in Western, Chittagong and Central regions according to the availability of land and the gravity of situation. In Western and Central regions 2000 and 5000 acres of plantations respectively would be raised on either already encroached or degraded forest land in a way acceptable to both local people and the government (yet undefined). In Chittagong region, it is assumed that 5000 acres of exotic plantation would be raised on either presently degraded, encroached or denuded government forest land in a way acceptable to both local people and government. It is not possible to raise fast growing exotic plantation in Sunderban region due to the adverse ecological situation.

Regarding other plantation area established, it is assumed that out of approximately 240,000 acres of plantation raised during 1980-85 (TFYP p201), 100,000 acres were raised on coastal areas (Douglas 1981 p71) i.e. in Sunderban region assuming all the coastal plantations were raised in this region (though some of

the coastal plantations were actually raised outside the geographical boundary of the region in Chittagong and Noakhali area but it is not mentioned here due to lack of available data and also for the simplicity of the model). Of the remaining 140,000 acres, it is assumed that only 10,000 acres were raised in Central region more specifically in Sylhet area and the other 130,000 acres of plantation were raised in Chittagong region including 5000 acres of exotic plantation.

For Sunderban region, it is assumed that the past trend of raising 20,000 acres of plantation per annum would continue, because those plantations have greater significance of stabilization of newly accreted coastal areas other than the supply of forest produce. The regional distribution of plantation areas for the target of 261,000 acres of plantation in the TFYP (p206) period is given in table 6.7.

Table 6.7 Regionwise area distribution of plantation to be raised in 1985-90

Region	Plantation type	Area in th. acres
Western	Exotic	10.0
	Other	0
Sunderban	Exotic	0
	Other	100.0
Chittagong	Exotic	25.0
	Other	90.0
Central	Exotic	25.0
	Other	11.0
Total		261.0

Then from 1990, except for raising 20,000 acres per annum of other plantations in Sunderban region, other plantation would be raised on mainly inaccessible areas after logging of natural forest at a rate of 15,000 and 1,000 acres per annum in Chittagong and Central regions (Sylhet area) respectively.

Except plantations raised in Sunderban regions, the other plantations raised in other regions would have no impact on future supply till 2010 A.D. except for a small amount of forest produce during thinning (as rotation less than 30 years is unlikely). Table 6.8 gives the other plantation assumed to be established in thousand acres per year till 2010 A. D.

Table 6.8 Other plantation area established in thousand acres

Year	Western	Sunderban	Chittagong	Central
1980	0	20.0	25.0	2.0
1985	0	20.0	18.0	2.2
1990	0	20.0	15.0	1.0
1995	0	20.0	15.0	1.0
2000	0	20.0	15.0	1.0
2005	0	20.0	15.0	1.0
2010	0	20.0	15.0	1.0

6.3.6 Clearfelling and Thinning of Other Plantations

Regarding clearfelling of other plantation, it is assumed that Sunderban region plantation raised earlier would be clearfelled on a 20 years rotation and for Chittagong and Central regions the rotation will be 60 years according to the present trend. Accordingly, the area of other plantation clearfelled in thousand acres is given in table 6.9. based on areas actually planted 60 years earlier.

Table 6.9 Other plantation, area clearfelled in thousand acres

Year	Western	Sunderban	Chittagong	Central
1980	0	0	0.15	0.032
1985	0	0	0.30	0.12
1990	0	1.6	0.27	0.26
1995	0	17.2	0.24	0.17
2000	0	20.0	0.26	0.17
2005	0	20.0	0.56	0.32
2010	0	20.0	0.72	0.54

Regarding thinning of other plantations, it is assumed that plantation raised in coastal areas will be thinned at 11th year of establishment (i.e. after 10 growing seasons). In case of plantations raised in Chittagong and Central regions plantation will be thinned 20 years after establishment (except exotic plantations). Accordingly a thinning schedule for other plantation is given in table 6.10.

Both the above tables assume that all the plantation area reported does actually exist and will continue as planned i.e. no encroachment, unauthorized logging, fires etc. in the past or foreseeable future.

Table 6.10 Other plantation, area thinned in thousand acres

Year	Western	Sunderban	Chittagong	Central
1980	0	1.6	5.5	1.0
1985	0	17.2	13.0	1.2
1990	0	20.0	7.4	0.5
1995	0	20.0	6.7	0.7
2000	0	20.0	25.0	2.2
2005	0	20.0	18.0	2.2
2010	0	20.0	15.0	1.0

6.3.7 Projected Plantation Yield From Other Plantation

According to the simulation model, the last supply parameter is projected plantation yield per acre in thousand cubic feet. For the Bangladeshi situation, it is very difficult to predict. Other than the Sunderban region, all the plantation raised earlier were almost purely Teak plantation. To determine the yield from such plantations of Chittagong and Central regions, we shall use the yield tables provided by Kingston (1979) for Teak plantation. According to this table, on an average site (on SI 25 at the age of 50) the per acre standing volume of a Teak plantation is 2840 cubic feet per acre at the age of 60. Assuming 80% of this volume would be obtained as big log and rest as small log, the per acre volume of a fully stocked plantation would be 2272 cft. and 568 cft. respectively. Similarly, at the age of 20, the per acre standing volume on an average site would be 1570 cft./acre. Assuming 50 % of standing volume would be removed during thinning at the age of 20, per acre volume thinned from of a fully stocked Teak plantation would be 785 cft. If the proportion of big and small log available during thinning would be 40:60, then per acre available volume of big and small log during thinning would be 314 cft. and 471 cft. respectively.

In the Bangladeshi situation, it is hardly believed that all the plantations raised earlier were fully stocked. A recent inventory study revealed that the older plantations were only 40% successful (TFYP p205). To avoid any overestimation, here it is assumed that only 40% of the yield table volume would be available from other plantations of Chittagong and Central regions during clearfelling and thinning.

For plantations in Sunderban region, no growth data are available and as a result for our purpose projected yield given in the master data of the simulation model in this regard has been used. These are based on the World Bank Appraisal/Feasibility reports, and are yet unproven. Table 6.11 gives the projected plantation yield per acre in thousand cubic feet.

Table 6.11 Projected plantation yield/acre in thousand cft.

	Western	Sunderban	Chittagong	Central
Clearfelling big log	0	0.3	0.91	0.91
Thinning big log	0	0.05	0.126	0.126
Clearfelling small log	0	0.8	0.23	0.23
Thinning small log	0	0.4	0.19	0.19

6.4 Supply Projection and Supply-Demand Balances

The national supply of big and small logs under two scenarios, assuming the growth rate of village forest is the only policy variable, are given in tables 6.12 and 6.13

Table 6.12 Total national supply and supply-demand balance of logs in million cubic feet of roundwood equivalent under supply scenario 1 (assuming 5% village forest growth)

Year	Big log	Small log	Total log	*S-D balance
1980	53.5	239.4	292.9	+2.4
1985	47.5	192.5	240.2	-85.3
1990	48.6	162.9	211.5	-149.4
1995	67.5	166.8	234.3	-163.6
2000	68.9	155.8	224.7	-208.8
2005	67.0	142.7	209.7	-257.7
2010	66.6	135.1	201.7	-296.5

* Supply-demand balance compared to demand scenario 2; (+) means surplus and (-) means deficit

Table 6.13 Total national supply and supply-demand balance of logs in million cubic feet of round wood equivalent under supply scenario 2 (assuming 10% village forest growth)

Year	Big log	Small log	Total log	S-D balance
1980	53.5	239.4	292.9	+2.4
1985	58.6	264.2	322.8	-2.7
1990	70.4	294.9	365.3	+4.4
1995	100.9	355.0	455.9	+58.0
2000	115.9	401.9	517.8	+84.3
2005	152.2	525.0	677.2	+179.0

A more detailed description of national and regional supply situations under supply scenarios 1 and 2 together with supply-demand balance are incorporated in tables C1.1- C1.10 and C2.1- C2.10 respectively in appendix C.

Figure 6.1 represents the very different supply situations under two supply scenarios over time. As a result, the national supply-demand balance for scenario 1 is steadily declining starting from base 0 in 1980, whereas for scenario 2 it is steadily increasing over time (figure 6.2). Figure 6.3 revealed that the composition of the supply-demand balance are not the same for the two scenarios. For scenario 1, the supply is very much less than demand for small logs in comparison with big logs, whereas for scenario 2 the trend is just opposite. In that case small log supply is well in excess of demand and the gap is widening over time, whereas for big logs it is more or less constant and is very close to the zero line over the entire period. This is simply due to the fact that with an increase in the growth of village forest, the supply of small log would be increased to a great extent, since most of logs from village forests would be coming as small logs (fuelwood) according to the present trend. Though it is possible to get more supply of big logs from village forest with an increase in growth, it has certain limitations, since these forests are always of inferior quality for timber production compared to natural forest and plantation.

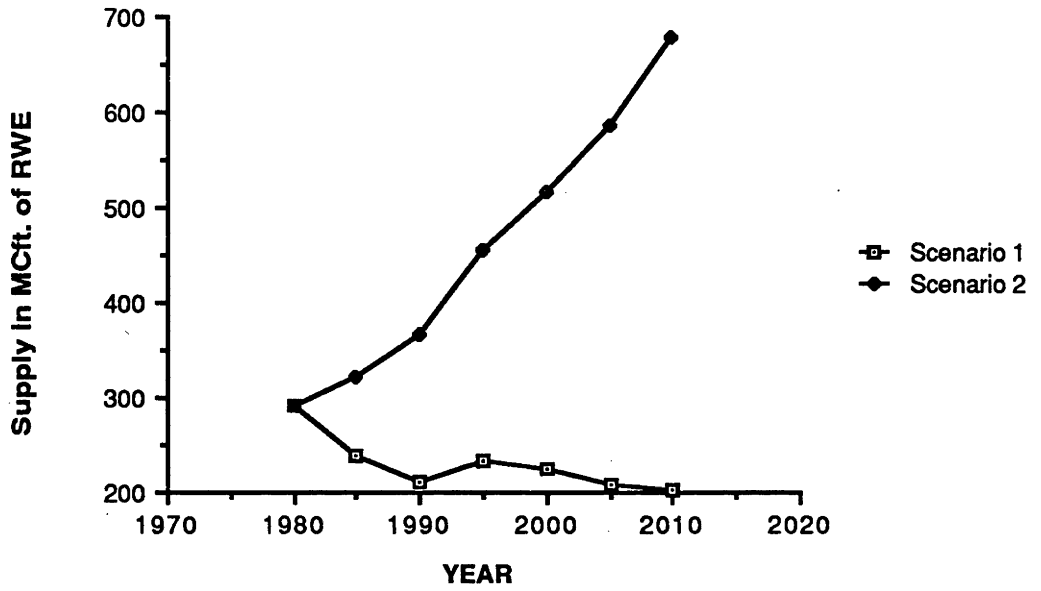


Figure 6.1 Total supply of logs under two supply scenarios in million cubic feet of roundwood equivalent (MCft. of RWE).

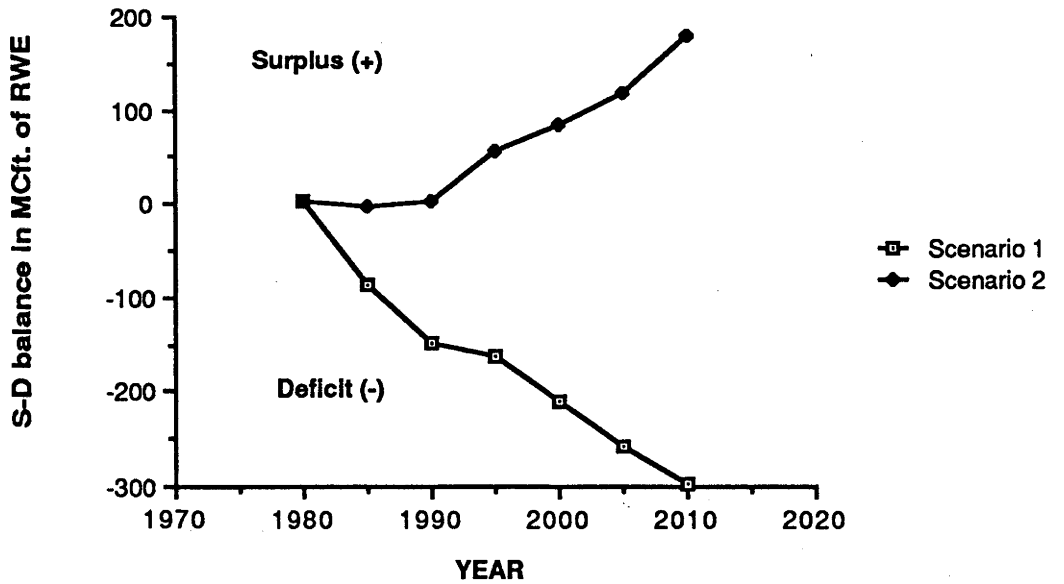


Figure 6.2 National supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for two supply scenarios.

