

**EFFECTS AND CONSTRAINTS
OF
SOCIAL FORESTRY :
THE WEST BENGAL EXPERIENCE**

*Thesis submitted for the Degree of
Doctor of Philosophy in Arts (Economics)
of the University of North Bengal*

Satyanarayan Mandal, M. A.

December, 1995

STOCK TAKING-2011

ST - VALUE

Ref.

333.1750 25.11.11

120556

120556

035 MAR 1208

PREFACE

Forest resource has become a much talked of subject globally in general and in our country in particular. The relationship between man and nature has become intricately with the pace of economic development. Deforestation has touched a serious height. Forest resource of India was initially exploited by the British and after independence commercialisation for industrial interest and alienation of the local people have converted this resource into a common pool resource (CPR) problem. It has been converging to what Garrett Hardin calls "the tragedy of the commons". It is in this context that the Social Forestry (SF) programme has been initiated in the country. The objective is to overcome the tragedy through a sustainable use with people's participation. Government of West Bengal, has started this programme more than a decade ago. The basic objective of this study is to find out, on the basis of practical experience in West Bengal, whether the S.F. on private holdings and farm forestry, on common lands are economically and financially viable, whether the projects have achieved their main objectives, whether they will emerge as a new rural institution for greening our country, and what are their impacts and constraints.

The study is divided into six chapters. The first chapter is concerned with the vanishing forests, global concern and the extant literature. The second chapter deals with the present status of forest resources-causes and impacts of deforestation, forest policy and forest development of West Bengal Vis-a-Vis India. Conflicts and alternative claims on forest resources with their social and cultural acceptability have been analysed in Chapter three. The fourth Chapter deals with the analytical framework of CPR problems in the context of social forestry with its evolution, importance and role in economic development. The fifth chapter analyses the achievement and impact of social forest on rural economy based on micro studies. The sixth chapter comprises the issues and options, conclusion and lessons with some suggestion. At the end a glossary and the list of references are provided.

I am extremely grateful to Dr. Rabindra Nath Bhattacharya, Dept. of Economics, North Bengal University, who gave me the opportunity to do this work under his guidance and supervision.

I would like to express my gratitude to the following institutions: National Library, Calcutta; Centre for studies in Social Sciences, Calcutta; Departmental Library, West Bengal Forest Department, Calcutta; Departmental Library, Divisional Forest Office, Social Forestry, Siliguri; North Bengal University Library, Rajarammohanpur; United Nations Research Institute For Social Development, Palais des Nations, Switzerland; Forest Research Institute, Dehradun; Computer Centre, North Bengal University, Rajarammohanpur; College Library, Cooch Behar College, Cooch Behar; Ministry of Environment and Forest, Government of India, New Delhi; Centre for Himalayan studies, North Bengal University, Rajarammohanpur.

I am highly indebted to the following persons who helped me in various ways to complete my work: Mr. Kamal Nath, Minister, Ministry of Environment and Forest, Government of India, New Delhi; Mrs. Malini Bhattacharya, M.P.; Mr. Jiten Das, M.P.; Mr. Lama, D.F.O, Sukna, Darjeeling; Mr. Dipen Chakraborty, Ranger, Siliguri, Social Forestry Division; Mr. Dwijen Saha, Ranger, Bagdogra & Naxalbari, Social Forestry Division, Darjeeling; Mr. Manab Chakraborty, Extension worker, Phansidewa Beat, Bagdogra Range, Darjeeling; Mr. Moloy Mitra, Extension worker, Kharibari Beat, Darjeeling; Mr. Sukumar Das, Extension worker Cooch Behar (1), Cooch Behar Range, Cooch Behar; Mr. Dharendra Nath Roy, Extension worker, Tufanganj Beat, Cooch Behar Range, Cooch Behar; Mr. Krishna Chandra Mitra, Beat Officer, Tufanganj Beat, Cooch Behar; Mr. Ajoy Desarkar, Ranger, Social Forestry Division, Debibari, Cooch Behar; Mr. Shaktipada Dey, Ranger, Humgarh Range, Midnapur; Mr. Haradhan Dalui, Beat Officer, Amlasuli Beat, Midnapur; Mr. Baidyanath Roy, Ranger, Khatra Range, Bankura; Mr. N. K. Hudati, Ranger, Kashipur Range, Purulia; Mr. Narayan Chandra Paul, Beat Officer, Cooch behar II, Cooch Behar; Mr. Bhawani Shankar Pratihari, Add. D. F. O., Jalpaiguri Division; Mr. Ratan Chakraborty, Ranger, Sukna Forest Division, Darjeeling; Mr. M. P. Rai, Ranger, Monitoring Cell, Siliguri, Darjeeling; Mr. Basanta Mandal, Public Health Engineering, Siliguri; Mr. Subhas Chandra Paul, Programmer, Computer Centre, North Bengal University, Darjeeling; Mr. Abani Barik, Amlasuli; Mr. Sudhansu Chakraborty, Bansraya, Purulia; Mr. Swapan Bagchi, Librarian, Siliguri College; Dr. Chaturbhuj Kundu, Librarian, Siliguri College of Commerce.

I could complete this study with the help of a Teacher-

Fellowship for one year granted by the U.G.C. I am indebted to the U.G.C. I must express my debt to Sri Aurabinda Basu, Principal, Siliguri College, Dr. Shyamal Chakraborty, H.O.D. of Economics Siliguri College for their kind cooperation. I am grateful to my senior colleauge Mr. Samir Bhattacharya and his wife Mrs. Mandira Bhattacharya who inspired me from the very begining of the work and helped me to get sutdy materials from different sources. I am also grateful to my senior colleauge Dr. Sanjiban Dutta Roy, Dr. Ashok Kumar Sarkar and Dr. Nibedita Chakraborty, Dr. R. P. Sinha for their love, affection and inspiration.

My wife, Iva and our son Arkaparna freed me from various household responsibilities and provided emotional support and encouragement to complete this work. I remain extremely grateful to them.

Satyanarayan Mandal

Siliguri College

Satyanarayan Mandal

15th August, 1995

CHAPTERS

CHAPTER 1

Introduction

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

1.2 Vanishing Forests and Global Concern

1.3 Institution and Question of Sustainable Forest Resource

1.4 Objective to the Present Study And Its Conceptual Framework.

1.5 Extant Literature.

CHAPTER 2

Present Status of Forest Resource in West Bengal Vis-a-Vis India

2.1 Estimates of Forest Resource in West Bengal

2.2 Causes of Deforestation In West Bengal and Its Impact

2.3 Forest Policy And Forest Development

CHAPTER 3

Conflicting Claims on Forest Resource

3.1 Forest Characteristic And Forest Uses

3.2 Economic Interests And Conflicts Among Users

3.3 Social And Cultural Acceptability of Forest Uses

CHAPTER 4

Common Pool Resources And Its Analytics

4.1 Concepts And Definitions

4.2 Common Pool Resources in India

4.3 Problem of Common Pool Resources

4.4 Common Pool Resources And Rural Development

4.5 Analytical Aspects of Common Pool Resource Problem

4.6 Social Forestry: Origin, Evolution and Importance

4.7 Social Forestry as a vehicle of Rural Development

4.8 Working of the Social Forestry Schemes in West Bengal

CHAPTER 5

An Impact Analysis Based on Micro Studies

CHAPTER 6

6.1 Some Issues And Options

6.2 Lessons And Implications

ABBREVIATIONS

BCR	Benefit Cost Ratio
BJP	Bharatiya Janata Party
BLLRO	Block Land and Land Revenue Officer
CPR	Common Pool Resource
CPrR	Common Property Resource
CPM	Communist Party of India (Marxist)
FD	Forest Department
FPC	Forest Protection Committee
GOWB	Government of West Bengal
GP	Gram Panchayat
GO	Government Order
IRR	Internal Rate of Return
JFM	Joint Forest Management
LAMPS	Large Area Multipurpose Society
MS	Multiple Suit Cutting
NPV	Net Present Value
PPR	Private Property Resource
TSP	Tribal Sub-Plan

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, reeds 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 ecologists 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 reduced when deciduous trees are replaced by conifers and increased when forest is replaced by lower growing vegetation; (iv) Forests 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 landscape 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 deforestation¹ 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 Southeast Asia	5	192,900	83,200	69,700	1,300	-1.6
Insular Southeast 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 Philippines 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 compared 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 metaproceses are responsible or whether they seem to be indiscriminately lumped together with the micro-processes directly causing deforestation and the metaproceses 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-

ticated 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 pruning, 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 deforestation 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 (Barracough 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 pursuit 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 (Barracough 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.

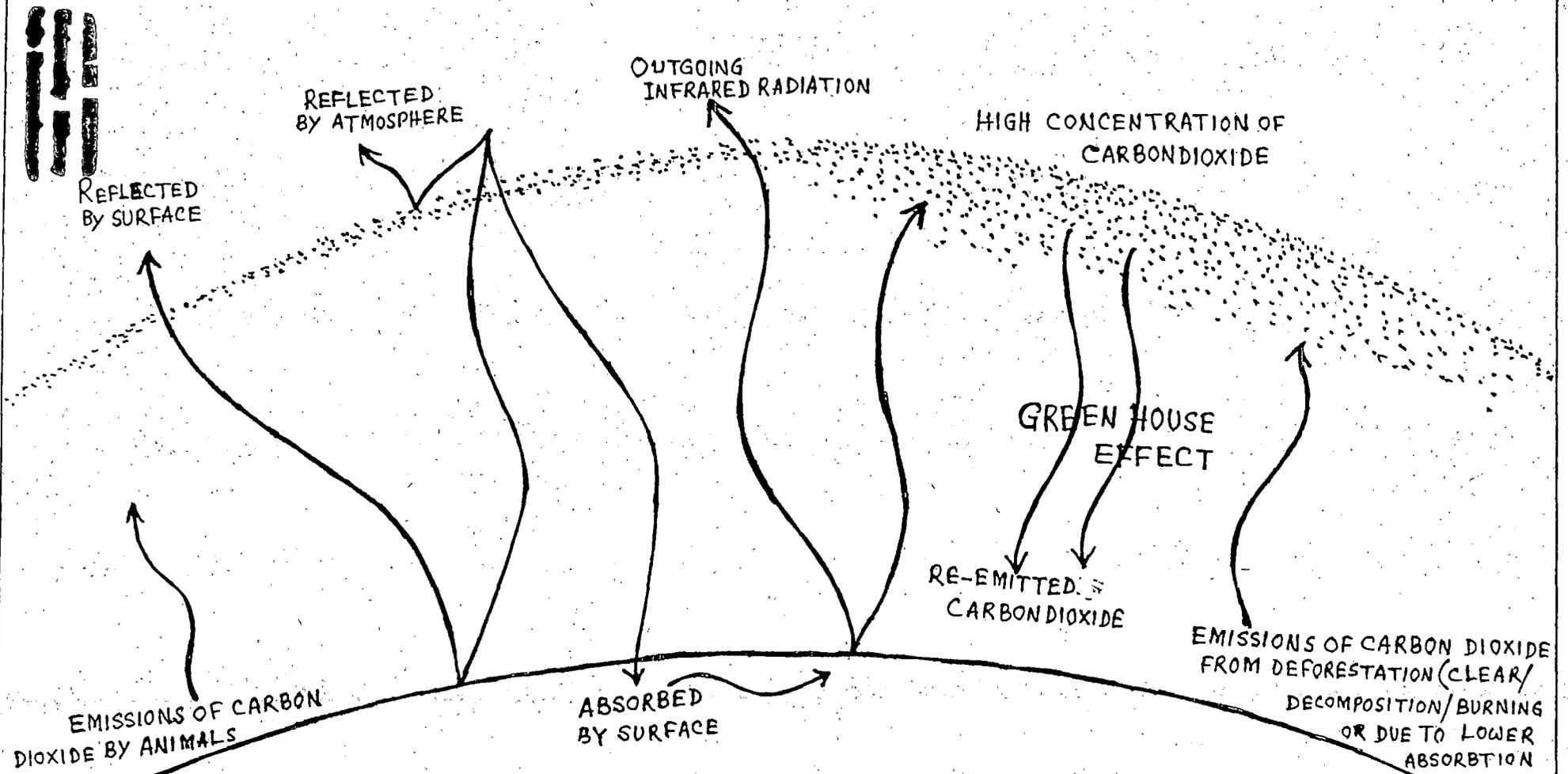
Wherever it may occur and whatever may be the cause the process of reckless destruction turned it into a global concern and it is high on the agenda for international and national discussions during the 1990s. Because what a nation does will affect not only her own future generations but also the generation 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, CH₄, N₂O, O₃ 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-

11-11-11

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



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

120556

Page 15

25 MAR 1998

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 severely 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) (Barracough 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" (Barracough 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 other words, 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 unworkable 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 has 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 margin 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 agroforestry 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 (Deweese, 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 pursued 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 consider 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 influence 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 social 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 Environment 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 fodder. 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 from the study of Muranjan (1987) that there is a good scope to solve the fuel problem in the State of Maharashtra 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 studies 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 explore 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.

