INTRODUCTION

1.1. Forest Resource as a Source of Economic and Non-economic Benefits

Now a days, forest resource has become a much talked of subject globally in general and in our country in particular. The importance of forests on the economy and the life support system of a country can hardly be exaggerated. The multiple benefits which we get from forests can broadly be divided into two categories: direct economic benefits and indirect economic benefits that flow as environmental externalities.

The direct economic benefits of forests to the society are mainly due to their produce. Forest produces may be divided into two broad types: major products and minor products. Here major forest products refer to wood and timber, whereas minor forest products refer to all other tangible products obtainable from the forest. Major forest products include industrial wood such as timber, pulp and match wood, round-wood etc. and fuel wood such as firewood, charcoal etc. On the other hand, minor forest products include [N.C.A., 1976]: fibres and flosses, grasses (other than oil producing), bamboos, reads and canes, essential oils, oil seeds, tans and dyes, gums, resins and oleo resins, drugs, species, poisons and insecticides, leaves, edible products, lac and its products and other products.

Some direct economic benefits that are usually extracted from forests in less developed countries in particular are :

(a) Timber : Forests provide timber for the construction of houses, for the agricultural implements and for fencing and other local uses, (b) Energy : Forest is a renewable natural energy resource. In the rural areas of most of the less developed countries wood constitute the main source of energy. About 70 per cent of the people in rural areas of the developing countries still depend on fuelwood (Banabithi, 1989). In Africa, about 90 per cent of the population use fuelwood for cooking and in Northern India, about 75 per cent of firewood for domestic use comes from twigs and fallen branches (Dasgupta, 1993). As reported by FAO in 1980 (Wood Energy News, 1991), globally about 2 billion people depend on fuelwood. (c) Employment : A substantial number of population

find employment in forest related activities like planting, protecting, tending and harvesting. Many are engaged in its ancillary occupations (like processing and marketing etc.) also. For the poor, and particularly for the women these forest based activities are often their only primary source of cash income (FAO, 1989a). Over 200 million people currently depend on tropical forests for their livelihoods (Barraclough and Ghimire, 1990). (d) Fodder : Forests are an important source of fodder for livestock population and fodder is an indispensable component of rural economy. (e) Being a component of the primary sector forest (in particular a tropical forest) is a source of many raw materials. Almost every modern industry is, to some extent, dependent on forest products in one or more of its processes (World Bank, 1978).

In addition to their direct economic benefits to the society, forests provide many environmental benefits. The important environmental benefits are as follows :

(i) Forests make the climate more equable through transpiration, increase humidity of the air, reduce evaporation and tend to increase the precipitation of moisture (Ovington, 1955); (ii) Forests help to regulate the water supply, produce a more sustained feeding of springs and ground water regime, tend to reduce violent floods and drought, render the flow of water in rivers more continuous, control the siltation of reservoirs (Dasgupta, 1993); On a regional scale, recycling process of forest ecosystem is so efficient that ecologist refer to tropical forests as "rain machines" (Hewlett and Halvey, 1970); (iii) Forests prevent erosion and stabilise soils. (Salati 1991, P.120) shows that erosion losses can be 100 times greater in soils converted to agricultural use when compared to similar soil covered with forest. Royward (1971) establishes a clear relationship between forest cutting and increased soil run-off. He shows that, in general, run-off is reduces when deciduous trees are replaced by conifers and increased when forest is replaced by lower growing vegetation; (iv) Forest reduce the velocity of air currents, protect adjoining fields against cold and dry winds and afford shelter to cattle game and useful birds (Champion and Seth, 1968); (v) Forests produce a healthy aesthetic influence upon the people by adding good land scape and thrilling atmosphere to the locality (Ehrlich and Ehrlich, 1972); (vi) Forests act as

reservoirs for a variety of plant species. Scientists have exploited so far about 7000 species for food. Until 1980s, about 1.4 million species have been identified out of about 3 million to 10 million species on the earth (Silver and DeFries, 1991). Moreover, genetic material in tropical forests provide us with option value and use value which is more amenable to quantification (Dasgupta, 1993); (vii) Forests increase the fertility of soil. Falling from the trees, leaves, twigs, branches, fruits etc. rot and mix with soil. They increase the porosity of the soil. However, the nature and amount of this contribution, besides other factors, depend on the species present (Bray and Gorham, 1964); (viii) Forests provide hygienic benefits to our society. Forests can absorb dust and other air-borne pollutants. They also mitigate the noise pollution; (ix) Forests provide shelter to the wildlife. Forests are the habitats of animals, birds and insects (flora and fauna) which are important for ecological balance; (x) Forests have also some strategic value. Forests render assistance in the defence of a country.

A conscious and rational management of forests could ensure us the opportunity to derive benefits from this resource more or less in perpetuity. But forest cover of the globe is decreasing at an alarming rate. Many valuable tracts of forests have disappeared entirely.