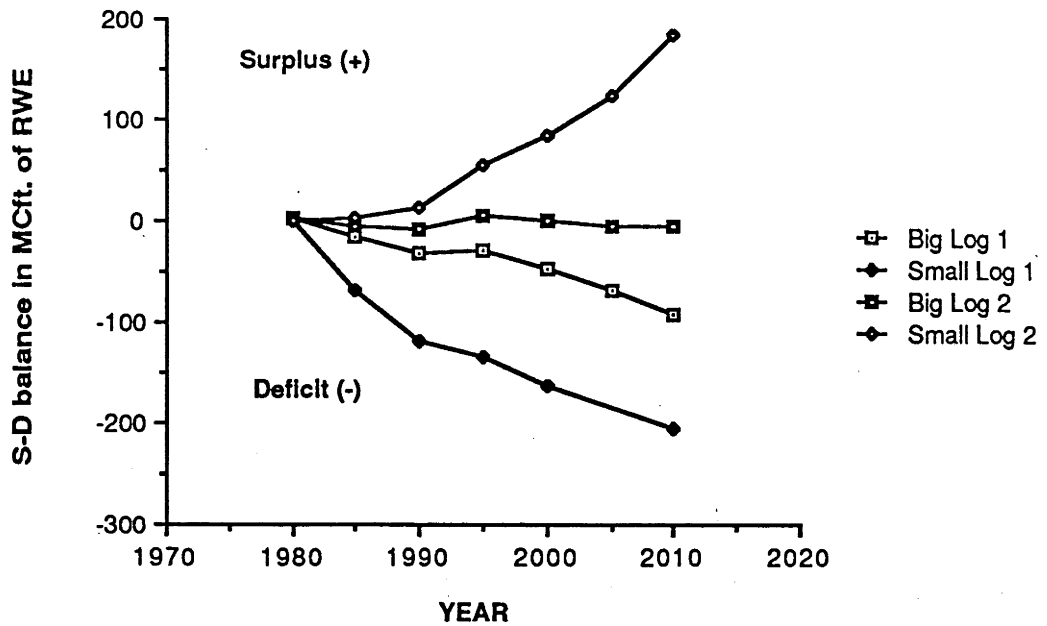


Figure 6.3 National supply-demand balances for small and big logs in million cubic feet of roundwood equivalent (MCft. of RWE) for two supply scenarios (1 and 2 means scenarios 1 and 2 respectively).

Figures 6.4-6.7 show regional supply-demand balances over time for supply scenario 1. Two different patterns of supply-demand balance have been observed from these figures. In the case of Western and Central regions (figures 6.4 and 6.7), supply would be well short of demand for both small and big logs showing overall shortage of logs in those regions under scenario 1, and the situation would worsen over time. This shortage would be greater for small logs than for big logs. The situation is such that even any enthusiastic plantation program in public forest land would theoretically not be enough to meet this gap. Again, the situation is more critical for Western region where exploitation of village forest is almost 2.5 times the rate of increment. In the case of Sunderban and Chittagong regions, the supply-demand balance would be negative for big logs, whereas positive for small logs. On the other hand, in Chittagong region village forest is under exploited (as much as 2.6% against a growth rate of 5%). So it is expected that if village forest is exploited to the extent of 5% and if through better utilization big log production is increased, then

this 5% growth of village forest together with other measures as stated earlier in scenario 1 would be enough to meet the regional demand.

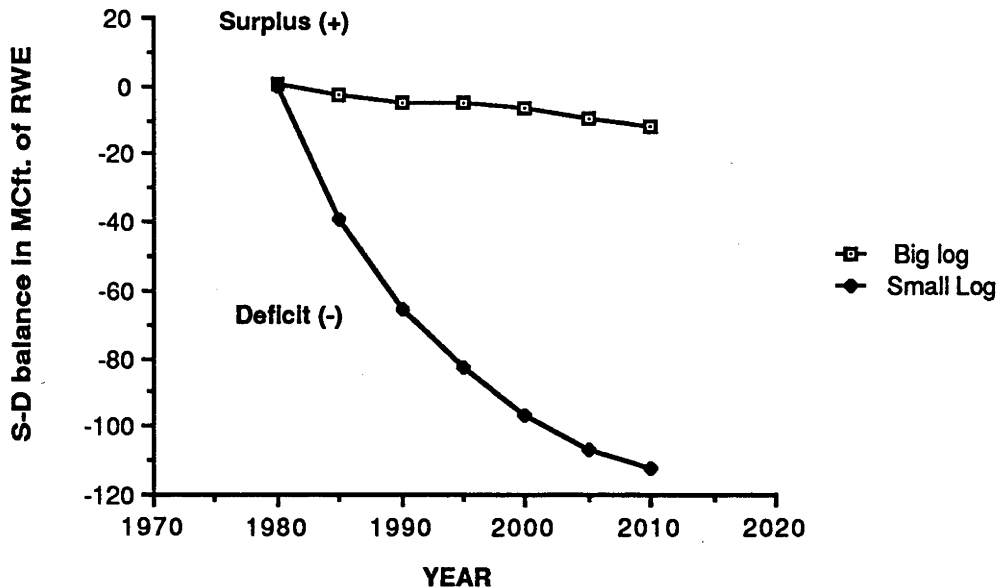


Figure 6.4 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under supply scenario 1.

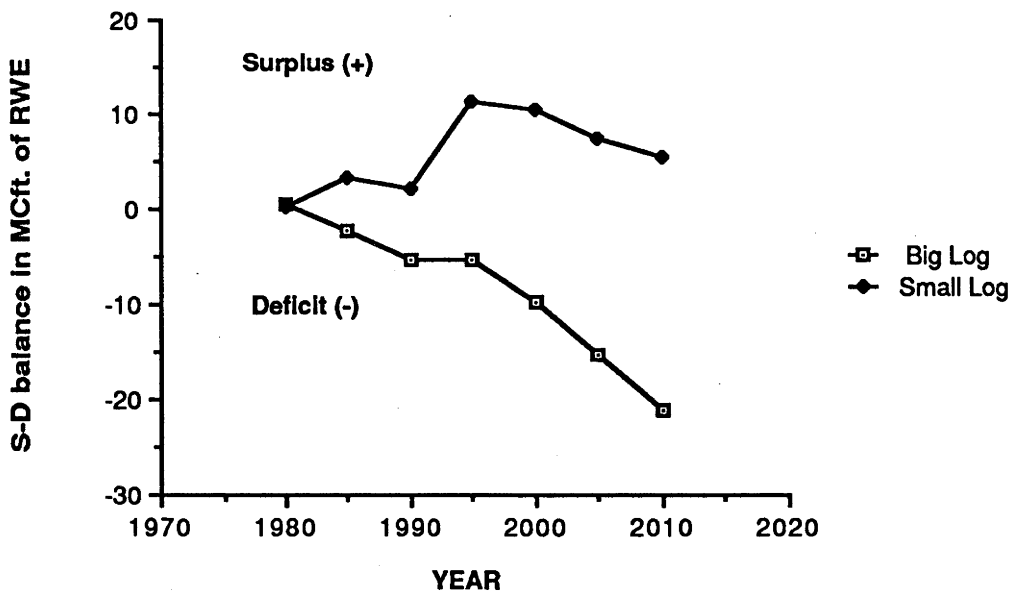


Figure 6.5 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under supply scenario 1.

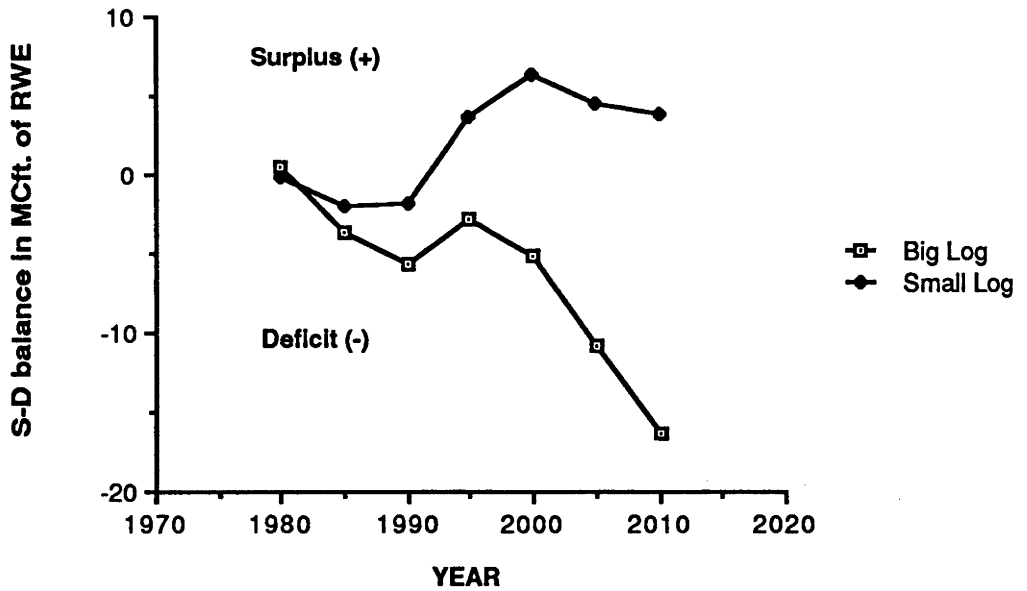


Figure 6.6 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Chittagong region under supply scenario 1.

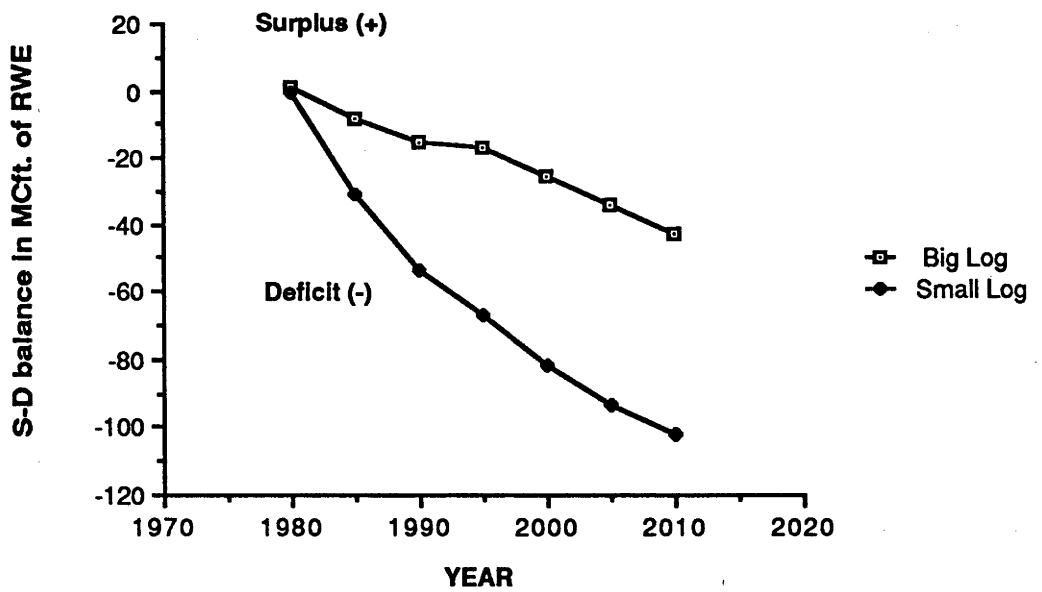


Figure 6.7 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Central region under supply scenario 1.

For Sunderban region, overall supply demand balance would be positive up to 2000 A.D. (For big log it would be negative, whereas small log it would be positive as seen in figure 6.5). After 2000, supply-demand would be negative and the gap would be widening over time and in 2010 the amount would be 15 million cubic feet. But unlike Chittagong region, there would be little scope to increase the supply from village forest without increasing the growth rate, since under this scenario village forest is exploited at a rate of 5.2% against a growth rate of 5%.

Figures 6.8 -6.11 show regional supply-demand balances for regions under supply scenario 2. From figure 6.8 it is evident that supply-demand balance would be negative for both big and small log in Western region under this scenario. The situation would be worse for small logs in comparison to that for big logs. This indicates that even doubling the present growth rate of village forest would not solve the problem of forest produce for this region. For Sunderban region, there would be an increasing regional surplus over time of both small and big logs under this scenario as seen in figure 6.9. This surplus would be increased manifold, if village forest exploitation is enhanced from present 5.2% level to the level of 10% (equivalent to growth rate under this scenario). Again in this region other forestry activities would not be reduced as these activities would be necessary for reasons other than supply of logs as noted earlier. So it is suggested that a village forest growth rate slightly more than present sustainable growth rate of 5% would be enough to meet future regional demand. For Chittagong region, there would be apparently a supply-demand balance for big log and demand for small log would be only 50% of that of supply in 2010 A.D. (figure 6.10), but the supply would be manifold if village forest would be exploited at a sustainable growth rate of 10% instead of present exploitation rate of 2.6%. So, for this region as noted earlier, even present sustainable growth rate (5%) of village forest would be enough to meet future demand, if other steps as stated in this scenario are taken properly. From the figure 6.11, it is apparent that supply-demand balance would be negative for big

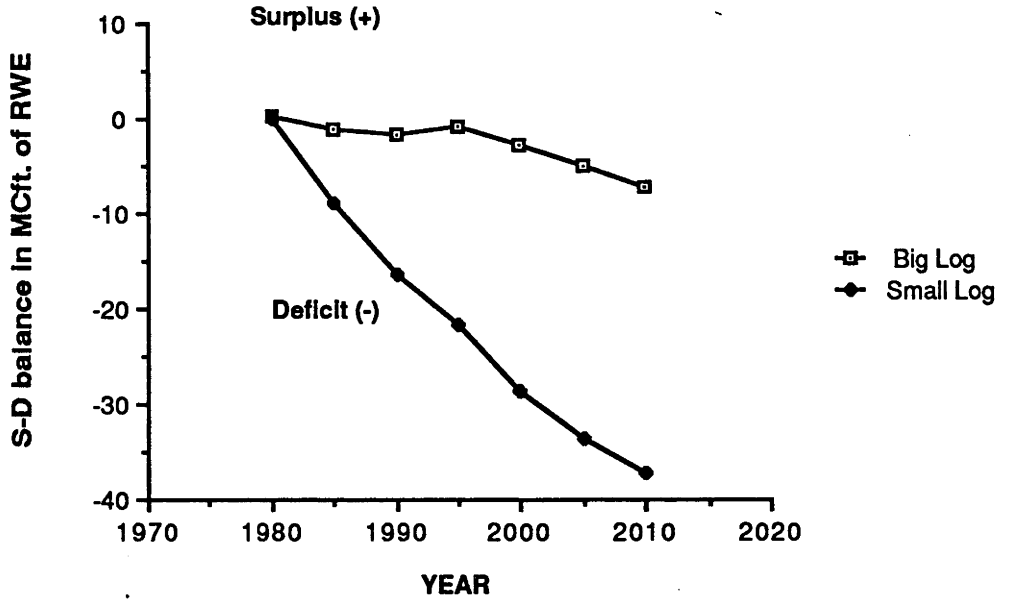


Figure 6.8 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Western region under supply scenario 2.