CHAPTER 2

Present Status of Forest Resource in West Bengal VIS-a-VIS - India.

2.1 Estimates of Forest Resources in West Bengal.

The State of West-Bengal, one of the most densely populated States in the country, being located in the eastern region of India has a total geographical area of about 88,752 square Kilometers and supports a population of 6,79,82,732 (as per 1991 provisional census). The density of population is 766 per square Kilometers which is much higher than the national density. The forest area of the State is 11,879 square Kilometers which is only 13.4 percent of the total geographical area whereas for India as a whole it stands at 23.4 per cent. The per capita forest area is 0.02 hectare which is also very low compared to the All-India per capita forest area of 0.09 hectare. The statistical data for India and West Bengal are given in table 2.1.

TABLE 2.1 LAND DISTRIBUTION IN WEST BENGAL AND INDIA

Particulars	West Bengal	India
1. Total Geographical area (in sq. km., 1991)	88,752	32,87,263
2. Area Under Forest (in sq. km., 1989)	11,879	7,70,078
3. Percentage of Forest area to geographical area, (1980)	13.4	23.4
4. Population (1991)	6,79,82,732	84,39,30,861
5. Per capita Forest area (in Ha.)*	0.02	0.09
6. Density of Population (per sq. km.)	766	267

Source : 1) State Report on West Bengal Forests 1990-91, Government of West Bengal.

2) The State of Forest Report 1991, Government of India.

3) Census of India, 1991 (Provisional)

The distribution of forest area in West Bengal is very much uneven and even forests are unknown to a vast majority of the population of the State. In one extreme, area under forest in Darjeeling district is 45.57 per cent of the total geographical area whereas on the other extreme it is only 0.97 per cent

*The average per capita forest area in the State in 1991 worked out to about 0.01 hectare as compared to All-India average of 0.08 hectare (Singh, 1994).

in Cooch Behar and 10 districts out of the 16 districts of the State have a very low percentage of area under forest. Out of these 10, 7 districts have less than one per cent of geographical area under forests. Table 2.2 indicates the district-wise distribution of forest cover in the State of West Bengal.

TABLE 2.2 : DISTRICT WISE FOREST COVER ASSESSMENT FIGURES 1991 (Area in sq. kms)

Serial NO.	Districts	Geographical Area	Total Forest Cover	% of forest cover
1.	Bankura	6882	753	10.94
2.	Birbhum	4545		
3.	Bardhaman	7024		
4.	Calcutta	104		
5.	Hooghly	3149		
6.	Howrah	1467		
7.	Maldah	3733	3681	5.86
8.	Mednipur	14,081		
9.	Murshidabad	5324		
10.	Nadia	3927		
11.	24 Parganas	14136		
12.	West Dinajpur	5358		
13.	Cooch Behar	3387	33	0.97
14.	Darjeeling	3149	1435	45.57
15.	Jalpaiguri	6227	1537	24.68
16.	Purulia	6259	576	9.20
	Total West Bengal	88752	8015	9.03

Source : The State of Forest Report, 1991, Government of India.

In West Bengal, there is only one district (Darjeeling) which has more than 33 per cent forest cover and there is only one district (Jalpaiguri) which has forest cover between 19-33 per cent and rest of the 14 districts have forest cover 0.1 to 19 per cent only. But in India, there are 105 districts which have forest cover more than 33 per cent, 52 districts have forest cover between 19 to 33 per cent, 217 districts have forest cover ranging from 0.1 to 19 per cent and 39 districts do not have any discernible forests as it is shown in TABLE 2.3.

TABLE 2.3 : FOREST COVER DENSITY DISTRICTWISE

	No. of districts more than 33% forest cover	No. of districts forest cover between 19-33%	No. of districts forest cover 0.1-19%	No. of districts without forest	Total No. Districts
India	105	52	217	39	413
West Bengal	1	1	14	0	16

Source : The State of Forest Report 1991, Government of India.

It is interesting to note that there is a wide gap between recorded forest area and actual vegetation cover for both the State of West Bengal and India. TABLE 2.4 reveals the fact.

TABLE 2.4 : RECORDED FOREST AREA AND ACTUAL VEGETATION COVER COMPARATIVE Situation (Area in sq. kms.)

Particulars	West Bengal	India
1. Recorded Forest Area	11,879	7,70,078
2. Actual Vegetation (1991 Assessment),	8,015	6,39,182
3. Percentage (2 to 1)	67.60	82.92

Source : The State of Forest Report 1991, Government of India

Thus TABLE 2.1 shows that the percentage of forest area to geographical area is 13.4 percent and 23.4 percent for the West Bengal and India respectively. However, it is not the reality, actual vegetation cover is much less and is shown in TABLE 2.5.

TABLE 2.5 : ACTUAL VEGETATION COVER 1991 ASSESSMENT.

	Geographical area	Actual Forest Cover assessed based on 1987-89 imagery	Actual Forest cover as % of Geographical area
India	32,87263	6,39,182	19.44
West Bengal	88,752	8015	9.0

Source : The State of Forest Report 1991, Government of India.

India placed her in the 9th position regarding forest area in the world as it is shown in TABLE 2.6.

TABLE 2.6 : FIRST TEN IN THE WORLD

Serial No.	Country	Forest Area (million hactares)
1.	U.S.S.R.	929
2.	Brazil	553
3.	Canada	436
4.	U.S.A.	298
5.	Zaire	178
6.	China	170
7.	Indonesia	126
8.	Australia	107
9.	India	78
10.	Peru	72

Source : State Report on West Bengal Forests 1990-91, Government of West Bengal.

In India there are different types of forests. They are broadly classified as Moist Tropical Forests, ^{Dry deciduous Forest,} Mountain Sub-Tropical Forest, Mountain Temperate Forests, Sub-Alpine Forest, Alpine Scrub (Champion and Seth, 1968). Forests of West Bengal are of different types. Moist Tropical Forests are found mainly in the Darjeeling, Jalpaiguri, 24 Paraganas and cooch Behar districts. Dry deciduous Forest are generally found in Midnapur, Bankura, Purulia, Bribhum and Burdwan. Forest types of India and West Bengal is shown in TABLE 2.7. Regionwise, as they exist now, the forests of West Bengal may be classified as: the Northern Montane and sub-Montane; the Gangetic delta; and the laterite tract in South-West-Bengal.

There are various species found in forests of West Bengal. Shorea robusta is the principal species (mainly of capping origin found in the laterite forests of South-West Bengal). Other important species are Pterocarpus marsupium, Diospyros melanoxylon, Madhuca longifoliavar latifolia, Terminalia alata, Terminalia belerica, Terminalia arjuna, Butea monosperma.

It is significant to note that about 4 billion hectares of the total terrestrial land mass is under forests, roughly half of it under tropical forests and of the remainder, temperate and broad-leaved forests account for one-third and two-thirds respectively (Soni et. al., 1992).

According to the World Resource Institute, India has a total forest area of 64.20 million hectare of which 36.54 million hectare is closed forest and the remaining 27.66 million hectare is open forest (W.R.I, 1990).

TABLE 2.7 FOREST TYPES (Area in Million Hectares)

Tropical evergr- een forests	Tropical semi eve- green forests	Tropical moist deciduous forests	Littoral swamp forests	Tropical dry deciduous forests	Tropical thorn forests	Tropical dry evergreen forest	Subtropical broad leaved hill forest	Subtropical pine forests	Subtropical dry ever green forests	Mountains wet tempe- rate forest	Himalayan moist temperate forest	Himalyan dry tempe- rate forest	Subalpine moistalpine dryalpine scrub	Total
Ind. 3.845	1.832	23.245	0.671	29.149	5.236	0.075	0.287	3.740	0.173	0.613	2.725	0.227	1.790	74.608
W.B. -	-	0.459	0.279	0.430	-	-	0.005	-	-	0.005	-	-	0.005	1.18

Ind.=India, W.B.=West Bengal

From the economic point of view Composition of forest is very important. By Composition forest may be classified as coniferous (or soft wood) and non-coniferous (or broad leaved). In the State of West Bengal, forests are under non-coniferous (or broad leaved) category. Stistically it is 11,879 square kilometres (India's Forests, 1987).

On the basis of legal status forestry may be classified as i) Reserved, ii) Protected, iii) Unclassed forests. In West Bengal the total non-coniferous forests (11,879 sq.kms) are divided into i) 7054 sq. kms. as Reserved, ii) 3772 sq. kms. as Protected forests, iii) 1053 sq. kms. as Unclassed forests (The State of Forest Report 1991). TABLE 2.8 Shows the Classification of forest area by Status.

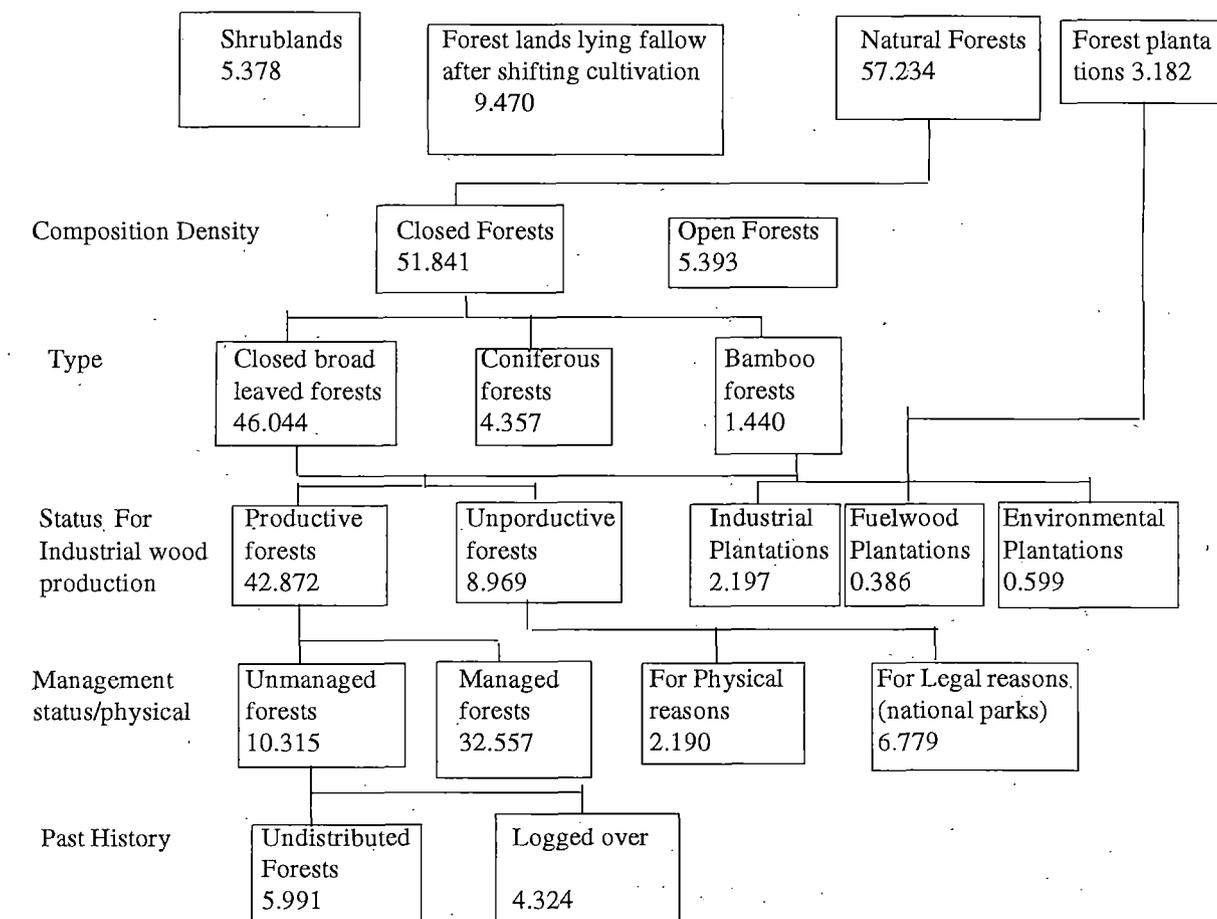
TABLE 2.8 : Classification of Forest Area By Status in West Bengal

	Reserved Forests	Protected Forests	Unclassed State forestand others	Total
1.Area (in sq. kms.)	7054	3772	1053	11,879
2. % of total	59%	32%	9%	100%

Source : State Report on West Bengal Forests 1990-91, office of the Principal chief Conservator of Forests, Government of West Bengal.