1.2 Vanishing Forests and Global Concern

In order to put the deforestation[1] problem into global perspective it would be logical to begin with the existing global forest resources. Concepts, definitions and estimates of forest vary widely. Available evidence suggests that about one third of the world's land area i.e. between 40 and 50 million square kilometres is forested (Barraclough and Ghimire, 1990). Some 60 per cent, i.e. about 27 million square kilometres of this forest is classified as closed forest. The distribution of this closed forest is very much uneven as about half of these closed forests are to be found in the industrialised countries of the North (mostly in former USSR, Europe and North America) and the remaining closed forests can be found in the developing

1. Deforestation means a complete clearing of tree formations (closed or open) and their replacement by non-forest land uses.

countries of the world. Among the developing countries, Central and South America possesses half of the closed forests and the remaining closed forests are possessed by the tropical regions of Asia and Africa. Half of the Africa's forests area consists of open woodlands, forest fallows and shrublands and about one third of that can be found in Asia and Latin America. These facts are shown in table 1.1 (Barraclough and Ghimire, 1990).

Table 1.1

DISTRIBUTION OF THE WORLD'S FOREST LANDS (areas in million hectares)								
Region	Total Land Area	Total Forest and Wooded Lands		Closed Forest		Other Wooded Areas		
		Area	% of total land area	Area	% of forest & land area	Total	Open	Fallow
Temperate	6,417	2,153	34	1,590	74	563	X	NA
North America	1,835	734	40	459	63	275	X	NA
Europe	472	181	38	145	80	35	X	NA
USSR	2,227	930	42	792	85	138	X	NA
Other Countries	1,883	309	16	194	62	115	X	NA
Tropical	4,815	2,346	49	1,202	25	1,144	734	410
Africa	2,190	869	40	217	25	652	486	166
Asia & Pacific	945	410	43	306	10	104	31	73
Latin America	1,680	1,067	64	679	63	388	217	170
World	13,077	4,499	34	2,792	62	1,707	734	410

Source : World Resource Institute, 1988

Estimates regarding the extent and rates of deforestation vary widely. Nonetheless there is a wide consensus that deforestation processes are more acute in tropical regions of the South where well over half of the world's population dwells (FAO, 1986; Postel, 1984). During 1960s and 1970s, West Africa, South and South-East Asia experienced a high rate of deforestation. Estimation made by the Manshard (Manshard, 1972) reveals that between 1930 and 1970, African rainforest was destroyed by 25 to 30 per cent, forest area of Ghana declined from 8.2 to 5.2 million hectares, forest area of Liberia declined from 9.3

TABLE 1.2
Preliminary Estimates of Tropical Forest Area and Rate of Deforestation for 87 Tropical countries
1981-90

(in thousand hectares)

Regions/ Subregions	Number of countries studied	Total Land Area	Forest Area 1980	Forest Area 1990	Area Deforested Annually 1981-90	Annual rate of change 1981-90 (%)
Total	87	4,815,700	1,884,100	1,714,800	16,900	-0.9
LATIN AMERIC	32	1,675,700	9,23,000	8,39,900	8,300	-0.9
Central america & Mexico	7	245,300	77000	63500	1400	-1.8
Caribbean Subregion	18	69,500	48,800	47,100	200	-0.4
Tropical South America	7	1,360,800	797,100	729,300	6,800	-0.8
ASIA	15	896,600	310,800	274,900	3,600	-1.2
South Asia	6	445,600	70,600	66,200	400	-0.6
Continental Southest Asia	5	192,900	83,200	69,700	1,300	-1.6
Insular Southest Asia	4	258,100	157000	138,900	1,800	-1.2
AFRICA	40	2,243,400	650,300	600,100	5,000	-1.2
West Sahelian Africa	8	528,000	41,900	38,000	400	-0.9
East Sahelian Africa	6	489,600	92,300	85,300	700	-0.8
West Africa	8	203,200	55,200	43,400	1200	-2.1
Central Africa	7	406,400	230,100	215,400	1500	-0.6
Tropical Southern Africa	10	557,900	217,700	206,300	1100	-0.5
Insular Africa	1	58,200	13,200	11,700	200	-1.2

Source : Forest Resource Assessment 1990 Project, FAO

to 3.6 million hectares. According to him more than 15 million hectares of forest have been destroyed annually in the South and South-East Asia (Indonesia 5.26 million hectares, India 4.8 million hectares, Myanmar 1.15 million hectares and Philipines 0.73 million hectares, Vietnam 2 million hectares). Between 1971 and 1986, the forest area in developing countries declined by 5.4 per cent with the annual rate of deforestation being about 0.4 per cent (FAO, 1988). Almost during the same period Myers (1989) gave some spectacular picture of deforestation for some developing countries. According to his estimates West Africa, Cote d'Ivoire and Nigeria are losing over 14 per cent

of their forest every year. Madagascar, in East Africa, losing about 8 per cent per annum, Central America losing about 3.7 per cent per annum. In terms of total loss of forest areas, Myers study reveal that nearly half of the tropical deforestation take place in just three countries- Brazil, Indonesia and Zaire which contain a major share of the world's tropical forests. Trends in deforestation for different countries has been estimated by FAO. FAO calculated an annual rate of deforestation for 3 tropical regions and 12 subregions as shown in table 1.2 (WRI, 1992, P119).