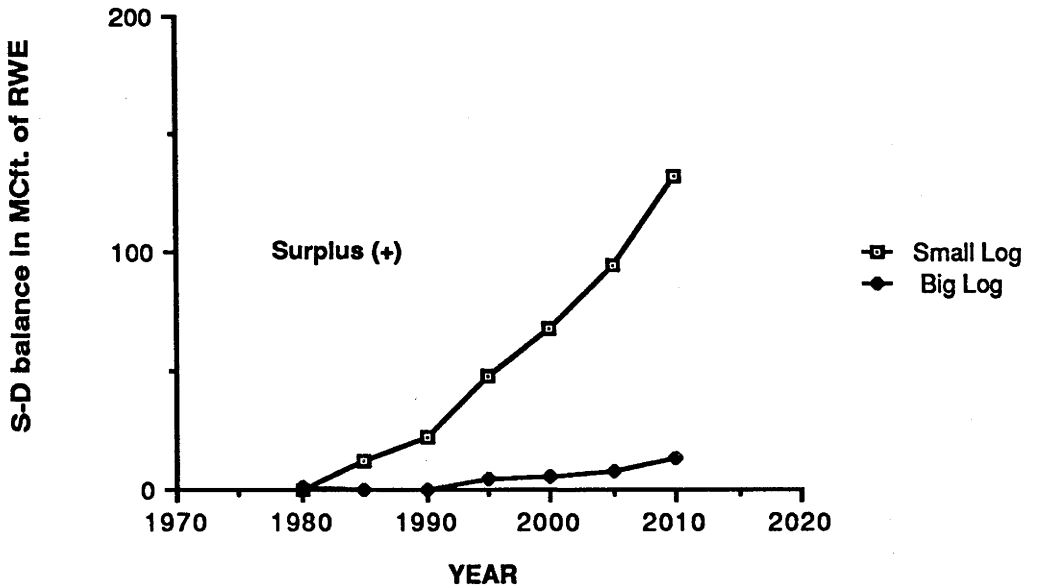


Figure 6.9 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) for Sunderban region under supply scenario 2.

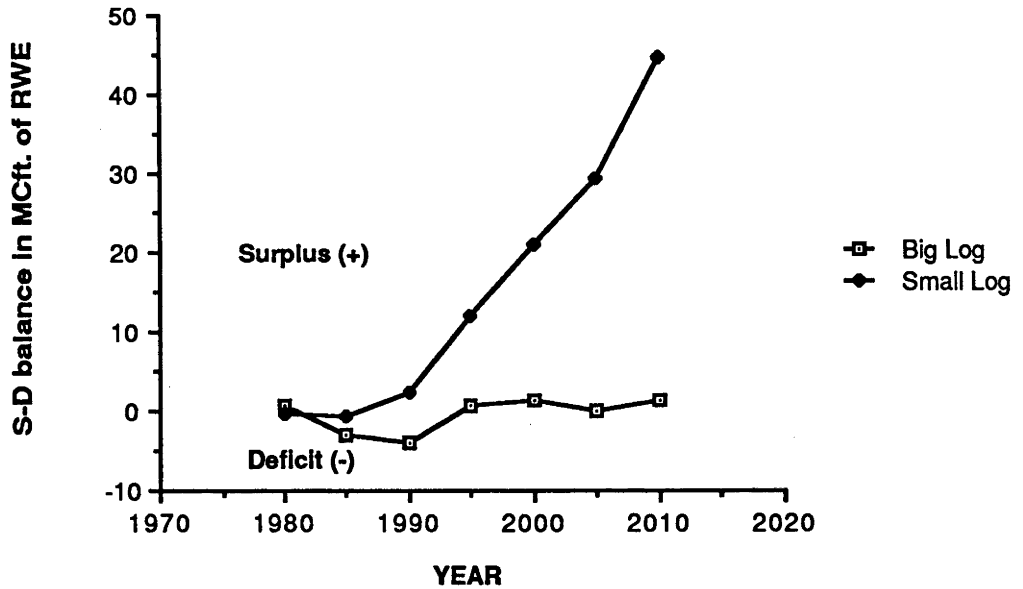


Figure 6.10 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) in Chittagong region for supply scenario 2.

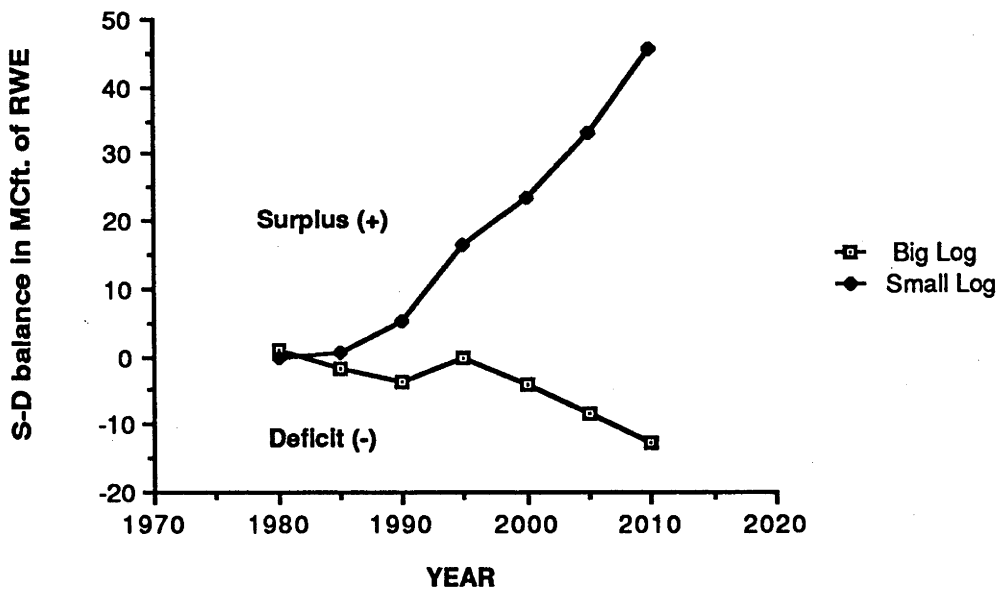


Figure 6.11 Supply-demand balance in million cubic feet of roundwood equivalent (MCft. of RWE) in Central region for supply scenario 2.

logs in Central region, whereas there would be huge regional surplus of small logs under this scenario. So a small deficit in big logs could be easily met by improving the utilization rate to get more supply of big log from both village forest and exotic plantation.

So, major extension programs to upgrade the village forests' growth rate are not necessary in Chittagong region and only to a little extent necessary for Sunderban region. On the other hand such programs to double the present growth rate are absolutely essential for both Western and Central regions. In addition to this, other measures are also necessary to cope with the expected future demand situation in Western region.

6.5 Future Policy Options

The situation for Western region is entirely different from the three other regions. As stated earlier even increasing the growth rate of village forests from 5% to 10% would not be enough to meet the projected future demand situation for both small and big logs. The situation would be worse for small logs than for big logs. Supply from village forests would remain constant with a slight downward trend, as a result of over exploitation of these resources. To reverse this situation, options would be

1. to further increase the growth of village forest;
2. to reduce demand for forest produce in the region either by making alternatives for those resources available to the people or by increasing efficiency in utilization;
3. to increase supply from sources other than village forest such as raising more exotic plantations and
4. to get supply from other regions to meet regional demand.

Now, if one carefully examines all the options left for meeting regional demand of Western region, to achieve growth rates of village forest exceeding 10% per annum would be a difficult task. Though these village groves are the most important sources of wood for village people (mainly fuelwood), they also serve other purposes such as providing fruit, shade etc. So it would be unlikely that people will grow only fast growing trees in their homestead solely for the supply of wood to meet their domestic demand, by sacrificing other needs (such as fruit, shade etc.). To get all these benefits simultaneously from village forest resources, it is rational to expect that the growth of village forest even to the rate of 10%/annum would be a difficult task and anything beyond that rate would be almost impossible.

As regards increased supply from other sources, the only possibility would be to raise more exotic plantations. Under scenarios 1 and 2, it is suggested that per year 2000 acres of exotic plantation would be raised in this region. The limitation for any program of raising more than 2000 acres of plantation yearly would be availability of land. As said earlier, the total forest land officially managed by the forest department in this region (which in fact is already degraded and encroached) is only 35000 acres. The success of raising even 2000 acres plantation yearly in these lands depends on acceptance of such a program (by making the program socially and economically attractive to the people). It would only be possible to bring more land under this program by including other fallow land of the region under the control of the revenue department or other agencies. But due to population pressure, people are bringing land wherever possible under agriculture for growing food for their subsistence, so even bringing 5000 acres of land outside of the 35000 acres of so called forest land would be difficult and depends solely on the success of such program initially started on land under the control of Forest Department. So starting from raising 2000 acres of exotic plantation annually, it is expected that the program would be gradually extended up to 4000 acres/annum over 10 years time and this would include 5000 acres of land outside the present 35000 acres of (officially recorded) forest land in the region.

The next option is to reduce demand for wood in the region through other measures, such as increasing the heating efficiency of wood, reducing wastage of wood or supplying alternate sources of energy (e.g. natural gas, oil or coal) to the people of the region. Increasing heating efficiency or reducing wastage are partially dependent on improved literacy. Since the literacy rate would be unlikely to exceed 30% even in 2010 A.D., this option is not a realistic one. Another way is to supply an alternate source of energy such as natural gas, oil or electricity to reduce demand for fuelwood (which accounts more than 90% total demand of log in the region). The indigenous sources of energy like natural gas are not available in this region and supply of natural gas from other regions to this region would depend on infrastructural development of a gas distribution line. Similarly for electricity this region is also dependent on other regions. The alternate way is to depend on imported coal or oil, which is difficult for Bangladesh to afford. But this region has some geographical advantage, as coal could be imported from India by road with minimum transport cost involvement and the present world market of coal would make this alternative more attractive. As said earlier, given the financial resource constraint, it would not be wise to meet more than 10% of regional demand with imported coal from India. Accordingly, it is expected that only 10% of regional demand for small logs would be met from imported coal from India till natural gas and electricity from other regions would be available to take the place of imported coal.

The last option is to get supply from other regions. This would depend on availability of produce in other regions (in excess of regional demand) and the possibility of inter-regional transportation of produce. The supply from Chittagong and Central regions are constrained by physical barrier like rivers. The inter-regional transport of produce like firewood would not be feasible across such physical barriers due to high transport costs. Alternately the region could look for supply from Sunderban region, where it would be possible to grow in excess of regional demand and at the same time inter-regional transport of forest produce from Sunderban to some parts of Western region (e.g. Jessore and Kushtia area)

would involve minimum transport cost. So, it would be more rational for Western region to adopt a strategy to reduce its village forest exploitation rate gradually from 12.5% (present rate) to the sustainable rate of 10% (the growth rate expected) and to meet the excess demand to some extent from the Sunderbans and also to some extent from alternate sources of energy (initially imported coal and then natural gas and electricity from other regions). The ultimate objective would be to reduce dependency on imported coal and also on inter-regional transportation of fuelwood. The problem associated with this strategy is that people will have to pay cash for imported logs from the Sunderbans or for coal from India. But in Bangladeshi situation, the rural people (the majority of the population) usually collect fuelwood with no or minimal cash cost. So it is expected that imported coal or fuelwood will be used for commercial activities like brick burning, tobacco curing and sugar cane processing and also will be supplied to the urban areas, where fuelwood is a commercial commodity.

A future policy option suggesting growth and cutting rates of village forest together with other modified supply parameters for different regions (which includes more production of big logs from both natural forests and plantations through better utilisation) and also with future supply situation are incorporated in appendix C under supply scenario 3. The only changed supply parameters are presented in tables C3.1.1-C3.1.7 in the appendix. All other parameters as required by the model would be the same as supply scenario 2. There are still some discrepancies regarding supply demand balance specially for both big and small logs in the Western region and it could be met by importing more big logs from other regions (mainly Sunderban) and also by importing small logs to a small extent (less than 5% of the regional demand) from central region or by converting more big logs from village forests or exotic plantations. In other words, it is a very difficult task to meet the future demand for forest produce in Western region. Unlike other regions future supply-demand equilibrium would not be dependent on the success of forestry programs alone, but also on some factors outside the sector (e.g. infrastructural

development to allow inter-regional transport of produce, to make substitutes like coal, electricity and natural gas available to the people etc.).

Lastly, it is not possible to precisely quantify the growth of village forest and other supply parameters such as % cut as big and small logs as specified in supply scenario 3 in appendix C in a country like Bangladesh, but it simply indicates relative emphasis necessary for these supply parameters in different regions to maintain future supply-demand equilibrium.

6.6 Development Impacts

In previous sections, three supply scenarios have been presented. It is assumed that supply scenario 1 would not work for Bangladesh, since it would result in a large supply-demand gap which it is not possible to satisfy even by taking massive programs in the formal forestry sector.

From supply scenario 2, it would be at least theoretically possible to meet future demand from the village forests alone by doubling the present growth rate (assuming more inter-regional mobility of forest produce and improved utilization technique to get more supply of big logs). This section examines what would be the impact on the creation of employment opportunities, as this is one of the major concerns for any development activities in Bangladesh (as discussed in chapters 3 and 4). Labour requirements will be assessed for two scenarios; one by assuming a hypothetical situation where there will be supply-demand balance for both small and big logs and these logs will be supplied by the village forestry sector alone (labour scenario 1) and the another by assessing labour requirements for supply scenario 3 as suggested in previous section (labour scenario 2). The model assumes no other activity in the formal forestry sector except the processing of logs (both in sawmills and wood based industries) obtained from the village forestry for labour scenario 1.