Figure 2.1 : STATUS OF FORESTS IN INDIA IN 1980 (in million hectores)

Total forest area : 75.268 million hectares



Source : The State of India's Environment 1984-85,

The Second citizens' Report

Centre for Science and Environment.

It may also be classified in terms of exploitability where 7743 sq. kms are potentially exploitable and 4136 sq. kms. fall under other categories out of 11,879 sq. kms. (India's Forest, 1987).

The Status of forests in India, which may provide a better background (though an old one), can be shown schematically as above (Fig. 2.1)

At present, land utilisation position in West Bengal is shown in Table 2.9

TABLE 2.9 : Land Utilisation Percentage in West Bengal (1988-89)

1. Net area sown	60.3%
2. Current fallows	4.5%
3. Area Under forests	13.4%
4. Area not available for cultivation	19.4%
5. Other cultivated lands excluding current fallows	2.4%
Total	100%

Source : Economic Review 1990-91

Bureau of Applied Economics and Statistics,

Government of West Bengal.

2.2 Causes of Deforestation in West Bengal and Its Impact.

Even after recognising the importance of forests in day to day life, man himself has been the worst enemy of forests. The forests in West Bengal had a complex and chequered history, but suffered a widespread trespass and disintegration. According to the views expressed by experts, a state should maintain a forest area, covering not less than 25% of its total area. The State, taking all sorts of forests in view, has barely 9 percent of its total area under forest cover (GOWB, 1991). Large scale deforestation, mainly in the private forest holding, continued for few decades before the take over by the Government (West Bengal Estates Acquisition Act, 1953), for the last time the owners availed themselves of the chance of exploiting the forests as much as they could being threatened by the fear of expropriation. It is apprehended that, actually, within that very short period of time, the State lost forest wealth to an extent that would require quite a long time to get back. However, large scale deforestation in West Bengal has been due to the following facts :

i) Population Pressure : The State of West Bengal suffered

from high population pressure. Density of population is 766 per sq. km.¹. Mingled with poverty it led to an encroachment on forest land, even mountain slopes are being cleared up to make room for agriculture violating the tenets of land-use planning and capability (Chakraborty, 1991). The extent of forest area under encroachment in the State is about 17,907.56 hectares (GOWB, 1991).

ii) Diversion of forest land : Diversion to alternative uses of forest lands took place due to requirements of land for development projects like water reservoirs industrial estates, roads, airstrips, railway, tracks, army cantonments and the like. Forest land diverted over the period 1981-89 is shown in the following table 2.10:

TABLE 2.10 : Forest Land Diverted over the period 1981-89

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	Total
Forest area diverted (hectares)	29.74	617.69	15.325	13.309	-	329.766	16.702	18.905	81.50	1122.957

Source : State Report on West Bengal Forests 1990-91, Office of the Principal Chief conservator of Forests, West Bengal, Calcutta.

This amount of forest land had been deforested even after the enactment of forest conservation Act, 1980. During the period from 1951 to 1976, West Bengal has lost forest areas to the extent of 3245 square kilometres. This is shown in the following table 2.11 :

TABLE 2.11 : Loss of Forest Areas from 1951 to 1976 (sq. kms.)

Purpose Forest	Area
1. River Valley Project	17
2. Agriculture	3137
3. Construction of Roads	26
4. Industries	29
5. Miscellaneous	36
Total	3245

Source : Forest Statistics, 1984. Government of West Bengal, Calcutta.

iii) Over exploitation : Over exploitation occurred for industrial raw materials, railway sleepers, timber for naval

In this connection it may be noted that with less than 2 percent of the total forest area of the world, India supports 15 percent of the world's population (Khullar, P., 1992, Indian Forester, Vo. 118, No. 10)

stores, military equipment and for arms and non-industrial uses. Annual consumption of industrial wood is estimated to reach 3.159 million m³ by the turn of the Century.

iv) Grazing : Increase in human population in an agrarian economy like India leads to increase in Cattle population. These animals indiscriminately graze all over the forest land. Particularly, sheeps and goats are reared by poor because of low investment requirements, their speedy multiplicity, high-feed conversion efficiency and quick pay-off. These are an important (sometimes only) source of income for the rural poor. Table 2.12 reveals the precarious situation of live-stock which is considered to be far in excess of the carrying capacity of the land area of West Bengal. As per livestock census 1984, the total number of livestock is 16.78 millions i.e. in other words, 4 cattle per head (according to 1991 census population) and 189 heads of cattle per square kilo metre of the geographical area of the State. Number of unauthorised grazing in the State for the year 1990-91 is 1072 (GOWB, 1991).

TABLE 2.12 : CATTLE POPULATION IN WEST BENGAL 1984 (in million)

Cattle	Buffalo	Total
15.80	0.98	16.78

Source : Livestock census 1984, Department of Animal Husbandry Government of West Bengal, March, 1988.

v) Insects, Pests and Fire : Insects, pests and fire also had thier role in destructing forests in West Bengal.

vi) Energy needs : Energy requirement is another cause of denudation of forest cover in West Bengal. About 70 percent of the people in rural areas of the developing countries like India still depend on the cheap source of energy [i.e. woodfuel consuming about 700 kgs. of dry fuelwood per person annually.] The annual consumption of fuelwood in West Bengal is 12.210 million tonnes and among the consumption of different fuels fuelwood constitute 41.97 percent (GOWB, 1991). In West Bengal, short-run remunerative exploitation of forests, mainly for firewood, contribute to a great extent in this respect. Many poor people of the adjacent areas of forest, indiscriminately cut trees inorder to earn a living from the sale of firewood and also for selfconsumption.

vii) Rural Poverty : In spite of sustained efforts over

the last four decades to eradicate poverty the incidence of poverty in the country is high. In 1977-78, about 48 per cent of the people had been living below the poverty line and in the rural areas the percentage had been still higher at about 51 percent (GOI, 1984). Such population includes mainly landless labourers, small and marginal farmers, rural artisans, scheduled caste and tribes. These people have either no asset or asset with low productivity, few relevant skills and no regular full time job or very lowly paid jobs (Bhatia, 1988). The persistence of rural poverty in rural West Bengal exerted pressure on forests due to the fact that felling of trees has become an attractive source of income without any investment as the price of fuelwood is rising day by day. In many cases they are financed and otherwise protected by unscrupulous middlemen or contractors whose profit margin is quite high. Again, the persistence of poverty has reduced the opportunity cost of labour (Mellor, 1988). In the rural areas of West Bengal the actual wages are significantly lower than minimum wages fixed by the Government. Under such circumstances, they are easy to be exploited as a cheaper source of labour for the contractors who employ them for illegal felling of trees in the forests. The number of illegal felling will reveal the seriousness of the fact. According to West Bengal Forest Statistics total number of illegal felling in one year (1990-91) was 14210 (GOWB, 1991). It is a tragedy that 0.75 square kilometres of forests in West Bengal is being denuded every minute and if things go unchallenged or unresisted, the entire forest will vanish in another twenty years (Banabithi, 1988).

viii) Political and Administrative will : Above all, a serious and potentially dangerous cause of wide spread deforestation, in the State has been the prolonged lack of political and administrative will to protect the forests.¹

ix) Commercialisation : Commercialisation of major and minor forest products through private contractors is held to be a significant cause of deforestation in India. Private contractors, guided by short-run profit motive, carried out their

The classic example of political and administrative corruption is the recent scandal (though not in West Bengal) in Karnataka where more than 200000 cubic meters of timber, worth Rupees 600 crores, are said to have been illegally created away in Kodagu in 1993 (The Statesman, June 22, 1994).

operation of 'deforestation' with active aid and connivance of the forest department, particularly the lower level functionaries (Singh, K 1994); Guha R. 1983; P.U.D.R, 1982; GOI, 1988; Gadgil, 1991). This is ipso-facto applicable to the State of West Bengal too.

x) Nationalisation : Nationalisation of forests weakened the traditional forest conservation and management system under which the local communities protected their forest resources against exploitation by outsiders. After nationalisation they have no legal right to do so, tending to view the forests as Government property (to be used as a free access resource) rather than their own and thus hastening the process of deforestation (Singh, K, 1994; mitra, A., 1953; Gadgil and Guha, 1992)

As already mentioned, it is widely accepted view that deforestation have many adverse ecological and social impacts. Many species of forest plants and fauna become extinct or are endangered with the destruction of their forest habitats. This diminishes the State's gene-pool which is invaluable for humanity's future. For example, *Diospyros melanoxylon* (Kend) and *Madhuca latifolia* (Mahua) have become almost extinct and major faunal species are endangered with only some hares and kinds of avifauna are to be found fighting for their survival in the laterite tracts of South-West Bengal. Deforestation jeopardises the natural process of food-chain. As a result Royal-Bengal Tiger and Wild-Elephants are coming off and on into human habitats in search of foods.

Absence of forest resource has direct and adverse impact on agriculture. It lowers the productivity of land and makes yields more vulnerable or sensitive to variation in rainfall. Scanty, unusual rainfall and draughts in various parts of the State is considered to be, according to some authorities, the consequence of high rate of deforestation. It leads to fodder scarcities due to loss of soil cover and depletion of soil-moisture. It creates bare and barren land locally known as 'danga'. Drinking water become scarce as deforestation lowers the water-table due to low run-off and insufficient percolation of water. Erosion of soil is also rampant in the State, mainly in the lateritic belt and Sundarban delta. Soil run off is excessive due to bare and sloping lands. Incidence of landslide is also on the rise in the hills of North Bengal. The lives of our dams, canals, and rivers have been jeopardised by

heavy siltation. Floods are occurring in the State due to deforestation in Himalyan head waters of the drainage basins (Rieger, 1976)

Deforestation leads to fuelwood crisis and adversely affects the livelihood of rural poor, particularly women and children who have to procure these things. It is also associated with low wage rate and high incidence of rural poverty. Many rural communities who are living in the vicinity of forests suffer most because forest serve as a kind of 'food bank' to them. Various types of fruits, nuts, leaves, roots, shoots are periodically collected and various types of birds, animals and insects are hunted and consumed by these peoples to supplement their nutrition and health. In West Bengal, for example, mahua (fruits and flowers), Kend (fruits) Valai (Fruits), Kazu (Thalamass), Wild kundri (Fruits), Mushroom, Gurur (Bird), Hare (Animal) etc. are very popular source of food from forest. Similarly, forest is an important source of income and employment to them as they have to supplement their subsistence requirements (in lean period) by engaging themselves in activities related to processing, gathering and selling of forest products (FAO, 1989a).

Deforestation leads not only to deterioration in natural environment but also adversely affects the cultural environment of different social groups. Particularly, the cultural heritage of the tribals suffers the most. For example, in South-West Bengal 'Shikar Utsab' (hunting festival) of once forested Ayodhya hill has lost its past glory among the tribal communities. Similarly, life support systems for many other social groups have become increasingly disrupted in the process. (Barraclough and Ghimire, 1990).

2.3 Forest Policy and Forest Development.

Development, conservation and utilisation of any resource depends, to a large extent, upon the policy followed by the State for the purpose. Forest is an unique and vital renewable natural resource. Debates and controversies surround the forest policies enacted by the government of India from time to time. In the early days of British rule, by and large, the British followed a laissez-faire policy regarding forest resource of the country. Upto the middle of nineteenth century, the Raj let loose a "fierce onslaught on India's forests" (Smythies,

1925). They followed such rule primarily for an uninterrupted supply of the teak export trade, supply of the sleepers for the railway network in the country, supply of suitable timber for Royal Navy, supply of shipbuilding timbers etc. on the one hand and to increase revenue on the other. In order to augment revenue "The whole policy of the time was to extend agriculture and the watchword of the time was to destroy the forests with this end in view" (Ribbentrop, 1900; Stebbing, 1926).

A policy shift came in the form of a policy document issued in 1855, known as the charter of Indian Forestry. Important and conflicting features of this policy were to assert State proprietary rights in the one hand and the obligations in the form of privileges and concessions to the local people to be exercised at the mercy of the rulers on the other. The first Forest Act was enacted in 1865, shortly after the forest department was formed, mainly to facilitate the supply of timber smoothly.

In 1874, all the provisions of the 1865 Act, except the one pertaining to arrest, was revised and a new Act was enacted in 1878. The main aim of 1878 Forest Act was to assert the absolute control and ownership right of the State, while at the same time retaining enough flexibility to deal with the diverse socio-political circumstances in which different State Forests were to be managed. Customary 'right' of the villagers over forest resources was replaced by 'privilege' which could be exercised at the mercy of the officer.