From the table (1.2) it is seen that during 1981-90 among the three tropical regions, deforestation rate was highest in Asia i.e., 1.2 per cent per year, in Latin America it was 0.9 per cent & in Africa it was 0.8 per cent. If we compare regionwise then we see that in West Africa annual loss rate was 2.1 which was the highest, followed by Central America & Mexico (1.8 per cent), Continental Southeast Asia (1.6 per cent) & insular Southeast Asia & insular Africa (1.2 per cent) (WRI, 1992). Compared to the deforestation rates for 1976-80 these figures show a sharp increase for some subregions & remains steady in others. In four subregions - viz Central Africa, the Caribbean, Continental Southeast Asia and insular Southeast Asia deforestation rates increased by more than 50 per cent. In three subregions- Tropical South America, Central America and Mexico, and tropical Southern Africa deforestation rate has increased by about 50 per cent. The deforestation rate in five other subregions, four in Africa and one in Asia, remained about the same (WRI, 1992). The FAO interim report released in late 1991 reveals that tropical deforestation was about 17 million hectares per year campared to an early 1980s figure of about 11.3 million - an increase of around 50 per cent (WRI, 1992). Hyde and Newman (1991) gave an alarming picture of global deforestation. According to them, in some Countries, the rate of deforestation exceeds 3 per cent. and globally, deforestation occurs at an annual rate approaching 0.7 percent and it annually disturbs land cover on an area of the size of Great Britain. In addition to the closed forests, a considerable amount of open tropical forests are being destroyed each year. Some observers indicate that about 3.8 million hectares of tropical open woodland, which is not considered in FAO estimates, in Africa, Asia and Latin America were cleared each year in the early 1980s (Lanly, 1982).

There is considerable confusion in the literature concerning the 'Causes' of deforestation-whether micro-processes or large scale metaprocesses are responsible or whether they seem to be indiscriminately lumped together with the micro-processes directly causing deforestation and the metaprocesses behind them (Barraclough and Ghimire, 1990). However, the most prominent among these processes stimulating rapid deforestation specially in the tropics is the phenomenal growth of population. (Global 2000 report, 1980). Lester Brown (1981) of World Watch Institute calls population growth a double-edged sword that simultaneously adds to global demand for food and other necessities and consumes or fouls the productive resources that provide them. Population growth and movements and their encroachment into the forest is a key factor in deforestation and in a very fundamental sense to attribute deforestation to population growth is a mere truism (Barraclough and Ghimire, 1990).

Shifting cultivation is also an important cause of deforestation around the globe. The assessments done by FAO reveal that shifting cultivation causes 70 per cent of deforestation in Africa, 50 percent in tropical Africa and 35 per cent in Latin America (FAO, 1982). Another estimate by FAO for the period 1976-80, shows that about 9.2 million hectares of forest cover has been removed in the tropical region for either permanent or shifting cultivation. This figure has increased to 16.8 million hectares annually during 1981-90 (Lanly et. al., 1991)

Deforestation occurs also due to collection of firewoods for energy and fodder for animals by the people, specially in the densely populated countries. In 1983, FAO estimated that, worldwide, three quarters of the 2 billion people rely mostly on wood for fuel and they have been cutting trees faster than it is growing back (silver, 1991). The excessive exploitation of forests for fuelwood as the proximate cause of deforestation is documented by Grainger (1990). According to him about half of all the wood harvested in the world is estimated to be used as fuel, primarily in developing countries. Another estimate expresses that in some countries woodfuel fulfils nearly 90 per cent of the local fuel-energy demands (Eckholm et.al.1984).

Deforestation is inextricably linked with poverty. The link between rural poverty and deforestation was clearly ar-

ticulated by the World (Brundtland) Commission on Environment and Development in the following words, "Those who are poor and hungry will often destroy..... cut down forests,.." (WECD, 1987). Poor do not plant trees, instead they exploit it by prunning, often indiscriminately, for firewood or for another patch of cultivable land. Rural landlessness or near landlessness is almost synonymous with rural poverty in most developing countries and usually the principal immediate human agents in deforestatiion process (Sinha, 1984). The explanation that deforestation is primarily caused by poverty is a tautology and a symptom of unequal exploitative development, as is indiscriminate deforestation itself (Barraclough and Ghimire, 1990).

Government policies, too, are responsible for deforestation. There are ample evidences throughout the World that tax and trade regimes, land tenure laws, agricultural resettlement programmes and administration of timber concessions with loggers are but a few of the policies which aggravate deforestation (Repetto and Gills, 1988; Mahar, 1989; Bautista, 1990; Southgate and Runge, 1990; Binswanger, 1991). Regarding Government policies like construction of road and highway, Bromley suggests that resource destruction follows road access as surely as night follows day (1991). According to Goodland (1991), globally, the main cause of tropical moist deforestation is the settlement along logging roads and peasant agriculture.

Commercialisation is another important cause of deforestation. Mainly poor countries, in the persuit of much-needed foreign exchange, are exporting exotic tropical hardwoods to the industrialised West. On this account much of the deforestation take place in Central America, and in Bolivia, Brazil, Cote d'Ivoire, Indonesia, Malaysia, Nigeria, the Philippines and many other countries (Barraclough and Ghimire, 1990). Estimation done by Gregersen et. al. (1989) suggests that about 4.4 million hectares of tropical forests is used to be logged each year to supply European, American and Japanese markets. According to FAO, exports of tropical hardwoods went up nearly 14-fold between 1950 and 1980 (GOI, 1985).