To do so, another important aspect will be ignored i.e. impact on the capital necessary for various industries and saw mills and also for the payment of labour for various forestry activities. Capital necessary for various wood based industries would be the same for the two scenarios as it is output related and independent of the source of the wood. It is also assumed that in the Bangladeshi situation, manual logging would be preferred over mechanical logging for both the scenarios. In sum, capital including foreign exchange required for various forestry activities would be the same for both the scenarios, but the funding required for wages for various forestry activities would vary depending on labour requirements in the two scenarios.

6.6.1 Assumptions for Labour Impacts

6.6.1.1 Village forest growth

To increase the village forest growth rate from the present level of 5% to a level of 10% would be a difficult task and yet undefined. To achieve this objective it would be necessary to motivate and educate village people through various forestry programs and success depends on peoples' acceptance of any such program. But still motivation and education of people would not be enough for the success of any such program. It might also be necessary to supply some inputs, such as distribution of seedlings or technical information about species which could help in achieving the growth rate to the desired level. So here it is assumed that any program to double the growth rate of village forests could engage at least 3 people full-time in each Union Parishad, who can make their livelihood by selling seedlings or providing technical information to the village people. It is also assumed that village forests will continue to be grown and maintained by the villagers themselves or by their family members in their off-time and no labour would be required for this purpose except during logging in village forest. Assuming three labour man

years for each Union Parishad to double the average growth rate of the village forests, labour required for each region depending on number of Union Parishads in that region is estimated and presented in table 6.14.

Table 6.14 Labour requirement to double the growth rate of village forests (labour scenario 1)

	Western	Sunderban	Chittagong	Central
Labour requirement in thousand man years	3.3	3.8	1.1	5.4

It is assumed that for the present growth rate of village forests (5%) there would be no requirement for labour and for double growth of village forests (10%), the labour requirement would be as stated in table 6.14 and for any intermediate growth of village forest labour requirement would be proportionate. Accordingly labour requirement for village forest growth for various regions as shown in supply scenario 3 (table C3.1.1) is estimated and presented in table 6.15.

Table 6.15 Labour requirement for village forest growth under supply scenario 3 (labour scenario 2)

	Western	Sunderban	Chittagong	Central
Labour requirement in Th-man years in each year from 1980-2010	3.3	1.1	0	5.4

6.6.1.2 Logging

It is very difficult to assess the probable labour requirement for logging of natural forest areas. Considering the inaccessibility, it is assumed that on an average a labourer can extract 5 cubic feet of log per day (both small and big) and this includes all activities associated with the logging like transportation, but not sawmilling. Similarly from a plantation (both exotic and other), it is assumed that a labourer can extract on an average 10 cft. of logs per day (both small and big and whether it is clear felling or thinning) considering the systematic location and stocking of those plantations as compared to natural forest. In the case of village forests, it is assumed that on average 20 cft. of logs can be extracted by a labourer in a day, considering the accessibility of these resources as compared to natural forest and plantations and also assuming that a considerable portion of this logging would be done by family labour during off time. On the basis of these assumptions, the labour requirement for logging of 1 million cft. of logs from different forests are estimated and presented in table 6.16.

Table 6.16 Labour requirement for logging and transport of 1 mcft. from different forest types

Forest type	Labour requirement man years/per mcft.
Natural forest	548.0
Plantation	274.0
Village forest	137.0

To estimate the labour requirements for logging for labour scenario 1, it is assumed that total demand for round wood as projected in demand scenario 2 (as given in table 5.16) would be exactly met. For labour scenario 2, labour requirement is projected on the basis of labour requirement for extraction of logs (both small and big) from various sources (e.g. Village forests, natural forests and

plantations) as given in tables C3.2.1 and C3.2.2 in appendix C for supply scenario 3.

6.6.1.3 Other activities

For estimating labour requirement for other forestry activities, the information given in Byron et al (1983a) master data of the simulation model will be used. Although Byron et al provided two sets of data, for establishment of exotic and other plantations, it is considered here that the same effort would be necessary for raising exotic and other plantations and as such, the labour requirement would be the same. So their upper estimates of labour requirements for "other plantation establishment" has been used for both exotic and other plantations. That is, there would be no improvement in labour productivity in the exotic plantations. Labour requirements for various forestry activities according to 1984 estimates are presented in table 6.17.

Table 6.17 Labour requirements for other forestry activities

Activity	Labour requirements	
	Quantity	Units
Plantation establishment and management	107	man years/'000' acres
Saw milling	255	man years/ million cft.
Pulp and paper	106	man years/'000' ton
Other industries	450	man years/ million cft.

Reasons for not using those estimates for logging are that those estimates considered only mechanical logging, whereas according to our scenario preference would be given to manual logging.

Total labour requirements for sawmilling and other industries (except pulp and paper) for both the scenarios are estimated on the assumption that total demand for these products as projected in demand scenario 2 in RWE (table 5.15) would be exactly met. Similarly, the labour requirement for pulp and paper is computed on the basis of assuming that total demand for these products as projected in demand scenario 2 in product units (as given in table B 2.1 in appendix B) would also be exactly met. Labour requirement for plantations establishment is computed on the basis of both other and exotic plantation area established as given in table 6.8 and table C3.1.6 respectively for supply scenario 3.

6.6.2 Projected Demand for Labour

Projected demand for labour for two scenarios are computed and presented in tables 6.18 and 6.19.

Table 6.18 Labour requirement in th-man years for labour scenario 1

Activities	Y	E	A	R
	1980	1990	2000	2010
Village forest growth 3 man years/ UP	13.6	13.6	13.6	13.6
Logging in village forest 137.0 man years/ mcft.	40.3	50.2	60.5	69.8
Saw milling 255 man years/mcft.	12.4	19.4	28.4	38.9
Pulp and paper 106 man years/'000' ton	6.5	10.6	16.6	24.5
Other industries 450 man years/ mcft.	2.0	2.8	3.7	4.6
TOTAL	74.8	96.6	122.8	151.4

6.19 Labour requirements in th-man years for labour scenario 2

Activities	Y	E	A	R
	1980	1990	2000	2010
Village forest extension 3 man years/UP	9.8	9.8	9.8	9.8
Logging in village forest 137.0 man years/mcft	33.8	39.2	41.5	48.3
Natural forest logging 548 man years/mcft.	23.7	22.0	22.0	22.0
Logging in plantations 274 man years/mcft.	0.8	6.1	23.4	25.6
Plantation establishment and management 107 man years/'000' acres	5.3	5.2	5.6	5.6
Saw milling 255 man years/mcft	12.4	19.4	28.4	38.9
Pulp and paper 106 man years/'000' ton	6.5	10.6	16.6	24.5
Other industries 450 man years/mcft	2.0	2.8	3.7	4.6
TOTAL	94.3	115.1	151.0	179.3

From the figure 6.12, it is apparent that labour requirement for scenario 2 (to adopt supply option 3) would be much more over the whole period than that under scenario 1 (where demand would be met from village forest only). From the development perspective (as discussed in chapters 3 and 4), scenario 2 would be more acceptable. In other words, supply option 3 would be much more favorable as this would create more employment opportunities than the other option (which would give all attention to the rural forestry sector alone). As said earlier, capital including foreign exchange required for different industries and logging operations would be the same for the two scenarios, but development capital required for two scenarios would vary according to their labour requirements. Accordingly, more development capital would be required for labour scenario 2 than that for scenario 1. So labour scenario 2 (in other words supply scenario 3), would help in

achieving development, when it would be implemented successfully; otherwise it would have more negative effect on development than the other scenario.

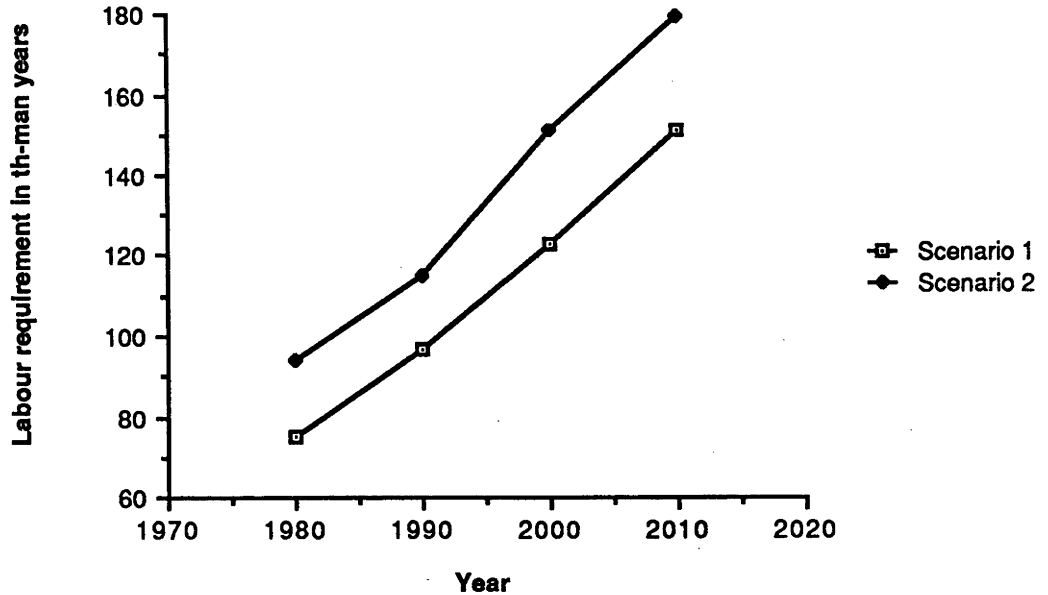


Figure 6.12 Labour requirements in thousand man years for two labour scenarios.

6.7 Conclusion

From supply scenario 1, it is evident that without increasing the growth of the village forests, even the most overenthusiastic plantation program on public forest land would not theoretically produce enough wood to meet the future demand situation of the country. Again, from supply scenario 2, it is apparent that even a nationwide prescription for doubling the growth rate of village forests would not solve the problem. Rather it would create regional imbalances i.e. a huge surplus in two regions (Chittagong and Sunderban) but acute shortage in Western region. So, a nationwide blue print of making village forests grow at 10% increment/annum would create a situation, where there would be lack of demand of forest produce in two regions but overexploitation of forest resources in another region. So as argued

in chapter 2, measures are necessary to make solutions to fit the situation rather than forcing the situation to accept the solution.

Another important point of concern is that, though the village forest is the prime supplier of forest produce, and theoretically it is possible to meet national demand only by enhancing the growth of village forest, this would create problems from other development aspects. As discussed in section 6.6, the development activities in the formal forestry sector have the capability of creating more employment opportunities than has the village forestry sector where village people raise trees in their homesteads mainly on self help basis. In this regard the formal forestry sector has certain priorities over village forestry sector in the development of Bangladesh.

The development of the formal forestry sector has other development implications too. As said earlier, these resources (village forest) might be enough to meet fuelwood demand (which constitute 80% of demand), but at the same time there would be some demand for big logs for other purposes. Village forest might meet some of these demands but it would not be possible to meet all demand of big logs due to the inferior quality of logs available from these resources. So to get better quality logs it would be necessary to develop the formal forestry sector together with the development of informal rural forestry sector.

It is also likely that the development of village forests would divert benefits towards the people with land and do little for the people with no land, which would prevent the access of the mass of people to their basic needs. On the other hand specially designed forestry programs (not present practices but programs yet to be designed) aiming towards people with no land in the formal forestry sector would at least ensure their access to the basic needs which is also expected from the development perspective of Bangladesh.

CHAPTER 7

7. SUMMARY AND CONCLUSIONS

The summary and conclusion will be around three major divisions of this study. First, the theoretical background of forestry and development i.e. various interpretations of development and their relationships to forestry development as considered in chapters 1 and 2, will be summarized. Second, forestry and development in Bangladesh's context as discussed in chapters 3 and 4 will be reviewed. Third, forestry sector planning, which includes both future demand and supply situations with its developmental impacts as discussed in chapters 5 and 6, will be re-capitulated. Then in the concluding section, areas for future research will be discussed.

7.1 Forestry and Development (Theoretical Background)

The conflicts and confusions regarding the role of forestry in development originated from the conflicts and disagreements amongst development economists regarding the meaning of development and effective ways of achieving it. The forest industrialization approach was based on initial interpretation of development as economic growth and the Harrod-Domar economic model gave the theoretical basis for this approach.

The industrialization approach in forestry and a two-sector model developed by Fei and Ranis (1964) echoed the same view, to release labour from primary activities like agriculture and to employ them in industry to promote development. They favoured industry over agriculture on the ground that industry is a more efficient user of capital than agriculture. So, to them more investment in industry means more economic growth, which means more development without considering its effect on employment opportunities.

Disillusionment with the industrialization approach stems from its failure in achieving the expected results as shown by spreading and widespread poverty and destitution in third world countries. This led to the realization that economic growth is not the only criteria for development. Development economists started to think about structural differentiation and the process started back in 1967 (Frank), or even earlier, but in forestry this realization came much later in 1978. This late realization of the structural differentiation approach in forestry may be due to the sector's isolation from the people, and from the mainstream of development thinking.

In fact, in the earlier forest industrialization approach, the planners thought about forestry in isolation from the people, which was possible at that time considering relatively low population pressure of developing countries at that time. With the changing demographic character of developing countries in the next 15 years, it was no longer possible to think about forestry in isolation from people and this led to the general rejection of industrialization approach and acceptance of basic need approach in 1978.

As argued in chapter 1, this generalization of problems for all developing countries would create further problems in future. In fact, all the developing countries are not facing the same problems. In some developing countries, still there are forest resources, which if properly utilized, are in excess of their needs and even within a country the situation varies from region to region. So, oversimplification of problems to accept a single prescription for every developing country and within a country for every region, may create problems in future. There might well be some countries or within a country some regions, where forest resources will be very much under-utilized and this is unexpected from the development point of view which seeks proper utilization of all the available resources. That is why it was argued in chapter 2 that any single path may not be the solution for everywhere and excepting one path at the expense of another may create

problems in future. Which path will have to be followed, whether it is industrial or basic needs or a mixture of two, must depend on the situations prevailing in a particular developing country.