The first important shift in forest land use policy came mainly due to exorbitant exploitation of tenants by zamindars and jaigirdars¹, deindustrialisation of small and Cottage industries, great famine of 1876-78, devaluation of currency etc. On the basis of Dr. Voelcker's report (1893) Government of India declared a new forest policy, known as Indian Forest Policy 1894, where claims of cultivation were stronger than the claims of forest conservation (GoI, 1894). The "Carrot and Stick" approach was called for by the 1894 forest policy which had given rise to serious discontent among the agricultural classes. The 1911 Gazetteer report also support the fact. "The forest department instituted in 1855, concentrated its energies

Zamindars & Jaigirdars - The authorised revenue collectors, holding different ranks bestowed on them by the emperor (Mughals)

on the collection of forest revenue without making any attempt at systematic conservancy. It was in fact nothing but a revenue collecting agency" (Walton, 1911).

Another policy shift occurred in 1921 when the management of forests became vested in the State Governments, while the implementation of Government of India Act 1935 resulted in forests becoming completely vested in the provinces (Sharma et. al., 1990). However, upto 1947, the forest policy of British India was formulated and guided by the imperial interest only, though there was a provision to constitute village forests in reserved forests (rarely exercised in practice) in the Indian.

After independence, control over forest was vested in the Indian State but the colonial institutional framework for forest management did not change materially (Singh, 1994). Where the colonialism collapsed, the slogan of economic development stepped in (Shiva, 1991). Between 1854 and 1952, that is roughly 100 years before independence, forest areas come down from 40 percent to 22 percent of the land area, at the annual rate of about 0.2 per cent (Datt & Sundharam, 1992). After independence, realising the necessity of developing forests, Government of India declared its forest policy in 1952 with some conflicting objectives viz., the people's need for minor forest produce, the industries demand for raw materials, the States' demand for revenue, without assigning any clear priority to them. The traditional 'rights and privileges' in the Resolution of 1894 became 'right and concessions' in the Resolution of 1952 and in actual practice it was regarded only as 'concessions' at the mercy of the forest officials (Kulkarni, 1989). Industry's demand for raw materials and States' demand for revenue took precedence over all other demands. The forest bureaucracy took the opportunity to gratify their own pocket at the cost of national interest through permitting illegal felling of trees. According to Gadgil (1992) in India the forest management practices are largely shaped and administered by a tightly knit bureaucracy, which claims to manage the forest wealth in the broad national interest on a scientific basis. But the national interest is equated to the short-term commercial interests of a narrow segment of Indian Society-the omnivores.

In the changed circumstances Government revised and shifted its policy from 'uneconomic' and 'conservation-oriented' approach to 'economic' and 'production forestry'. This signifi-

cant departure has been supported by the National Commission on Agriculture (N.C.A, 1976). Another significant shift in the post colonial forest policy is evident from its recommendation that the country should make better use of its forest resources by exporting wood and wood products to generate foreign exchange (USAID, 1970). In this context it may be pointed out that NCA recommended intensive development of minor forest product (MFP) noting with satisfaction that it was "already a fairly good net foreign exchange earner" (N.C.A, 1976).

Taking the advantage of the policy, the private contractors and industrialists, made enormous profit out of MFP trade and logging timber operation. Government policy documents and official reports have repeatedly pointed out these facts and different committees were appointed. Quite surprisingly they did not "envisage the need for any changes in the wording of the existing (1952) forest policy" (G.O.I., 1967). As a result, between 1952 and 1988 i.e. only in 36 years, our country witnessed an interesting result-forest cover has been reduced to 12 percent instead of being raised to target of 33 percent of the total geographical area (Datt and Sundharam, 1992).

Due to the inadequacies of the earlier forest policies, the Government of India introduced a new forest policy in 1988. However, it did not depart much from the acts of 1927 and 1952. The notable feature of this policy is that it tried to solve the alienation problem of the earlier policies and recognised the symbiotic relationship between the tribal people and forest, and attempted to protect the interests of the communities living within and around the forests. This new policy tried to get rid of the trap of industrialists and contractors, the twin blade of deforestation. This policy, for the first time, recognised, the conversion of forest land to non-forest uses as cognisable offence. During 1951 to 1983, the official diversion of forest lands to non-forest uses (mainly agriculture) resulted in a loss of 4.3429 million hectares and more than 25 million hectares of tree crops, groves and culturable wastelands have been cleared and brought under plough during the last 30 years (Anon, 1984; Tiwari, 1985).

According to some critics this new forest policy of 1988 is also bound to fail to resolve the inherent contradiction between the three interested parties namely, the people, the forest-based industries and the State. To them, the draft new forest act which is going to be called as "The conservation of

Forests and Natural Ecosystem Act" and proposed by our government is found to be more dangerous than the previous colonial forest law. Because, it again favoured the wildlife conservationist (urban upper and middle class, ex-hunters), 'scientific forester (corrupt foresters)' and 'industrialist (timber harvesters through captive plantations)' and denied the traditional communities' rights and people's participation. The ecological focus combined with a more traditional emphasis on State control over forest areas is the only distinctive feature of this draft. "In some respects this draft act uses 'environmental protection' as a cover or excuse to further deny the rights of local communities" (Guha, 1994). The proposed act is still strongly oriented, towards centralisation, the consolidation of the powers of government at the expense of the ordinary citizens. We may point out at least two possible reasons:

i) There are some forest officers, naturalists, anthropologists and researchers in different government bodies and organisations, who are unaware of a rural poor's love for forest rather aware of the money (mainly foreign aid flowing to the sector),.

ii) The General Agreement on Trade and Tariff (GATT) in which our Government is a party also played a role in shaping the fate of the current Indian Forest Policy. Because 'Eligibility for payments under environmental programmes shall be determined as part of a clearly defined government environmental or conservation programme and be dependent on the fulfilment of specific conditions under the government programme, including conditions related to production methods or inputs (GATT, 1994). Thus to frame and enact a good forest policy for forest development where forest resource can be used in an equitable and sustainable manner we have to perceive and accomodate the conflicting demands on the forest resource.

CHAPTER 3

CONFLICTING CLAIMS ON FOREST RESOURCE.

3.1 Forest Characteristics and Forest Uses.

Forests are an important renewable natural resource and contribute significantly to the economic development of rural people. Forestry activities are highly important in local, rural areas as it provide food fodder, fuel, fibre etc. to them. In general forests have many distinctive characteristics subject to one or more different major types of use. However, from a purely economic stand point the major characteristics of forests may be grouped under four heading (Clawson, 1975) : Land, timber stand, annual growth, and annual harvest.

LAND : Land is essential for forests upon which it grows. Forest lands differ greatly depending upon the topography or slope fertility, geological origin, soiltype, exposure, climate and other features. Growth of tree, in turn depends on these factors.

TIMBER STAND : Timber stand refers to the standing trees upon the forest land at present. Timber stand varies from species to species, tree to tree and depends on age, size, degree of defect, rate of growth, insect or disease infestation and in other respects. Standing timber is classified as sawtimber or as growing stock. Timber volume is measured in cubic meters or cubic feet.

ANNUAL GROWTH : The third major characteristic is annual growth of the forest. Annual growth of tree varies from tree to tree depending upon the quality of soil, weather, space etc. Volume of growth per tree is partly a function of the age of the tree as well as a function of the site characteristics. Thinning, pruning, tending, weeding, poisoning and space influence the annual growth of tree. Appropriate weeding with reasonable space may increase the rate of growth of tree. Prompt regeneration of forest site after harvest, adequate restocking for stems, planting of genetically superior strains, fertilisation also are important factors in determining the rate of growth of tree.

ANNUAL HARVEST : Annual harvest is the fourth major characteristic of forests. In any particular forest usually

harvest of wood do not occur annually. It has a gestation period ranging from a minimum of 5 or 10 to 100 or more years. Since forests are in remote places, it is quite unworthy and uneconomic to harvest a small volume of timber. In the territorial forest land, forest department harvests wood annually part by part and replants at the same time for the same size in a cyclical order. There are various problems in annual harvest. There is the problem of soil erosion, stream pollution etc. In the long-run wood harvest can not exceed wood growth.

Forest has immense use in the life of a country. However, we may grouped them under the following categories as it is done by Clawson (1975) : i) maintenance of an attractive forest environment, ii) provision of opportunity for outdoor recreation, iii) provision for wildlife, iv) provision for natural watershed, v) provision for general conservation vi) production of timber for various uses, vii) provision of opportunity for a wilderness experience.

FOREST ENVIRONMENT : People of the country like to visit and see forest. Most people expect that there should be a good forest which would be attractive in appearance. It is interesting to note that these people of the country feel that they have a right to have a good forest though they do not pay attention or bear cost for maintaining the forest in attractive appearance. These forest lovers do often object against clear-cutting or harvesting of timbers. This use of the forest is in many ways illusive and difficult to measure.

OUTDOOR RECREATION : Another important use of forest is outdoor recreation. This activity is increasing day by day. Local Governments are also becoming conscious about creating the avenues for board and lodging in the forest areas of the country. For the tribals recreation in forest is a part of their culture and heritage.

WILDLIFE : Forests harbour many types of animals, birds, and insects. Forest is required for their food, shelter, breeding grounds and for other aspects of their life cycle.

NATURAL WATERSHED : Forest acts as a good watershed. It helps to break the force of heavy rain and keep erosion to a minimum. It helps to control water runoff by means of rainfall interception and transpiration. However, man can affect this use of forest to some extent.

TABLE 3.1 Physical Interrelations of Forest characteristics and Forest Uses
Forest characteristic

Forest Use	Land Area	Timber Stand Volume	Annual Growth	Annual Harvest
Attractive Environment	Essential	Modest Stand attractive; most productive stand not required	Not very Important	Generally inimical but careful planning and operation may reduce impact greatly and may enhance appearance in some instances.
Recreation opportunity	Essential	Moderate importance open stand often more attractive than full stand	Limited value	Possible under carefully controlled conditions and on rotation; enhances recreation opportunity in some instances.
Wilderness	Essential	Volume at natural maximum but actual volume unimportant	Unimportant	Unacceptable : destroys basic value of experience
Wildlife	Essential	Kind and numbers of wildlife responsive to stand characteristic	Limited importance	Acceptable under proper controls; desirable for some species.
Natural Watershed	Essential	Importance to have good cover but timber volume of limited importance	Relatively unimportant	Acceptable under proper controls
General conservation	Essential	Helpful to have good cover	Relatively Unimportant	Acceptable under proper controls
Wood Production	Essential	Thrifty growing stand essential; too small or too large volume reduces growth possibilities	Critical for longrun rate of harvest, but growth rate also dependent upon harvest	Critical both for use of wood and forests further growth

Source : Marion Clawson, 'Forests for whom and for what? (1975)

GENERAL CONSERVATION : General conservation refers not to a particular 'use' of the forest but to an important component of all other uses. It has to remain attractive for recreation, productive for tree growth and so on. It is essential that the soil or other parts of the total ecosystem be preserved from severe damage. Any use of the forest has some impact on its ecosystem. Therefore, the essential consideration in general conservation is not the severity of the impact caused by man but the extent to which it is irreversible or the extent to which the ecosystem can heal itself and over what time the healing process will extend.

WILDERNESS EXPERIENCE : It is a special form of outdoor recreation. There are some problems in managing or maintaining the wilderness use of a forest. However, it may be curtailed if

required.

PRODUCTION OF WOOD FOR VARIOUS USES : Wood production is the main purpose and objective of most management of the forests . Wood is an extremely valuable and versatile raw material . Wood has been, and is, used for a wide variety of uses like plywood, pulpwood, paper, fibreboards, or particle boards, plumber lumber, construction pole and even adhesive.

The numerous and complex relationship between the forest characteristics and the forest uses are explained by Clawson (1975) in a tabular form which is shown in previous page.

The relationships among different forest uses are mostly conflicting. If one use is satisfied then another use has to be given up in some instances and in some instances two or more uses can be satisfied at the same time. For example, recreation is very much compatible with wildlife, watershed etc. Again wood production is incompatible with watershed. Degree of compatibility differs for different uses of the forest. The relationships among different uses has been explained by clawson (1975) as it is shown in the TABLE 3.2 :

According to some who are interested in forest management and uses, "multiple use is good, dominant use is bad and single use is anathema". But whether the proposition is true or not, depends on the meaning of the term 'multiple use', 'dominant use', and 'single use'

If 'multiple use' refers to mean that every possible forest use should occur on every acre of forest land at the same time, then 'multiple use' is quite impossible, has never existed in the past, does not exist today and will never exist in the future. If it refers to mean that every possible use should occur on different acres of forest land and at different time period then multiple use is good.

If 'dominant use' refers to mean that some use of the forest, completely dominates, ignoring or neglecting or suppressing other uses, then 'dominant use' is bad. But if it refers to mean that one particular use of the forest is primary and other uses can be adjusted to it then 'dominant use' is good. If 'single use' refers to mean that for one use and only one use forest will be used and other uses will be excluded then single use is impossible. By neglect or in opposition there must be more than one use in each forest land. Therefore,

TABLE 3.2 Degree of Physical Compatibility of Secondary with Primary Forest uses.