Urban and industrial wood/timber demand is another important cause of deforestation in the developing countries. In most of the developing countries where urbanisation is rapid and industrialisation get preferential treatment, specially

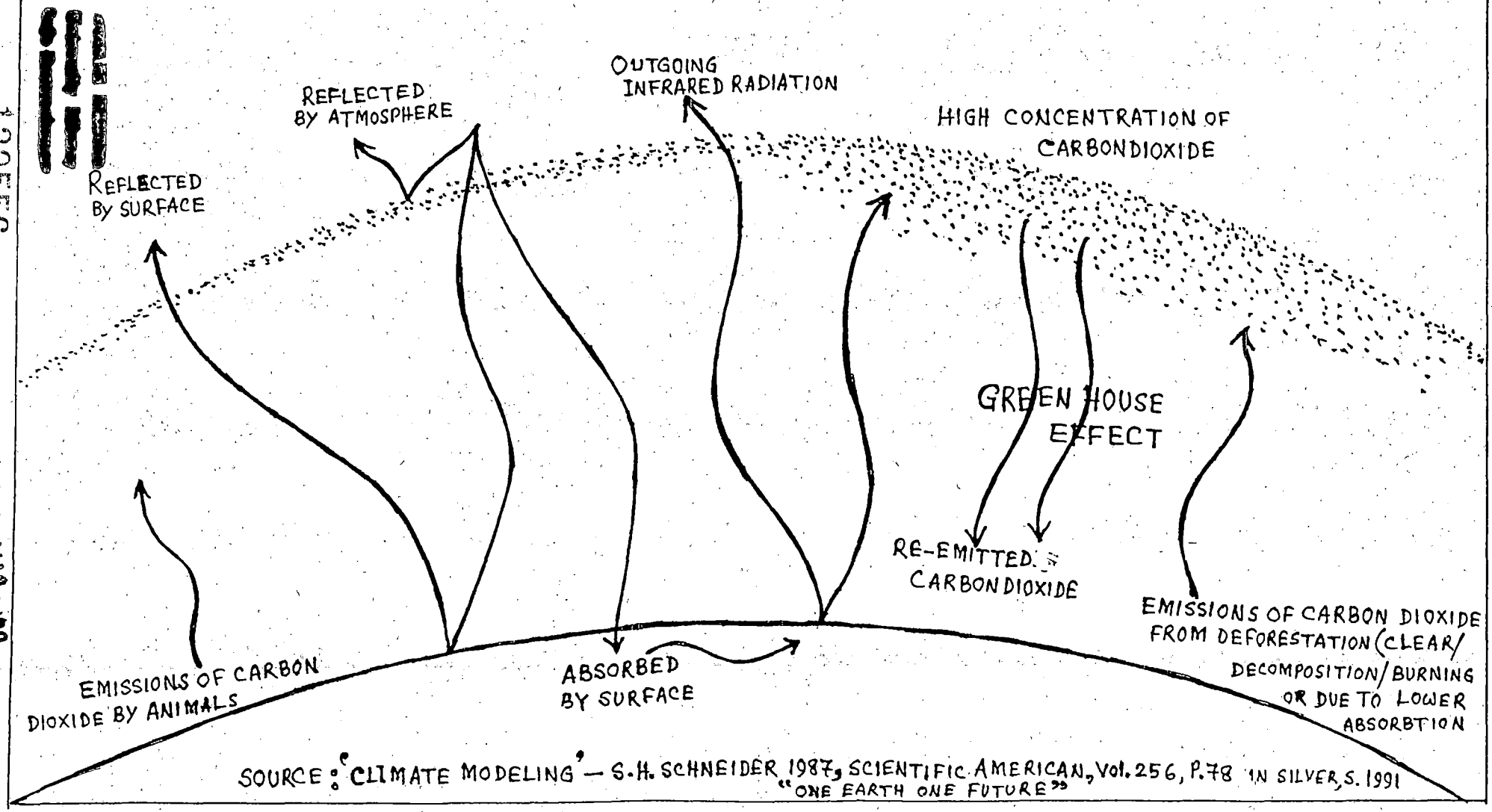
forest based, expropriation of forest resource is limitless (Barraclough and Ghimire, 1990). In many countries, forest products provide most of the basic raw materials to local and national industries.

Wherever it may occur and whatever may be the cause the process of reckless destruction turned it into a global concern and it is high on the agenda for international and national discussions during the 1990s. Because what a nation does will affect not only her own future generations but also the generation of the rest of the world. Above all, we are under the same sky and within the same planet. The trends of the past and forecasts for the future raise considerable concern over ensuing catastrophies. Over the past centuries, the human, the most important animal in the earth, reacted over the nature, profoundly over the vegetation. The net loss of forests due to human action is about 15 to 20 per cent of the world's forest area or about 8 million sq. kms (Silver with DeFries, 1991). If the present rate of deforestation continues in future, much of the tropical forests will vanish by the end of the century. Many countries like Bangladesh, Haiti, India, and Srilanka have already lost nearly all of their primary forests and countries like Cote d'Ivoire, Madagascar, Malaysia, Nepal, Nigeria, Philippines, Thailand and most Central American countries will have only a little patch of forests by the end of the century (Barraclough and Ghimire, 1990).