7.2 Forestry and Development in Bangladesh's Context

The overall development processes and those of the forestry sector as discussed in chapters in 3 and 4, have more similarities than dissimilarities. During the British period, Bangladesh experienced an economic exploitation by her colonial ruler and the forestry sector was not out of this exploitation. The first part of the British rule was marked by a deliberate British policy of de-industrialization of British India and Bangladesh as a part of India, was no exception. Then in the later period of British rule, due to economic reasons some processing industries were established in India and Bangladesh became a raw material supplier for one of those industrial zones of the Calcutta-Hooghly region. As a result of this policy, the diversity which was characteristic of the economy of pre-British Bangladesh, was changed to an economy dependent solely on agriculture.

On the other hand, in the forestry sector vast areas of forest land were declared as reserve forest by denying or severely restricting peoples' right over it. These forests were managed according to a European concept of forest management, by a professional forest service, excluding people, to supply timber to urban areas and also to earn revenue for colonial interest. The fuelwood, bamboo etc. on which village people are largely dependant became outcast in the new management system, and the forest and rural people were separated from one another as a result of this policy. Rural people began to depend on their own trees for the supply of forest produce for their everyday use.

Then, in the Pakistan period, like other sectors, the forestry sector also experienced industrialization on a limited scale. In most cases, like industries

in other sectors, wood based industries were initially established in the public sector and later disinvested in favour of West Pakistani industrialists. Those industries, as a result of different kinds of government subsidies and protected domestic market for their product, did not try hard to increase their efficiency. So, the idea behind the industrialization approach that industry is an efficient user of capital was not true in this case. On the other hand, profits earned by those industries (largely because of favour from the government) were invested in West Pakistan. So, in the name of industrialization, Bangladesh experienced an economic exploitation by the West Pakistani industrialists. Also, forward and backward linkages of the forest industries with the rest of the economy to promote development as claimed in the forest industrialization approach, were negligible.

Then, in the late 1960s, efforts were taken to modernize the agriculture sector. It failed to create any impressive result in Bangladesh, except the creation of an income gap between rich and poor farmers. On the other hand, in the forestry sector, industrial plantations were established to meet future demand of forest produce for forest industries (though raw materials for most of the industries were other than timber at that time) without paying any attention to the need of the village people. This policy was largely responsible for the dualistic nature of the forestry sector - all development resources were spent on the vast public forest lands to meet only fraction of the total demand, whereas village forests maintained and raised by village people without any assistance from the government met most of the demand.

Then in independent Bangladesh, planners officially rejected the explicit economic growth path and accepted development as distributive justice for Bangladesh from the very beginning. Correspondingly, the rejection of industrialization and acceptance of basic needs came much later in 1980 in the forestry sector as a result of late international reassessment of the role of forestry in development in 1978.

Again, new approaches to development were only slowly reflected both in overall development processes and development processes in forestry. This was either due to a lack of knowledge of the people associated with the development processes or due to their class structures. As a result, the gap between the rich and the poor as seen in the later period of Pakistan was not reduced, but rather this gap widened in independent Bangladesh. Similarly, in the forestry sector, the dualistic nature of the sector was not changed, rather more pronounced and peoples' dependence on village forests increased. Some of the development resources have been diverted recently to the development of village forest resources, but with no results for the same reasons as described for the overall development processes.

7.3 Forestry Sector Planning

The re-capitulation of forestry sector planning will be around four sub-headings: future demand projections; future supply situations; developmental effects of the suggested supply strategy; and lastly, limitations of this study.

7.3.1 Future Demand Situation

Problems arising in forestry sector planning are uncertainties regarding the future demand and supply situation as these are dependent on various complex factors, which are particularly uncertain in a developing country like Bangladesh. There are always contradictory scenarios regarding the future of Bangladesh, and the nature and composition of future demand vary widely from scenario to scenario.

As seen in this study, if future demand is predicted on the basis of information given in various development plans, the nature and composition of future demand will be such that comparatively greater efforts will be necessary to develop forest resources in the two forestry regions of the country (namely Chittagong and

Sunderban), where virtually all the public forest lands are situated. In that situation, the past direction of spending development resources for the development of public forest lands may not be wrong. In other words, what the Forest Department has done in the past may be right, if and when everything will happen as per expectations of official development plan.

But the problem for a developing country like Bangladesh is that there is always a gap between official expectation and real happenings. That is why, in this study besides an official scenario for future Bangladesh, two other scenarios (scenario 2 and 3) were considered accepting some more realistic assumptions about future Bangladesh. Interestingly, it is seen in this study that demand and composition of future demand for these two scenarios will be different from that seen for scenario 1 (the scenario according to official development plans). According to scenarios 2 and 3, demand for logs will be much more in two non-forested regions (namely Western and Central) virtually with no public forest land, but on the other hand demand will be less in two forestry regions (Chittagong and Sunderban). So, much greater efforts will be necessary to develop forest resources in the non-forestry regions and less efforts necessary to develop resources in forestry regions i.e. what Forest Department has done in the past is totally wrong, if the macroeconomic and demographic reality is less than official, optimistic targets and plans.

Choosing the right scenario is a decisive factor for proper planning. If we analyse why foresters were wrong in their policy in the past, we can conclude that it may be due to their choosing the wrong scenario for the aggregate future of Bangladesh. As seen in this study, they are not wrong if everything will happen according to the wish of government. Now they appear to have been wrong, because there is a gap between real events and government expectation, and they failed to realize this.

The failure of Forest Department to contribute towards development is largely due to their failure in analyzing the real situation of Bangladesh. So,

instead of the outright rejection of one path and acceptance of other, it is important to analyze the situation first and then to make solutions to fit the situation.

7.3.2 Future Supply Situation

To predict future supply situation, in this study we dealt with the dualistic nature of the forestry sector and examined what would be the effect in future supply-demand balance (assuming a realistic demand scenario for Bangladesh) by adopting two extreme supply strategies. In one extreme, the village forest resources will be allowed to grow at its estimated present rate (5%) i.e. no development of these resource, and in another extreme maximum effort will be taken to double the present growth rate (i.e. to 10%) of village forest nationally.

From the results, it is apparent that it would not be possible to meet future demand nationally even taking any overenthusiastic plan in public forest lands without increasing the present growth rate of village forests. But it is also seen from this study that it would be possible to meet future demand at least in one region (Chittagong) without increasing the village forest growth rate and village forest resources of this region are very much under utilized at present.

On the other hand, by doubling the growth rate of village forests, theoretically it would be possible to meet future demand, but it will create a different sort of problems in future. In this situation, there would be a surplus in three regions and still there would be a huge deficit in another region (Western). So meeting this deficit demand would depend on the possibility of inter-regional transportation of logs from other regions to the deficit region, which in turn depends on infrastructure development of the concerned regions and it would be a less likely possibility for future Bangladesh.

From theoretical interest, if it is assumed that it would be possible to meet the deficit from surpluses from other regions, still there will be surplus of forest resources in other regions, if forest resources would be exploited up to their potential. In that situation, forest produce raised mainly by villagers would remain underutilized. This would be unexpected from a development viewpoint, which demands proper utilization of all available resources. In fact the "surplus" is only compared to the minimal consumption level assumed in the demand projections, so in practice, the people of "surplus" regions could enjoy slightly higher than minimum levels of consumption. That is why it is required to increase the growth of village forest according to the future requirement and it is different for different regions, together with some demand reducing strategy for deficit region as suggested in supply scenario 3, rather than to follow a nationwide prescription of doubling the growth rate of village forest of all regions.

7.3.3 Developmental Impacts

Supply option 2 (Village forest growth 10%) has other implications from a development viewpoint. The creation of productive employment opportunities is an important development aspect for Bangladesh to reduce poverty and destitution. But the village forestry option (Option 2) disregarding the formal forestry sector, will create less jobs than a balanced strategy of developing both the formal forestry sector and village forest resources. From that respect, in addition to developing village forest resources, the development of formal forestry sector has a greater role in development rather than the development of village forestry alone. At the same time, scenario 3 will make a positive contribution to development if and when it would be implemented successfully, otherwise it will have a large negative contribution, because development capital required for scenario 3 will be more than that for scenario 2. The risk involvement with supply scenario 3 will be much more than that with 2.

Another important development aspect is that the development of village forest resources will allow people with land to develop their resources, whereas people with no land will not get any benefit from this development (except some benefits from employment during extraction of these resources), creating an unfavorable income distribution. In contrast, properly designed forestry programs in public forest land involving the poor and destitute (not present forestry practices) could at least divert some benefits to the landless poor and to make some contribution towards development as distributive justice. In that sense, supply option 3 with properly designed forestry programs (yet undefined) is more acceptable than scenario 2 from the development perspective of Bangladesh.

7.3.4 Limitations

Future demand and supply of forest produce are predicted in this study using Bangladesh Forestry Sector Simulation Model developed by Byron et al. To predict demand and supply, various supply and demand parameters as required by the model, are assumed. As there are always contradictory information regarding various parameters, assumptions of these parameters are very difficult part of this study. Problems regarding contradictory demand parameters are avoided using different demand scenarios. But for the supply parameters, this study depends on the best available information for each of the parameters. To do so, in some cases it has to depend on some official information due to unavailability of reliable information from alternative sources. This reliance on official information imposes some limitations to this study, as people who know about the forestry sector of Bangladesh, have serious doubt about the authenticity of some of these official data especially regarding natural forest and existing plantations. But whatever may be the difference between official information and actual existence in the field, it has no significant impact on this study, as it was shown earlier that natural forests and existing plantations have less significant role in the future supply situation.

7.4 Areas for Future Research

This study identifies areas for future research and suggests refinement of the forestry sector simulation model used in this study. The scope for refining the Bangladesh Forestry Sector Simulation Model developed by Byron et al is as follows:

1. Discrepancies regarding growth data for exotic species which is implicitly given in the model and those found in other studies should require further careful investigation.
2. The model in some cases incorporates relatively less important demand and supply parameters (e.g. %literacy rate for different population strata), whereas some important demand and supply parameters were not included in the model (e.g. projected yield from other and exotic plantations which are fixed and implied respectively in the model). This also needs further investigations.
3. Computation of natural forest area remaining after each 5 year interval was not incorporated in the model and without this, inclusion of encroachment rate in the model has no significance.
4. This model is for the period 1980-2010 A.D. and needs further extension of the simulation period.

This study also suggests some modifications of the forestry sector planning suggested here based on data collected from the field (instead of reliance official information which imposes some limitation to this study as discussed in sub-section 7.3.4) and refined model as suggested in the above paragraph.

This study also raises some important questions and answers to these questions will be needed to proceed with this planning. The questions are:

1. How forestry programs will be designed in the formal forestry sector to direct benefits towards the landless poor?

2. How forestry programs will be designed to achieve growth rates in the village forestry sector as prescribed in this study?
3. Is the present structure of the Forest Department adequate to implement this new program (as suggested in this study).

Finally, Forestry Sector Planning for Bangladesh as suggested in this study, outlines the relative emphasis necessary for the development of forest resources in village and formal forestry sector within the development framework of Bangladesh. The plan's contribution towards development as expected in this study depends largely on appropriate answers to the above questions. Even if we develop the perfect plan and strategy, there must be the political will to implement it, the right institutional structure, and trained, competent, sincere staff to implement the plan.

REFERENCES

- Adelman, I. and Morris, C. 1973. Economic Growth and Social Equity in Developing Countries. California: Stanford University Press.
- Ahluwalia, M. S. 1976. 'Inequality, poverty and development'. Journal of Development Economics, vol3 p307-342.
- Ahmad, N. 1976. A New Economic Geography of Bangladesh. New Delhi: Vikash Publishing House.
- Alamgir, M. 1978. Bangladesh: A Case of Below Poverty Level Equilibrium Trap. Dhaka: Bangladesh Institute of Development Studies.
- Arnold, J. E. M. 1982 'Report on FAO activities'. Socio-economic Effects and Constraints in Tropical Forest Management. (ed) Hallsworth, E. G., p209-215. New York: John Wiley and Sons.
- Arnold, J. E. M. 1982 'Keynote address' in Forest Policy Seminar held at Cox's Bazaar. Proceedings FAO/UNDP/BGD/78/010, p2-7.
- Baran, P. 1957. The Political Economy of Growth. New York: Monthly Review Press.
- Blomstrom, M. and Hettne, B. 1984. Development Theory in Transition: The Dependency Debate and beyond: Third World Responses. London: Zed Books.
- Brenner, R. 1977 'The origins of capitalist development: a critique of Neo-Smithian Marxism'. New Left Review v104, p25-92.
- Bureau of Statistics, Government of Bangladesh. 1983. Statistical Yearbook of Bangladesh 1982. Dhaka.
- Bureau of Statistics, Government of Bangladesh. 1984. Bangladesh Population Census 1981: Analytical Findings and National Tables. Dhaka.
- Bureau of Statistics, Government of Bangladesh. 1985. 1984-85 Statistical Yearbook of Bangladesh. Dhaka.
- Byron, R. N. 1981 'Supply and demand of forest products in Bangladesh'. Unpublished Consultant's Report to UNDP/FAO/BGD/78/010. Dhaka.