Primary use	Secondary use						
	Attractive environment	Recreation opportunity	Wilderness	Wildlife	Natural watershed	General conservation	Wood production and harvest
Maintain attractive environment		Moderately compatible; may limit intensity of use	Not inimical to wilderness but does not insure	Compatible to most wildlife, less so to a few	Fully compatible	Fully compatible	Limited compatibility; often affects amount of harvest
Provide recreation opportunity	Moderately compatible unless use intensity excessive		Incompatible; would destroy wilderness character	Incompatible for some kinds; others can tolerate	Moderately compatible; depends on intensity of recreation use	Moderately compatible; incompatible if use too heavy	Limited compatibility depends on harvest timing and intensity; roads provide access
Wilderness	Fully compatible	Completely incompatible, can't tolerate heavy use		Highly compatible to much wildlife, less so to others	Fully compatible	Fully compatible	Completely incompatible, precludes all harvest
Wildlife	Generally compatible	Limited compatibility; use intensity must be limited	Mostly compatible though some wildlife require vegetative manipulation		Generally fully compatible	Generally fully compatible	Generally compatible but may require limiting volume or conditions of harvest
Natural watershed	Fully compatible	Moderate compatibility; may require limitation on intensity	Not inimical to wilderness but does not insure	Generally compatible		Fully compatible	Moderate compatibility; restricts harvest methods but does not prevent timber harvest
General Conservation	Fully compatible	Moderately compatible; if use not excessive	Not inimical to wilderness but does not insure	Generally compatible	Fully compatible		Compatible but requires modifications in methods of timber harvest
Wood production and harvest	Compatible if harvest methods strictly controlled	Moderately compatible	Completely incompatible; would destroy wilderness	Compatible if harvest methods fully controlled	Compatible if harvest methods fully controlled	Compatible if harvest methods fully controlled	

it is clear from the above discussion that for policy decisions degree of compatibility and non-compatibility of different forest uses is more useful.

3.2 ECONOMIC INTERESTS AND CONFLICTS AMONG USERS

In less developed countries in many situations, forest is a common pool natural resource in the sense that it is accessible to and jointly used by people living in the community. In a society there are different interest groups who perceive forest resource in different ways as forest can perform diverse functions. The pattern of utilisation of forest absolutely depends on the way it is perceived by the different groups. For example, a forest has the basic economic function of soil and water conservation for subsistence farmers, energy and food supply for forest dwellers etc. Again the same forest has the only function of being the source of raw materials for industries, the source of recreation for tourist etc. Thus as forests play multifunctional roles, it must have conflicting uses. However, the conflicting demands for forest resource may be classified into three fundamental economies (Shiva, 1991) :

- i) Nature's economy of essential ecological process.
- ii) The Survival economy of basic needs satisfaction of the people.
- iii) The market economy of industrial-commercial demands.

Nature's economy of essential ecological processes creates demand on forests in terms of the maintenance of the stability of soil systems and the hydrological balance of the forest ecosystems. The survival economy of basic needs satisfaction of the people creates demand on forests in terms of fuelwood, fodder, fruits, lops and tops etc. And the market economy of industrial-commercial demands creates demand on forest for pulpwood, plywood, furniture, fuelwood for urban market etc. These three diverse economies, with their diverse demands, lead to conflict over forest resources.

Initially, in India there were no major conflicts on forest resources. The nature's economy and survival economy have always been satisfied simultaneously. People used it and managed it with justice and efficiently on a sustainable basis by an informal but strict code of conduct towards forest. Human settlements in India developed as an integral part of the forest ecosystem and not at the cost of it. But conflicts over

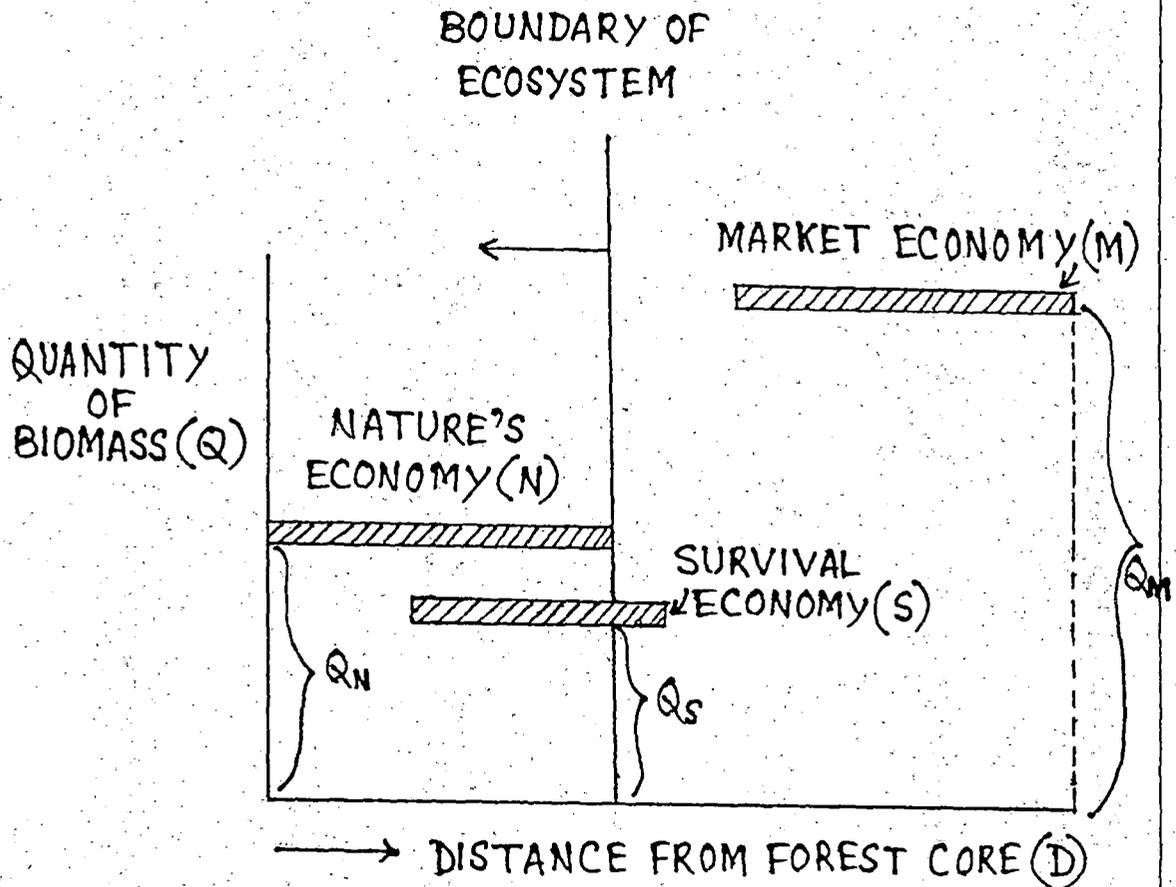
forests emerged with the introduction of large-scale commercial exploitation of forests by the British as the colonial rule of British intentionally ignored the demands of 'Nature's Economy' and 'Survival economy' (Campbell, 1992; Shiva, 1991). British rule systematically transformed the forest resources into commodities for generating profits and growth of revenues. Thus the first radical change in forest control and the emergence of major conflicts over forest resources induced by non-local factors was associated with colonial domination of this part of the World. A schematic picture of the three competing biomass requirements of the three economies is presented in fig 3.1 (Shiva, 1991).

In this figure horizontal axis represents the distance (D) from the Core of the forest ecosystem while the vertical axis represents the quantity of biomass required by the three competing economies. Nature's requirement (Q_N) is spread throughout the forest ecosystem while the survival economy's requirement (Q_S) is divided between inside and outside the forest ecosystem. The spread of survival is not too far away from the forest ecosystem's boundary since local people can collect the forest biomass. The requirement of the market economy (Q_M) is high and spread over long distances far away from the forest ecosystem as it can be transported over long distances. This indicates a continuous long distance transfer of large quantities of forest biomass outside the forest ecosystem. All forest related conflicts are thus based on conflicts between the above mentioned requirements - Q_N , Q_S and Q_M .

Serious conflicts and popular opposition in all forest areas of the country emerge due to violation of people's traditional rights over forest resources through colonial forest policy (Shiva, 1991; Guha, 1991). Forest conflicts occurred under colonial rule were primarily conflicts between the survival economy associated with local management of forest resources and the market economy associated with non-local management by the British Government.

Unfortunately, these conflicts were not satisfactorily resolved even after independence. On the contrary, post-colonial forest policy further aggravated these conflicts. Post independent forest policies gave new thrust to the commercialisation of forestry and the growth of forest based

FIGURE 3.1 SCHEMATIC DESCRIPTION OF THE ECONOMIES ASSOCIATED WITH FORESTS



SOURCE : BANDANA SHIVA "ECOLOGY AND THE POLITICS OF SURVIVAL-CONFLICTS OVER NATURAL RESOURCES IN INDIA". P. 72

industries. The concept of 'sustained yield' has been replaced by 'progressively increasing yields' and mixed natural forests has been replaced by monocultures of industrial species. These facts aggravated the conflicts between 'Nature's economy', 'survival economy' and 'market economy'. For that reason even at present there exists many popular movements like Chipko movement in Uttar Pradesh, Appiko movement in South-India, Jharkhand movement in Bengal-Bihar-Orissa, Tehri Dam movement in Uttar Pradesh, Narmada Valley movement in Madhya Pradesh and Gujrat, silent valley movement in Kerala etc.

3.3 Social And Cultural Acceptability Of Forest Uses

Following Clawson (1975) issue of conflicting claims on forest and its uses can be seen from an alternative perspective. In the society of man, individual is not always guided by economic motives alone. They are governed also by other considerations like personal philosophy, ideology, religion, ethics, or other attitudinal relationships or social pressures. Social and cultural acceptability is also very much related to political acceptability (Clawson, 1975). In the present day system, political power is the more powerful force which imposes its will and standards on others as law. In case of public forests, some of its uses or practices have been advocated on grounds of physical or biological feasibility. According to Clawson (1975) social and cultural values are as respectable a ground as is economic efficiency for forest uses, at least in some cases. There are several forest uses belonging to this group, however the most important uses are as follows : i) Forest aesthetics or preservation of the general forest environment : It is said that forest aesthetics, beauty and harmony must be maintained in forest and thus harvests, cuts, slash or tree tops left behind after harvest, construction of roads through forest, any damage to soil etc. have been denounced as aesthetically unacceptable.

ii) Clear-cutting of timber, both as a special case of forest aesthetics and because of its own ill effects : There are several adverse effects of clear-cutting. But there is controversy whether clear-cutting is desirable or not. There are some cases, for example, whose slopes are very steep, where soils are very thin, where reproduction is uncertain, where trees have some other uses such as stream protection- clear-

cutting is undesirable. There are some cases, where clear-cutting is desirable. Thus the method of cutting is important and which depends upon the site, the species, the stand and the goal for the future forest (Clawson, 1975). Sometimes it is replaced by selective cutting. Clear-cutting practice supported by silvicultural and economic grounds may be rejected on aesthetic, social and cultural grounds as it often leads to "cultural shock" and "social disintegration" (Zimmerman, 1982).

iii) Monoculture or the growing of one species to the exclusion of all others : This practice has been subject to vehement opposition and criticism by ecologists, whether it is on farm or in forests. The United States Agency for International Development (USAID) recommended monoculture in India in 1970 and the Government used to practice it in different parts of India. But this practice of monoculture has not been socially accepted by the people of India. For example, Pine plantation in Bastar and Teak plantations in Jharkhand area have not been accepted by the local people. (Guha, 1983).

iv) Wilderness preservation : In more recent years, 'wilderness preservation' is gaining momentum in our country. There has been a strong moral, scientific and philosophical content to the advocacy of wilderness by wildlife conservationists. "Although their initial and possibly still dominant impulse is the aesthetic value of wilderness and wild species, conservationists have found strong support from recent biological debates. The theme of biological diversity is an essential component of a direct and indirect, known and yet to be discovered survival value for humanity. Furthermore, an emphasis upon the 'intrinsic' rights of non-human species has been prominent in recent debates on the preservation of wilderness areas". (Guha, 1994). The Government of India has passed the Wildlife Conservation Act, 1972 and amended it in 1991 to give legislative protection to wilderness preservation. As a result, the area under parks and sanctuaries are increasing day by day. But no one is raising the question as to who gains from wilderness and who pays for it? Quite reasonably, Clawson answered this question that wilderness satisfies certain cultural standards or values of wilderness conservationists but others who do not share these values may oppose it on economic or other grounds (Clawson, 1975).

Thus economics of forestry and forestry practices can not avoid the importance of social and cultural attitudes towards forestry. If the objective is sustainability, due considerations to these traits can not be by-passed.