The direct reaction of such human action, is the rising concentration of one of the important trace gases in the atmosphere i.e, carbondioxide. The large scale deforestation around the world poses the single greatest threat among all other trace gases (like CFC-11, CFC-12, CH_4, N_2O, O_3 etc.) (Dorner and Thiesenhusen, 1992). Estimation made by several leading authorities shows that deforestation contribute about 30 per cent of carbon to the atmosphere world-wide (Houghton, 1989). According to some other analysts it accounts for less than 15 per cent (Sedjo and Clawson, 1984). The increasing concentration of carbon dioxide in the atmosphere trap more energy at the earth's surface and in lower atmosphere which in turn increases the temperature. This is popularly known as the "Green House Effect" (illustrated in Fig. 1.1)

Scientists working in climatology and related fields ex-

FIG. 1.1 SCHEMATIC ILLUSTRATION OF GREEN HOUSE EFFECT DUE TO DEFORESTATIO -N



SOURCE : 'CLIMATE MODELING' — S.H. SCHNEIDER 1987, SCIENTIFIC AMERICAN, Vol. 256, P.78 IN SILVER, S. 1991 "ONE EARTH ONE FUTURE"

press great concern about the insulating effects of the green house gas - Carbondioxide. The weather events of 1988 have given some signs and signals regarding the effects of global warming to come. Drought in the corn belt of North America, fall in the water levels of Mississippi river, floods in Bangladesh, forest fires in America's natural parks are a few examples of such signals (Silver.S with DeFries, 1991)

Scientists express serious concern about the loss of plant and animal species due to deforestation specially of the tropical moist forests, which cover only 7 per cent of the earth's land surface but contain over half of the world's species. Ecologists have identified "hot spots" around the world where habitats rich in species are in imminent danger including choco forest of Colombia, the Napo center of diversity in Peruvian Amazonia and other centres around the fringe of the Amazon basin, the Tai Forest of Cote d' Ivoire, the montane forests of East Africa, the wet forests of Srilanka, the monsoon forests of the Himalyan foothills, lowlands of Philippines and several islands of the South Pacific (Silver.S with DeFries, 1991). The loss of genetic resources is the loss of valuable heritage of humanity.

Acid rain is another aspect of the changing 'global chemical climate' with many varied and interlinked effects. As for example, change in the "Chemical Climate" have accelerated the corrossion and erosion of buildings and historic monuments like the Acropolis in Athens and Jefferson Memorial in Washington D.C., Leaning tower of Pisa and Italy etc. (Silver, S. with DeFries, 1991). A serious concern has been expressed considering the effects of acid rain over forests as it play a major role in what has come to be known as "forest die back" in northeastern Bravaria. By the early 1980s, 20 to 25 per cent of European forests were classified as moderately or severly damaged. Red spruce of northern Appalachains in the eastern United States, red spruce of New York, Vermont, New Hampshire have began to decline or died. A team of forest Scientists led by Ernst - Detlef schulze of West Germany's University of Bayreuth hypothesizes that the visible symptoms of forest is nothing but the atmospheric deposition - particularly nitrogen compounds (Silver.s with DeFries, 1991)

In the early 1980s, the World Conservation Strategy has been launched by the International Union for Conservation of

Nature and Natural Resources (IUCN) together with the World Wildlife Fund (WWF), United Nations Environment Programme (UNEP), the United Nations Educational Scientific and Cultural Organisation (UNESCO) and the Food and Agriculture Organisation of the United Nations (FAO) where emphasis has been given on both Conservation and sustainable development. In the mid-1980s, global Tropical Forestry Action Plans (TFAPs) has been prepared by FAO and by the World Resource Institute (WRI) (Barraclough and Ghimire, 1990).

The report of the World Commission on Environment and Development 1987, chaired by Gro Harlem Brundtland sounded an urgent warning that present trends should not be continued, they must be reversed (Brundtland, 1989). In 1988 deforestation issues has been highlighted in the resolution of the United Nations General Assembly on "Environmental Perspective to the year 2000 and Beyond" (Barraclough and Ghimire, 1990). The report of the world Bank expresses serious concern over environmental consequences and pays a special attention to the severe environmental problems in Sub-Saharan Africa, to the threat of deforestation in countries with tropical rain forests, whose animal and plant life is threatened and in other countries with an acute shortage of fuelwood and to regional problems such as the pollution of the Mediterranean (World bank, 1988). As, day by day, the earth's environment is deteriorating and global risks are becoming more acute, leaders from nearly all the industrial and developing countries express their concern about environment, global warming, destruction of forests, flora, fauna and pollution in the ever largest United Nations conference on the Environment and Development known as "Earth Summit" in Rio de Janerio from June 1 to 12, 1992 (Oza, 1992).