- Byron, R. N. 1984a. 'Status, trends and proposed direction of Bangladesh forestry'.
Paper presented in a seminar at Kaptai, Bangladesh.
- Byron, R.N. 1984b. 'Village forest inventory'. Unpublished Inventory Report
(Personal communication).
- Byron, R.N. 1984c. Report Prepared for the Secretary, Agriculture and Forest
Division, Ministry of Agriculture, GOB (Personal Communication).
- Byron, R. N. 1985. 'Rural versus state forestry in Bangladesh' Forestry: Success
or Failure in Developing Countries? (eds) Dargavel, J. and Simpson, G.,
p50-72. CRES Working Paper, The Australian National University.
- Byron, R. N., Edelman, D. J. and Manson, D. M. 1983a 'Technical manual for the
Bangladesh forestry sector simulation vol.1 model description'. Field
Document No 7b. UNDP/FAO Forestry Sector Planning Project
BGD/78/010. Dhaka.
- Byron, R. N., Edelman, D. J. and Manson, D. M. 1983b 'Technical manual for the
Bangladesh forestry sector simulation vol.2 basic program description'.
Field Document No 7c. UNDP/FAO Forestry Sector Planning Project
BGD/78/010. Dhaka.
- Byron, R. N., Edelman, D. J. and Manson, D. M. 1983c 'User's guide to the
Bangladesh forestry sector simulation'. Field Document No 7a. UNDP/FAO
Forestry Sector Planning Project BGD/78/010. Dhaka.
- Chenery, H., Ahluwalia, M. S. and Others 1974. Redistribution with Growth. Oxford
University Press.
- Chowdhury, M. R. 1982. 'Specific aims for forestry development for second and
third five year plans'. Paper presented at the Forest Policy Seminar held
at Cox's Bazaar. Proceedings UNDP/FAO/BGD/78/010, p35-36.
- Colman, D. and Nixon, F. 1978. Economics of Change in Less Developed Countries.
Oxford: Philip Alan.

- Dargavel, J., Hopley, M. and Kengen, S. 1985. 'Forestry of development and underdevelopment of forestry'. Forestry: Success or failure in developing Countries? (eds) Dargavel, J. and Simpson, G., p1-37. CRES Working Paper, The Australian National University.
- Davidson, J. 1985. 'Species and sites'. Field Document No.5. FAO/UNDP Project BGD/79/017. Dhaka.
- Douglas, J. J. 1981. 'Consumption and supply of wood and bamboo in Bangladesh'. Field Document No. 2. Project UNDP/FAO/BGD/78/010. Dhaka.
- Douglas, J. J. 1983. A Re-appraisal of Forestry Development in Developing Countries. The Hague: Martinus Nijhoff.
- Douglas, J. J., Rahman, K. and Aziz, A. 1981. 'The industrial forestry sector in Bangladesh'. Field Document No. 3. Project UNDP/FAO/BGD/78/010. Dhaka.
- Edelman, D. J., Byron, R. N. and Manson, D. M. 1985. 'The Bangladesh forestry sector simulation'. International Journal for Development Technology. vol. 3, p5-18.
- Faaland, J. and Parkinson, J. R. 1976. Bangladesh: The Test Case of Development. London: C. Hurst and Company.
- Food and Agriculture Organization. 1978. Forestry for Local Community Development. FAO Forestry Paper No. 7. Rome.
- Food and Agriculture Organization, United Nations Development Program and Bangladesh Planning Commission. 1984. Forestry Sector Statistics.1983. Dhaka.
- Fei, J. C. H. and Ranis, G. .1964. Development of the Labour Surplus Economy: Theory and Policy. Yale University: The Economic Growth Centre.
- Frank, A. G. 1967 Capitalism and Underdevelopment in Latin America: Historical Studies of Chile and Brazil. New York: Monthly Review Press.
- Frank, A. G. 1977. 'Dependency is dead, long live dependence and class struggle: an answer to critics'. World Development 5(4), p355-370.

- Forest Research Institute, Bangladesh. 1982. Forest Statistics of Bangladesh. Chittagong.
- Gandhi, M. K. 1938 (1958) The Economics of Village Industries. Ahmedabad (India): Navajivan Publishing House.
- Hamid, A. 1982. 'Chairman's sum up' of the session on forest supply in Forest Policy Seminar held at Cox's Bazaar. Proceedings UNDP/FAO/BGD/78/020, p8-10.
- Hammermaster, E. 1981. 'Final report of the village forest inventory'. Project UNDP/FAO/BGD/78/020. Dhaka.
- Hoselitz, B. F. 1962. Sociological Aspects of Economic Growth. New York: The Free Press of Glencoe.
- Hossain, M. 1983. Quantitative Analysis of Policy Alternatives for Bangladesh's Future Agrarian Development. PhD Thesis. University of Western Australia.
- International Labour Organization. 1972. Employment, Incomes and Inequality: A Strategy for Increasing Productive Employment in Kenya. Geneva.
- Islam, N. 1977. Development Planning in Bangladesh. London: C. Hurst and Company.
- Jannuzi, F. T. and Peach, J. T. 1981. The Agrarian Structure of Bangladesh: An Impediment to Development. Colorado: Westview Press.
- Kengen, S. 1985. Industrial Forestry and Brazilian Development. PhD Thesis. The Australian National University.
- Khan, A. R. 1972. The Economy of Bangladesh. London: The Macmillan.
- Kingston, B. 1979. 'Growth and yield studies in the forest of Bangladesh by permanent forest inventory method'. Field Document No. 6. UNDP/FAO Project BGD/72/005. Dhaka.
- Kravis, I. 1960. 'International differences in the distribution of income. Review of Economics and Statistics. 42: p408-416.
- Kuznets, S. 1955. 'Economic growth and income inequality'. American Economic Review. 45: p1-28.

- Lall, S. 1981. Developing Countries in the International Economy: Selected Papers. London: The Macmillan.
- Leslie, A. 1977. 'Where contradictory theory and practice co-exist'. Unasyuva 29(1) p2-17. FAO, Rome.
- Leslie, A. J. 1980. 'Logging concessions: how to stop losing money'. Unasyuva. Vol. 32, No. 129, p2-7. FAO, Rome.
- Leslie, A. J. 1985. 'A plague on all your houses: reflections on twenty years of forestry for third world development'. Forestry: Success or failure in developing Countries? (eds) Dargavel, J. and Simpson, G., p87-96. CRES Working Paper, The Australian National University.
- Lewis, W. A. 1955. The Theory of Economic of Growth. London: Unwin University Books.
- Lundgren, B. and Lundgren, L. 1982. 'Socio-economic effects and constraints in forest management: Tanzania'. Socio-economic Effects and Constraints in Tropical Forest Management. (ed) Hallsworth, E. G., p43-52. New York: John Wiley and Sons.
- Mabogunje, A. L. 1980. The Development Process: A Spatial Perspective. London: Hutchinson University Library.
- Melhuish, A. D., 1982. 'An assessment of the private sawmilling industry with notes on other mechanical wood industries'. Field Document No. 6. Project UNDP/FAO/BGD/78/010. Dhaka.
- Ministry of Agriculture and Forests, GOB. 1979. 'National forest policy'. Gazette Notification Dated the 8th July 1979, Dacca.
- Ministry of Information and Broadcasting, GOB. 1977-78. 'Forest resources and industries of Bangladesh'. A booklet published by Government Press, Dhaka.
- Naoroji, D. 1901(1962). Poverty and Un-British Rule in India. Publications Division, Government of India.

- Nash, M. 1977. 'Modernization: cultural meanings-the widening gap between the intellectuals and the process'. Essays on Economic Development and Cultural Change in Honour of Bert. F. Hoselitz. (ed) Nash, M. Economic Development and Cultural Change vol. 25(suppl.), p16-28. University of Chicago Press.
- Planning Commission, Government of Bangladesh. 1973. The First Five Year Plan 1973-78. Dhaka.
- Planning Commission, Government of Bangladesh. 1978. The Two Year Plan 1978-80. Dhaka.
- Planning Commission, Government of Bangladesh 1983 The Second Five Year Plan 1980-85. Dhaka.
- Planning Commission, Government of Bangladesh. 1985 The Third Five Year Plan 1985-90. Dhaka.
- Prebisch, R. 1962. 'The economic development of Latin America and its principal problems'. Economic Bulletin for Latin America 7(1), p1-22.
- Proceedings of the 4th World Forestry Congress held in India in 1954.
- Proceedings of the 5th World Forestry Congress held in U.S.A in 1960.
- Proceedings of the 6th World Forestry Congress held in Spain in 1966.
- Proceedings of the 7th World Forestry Congress held in Argentina in 1972.
- Proceedings of the 8th World Forestry Congress held in Indonesia in 1978.
- Proceedings of the 1st National Forestry Conference of Bangladesh held in Dhaka in 1977.
- Proceedings of the 2nd National Forestry Conference of Bangladesh held in Dhaka in 1982.
- Proceedings of the Forestry Review Workshop held in Dhaka in 1983.
- Reder, M. W. 1969. 'A partial survey of the theory of income size.' Six Papers on the Size Distribution of Wealth and Income. (ed) L. Soltow, p205-250. New York: National Bureau of Economic Research.
- Salam, A. 1982. 'Chairman's address' in the Forest Policy Seminar held at Cox's Bazaar Proceedings UNDP/FAO/BGD/78/010, p8-10.

- Seers, D. 1969. 'The meaning of development' Paper presented at the 11th World Conference of the Society for International Development held in New Delhi.
- Seers, D. 1977. 'The new meaning of development' International Review No.3 (1977) p3.
- Stepanek, J. K. 1979. Bangladesh - Equitable Growth? New York: Pergamon Press.
- Todaro, M. P. 1985. Economic Development in the Third World. New York: Longman.
- United Nations Development Program, Food and Agriculture Organization. 1982. Findings and Recommendations of Project FO:DP/BGD/78/010. Rome.
- Uphoff, N. and Ilchman, W. 1972. The Political Economy of Development. Berkeley: University of California Press.
- Wamugunda, B. G. 1987 Economic Feasibility of Second Pulpmill in Kenya. MF Subthesis. The Australian National University.
- Westoby, J. C. 1962. 'Forest industries in the attack on economic underdevelopment'. Unasylya 16(4), p168-201. FAO, Rome.
- Westoby, J. C. 1978. 'Forest industries for socio-economic development.' Proceedings of the 8th World Forestry Congress. vol. 5, p19-27.
- World Bank. 1978. Forestry Sector Policy Paper. Washington, D.C. The World Bank.
- World Resources Institute and International Institute for Environment and Development. 1986. World Resources 1986, p80.