CHAPTER 4

COMMON POOL RESOURCES AND ITS ANALYTICS

4.1 Concepts and Definitions

The present study involves basically, the question of common pool resource management (CPRM). CPRM cuts across boundaries of several disciplines. To understand its precise meaning we need to make clear the meaning of two key concepts, namely, 'property' and 'rights' on which hinges the notion of CPRM. According to Bromley (1991), '....property is a benefit [or income] stream and a property right is a claim to a benefit stream that the state will agree to protect through the assignment of duty to others who may covet, or somehow interfere with the benefit stream'. In this sense property is not just a physical object but also a social relation. Depending upon the nature of rights to a resource or property, one could conceive of four broad categories of property, namely, private or exclusive property, State property, common property, and non-exclusive or nobody's property. Exclusive property and non-exclusive property are the two extremes on a continuum of property rights. In between these two extremes lie State property i.e., property owned by the State and Common property, i.e., jointly owned by more than one individual. Private property is said to be exclusive because the rights holder can exclude others from appropriating the property and/or benefits from it. In this sense, private property is the legally and socially sanctioned ability of the holder to exclude others (Bromley, 1991). Nonexclusive property is so called because nobody can be excluded from appropriating its benefits, or, in other words, it is accessible to everybody (open access) without any restraints.

In contrast to non-exclusive property or open access the notion of common property subsumes a set of social conventions, norms, legally enforceable rules, procedures for regulating its use. In most situations prevailing in developing countries of the world, it is difficult to distinguish between common property and open access because what apparently appears to the casual observer to be open access may in fact be common property with its joint use by individual belonging to a particular group being regulated by some conventions or tacit understanding and cooperation among the users. Whereas the

problems of common property stem from the structure of joint-use rights, problems of open access arises from free and unrestricted access or entry from absence of any ownership of the resource by any person (Singh, 1994). There is some truth in the dictum that "everybody's property is nobody's property" (Gordon, 1954) and hence open access is likely to be abused, misused, and over-exploited more than private property or common property. Over time due to increase in the population of resource users and hence in the demand for the resource/resource commodities, and weakening of the social conventions and institutions that were established to regulate the total use of a CPR by its claimants, CPR may become an open access for its co-users (Bromely, 1991).

Since property rights in a resource like forest lands are less common in expanding but economically underdeveloped parts of the world, sometimes it is said that resources owned by nobody are 'common property' and give rise to "common property problems" or the tragedy of the commons. A simple static micro theoretic illustration in the following fig 4.1 highlights the problem. A "cut-and-run" logging operation can sell the harvested trees as lumber at price, say, P_1 along the demand curve denoted by d_1 . If the resource is owned by nobody then the harvester need to pay "royalty" or "stumpage" charges for the right to harvest the tree. There are costs of cutting, bucking, transport, processing and delivery to market. The marginal cost of doing all these rises as more of the less accessible forest area is harvested. This is shown by the rising marginal cost (MC curve in the figure). The forest harvesting profit is maximised at X_1P_1 , where price equals marginal cost.

As illustrated, only a part of the forest is harvested, measured left to right, by O_1X_1 on the horizontal axis. The rest of the forest, measured right to left by O_2X_2 remains virgin in less accessible areas. It is to be noted that the logger have responded rationally to market 'signals' being sent by the rest of the economy by following the principle of private profit maximisation. But as time passes the frontier is absorb. Virgin forest becomes scarce and valuable for some other uses (for example, for sustainable recreations, scientific and environmental purposes). The demand is now for live, in-situ trees, not lumber. But by this time O_1X_1 of the original forest has disappeared.

This new demand is measured downward on the vertical axis at P_2 which shows the values of virgin trees along the demand curve d_2 . The remaining stock of these virgin trees O_2X_2 is measured right to left on the horizontal axis. These will be preserved.

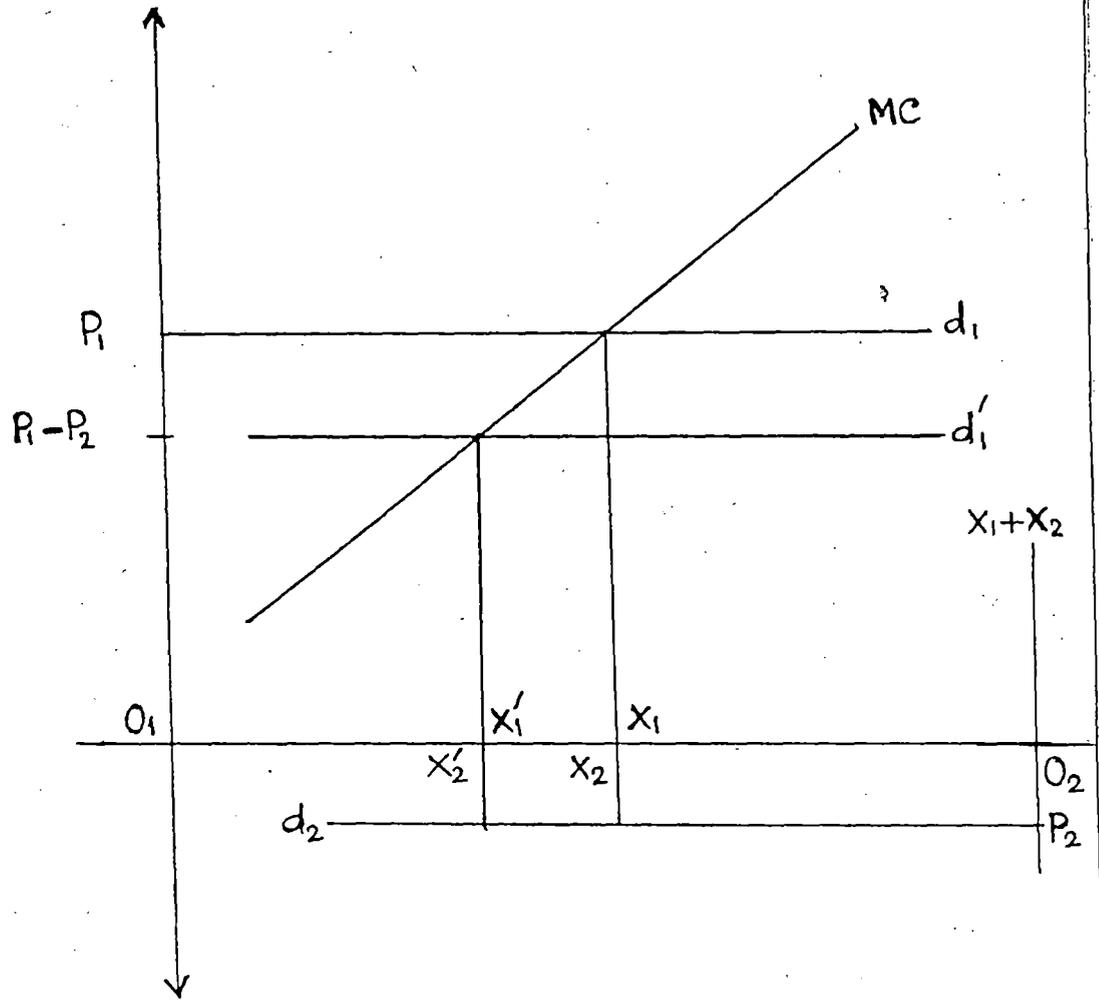
The allocation of X_1 and X_2 trees would possibly have been made better. Suppose the rights to property of the forest had been established then an owner logger or a community of owner loggers with some foresight might have foreseen future uses of virgin forest. Instead of maximising only his/ their logging profit, he/they would have maximise logging profit plus the value of remaining trees. Each tree cut for lumber would be worth P_1 minus value to him/them of saving the tree for future returns. If the value of a standing tree is P_2 during the cutting period as well as later (we assume this for the sake of simplicity), the net revenue from cutting a tree is $P_1 - P_2$. Thus the net addition to revenue over the two periods (let us say, present and future) from cutting a tree in the first period is the price of the trees' lumber in the first period minus price of the trees as standing timber in the second period. In this way, the cognisance of future in-situ timber value lowers the effective net lumber price and reduces the harvest from O_1X_1 to O_1X_1' . The second period timber supply rises from O_2X_2 to O_2X_2' .

A property right may be lodged in the private sector individual, corporation, government or responsible group such as organised community. The important characteristics of property rights is whether it is secured so that expectation of future benefits can be realised as compensation for present sacrifices.

This observation highlights the importance of bringing to bear collective wisdom, wit, and will to control forest resource use. It is not generally the case that ordinary markets naturally spring up to do the job (Neher P.A, 1990). Some alternative institutional arrangements may thus, be desirable.

The terms common property resource (CPR), common pool resource (CPR) and commons are often used synonymously and connote an economic resource or a facility which is communally or collectively held/owned by an identifiable community or a

FIG. 4.1



group of people and is, de facto, if not de jure, accessible to and jointly used by all members of the community/group. Collective ownership of CPR implies lack of well-defined individual private property rights of co-users in the CPR. Thus, a CPR is, 'subject to individual use but not to individual possession' (Oakerson, 1986). CPRs are free goods for the individual but scarce goods for society (Gordon, 1954). In true common property situations, use rights are shared co-equally and are exclusive to a well-defined group of people.

In this study I am concerned with common pool forest resource which may be defined as those resources that are accessible to and jointly used by people living in a particular geographical location such as a village or a cluster of villages. In the context of recreation of forest resource I also consider privately owned farm forests (planted after harvest of crops and before the next sowing), forests on common property lands (e.g. village panchayat grazing lands), forest on state property (e.g. revenue lands) or on near open access resource. Following Singh (1994) some salient distinguishing characteristics of private property resource (PPR), CP_rR, open access resources (OAR), and CPR are summarised in Table 4.1.

Some Salient distinguishing characteristics of PPR, CP_rR OAR and CPR

TABLE 4.1

TYPE OF RESOURCE

Characteristics	PPR	CP_rR	OAR	CPR
1. Property rights are well-defined	Yes	Yes	No	Yes & No
2. User/users' group is identifiable	Yes	Yes	No	Yes
3. Resource is accessible to everybody	No	No	Yes	No
4. Resource is used in common	No	Yes	Yes	Yes
5. Rules, regulations & conventions governing the use of resource exist	Yes	Yes	No	Yes & No
6. Exclusion of free-riders is difficult	No	Yes	Ye	Yes
7. Use of resource is subtractable	Yes	Yes	Yes & No	Yes & No

This distinction between CP_rR and a CPR is not even meaningful in many situations. My study here concerns with the

natural resource that is used in common by identifiable groups of people, irrespective of whether they do or do not have well-defined property rights in them. CPRs in this sense constitute a subset of a bigger set of CPRs.

An unambiguous definition of the term 'management' in the context of the use of CPRs is also necessary at the outset. In this study, by 'management' we mean human intervention in a CPR system with a view to restoring it, or conserving it, or augmenting and sustaining its productivity, and/or regulating its use. The intervention could be in the form of application of labour and/or material inputs, creation of institutions or modification of existing institutions, enactment of laws, and so on (Singh, 1994).

4.2 CPRs in India.

Common pool natural resources in India include such diverse things as village panchayat grazing land, privately owned fallow land, privately-owned cultivated land lying vacant in between two crop seasons, community threshing floors, degraded revenue land, degraded forest land, protected and unclassed forests, village forests and woodlots, land lying alongside railway tracks, roads, water reservoirs, tanks, ponds, lakes, rivers, streams, nalas, groundwater basins, marine fisheries, public (State) and community inland fisheries, and so on. In the Indian context, it is important to note that public land such as the degraded revenue land owned by the State Revenue Departments and degraded forest land owned by the State Revenue Departments and degraded forest land owned by the State Forest Departments are also de facto CPRs in the sense that they are accessible to and used in common by the villagers in whose (village) jurisdiction they lie. The rights and practices that determine who has access to and can use such public land are generally a matter of convention (Singh, 1994).

The availability of CPRs, and hence their role, varies widely from region to region in India depending mainly on the ecological conditions and agricultural systems prevailing there and partly on the present and past land settlement and land tenure systems. These factors affect not only the nature and extent of CPRs but also the broader institutional framework that governs their management and their integration with PPRs.

Arnold and Stewart (1991) identify three regions in India which exhibit markedly different patterns of endowment, use, and management of common property land and related resources. The regions are : (1) semi-arid and arid regions; (2) hill regions; and (3) forested tribal regions. The forested tribal region stretching from West Bengal to Gujarat is characterised by a great variety of forest and land resource use and management systems, and forest communities. Compared to the hilly and the semi-arid and arid regions, CPRs are relatively less important as a source of inputs for agriculture in this region but are very important as a source of minor forest produce for sale, and sites for shifting cultivation. Irrespective of their actual use and management, many areas in this region are classified as forest or revenue lands with very limited private or village rights.