1.3 **Institution and Question of Sustainable Forest Resource.**

Since world war II the concept of economic development in the present developing nations has been gaining attention as a phenomenon seperate from the development experience of present day developed nations. From a gradual, marginalist, non-disruptive, equilibrating concept of development path (propounded by the neo-classical development economists) to the concept of structural and institutional development (propounded by the Marxist and/or radical economists) - the analytical focal point has gone a long way producing various kinds of believes and dogma in the literature of economic development. Inspite of the

change in the analytical focal point, however, the concept of maximisation of present consumption has never been discarded. The abject level of poverty and extremely limited access to the basic amenities of life can not be ignored in the short-run. Hence it became really hard for any group of economists to deny the role of technological development and the progress of scientific knowledge oriented towards accelerating the growth rate of material benefits.

But, throughout the new developmental paradigm, the role of the environment and the ecological aspects of development have never been dealt with adequately. No serious methodology has been derived to reconcile developmental targets with the environmental or ecological degradation. In otherwords, it has been a common practice among the development economists to treat the natural resource and environmental issues as one of the secondary and 'externally given' problems (Kanjilal, Bhattacharya & Luzer, 1994). However, many economists now believe that "the old notion that we will first grow rich and then take care of environmental problems is an unmaintainable concept" (Chakraborty, 1992). It is something like the concept of 'path dependent equilibrium' in economics. In a dynamic system which is non-linear it is not possible to reach the same equilibrium unless the path along which the economy is going to move is also specified. This notion of path dependent equilibrium draws our attention to the fact that it is often not possible to revert to an original State, once certain things have been changed fairly irreversibly. This is one reason, analytically speaking, why it is important for the environmental dimension to be brought into the general developmental debate (Chakraborty, 1992).

Another major reason is the problem of livelihood - not only of our future generation but also of our contemporaries. In a country like India which is poor and have a high population density the environmental dimension has an obvious important bearing on survival strategies for the people. This point of view highlights the problem of equity.

Unfortunately, the concept of sustainable development is a highly imprecise concept. The World Resource Institute (WRI, 1986), among others sees sustainable development as a development strategy which manages all assets - natural and human resources, as well as financial and physical assets-for increasing wealth and well-being. United Nations' World Commis-

sion on Environment and Development (WCED, 1987) defined sustainable development as the means by which "development is made to meet the needs of the present without compromising the ability of future generations to meet their own needs." In defining sustainability, whereas WCED emphasised on human needs and sustaining livelihoods, others like Pearce, Markandya and Barbier (1989), World Bank (1991) emphasised on the maintainence of the biodiversity. United Nations Environment Programme (UNEP, 1989) linked the sustainability with the concepts of social justice and equity, both within generations and between generation, as well as both within nations and between nations (Colchester, 1992). However, the core of the concept has probably been captured by the definition given by Goodland and Ledec (1987) which describes sustainable development as a "pattern of social and structural economic transformation (i.e, development) which optimizes the economic and other social benefits available in the present, whitout jeopardizing the likely potential for similar benefits in the future".

All these, in a sense, simply imply that we need to pay as much attention to increasing the 'Gross Nature Produce' as is being paid to increasing the Gross National Product (Agarwal, 1992). Reduced natural stock and productivity of forests and grasslands can greatly affect the basic survival needs of the poor. Again we should not just focus on the productivity of only one component of village ecosystem, which is, croplands, but on all the three land components, namely, croplands, grasslands and forest plants.

Many Governments, environmental and other non-governmental organisations, and international aid agencies insist that tropical forests, in particular, must be managed on a sustainable basis if their economic, social and ecological benefits are to continue into the future. Experts agree that world opinion and global and local significance of forests have created a unique opportunity to explore the issues influencing sustainability and, ultimately, to take action. Action may be at the local and national levels or at the international level (WRI, 1992). Since our present study is mainly concerned about local questions involving forestry, our emphasis will be more on local and national actions. Though environmental problem is not merely a matter of resource accounting, it is certainly impor-

tant to have at least some resource accounting and that can promote both conservation and long term sustainable economic development. By undervaluing vargin natural forests, many current national policies destroy forests (WRI, 1992). Correcting these policies involves revaluation of forests resources to recognise the full costs of their loss or replacement. By treating forests resources and services as capital assets, governments. can begin to account for the depreciation of these assets through deforestation. A likely result of these change is that national budget will reflect the value of forests to the nation's well-being, abolish or modify questionable subsidies and charge commercial timber harvester rates that reflect the true environmental and social costs and give credit for sustainable harvest practices (WRI, 1992).

A major confusion in the sustainable development literature, at this particular point of time centres on what role ought to be given to the market mechanism and what role ought to be given to other forms of decision making agencies. On this issue, the sustainable development literatures seems to be inadequate. The problem, essentially, is that of institutions, mechanisms and levels of decision making. " The market can indeed play an important role, but so can the Central planner at the intermediate level of decision making" (Chakraborty, 1992). There has been some discussions about co-operative endeavours (mainly in Game Theoretic framework) but the literature on economics of co-operation is not yet well established.