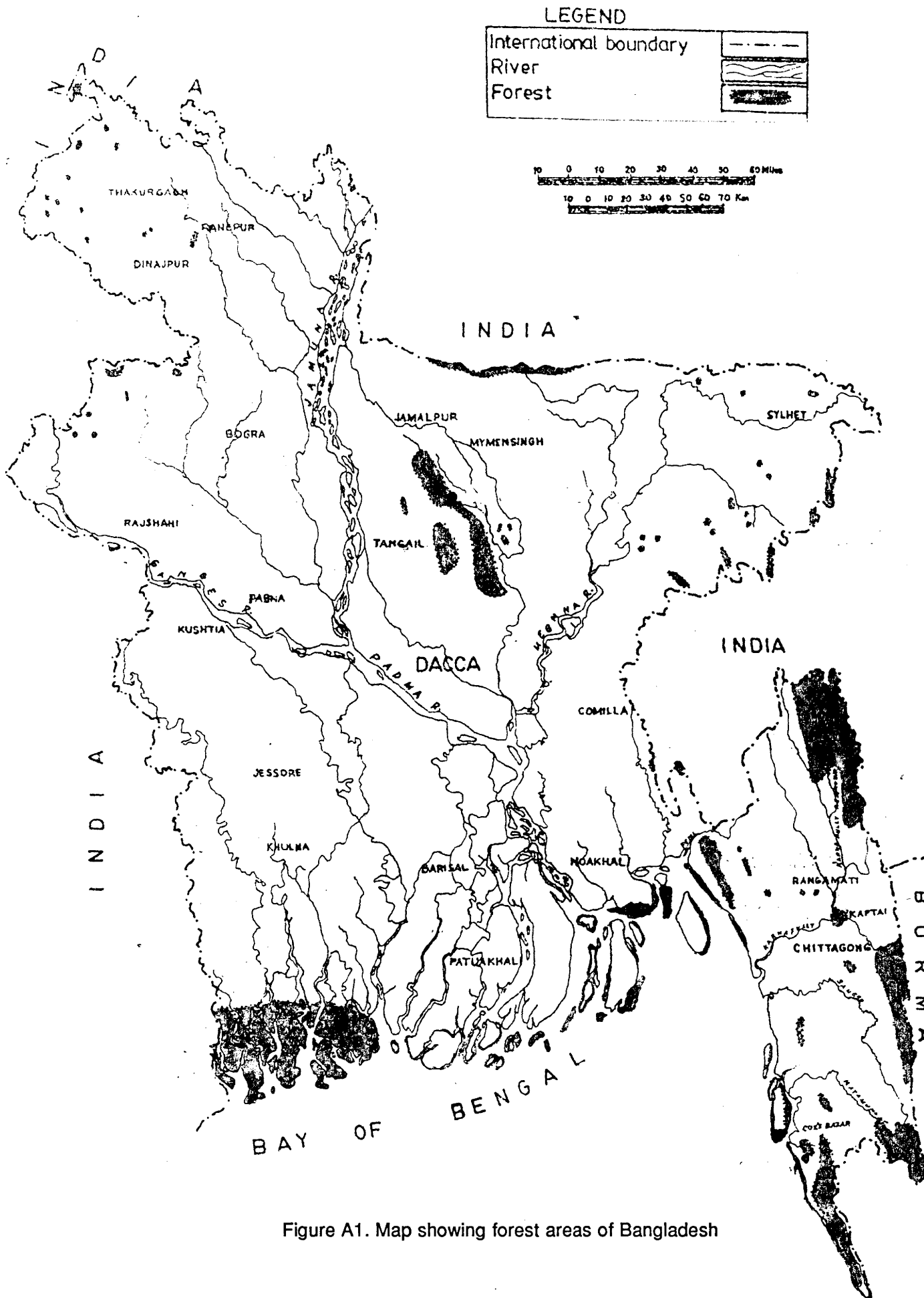


Figure A1. Map showing forest areas of Bangladesh

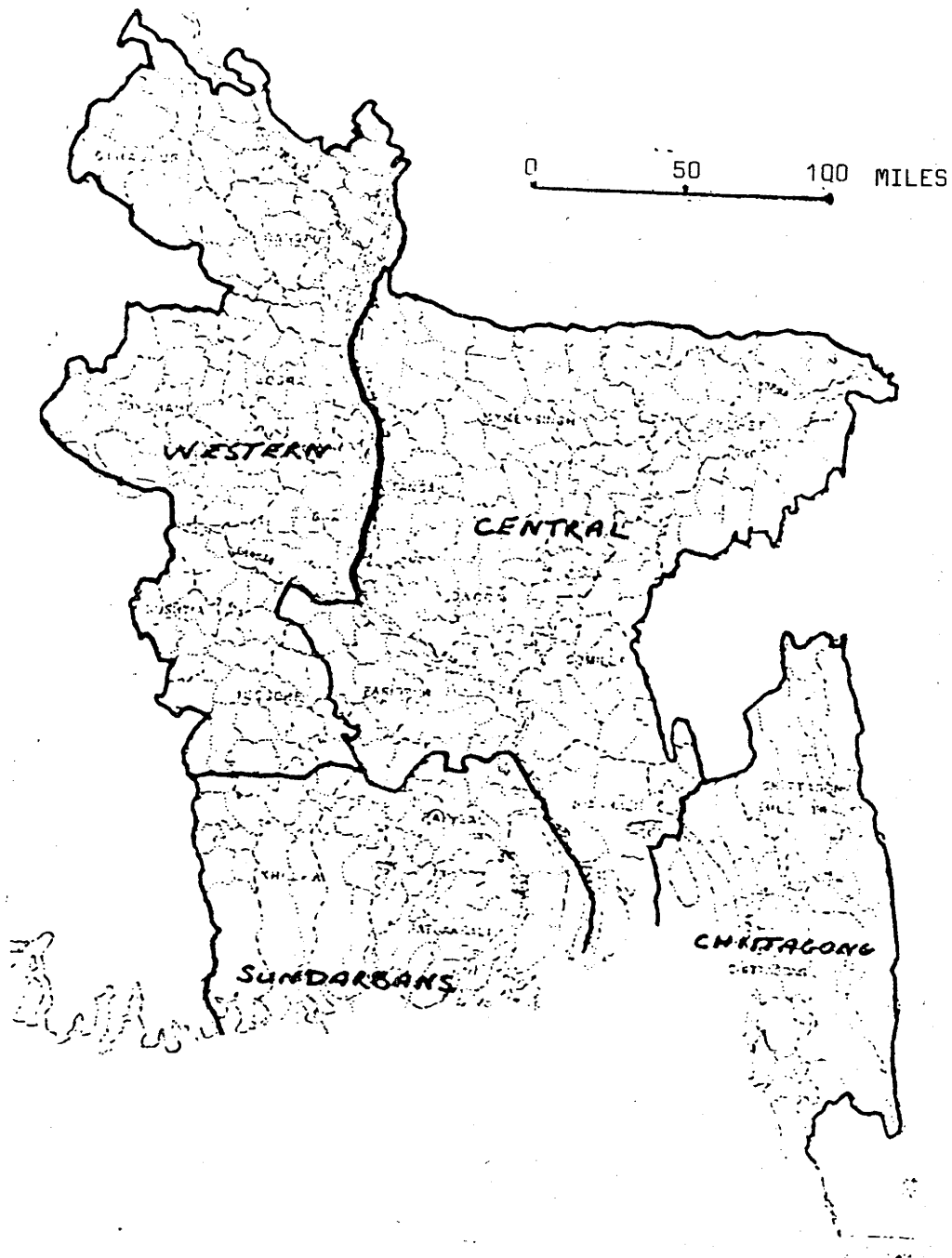


Figure A 2. Map showing four regions of Bangladesh used for the Forestry Sector Simulation

Appendix B

B1 Demand Scenario 1

Table B1.1 National Demand (Product Units)

Product	1980	1990	2000	2010
Fuelwood	192.5	188.2	134.7	71.7
Post/Poles	37.8	43.5	45.7	45.3
Sawntimber	36.0	77.8	150.6	275.6
Newsprint	28.9	68.3	114.5	160.4
Paper	42.5	96.1	154.3	203.5
Match	1.7	2.2	2.6	2.8
Plywood	0.6	1.1	1.7	2.6
Particleboard	0.3	1.0	2.8	7.2
Hardboard	1.3	2.2	3.5	5.2

Table B1.2 Western Demand (*MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	5.0	88.2	93.2
1985	7.3	95.0	102.3
1990	10.6	88.9	99.2
1995	14.9	79.3	94.2
2000	20.3	69.5	89.8
2005	27.4	55.4	82.8
2010	36.9	45.4	82.3

* Million Cubic Feet of Roundwood Equivalent

Table B1.3 Sunderban Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	13.6	36.8	50.4
1985	20.2	41.1	61.3
1990	29.2	40.9	70.1
1995	41.2	39.5	80.7
2000	56.3	38.3	94.6
2005	76.2	35.8	111.9
2010	102.9	35.3	138.2

Table B1.4 Chittagong Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	18.7	17.8	36.5
1985	27.6	20.6	48.2
1990	39.8	21.9	61.7
1995	56.0	22.8	78.8
2000	76.4	23.9	100.3
2005	103.1	24.7	127.8
2010	138.9	26.9	165.8

Table B1.5 Central Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	13.2	93.6	106.9
1985	19.3	100.8	120.1
1990	27.6	94.1	121.7
1995	38.5	83.7	122.2
2000	52.2	73.1	125.3
2005	70.1	57.9	128.0
2010	94.2	47.1	141.3

B 2. Demand Scenario 2

Table B2.1 National Demand (Product Units)

Product	1980	1990	2000	2010
Fuelwood	195.3	227.7	254.1	267.8
Sawntimber	36.5	57.3	83.9	114.8
Newsprint	25.0	44.0	71.6	108.8
Paper	36.0	56.1	85.3	122.8
Match	1.8	2.3	2.8	3.3
Plywood	0.6	0.9	1.1	1.4
Particleboard	0.3	0.5	0.7	1.0
Hardboard	1.3	1.9	2.6	3.4

Table B2.2 Western Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	5.0	89.6	94.6
1985	6.3	97.2	103.6
1990	7.8	104.4	112.2
1995	9.6	111.0	120.6
2000	11.4	116.5	127.9
2005	13.4	120.4	133.8
2010	15.6	122.8	138.4

Table B 2.3 Sunderban Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	13.8	37.0	50.8
1985	17.4	40.8	58.3
1990	21.5	44.6	66.1
1995	26.3	48.4	74.7
2000	31.5	51.8	83.3
2005	37.1	55.2	92.3
2010	43.1	57.7	100.8

Table B 2.4 Chittagong Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	14.1	17.7	31.8
1985	17.7	19.7	37.4
1990	21.9	21.7	43.6
1995	26.6	23.8	50.4
2000	31.8	25.8	57.6
2005	37.4	27.9	65.3
2010	43.4	29.4	72.8

Table B 2.5 Central Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	18.3	95.0	113.3
1985	23.0	103.2	126.2
1990	28.3	110.7	139.7
1995	34.4	117.8	152.2
2000	41.1	123.6	164.7
2005	48.3	127.7	176.0
2010	55.9	130.3	186.2

B 3. Demand Scenario 3

Table B 3.1 National Demand (Product Units)

Product	1980	1990	2000	2010
Fuelwood	205.3	255.4	301.8	349.3
Posts/Poles	40.3	50.1	59.2	68.6
Sawntimber	38.4	55.6	76.0	101.2
Newsprint	26.3	39.5	56.5	77.8
Match	1.9	2.4	3.0	3.7
Plywood	0.6	0.9	1.1	1.4
Particleboard	0.4	0.5	0.7	0.9
Hardboard	1.4	1.9	2.5	3.2

Table B .3.2 Western Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	5.3	94.1	99.4
1985	6.4	104.9	111.3
1990	7.6	117.1	124.7
1995	8.9	127.4	136.3
2000	10.4	138.4	148.8
2005	12.0	149.0	161.0
2010	13.8	160.2	174.0

Table B 3.3 Sunderban Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	14.5	38.9	53.4
1985	17.4	43.7	61.1
1990	21.0	49.1	70.1
1995	24.5	53.9	78.4
2000	28.6	58.9	87.5
2005	33.0	64.0	97.1
2010	38.0	69.4	107.5

Table B 3.4 Chittagong Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	14.8	18.6	33.5
1985	17.8	21.0	38.8
1990	21.4	23.7	45.0
1995	25.0	26.1	51.1
2000	29.1	28.7	57.7
2005	33.5	31.3	64.8
2010	38.5	34.1	72.7

Table B 3.5 Central Demand (MCF of RWE)

Year	Big logs	Small logs	Total logs
1980	19.2	99.9	119.1
1985	23.1	111.3	134.4
1990	27.6	124.2	151.9
1995	32.3	135.2	167.5
2000	37.6	146.8	184.4
2005	43.3	158.1	201.4
2010	49.8	170.0	219.8

Appendix C

C 1. Supply Scenario 1 (5% village forest growth)

Table C 1.1 National Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex Ptn	Oth. Ptn.	Total	*S-D balance
1980	19.4	33.0	0	1.1	53.5	+2.3
1985	17.4	27.1	0	3.0	47.5	-16.9
1990	18.1	23.1	4.4	3.0	48.6	-30.9
1995	18.1	20.3	21.6	7.5	67.5	-29.4
2000	18.1	18.4	21.6	10.8	68.9	-46.9
2005	18.1	17.3	21.6	10.3	67.3	-69.7
2010	18.1	16.7	21.6	10.2	66.6	-91.4

Table C 1.2 National Supply - Small Logs (MCF of RWE)

Year	NFor.	V For	Ex Ptn.	Oth Ptn	Total	S-D balance
1980	23.8	213.7	0	1.9	239.4	+0.1
1985	21.4	161.6	0	9.7	192.7	-68.2
1990	22.1	125.7	4.1	10.9	162.8	-118.6
1995	22.1	101.0	20.4	23.3	166.8	-134.2
2000	22.1	84.1	20.4	29.2	155.8	-161.9
2005	22.1	72.7	20.4	28.0	143.2	-189.2
2010	22.1	65.3	20.4	27.3	135.1	-205.1

* Supply-demand balance as compared to demand scenario 2

(+) means surplus

(-) means deficit

Table C 1.3 Western Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Exptn.	Oth. Ptn.	Total	S-D balance
1980	0	5.3	0	0	5.3	+0.3
1985	0	3.5	0	0	3.5	-2.8
1990	0	2.3	0.9	0	3.2	-4.6
1995	0	1.5	3.6	0	5.1	-4.5
2000	0	1.0	3.6	0	4.6	-6.8
2005	0	0.6	3.6	0	4.2	-9.2
2010	0	0.4	3.6	0	4.0	-11.6

Table C 1.4 Western Supply - Small Logs (MCF of RWE)

Year	N For.	VFor.	Ex Ptn.	Oth. Ptn.	Total	S-D balance
1980	0	89.7	0	0	89.7	+0.1
1985	0	58.4	0	0	58.4	-38.8
1990	0	38.1	0.9	0	39.0	-65.5
1995	0	24.8	3.4	0	28.2	-82.8
2000	0	16.1	3.4	0	19.5	-97.0
2005	0	10.5	3.4	0	13.9	-106.5
2010	0	6.8	3.4	0	10.2	-112.6

Table C 1.5 Sunderban Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth. Ptn	Total	S-D balance
1980	7.5	6.8	0	0.1	14.4	+0.6
1985	7.5	6.9	0	0.9	15.3	-2.1
1990	7.5	7.1	0	1.5	16.1	-5.4
1995	7.5	7.2	0	6.2	20.9	-5.4
2000	7.5	7.3	0	7.0	21.8	-9.7
2005	7.5	7.4	0	7.0	21.9	-15.9
2010	7.5	7.5	0	7.0	22.0	-21.1

Table C 1.6 Sunderban Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	ExPtn.	Oth.Ptn	Total	S-D balance
1980	11.2	25.5	0	0.6	37.3	+0.3
1985	11.2	25.9	0	6.9	44.0	+3.2
1990	11.2	26.3	0	9.3	46.8	+2.2
1995	11.2	26.7	0	21.8	59.7	+11.3
2000	11.2	27.2	0	24.0	62.4	+10.6
2005	11.2	27.6	0	24.0	62.8	+7.6
2010	11.2	28.1	0	24.0	63.3	+5.6

Table C 1.7 Chittagong Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	ExPtn.	Oth.Ptn	Total	S-D balance
1980	11.8	2.0	0	0.8	14.6	+0.5
1985	9.8	2.3	0	1.9	14.0	-3.7
1990	10.5	2.7	1.8	1.2	16.2	-5.7
1995	10.5	3.2	9.0	1.1	23.8	-2.8
2000	10.5	3.7	9.0	3.4	26.6	-5.2
2005	10.5	4.3	9.0	2.8	26.6	-10.8
2010	10.5	5.0	9.0	2.5	27.0	-16.4

Table C 1.8 Chittagong Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex Ptn.	Oth. Ptn.	Total	S-D balance
1980	11.8	4.6	0	1.1	17.5	-0.2
1985	9.8	5.4	0	2.5	17.7	-2.0
1990	10.5	6.2	1.7	1.5	19.9	-1.8
1995	10.5	7.2	8.5	1.3	27.5	+3.7
2000	10.5	8.4	8.5	4.8	32.2	+6.4
2005	10.5	9.8	8.5	3.5	32.3	+4.6
2010	10.5	11.3	8.5	3.0	33.3	+3.9

Table C 1.9 Central Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	ExPtn.	Oth.Ptn.	Total	S-D balance
1980	0.2	18.8	0	0.2	19.2	+0.9
1985	0.1	14.4	0	0.3	14.8	-8.2
1990	0.1	11.0	1.7	0.3	13.1	-15.2
1995	0.1	8.4	9.0	0.2	17.7	-16.7
2000	0.1	6.5	9.0	0.4	16.0	-25.1
2005	0.1	5.0	9.0	0.6	14.7	-33.6
2010	0.1	3.8	9.0	0.6	13.5	-42.4