4.3 Problem of CPR

Although common pool natural resources include such diverse things as community pastures, lakes, rivers, streams, ground water basins, forests, fishing spots, etc. they all face one common problem of how to coordinate the actions of individual users to attain an optimal rate of production or consumption for the whole community (Oakerson, 1986). Need for coordination and management generally becomes apparent when the flow of benefits or services from the resource is insufficient to meet the demand of the Community. The primary causes of the demand for products/services of a CPR exceeding their supply are increase in human and animal population, discovery of new uses for the CPR and/or its products, development and availability of new technologies for exploiting the CPR and for processing, transporting, and marketing its products discovery of new markets, and launching new public policies and programmes. Over a relatively short period of time when demand is constant, a CPR problem may occur due to a decline or deterioration in the supply of the resource caused by such factors as degeneration due to natural processes, destruction by natural and/or man made calamities, lack of necessary maintenance, etc. If a community of users is unable to control the use of its CPRs under changing circumstances, destructive competition or conflict among the users is bound to follow, which eventually results in depletion or degradation of the

resources. Hardin (1968) characterises this eventuality as the 'tragedy of the commons'.

Mckean (1987) enumerates the following three conditions under which co-owners of a CPR usually fail to cooperate in using the CPR optimally and consequently the problem of non-cooperation or cheating arises and spreads through the group.

1. When the perceived private costs to individuals of cooperating may exceed the perceived private benefits of cooperating;

2. When individuals feel that their own contribution to the collective goal is minuscule and would not be missed if withheld because others will continue contributing, enabling them easily to free ride on the contributions of others; and

3. When individuals have no assurance or certainty that the other members of the group will make their contributions (or cooperate) and that their lone contribution to the effort would be sufficient to produce the desired outcome. Hardin makes an implicit assumption that 'commons' are open access. This is not true even in the example of the medieval English grazing pastures that he used (Berkes and Farvar, 1989). The 'tragedy of the commons' in India is evident from the continued and unabated degradation of the CPRs. Community pastures are rendered completely denuded of any vegetative cover due to over-grazing, and community forests due to indiscriminate lopping and illicit felling.

The CPR problem represents a class of human problems which can be called 'no technical solution problems' (Hardin, 1968). For example, a typical technical solution to the problem of overgrazing of common pastures is erecting barbed-wire fences and/or deploying guards. It is common knowledge that this solution does not work; the fences are broken and the guards beaten up or bribed by those who are adversely affected by the solution. The real solution lies in helping the graziers to locate alternative sources of fodder for their animals and by educating, motivating, persuading, and organising them so they on their own can regulate and monitor the grazing without any external support or intervention. Similarly, other CPR problems like environmental pollution and degradation, congestion, excessive pumping of groundwater, encroachment of CPRs, etc. can not be resolved by introducing only technical changes : they require changes in human values, attitudes, behaviour, and in

the institutional foundation of the system (Singh, 1994).

4.4 CPR and Rural Development.

Even after extensive commercialisation, privatisation and encroachment on natural resources, quite a significant portion of these resources, is still held communally or collectively and used jointly by people in most of the developing countries of the world, including India. It is generally believed that the individually-owned resources or PPRs are better managed than those collectively held/owned or common pool resources. This belief is derived from the private profit motive which drives an individual to make the best possible use of his PPR. Such a motive does not operate in the case of a CPR whose benefits are shared by all its co-owners/users, irrespective of whether they do or do not contribute to its maintenance. However, there are many factors inherent in the structure of rural economy of most developing countries that make it desirable for these countries to hold as common property as much of their natural resources as possible (Singh, 1994). First, the low levels of income and literacy of rural communities make it impossible for them to meet the high financial, transaction, and enforcement costs. These are often beyond the managing capacities of formalised private property institutions. Second, a high degree of dependence of most people in rural areas for their survival on natural resources makes them more prone to natural calamities like droughts, floods, etc. whose incidence is highly unequally distributed in both time and space. Joint use rights in natural resources under those conditions may contribute to both the economic and social stability of rural communities. Third, common property may be an appropriate institutional insurance against individual failure; the right to be included in a group reduces the risk from individual failure by spreading it uniformly among the members of the group. A more plausible justification for retaining and promoting common property resource management is the tenacity of traditional institutions and therefore the high cost of changing these well-established practices and substituting new ones (Runge, 1986).

A large number of people, particularly the rural poor, all over the world depend to a large extent on the natural resources of land, water, forests, and fisheries for the supply

of many basic necessities of life, e.g. food, fuel-wood, small-wood, shelter, etc. (Gibbs and Bromley, 1989). According to Bromley (1986), some 80 per cent of the world's population depends on natural CPRs for their spare and precarious existence.

One of the major causes of poverty in India, as also in other countries of the world, is lack of natural resources available to the poor. That is, most poor people are poor because they do not possess any income-generating PPRs and do not have access to CPRs or CPRs are not locally available at all in their area. Conversely, it is also true that most rich people are rich because they possess PPRs and/or have access to CPRs. Distribution of PPRs today is the outcome of a process of interaction of various historical cultural, social, legal, political, and economic factors. In the initial stages of privatization of CPRs, availability of man power, as determined by the size of family, particularly the number of adult male members in a family, was a major determinant of the endowment of PPR of a household. This was so because a great deal of human labour was required to clear and enclose open access land, to make it fit for production of crops, to grow crops, and to domesticate wild animals. Resources were also acquired by use of force, as in wars of all sorts and of all scales. Afterwards, other factors such as economic power, social status, inheritance laws, political power, etc. played a dominant role in determining the resource distribution pattern in a community. The poor people had to depend on whatever CPRs were left out accidentally in the initial stages of privatization or afterwards deliberately set aside for communal use. These resources became, through convention and tradition, accessible to all the people living in a community located closest to the resource. But since the poor did not have any PPRs of their own, they depended on the CPRs for their livelihood to a degree for greater than those who had expropriated enough CPRs for use as PPRs. The dependency on CPRs was and still is higher in the tribal areas than in the non-tribal areas. This is because, historically, the tribal people have always lived in forests and depended for their livelihood on them (Singh, 1994).

Even today, most of India's rural poor depend, to a great extent for their livelihood on CPRs. They collect free of charge, firewood, crop wastes, cowdung, weeds, fodder, organic manure (dry leaves, forest litter), building materials (poles,

thatch and silt), fruits and vegetables, herbs, fibre etc. from CPRs. Water which is essential for survival is also collected from community ponds, lakes, rivers, etc. Besides, CPRs also provide raw materials for traditional occupations, including art and craft, and thus indirectly support employment in these occupations.

But with growing commercial exploitation of CPRs that is now going on, the poor find it increasingly difficult to meet their basic requirements from the CPRs. Evidence of their growing misery due to wanton depletion of CPRs abounds in the reports of research studies conducted in various parts of India (Agarwal, 1985). Depletion of CPRs of land, forest, and water has increased the misery and drudgery of the rural poor, particularly women who now have to travel many kilometers to fetch fuel-wood, fodder, and water (Nagabrahmam and Sambrani, 1983).

4.5 Analytical Aspects of CPR Problem

The logic of main stream economics emphasises private resource allocation decisions, under a smoothly functioning competitive market system. This system involves both the nature of goods traded and the characteristics of the market within which the trade occur. In brief, the conditions are; there must be perfect competition in the private factor and the product markets. Competition, in turn, requires, besides others, that a) each industry exhibit increasing costs; b) all goods and services produced and traded must be exclusive; c) absence of goods which exhibit jointness in supply such that one individual consumption does not diminish any other individual use of the good (non-rivalry in public goods); d) ownership rights are clearly assigned and can be enforced to all goods and services to be traded in the economy (Young and Haveman, 1985).

On several scores, either forest product as commodity or the markets in which they are actually bought and sold fail to meet the above requirements. This is more so in a less developed country. Some of the primary characteristics of forests which account for the inadequacy of the market can be listed as follows : a) the exclusive property rights which are the basis of an exchange economy are difficult to establish and enforce - mainly because of communal use requirements; b) forests create a capacity for assimilating and absorbing pol-

lutants controlling floods, soil erosion, recreational facilities etc. c) managing these characteristics is, in essence, the allocation of a collective good, one that exhibit non-rivalry in consumption; d) forests involve complementary uses for more than one purpose - and private ownership may capture only a part of this complementarities - solution of conflict of alternative uses may call for alternative allocative institutions; e) relative costliness of enforcement of property institutions in forest resources yields 'open access' problem; f) prevalent cultural and social values with regard to forestry may be conflicting. The sacredness of forests as a symbol of ritual and purity exempts forests in many areas, in some degree, from the rationality of the market. Market induced shift of forests to commercial use would alter the natural environment of the existing forest-dependent social structure. For such reason, some cultures proscribe allocation of forests produced by market forces.

Where markets are thin or absent, or where the demands or supplies exposed to markets capture only a portion of the full social costs and benefits, or when the forests resource in some role has the public good characteristic, public intervention may allocate resources more efficiently. But Government intervention may also fail because of the problems like free-riding, strategic behaviour, non-enforceability, exclusion of the vulnerable section of population (like some aspects of National Forest Policy 1980 etc.). In an imperfect world with imperfect and costly information, a combination of market and non-market resource allocation mechanism may yield better results.

In a market economy there is every likelihood that all outputs and inputs will not figure in the cost-benefit calculations of the individual economic agent either because they are intangible, in the sense of not being quantifiable, or they are non-marketable, such as collective goods, in the case of which, for instance, it is not feasible to exclude non-payers from the enjoyment of such goods. In such cases, it becomes necessary to undertake some other institutional arrangements to achieve the social optimum. The less developed the economy is and more backward the society, the more likely to be less perfect, less pervasive, less informed and less uniform. Economic inequalities tend to be more pronounced as social relations are less voluntary in a relatively more feudal society. Again, normative

considerations may be more important to the political leadership, expressed in a concern for social justice, income redistribution and protection of less privileged.

Even in the domain of main-stream Neo-classical economics it is being increasingly accepted that non-market considerations can and, from a social optimum point of view, ought to influence economic decision. The whole literature on "externalities" deals essentially with such concerns. Economic motivation need not necessarily lead to the social optimum, making social regulation desirable (Price, C. 1976).

Beyond externalities that affect society at a point in time, there is the need to consider intertemporal inequities. The Pigouvian "defective telescopic faculty" of the individual would undervalue the future, leading to inadequate provision for society of the future. If costs are pushed on to future generation by the unbridled operation of private economic activity, even the market mechanism can not come into play to readjust allocations because future generations remain unrepresented in present market transactions.

Externalities, distributional interest and intertemporal considerations are likely to be more inextricably interlinked in an underdeveloped economy than in a developed economy. An underdeveloped economy is usually characterised by wide disparities and inequitable distribution of income. Thus, it is more likely that those who suffer adverse external affects will have little economic power and they will be unable to force (some kind of Coasian) compensation solely through market pressure. The future generation are at double disadvantages and market pressures are likely to force external costs on to this generation.

Mancur Olson (1971) has challenged a generally held view that groups of individuals having common interests usually work together to achieve them. He argues that "Unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self interested individuals will not act to achieve their common or group interests (Olson, 1971). In general, the larger the group, the less noticeable the actions of its individual members, the higher the transaction costs of bringing them together, and hence the higher the tendency among its members to free ride. This is why large

groups frequently fail to provide collective goods for their members. Olson (1971) has shown that "Certain small groups can provide themselves with collective goods without relying on coercion or any positive inducements apart from the collective good itself. This is because in some small groups each of the members, or at least some of them, will find that his personal gain from having the collective good exceeds the total cost of providing some amount of that collective good.

More generally, the level of private provision of a collective good that individual will find profitable can be determined through simple maximisation exercise. Following Olson (1971) let the level of output of a collective good be given by T ; the size of the group by S_g ; cost of providing the good by $c=f(T)$; value or benefit to the group from the collective good by $V_g = S_g.T$; benefit to the i th individual member of the group by V_i ; and fraction of the group benefit gained by the i th individual by $F_i = V_i/V_g$.

The net benefit to the i th individual A_i is simply benefit to the individual less cost C , i.e. $A_i = F_i S_g.T - C = V_i - C$. To maximise A_i , we take the first derivative of A_i with respect to T and set that equal to 0 as follows :

$$d A_i/dT = d F_i S_g.T/dT - dC/dT = dV_i/dT - dC/dT = 0$$

$$\text{Or since } dV_i/dT = F_i(dV_g/dT) \text{ we have } F_i(dV_g/dT) = dC/dT$$

In words, for an individual the optimum level of private provision of the collective good will be when his marginal private benefit equals the marginal cost. In contrast, the optimum level of provision for the group would have the marginal cost equated with the marginal group benefit, i.e. $dV_g/dT = dC/dT$. This means that normally a rational individual member of a group will not provide a collective good in quantities that are optimal for the group as a whole.