A major policy area at the local as well as national level involves land ownership, tenure, and distribution. Most forestlands, legally controlled by the government, have been used or occupied by local peoples. But usually they have no secured right of use or access to it. Though many Governments grant title to forest land for improvement as they consider their forest land as "undeveloped". Changes in tenure laws to grant title or legal use rights to forest dwellers can help local peoples to retain their self-sufficiency and provide an incentive for forest immigrants to invest in homesteads. Agrarian reform is another related issue in this respect. The inequitable distribution of agricultural land is one of the primary forces that push landless migrants into the forest and act as a leading cause of deforestation worldwide. Land reform policies, therefore, are one of the most potent tools Governments possess to stabilise forest use (WRI, 1992).

1.4 Objective of the Present Study and Its Conceptual Framework.

Local level forestry problems in developing countries like India may be, for analytical purposes, thought of as problems related to small-holder forest production in developing countries (Hyde and Newman, 1994). Small-holders obtain a multiple of product from the forest - or from their privately owned trees, poles for domestic construction, fuelwood, fodder, forage, fruits and nuts, latex, native medicines. "The critical inputs seem to be private land used competitively for agricultural crop, communities commonlands and household labour, particularly women's labour (World Bank, 1994).

Competition for arable land places a premium on forest activities which can be satisfied as a part of an overall agroforestries scheme, yet which are not provided by marginally productive commonlands (community forestry). Therefore, sacrificing family labour to collect forest product may be a lower cost alternative than giving up arable land tree planting. But it is not an alternative that encourages sustainable forestry because there is little incentive for continuing forest management on many commonly held lands.

Insecure tenure places a premium on short-term activities. It removes access to credit (using land as collateral) and reduces incentives for long term conservation activities like tree planting. It also encourages over exploitation of the standing forest resource (Fortman and Bruce, 1988). On the other hand it causes the poorest household to view the less secure commonlands as a source of some protection against risk to their own alternative sources of fuelwood, fodder, and forage (Jodha, 1985).

Market access limits the acceptance of social forestry activity. Local markets are more important than external markets. Market expand the demand-side opportunities for both quantity and variety of forest product. Therefore, market existence can increase the incentive for social forestry activities (Dewees, 1989). Mixed forestry system, such as intercropping offer lower risks (by spreading risks) than more uniform system like plantations, but they may also yield lower returns. But fuelwood probably receives the greatest attention of any small-holder forest product. The implicit hypothesis in the fuelwood literature are that fuelwood : (a) consumes a

large-share of household budgets (of both time and income); (b) has relatively few substitutes, therefore a lower price elasticity, but higher income elasticity for the poorest household. Fuelwood collection is often a women's responsibility. However, releasing women's labour from fuelwood collection may yield greater gains in both in household nutrition and household production (Hyde & Newman, 1994; Agarwal B., 1992). These hypotheses form the basis for economic arguments about the importance of forestry in rural development.

Trees are generally low valued resources and they tend to grow on low-valued land (Hyde & Newman, 1994). Therefore, historical claims on them, in general, were not persued or enforced sufficiently actively. There are many forest areas, particularly in tropical region, where the de jure property lies with the national government. The de facto land operators, however, may be indigeneous populations or squatters. Without legal rights these population have little incentive to protect the long run productivity of the forest rather their incentive would be to treat the forest land as the "free access resource" leading to the proverbial 'tragedy of commons'. Preventing short-term exploitation of forest by these population only reenforces their incentive to exploit more quickly.

However, where the resource is scarce, transfers of rights to the population of generally poor local users may protect the values of minor forest. Permanent and transferable title would provide the new land owners with access to credit and inducement for longer-term conservation practices. Only the local inhabitants can police the property's boundaries on a regular and long-term basis.

All these considerations lie behind the concept of social forestry and its introduction. In our present study we would attempt to uncover the experiences, principally the economic, of the practices of social forestry in the State of West Bengal in India.

1.5 Extant Literature

The available literature pertaining to economic analysis of social forestry is limited to some sporadic attempts. Here we cosider some important literature on social forestry. Cernea (1981) discusses the special role of land tenure systems and

their sociological implications associated with forest development. Dorner and Thiesenhusen (1992) examine the linkages and interactions between land tenure regims, population dynamics and human behaviour and show how these together infulence deforestation. Biswas (1988) explains the importance of social forestry from the social point of view and analyses the role of sociological variables for successful implementation of social forestry programmes. Barraclough and Ghimire (1990) discuss about the extent and rate of deforestation, the underlying process and mechanisms behind it, the social consequences and the policy implications. Colchester (1992) examines the soical and political context in which forest communities operate, pointing out the main obstacles to sustainable management of natural resources. He reviews the experiences of community-based management and concludes that successful community- based management depends on the existence or evolution of open, accountable and equitable systems of decision-making at the local level. Rao (1994) examines the causes of environmental degradation and shows how the poor as well as the affluent are responsible for such degradation. Guha (1983) analyses how the traditionally held rights of the forest communities have been curtailed through the development of capitalist forest policy, management and legislation in India. Various aspects of social forestry programmes throughout the country and the national debate on eucalyptus have been analysed in detail in " The State of India's Enviornment 1984-85 : The Second Citizen's Report"(1985). In this report social forestry programmes are heavily criticised in the sense that trees are planted as commercial investment and not to fulfil basic survival needs of fuel and fooder. This report clearly shows that energy crisis for marginal and landless labourers has aggravated. Quick growing eucalyptus plantations are vehemently opposed by several States for its adverse effects (C.S.E, 1985)