Table C 1.10 Central Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex Ptn.	Oth Ptn.	Total	S-D balance
1980	0.8	93.9	0	0.2	94.9	-0.1
1985	0.4	71.9	0	0.3	72.6	-30.6
1990	0.4	55.1	1.6	0.2	57.3	-53.4
1995	0.4	42.2	8.5	0.2	51.3	-66.5
2000	0.4	32.4	8.5	0.4	41.7	-81.9
2005	0.4	24.8	8.5	0.5	34.2	-93.5
2010	0.4	19.0	8.5	0.3	28.2	-102.1

C 2. Supply Scenario 2 (10% village forest growth)

Table C 2.1 National Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex Ptn.	Oth Ptn.	Total	*S-D balance
1980	19.4	33.0	0	1.1	53.5	+2.3
1985	17.4	38.2	0	3.0	58.6	-5.8
1990	18.1	44.9	4.4	3.0	70.4	-9.1
1995	18.1	53.7	21.6	7.5	100.9	+4.0
2000	18.1	65.4	21.6	10.8	115.9	+0.1
2005	18.1	81.1	21.6	10.3	139.1	-5.1
2010	18.1	102.3	21.6	10.2	152.2	-5.8

Table C 2.2 National Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	23.8	213.7	0	1.9	239.4	+0.1
1985	21.4	233.1	0	9.7	264.2	+3.3
1990	22.1	257.7	4.1	10.9	294.8	+13.6
1995	22.1	289.2	20.4	23.3	355.0	+54.0
2000	22.1	330.2	20.4	29.2	401.9	+84.2
2005	22.1	384.0	20.4	28.1	454.6	+123.4
2010	22.1	455.2	20.4	27.3	525.0	+184.8

* Supply-demand balance as compared to demand scenario 2

(+) means surplus

(-) means deficit

Table C 2.3 Western Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex. Ptn.	Oth.Ptn.	Total	S-D balance
1980	0	5.3	0	0	5.3	+0.3
1985	0	5.2	0	0	5.2	-1.1
1990	0	5.2	0.9	0	6.1	-1.7
1995	0	5.1	3.6	0	8.7	-0.9
2000	0	5.0	3.6	0	8.6	-2.8
2005	0	4.9	3.6	0	8.5	-4.9
2010	0	4.9	3.6	0	8.5	-7.1

Table C 2.4 Western Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	0	89.7	0	0	89.7	+0.1
1985	0	88.4	0	0	88.4	-8.8
1990	0	87.1	0.9	0	88.0	-16.4
1995	0	85.9	3.4	0	89.3	-21.7
2000	0	84.6	3.4	0	88.0	-28.5
2005	0	83.4	3.4	0	86.8	-33.6
2010	0	82.2	3.4	0	85.6	-37.2

Table C 2.5 Sunderban Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	7.5	6.8	0	0.1	14.4	+0.6
1985	7.5	9.2	0	0.9	17.6	+0.2
1990	7.5	12.5	0	1.5	21.5	0
1995	7.5	16.8	0	6.2	30.5	+4.2
2000	7.5	22.7	0	7.0	37.2	+5.7
2005	7.5	30.7	0	7.0	45.2	+8.1
2010	7.5	41.5	0	7.0	56.0	+12.9

Table C 2.6 Sunderban Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex. Ptn.	Oth. Ptn.	Total	S-D balance
1980	11.2	25.5	0	0.6	37.3	+0.3
1985	11.2	34.4	0	6.9	52.5	+11.7
1990	11.2	46.5	0	9.3	67.0	+22.4
1995	11.2	62.8	0	21.8	95.8	+47.4
2000	11.2	84.8	0	24.0	120.0	+68.2
2005	11.2	114.5	0	24.0	149.7	+94.5
2010	11.2	154.6	0	24.0	189.8	+132.1

Table C 2.7 Chittagong Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex. Ptn.	Oth. Ptn.	Total	S-D balance
1980	11.8	2.0	0	0.8	14.6	+0.5
1985	9.8	3.0	0	1.9	14.7	-3.0
1990	10.5	4.5	1.8	1.2	18.0	-3.9
1995	10.5	6.8	9.0	1.1	27.4	+0.8
2000	10.5	10.1	9.0	3.4	33.0	+1.2
2005	10.5	15.1	9.0	2.8	37.4	0
2010	10.5	22.6	9.0	2.5	44.6	+1.2

Table C 2.8 Chittagong Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth. Ptn.	Total	S-D balance
1980	11.8	4.6	0	1.1	17.5	-0.2
1985	9.8	6.9	0	2.5	19.2	-0.5
1990	10.5	10.3	1.7	1.5	24.0	+2.3
1995	10.5	15.4	8.5	1.3	35.7	+11.9
2000	10.5	23.1	8.5	4.8	46.9	+21.1
2005	10.5	34.5	8.5	3.6	57.1	+29.2
2010	10.5	51.7	8.5	3.0	73.7	+44.6

Table C 2.9 Central Supply - Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex. Ptn.	Oth. Ptn.	Total	S-D balance
1980	0.2	18.8	0	0.2	19.2	+0.9
1985	0.1	20.7	0	0.3	21.1	-1.9
1990	0.1	22.7	1.7	0.3	24.8	-3.5
1995	0.1	25.0	9.0	0.2	34.3	-0.1
2000	0.1	27.5	9.0	0.4	37.0	-4.1
2005	0.1	30.3	9.0	0.6	40.0	-8.3
2010	0.1	33.4	9.0	0.6	43.1	-12.8

Table C 2.10 Central Supply - Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex. Ptn.	Oth. Ptn.	Total	S-D balance
1980	0.8	93.9	0	0.2	94.9	-0.1
1985	0.4	103.3	0	0.3	104.0	+0.8
1990	0.4	113.7	1.6	0.2	115.9	+5.2
1995	0.4	125.1	8.5	0.2	134.2	+16.4
2000	0.4	137.7	8.5	0.4	147.0	+23.4
2005	0.4	151.5	8.5	0.5	160.9	+33.2
2010	0.4	166.8	8.5	0.3	176.0	+45.7

C 3. Supply Scenario 3

C 3.1 Supply Parameters

Table C 3.1.1 Forest stock, Growth and Encroachment (1980)

	Western	Sunderban	Chittagong	Central
Natural forest left	0	1400.0	901.0	134.5
Natural forest density	0	0.8	1.4	0.5
Natural forest encroachment	0	0	2.0	1.0
Village forest standing volume	760.4	621.5	288.6	1104.5
Village forest growth rate	10.0	6.5	5.0	10.0

Table C 3.1.2 Natural Forest, % Cut as Big Logs

Year	Western	Sunderban	Chittagong	Central
1980	2	40	50	20
1985	2	45	55	20
1990	2	50	60	25
1995	0	55	60	25
2000	0	60	70	30
2005	0	65	70	30
2010	0	70	80	30

Table C 3.1.3 Natural Forest, % Cut as small logs

Year	Western	Sunderban	Chittagong	Central
1980	98	60	50	80
1985	98	55	45	80
1990	98	50	40	75
1995	99	45	40	75
2000	99	40	30	70
2005	99	35	30	70
2010	99	30	20	70

Table C 3.1.4 Village Forest, % Cut as Big Logs

Year	Western	Sunderban	Chittagong	Central
1980	0.7	1.1	0.7	1.7
1985	0.7	1.2	1.5	1.9
1990	0.7	1.2	1.6	2.0
1995	0.7	1.0	1.2	1.8
2000	0.7	1.0	1.2	2.0
2005	0.7	1.2	1.5	2.0
2010	0.7	1.6	1.6	2.0

Table C 3.1.5 Village Forest, % Cut as Small Logs

Year	Western	Sunderban	Chittagong	Central
1980	11.8	4.1	1.6	8.5
1985	11.5	4.1	2.5	8.6
1990	11.0	5.0	3.0	8.2
1995	10.5	5.0	2.0	7.5
2000	10.0	5.2	2.0	7.0
2005	9.8	5.0	2.0	6.3
2010	9.8	4.8	2.6	5.3

Table C 3.1.6 Exotic Plantation, Area Established in Th. Acres

Year	Western	Sunderban	Chittagong	Central
1980	0.5	0	1.0	0.94
1985	2.0	0	5.0	5.0
1990	3.0	0	5.0	5.0
1995	4.0	0	7.0	5.0
2000	4.0	0	7.0	5.0
2005	4.0	0	7.0	5.0
2010	4.0	0	7.0	5.0

Table C3.1.7 Projected Plantation Yield/Acre (in Th. Cft.)

Year	Western	Sunderban	Chittagong	Central
Clearfelling big log	0	0.6	0.91	0.94
Thinning big log	0	0.15	0.126	0.126
Clearfelling small log	0	0.5	0.23	0.23
Thinning small log	0	0.3	0.19	0.19

C 3.2 Supply Situation

Table C 3.2.1 National Supply- Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	¹ S-D balance
1980	19.4	33.0	0	1.2	53.6	+2.4
1985	19.3	41.6	0	4.8	65.7	+1.3
1990	22.1	46.6	4.4	5.4	78.5	-1.1
1995	23.0	44.1	21.6	14.6	103.3	+6.4
2000	26.0	52.6	23.4	18.8	120.8	+5.2
2005	27.0	62.7	28.8	18.4	136.9	+0.8
2010	30.0	76.9	28.8	18.2	153.9	-4.3

Table C 3.2.2 National Supply- Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	² S-D balance
1980	23.8	213.7	0	1.8	239.3	-0.5
1985	19.5	227.4	0	8.0	254.9	+3.7
1990	18.1	239.6	4.2	8.4	270.3	-0.6
1995	17.2	237.6	20.4	16.1	291.3	+1.1
2000	14.1	250.6	22.1	21.2	308.0	+2.0
2005	13.2	262.0	27.2	20.0	322.4	+3.1
2010	10.1	274.8	27.2	19.3	331.4	+3.7

1 S-D balance unless otherwise mentioned as compared to demand scenario 2

(+) means surplus

(-) means deficit

2 S-D balance as compared to demand scenario 2 but with 10% reduced demand for small logs in Western region

Table C 3.2.3 Western Supply- Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	0	5.3	0	0	5.3	+0.3
1985	0	5.2	0	0	5.2	-1.1
1990	0	5.2	0.9	0	6.1	-1.7
1995	0	5.4	3.6	0	9.0	-0.6
2000	0	5.7	5.4	0	11.1	-0.3
2005	0	6.1	7.2	0	13.3	-0.1
2010	0	6.6	7.2	0	13.8	-1.8

Table C 3.2.4 Western Supply- Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	*S-D balance
1980	0	89.7	0	0	89.2	-0.4
1985	0	86.2	0	0	86.2	-1.3
1990	0	82.5	0.9	0	83.4	-10.6
1995	0	80.7	3.4	0	84.1	-15.8
2000	0	80.8	5.1	0	85.9	-19.0
2005	0	85.1	6.8	0	91.9	-16.5
2010	0	92.4	6.8	0	99.2	-11.3

* S-D balance as compared to demand scenario 2 but with 10% reduced demand for small logs in Western region

Table C 3.2.5 Sunderban Supply- Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	7.5	6.8	0	0.2	14.5	+0.7
1985	8.4	8.3	0	2.6	19.3	+1.9
1990	9.3	9.1	0	4.0	22.4	+0.9
1995	10.3	8.1	0	13.3	31.7	+5.4
2000	11.2	8.6	0	15.0	34.8	+3.3
2005	12.1	11.0	0	15.0	38.1	+1.0
2010	13.1	15.6	0	15.0	43.7	+0.6

Table C 3.2.6 Sunderban Supply- Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	11.2	25.5	0	0.5	37.2	+0.2
1985	10.3	28.3	0	5.2	43.8	+3.0
1990	9.3	38.1	0	6.8	54.2	+9.6
1995	8.4	40.4	0	14.6	63.4	+15.0
2000	7.5	45.0	0	16.0	68.5	+16.7
2005	6.5	44.0	0	16.0	66.5	+13.1
2010	5.6	47.1	0	16.0	68.7	+10.6

Table C 3.2.7 Chittagong Supply- Big Logs (MCF of RWE)

Year	VFor.	NFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	11.8	2.0	0	0.8	14.6	+0.5
1985	10.8	5.0	0	1.9	17.7	0
1990	12.6	5.8	1.8	1.2	21.4	-0.5
1995	12.6	4.5	9.0	1.1	27.2	+0.6
2000	14.7	5.1	9.0	3.4	32.2	+0.4
2005	14.7	7.1	12.6	2.8	37.2	-0.2
2010	16.8	8.3	12.6	2.5	40.2	-3.2

Table C 3.2.8 Chittagong Supply- Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	11.8	4.6	0	1.1	17.5	-0.2
1985	8.8	8.4	0	2.5	19.7	0
1990	8.4	10.8	1.7	1.5	22.4	+0.7
1995	8.4	7.5	8.5	1.3	25.7	+1.9
2000	6.3	8.4	8.5	4.8	28.0	+2.2
2005	6.3	9.4	11.9	3.5	31.1	+3.2
2010	4.2	13.5	11.9	3.0	32.6	+3.2

Table C3.2.9 Central Supply- Big Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	0.2	18.8	0	0.2	19.2	+0.9
1985	0.1	23.1	0	0.3	23.5	+0.5
1990	0.1	26.4	1.7	0.3	28.5	+0.2
1995	0.1	26.1	9.0	0.2	35.4	+1.0
2000	0.2	33.3	9.0	0.4	42.9	+1.8
2005	0.2	38.6	9.0	0.6	48.4	+0.1
2010	0.2	46.2	9.0	0.6	56.0	+0.1

Table C3.2.10 Central Supply- Small Logs (MCF of RWE)

Year	NFor.	VFor.	Ex.Ptn.	Oth.Ptn.	Total	S-D balance
1980	0.8	93.9	0	0.2	94.9	-0.1
1985	0.4	104.5	0	0.3	105.2	+2.0
1990	0.4	108.2	1.6	0.2	110.4	-0.3
1995	0.4	108.9	8.5	0.2	117.8	0
2000	0.4	116.4	8.5	0.4	125.7	+2.1
2005	0.4	121.6	8.5	0.5	131.0	+3.3
2010	0.4	122.3	8.5	0.3	131.5	+1.2