Huria and Achaya (1983) examine the role of essential forestry under the different heads in meeting the basic needs of the local people and they urge for an integrated conceptual approach to micro-planning to meet the basic needs. It appears form the study of Muranjan (1987) that there is a good scope to solve the fuel problem in the State of Maharastra through practicing social forestry plantation on a massive scale and to create a tree cover over more than one third of the land mass. Chandrashekhar et. al. (1987) examine social forestry pro-

grammes of the Karnataka Government which was introduced about the same time as the land reforms were being implemented and draw attention to the fact that the programme has resulted in small and marginal farmers abandoning food grain cultivation not out of choice but out of the inability to grow the crops in lands surrounded by eucalyptus plantations. Kalla (1988) gives an economic analysis of afforestation of waste lands. Raju et. al. (1988) attempt to examine some of the macro aspects of the forest problem viz., the trends in the area under forests, the pattern of forests and their temporal changes. Singh (1988) discusses about the complementarity of tree and crops in increasing farmers' farm incomes where he shows that return on poplar tree is higher than crops. The study of Jain (1988) examines the role of farm forestry and shows how it did affect the lives of the local people and the regional economy (FAO, CFCS1, 1988). Shiva (1991) shows, from a third world perspective, how economic development generates conflicts over natural resources like forests and how it transforms commons into commodities to satisfy the needs of the market economy.

Saxena (1989) examines the village level participation in the conceptual framework of the present social forestry programmes and analyses the institutional constraints from the experiences of four villages in different ecological regions situated in the north of India. Blyth and Macgregor (1990) evaluated the socio-economic environment of forestry development in India since colonial period with some empirical evidence and emphasise the need for 'grassroot level planning' and people's active participation. Muthayya and Loganathan (1992) analyse the practical problems of implementation of social forestry projects in Karnataka through a dialogical approach and conclude the community participation is a misnomer as long as people have to depend upon outside forces. Fisher (1993) shows that local institutions are more effective than externally-sponsored projects for sustainable use of the natural resources.

Singh (1994) combines both theoretical and empirical approaches to common pool resource (CPR) development and management. He attempts to identify the causes of CPR problems and to explore alternative viable CPR management strategies for their solution on the basis of a critical review of India's and international, experiences in CPR management and in-depth

lyses of nine selected case sutdies of different forms of CPR management from various parts of India. He argues in favour of an eclectic approach i.e. an appropriate mix of privatisation, public management, and collective management of CPRs.

Chopra et. al. (1990) examine people's participation as an alternative institution to market forces and the government for the management of common property resources (CPR) like forests. Their analysis based on primary data gathered from five villages located in the lower Shivalik ranges provides the conceptualisation of participation as an institution by itself. They propose measurements and tools for identifying the forces and factors that are usually responsible for the evolution of participation. Using a cost-benefit approach they provide some evidence that under varying degrees of social and economic conditions prevailing in the villages, the emergence of participation results in fairly high rates of return. They conclude that village people's societies can be meaningfully utilised in the management of forest land.

Various aspects of forest protection committees (FPC) have been discussed by Chandra and Poffenberger (1989). They explores the patterns of FPC formation, structure and function as the programme expanded during the 1980's in West Bengal. They show that local communities may be effective caretakers of the forest and identified forest communities as a key factor in resolving forest management problems. Palit (1989) examines the background and present status of the FPC programme in West Bengal. He points out some major problems confronting the FPC programme and emphasised to strengthen this new approach of forest regeneration through community participation.

Campbell (1992) explains some issues and challenges of joint forest management programme in different states of India and concludes with a hope for a lasting solution to deforestation which ensures equitable participation and benefits from a forest resource. Roy (1992) examines the problem and prospects of forest protection committees functioning in the State indicating the significant role of women and suggests that some changes should be made in the existing Government order 1989, 1990 for effective and equitable functioning of FPCs.

Nadkarni et. al. (1989) provides an unique perspective to

the problem of forest use by combining historical analysis with contemporary field studies. They examine conflicts of interests involving the local population, the Government and the commercial forces at work and the impact of this conflict on the forests and the local economy. They highlight the class character of the local socio-economic structure and the highly inequitable use of forests by different interest groups based on a survey of selected villages in Karnataka. They show how the bulk of the population was alienated from the management of forests and how most of the benefits of forest use accrued to the two richest classes of rural society. Their study exposes the weaknesses inherent in the populist solution which calls for handing over forests to the locals, and in the bureaucratic and technocratic solution which is based on the presumed omnipotence of the forest department. In conclusion, they urge that an alternative institutional form be evolved which must involve local people including poor peasants and the landless in forest management. Nadkarni et. al (1992) establish the economic as well as financial worthwhileness of social forestry projects on common lands or government lands earmarked for the purpose on the basis of randomly selected projects in Karnataka. The viability is proved through all the three Criteria-Net present value, Benefit cost Ratios and Internal Rate of Returns and on the basis of direct benefits only. They assume that local people will continue to cooperate in maintaining and making a sustainable use of the projects.