Olson defines three sizes/types of groups, namely, the smallest type group or the 'privileged' group, the intermediate or 'oligopoly sized' group, and the very large or the 'latent' group. For the privileged group, for at least one i , gains from providing the collective good (V_i) exceed his own private cost (C), i.e. $V_i > C$. This means that for at least one of the members of the group it is profitable to provide the collective good entirely at his own private cost and free-riders are privileged

by the self-interested provision of the collective good by that individual. In this type of group 'there is a systematic tendency for exploitation of the great by the small' (Olson, 1971:29).

At the other extreme, there is a very large 'latent' group for which $V_i < C$ for all i . Large groups are likely to suffer without the collective good because no individual member of the group will have the incentive to provide the good privately. This is why a CPR jointly used by a large group of people is often over-exploited and degraded, i.e. the group fails to derive the optimum rate of output (Collective good) from the CPR. A latent group may, however, be coerced into providing collective goods in which case it is termed a 'mobilised latent group'. In between the privileged and the latent groups are what Olson calls 'intermediate groups'. Intermediate groups are vaguely defined as ones which at least two individuals must act together to provide the collective good but will always require some group coordination or organisation for provision.

Olson does not specify the number of individuals that would make up the very small group but he asserts that the group should be small enough so that 'the individual actions of any one or more members are noticeable to any other individuals in the group'. An important implication of Olson's theory for managing CPRs is that if a group using a CPR is very large and heterogeneous, it should be divided into a number of small and homogeneous subgroups and each subgroup randomly assigned a portion of the CPR that should be as far as possible proportionate to the size of the group. If there are marked variations in the quality of the CPR, the assignments may be rotated every year. This is, however, possible only if the CPR is divisible and if some arrangement exists for dividing and apportioning the CPR among the subgroups (Singh, 1994).

According to Olson, despite the free-rider problem, voluntary groups can provide collective goods in a wide variety of areas, including education, labour unions, and natural resources. He suggests that the success of the political entrepreneur will be related to his ability to utilise selective incentives to motivate participation in collective action. We concur with the opinion of Singh (1994) that in the context of CPR management, another important role of the political entrepreneur

neur is to provide requisite assurance to CPR users that expected benefits from collective management would actually accrue to them and the benefits would be equitably distributed among them.

James M. Buchanan and Gordon Tullock (1965) have propounded a theory of collective choice that is very similar to Olson's theory. In the context of CPR management, a key question is : what are the conditions under which a group comprising free and national utility-maximising individuals choose to formulate and abide by a rule or set of rules of restrained use of CPRs? Buchanan and Tullock's answer to this question can be summed up as follows : A group would choose a collective mode of action when each of its individual members finds it profitable to act collectively rather than individually, i.e. when his perceived costs include both external costs and decision-making costs.

Buchanan and Tullock (1965) argue that 'it is the existence of external costs that rationally explains the origin of either voluntarily organised, cooperative, contractual arrangements or collective activity. They use two cost functions - an external cost function and a decision-making cost function - to determine the 'optimal' or most 'efficient' decision-making rule for an individual. The external costs are considered to be a decreasing function and the decision-making costs as an increasing function, of the number of individuals required to reach an agreement (fig 4.2).

The optimum decision rule for an individual is derived by minimising the sum of expected external costs and expected costs of decision-making. Graphically, the two cost functions shown in fig 4.2 can be added vertically and the resultant composite cost function shown in fig 4.3. The optimum decision-making point is shown by the lowest point on the composite function. This means that the individual in question will choose the rule that requires the K/N of the group to agree to take collective decisions.

Buchanan and Tullock's approach represents an improvement over Olson's theory in that it explicitly relates the costs to the number of individuals in a group i.e. the size of the group and thereby resolves the question of the size of the group whereas Olson leaves the question unresolved. Their theory makes it clear that what is important in determining the

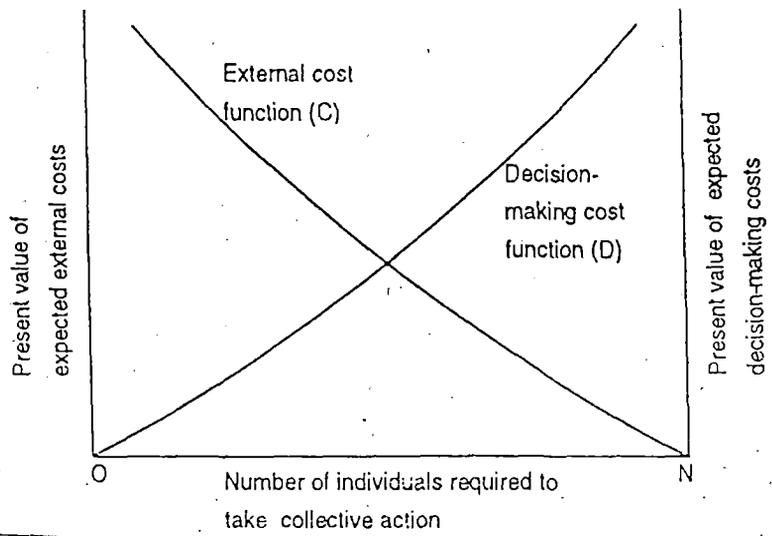


FIG. 4.2 External cost and decision-making cost functions (Buchanan and Tullock, 1965)

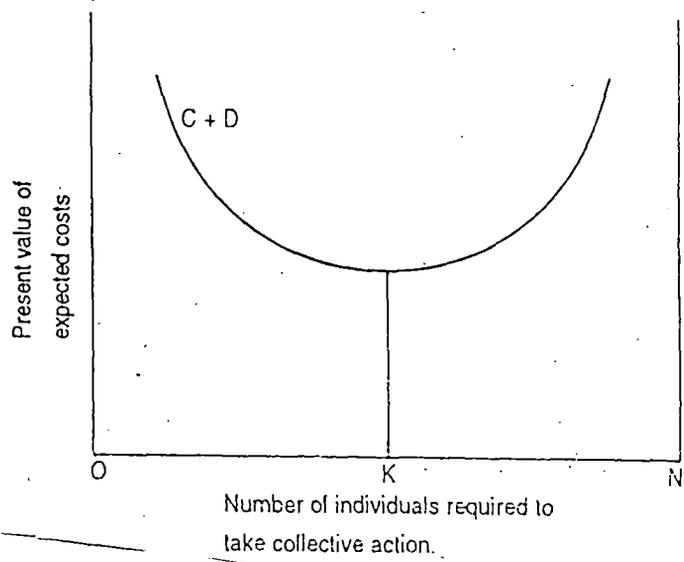


FIG. 4.3 Composite cost function

optimal rule or choice is the cost (external + decision-making) and not the size of the group. Thus, Buchanan and Tullock's theory could explain successes in CPR management where large groups are involved, eg. in Raymond, West and Central Basins in California (Ostrom, 1990) whereas Olson's theory cannot. Of course, the cost function employed by Buchanan and Tullock are too simplistic to approximate the real world cost functions. However, the framework provided by Buchanan and Tullock is broad and general enough to accomodate many details.

Recently, game theory has been used as an analytical tool for exploring the effects of different systems of property rights on common property resource management (Gardner and Ostrom, 1987). In this type of analysis, the structure of a game and its resultant equilibria are considered as dependent upon : (a) a set of institutional rules, and (b) the technical and physical characteristics of the CPR in question.

Many CPR problems have been formulated and analysed as a N-Person Commons Dilemma Game and a Prisoners' Dilemma (PD) Game (Campbell 1985) where decisions facing the users or appropriators of a CPR is analogous to the decision confronting each prisoner in the PD game situation.

The Classic PD game is analogous to many situations that prevail in the use of CPRs, such as communal grazing lands, common pool surface and ground water resources, marine fisheries community forests etc. The two-person game can easily be extended to a multi-person game played repeatedly if for Prisoner I, we substitute any CPR user or group of CPR users and similarly for Prisoner II, all the other CPR users. Such extensions are more plausible than the original two-person game because in the real world situations many persons use or share a CPR and face the PD situation repeatedly i.e. day after day or year after year (Singh, 1994). In India, CPR users are non-formally divided into caste-based or ethnic groups. These groups pursue conflicting interests and hence are comparable to players of a game whose outcome is controlled jointly by the players.

Following Singh(1994) the analogy between the classic PD situation and a CPR use-situation can be illustrated with reference to any CPR. Consider a hypothetical village in Eastern India with : 1) a population of 50 herds man divided in two caste groups of 25 each, each herdman owning only two

animals (whether cows, buffaloes, goats, sheep etc.); (2) 10 ha of common grazing land that can sustain at a reasonably good level of productivity on 50 animals per season; and (3) no formal or informal authority or leader or organisation acceptable to both the groups for arbitration on matters of grazing. In the absence of any authority or organisation, owners of herds do not negotiate individual grazing that would lead to socially optimum levels of grazing and do not have any grazing norms, rules or regulations - a no-holds barred situation. Following the structure of the classic PD game, we take one of the groups to represent prisoner I or Herder I and the other group to represent Prisoner II or Herder II. There are two strategies open to each herder group : (1) to cooperate with the other group by sending only one animal per member for grazing; and (2) do not cooperate and send any number of animals (more than one) per member for grazing. We can show the expected outcomes of these two strategies in TABLE 4.2 :

		Expected pay offs from grazing strategies of herder in village (Rs./season)	
		Herder II	
		Cooperate	Not cooperate
Herder I	Cooperate	125,125	40,160
	Not cooperate	160,40	75,75

Suppose if, prior to each grazing season, the community of herders is indifferent to the distribution of potential benefits from grazing between Herder I and Herder II, then the payoffs are highest (250) when both the herders' groups cooperate, and lowest (150) when they do not cooperate. Using the same reasoning as each of the prisoners used in the PD game; each herder group finds that it is better off by 'not cooperating' whatever the decision of the other group. So, both the groups home in on (75,75) which is the second best alternative for them. This means that 'non-cooperation' is the dominant strategy in this game. This outcome or solution of the game, which is a non zero sum game, is a Nash equilibrium (NE). An outcome of a game (a strategy pair) is an NE if, taking the strategy of the other party as given, neither party can improve his position by revising his own strategy (Hirschleifer, 1987).

The PD game has fascinated many scholars and its analogy used to understand and explain so many complex problems related to use of CPRs. The outcome of the game is a paradox, in that it shows that individually rational strategies lead to collectively irrational strategies (Campbell, 1985 :3). However the paradoxical outcome of the PD game is very much contingent, as in other games, on the structure and rules of the game. Structures of many real world situations where CPR problems exist are not similar to the structure of the PD game in that the resource users may be free to communicate with one another and enter into mutually binding contracts, i.e. both the structure and the rules of the game can be changed. When this is so, the dilemma can be resolved by cooperative action of the group members. Also, when a situation is repeated again and again, rational resource users could learn from the past sub-optimal decisions and select strategies that yield a collectively rational or optimum outcome (Braybrooke, 1985, Hardin R, 1982).

Theoretical, experimental, and empirical studies of multi-person repeated games suggest that cooperation can emerge under a wide variety of circumstances and that issues of strategy, ethics and expectations play bigger roles in multi-person games than in single person games (Magrath, 1986 : Axelord (1984). Several propositions, dealing with the emergence of cooperation in iterated prisoner's dilemmas can be advanced. The most important among them is that the threat of and the willingness and ability to retaliate against defections is vital to the emergence of cooperation. In the Hawk-Dove game type situations, the 'first come first served' of 'weaker yields to stronger' convention could avoid conflict and produce cooperative behaviour (Hirschleifer, 1987).

Ronald J. Oakerson has developed such a model which can be used to analyse common property problems whatever the particular resource or facility (Oakerson 1986). An analyst who is familiar with the problem situation can use the framework of that model to sort out the available technical, historical, cultural, economic, political and administrative/ managerial information, establish relationship among the key attributes/ variables involved, diagnose what is wrong and why, and offer potential solutions of the problem. There are four components in the model, namely : (1) the technical and/or physical

attributes of the specific resource or facility; (2) the decision making arrangements i.e. organisation and rule that currently govern relationships among resource users; (3) the patterns of interaction among decision-makers; and (4) outcomes and consequences.

Following Oakerson, a diagrammatic representation is given in Fig. 4.4. In the short run, components 1 and 2 are treated as exogenous and components 3 and 4 as endogenous, but in the longrun all the four components 3 and 4 as endogenous, but in the longrun all the four components of the model are treated as endogenous variables, that is, they can all change. The basic relationships among the four components in the shortrun are shown by the solid lines and in the long run by broken lines in the Fig. 4.4.

In his analysis Oakerson uses three economic concepts, namely, jointness in consumption, exclusion and indivisibility to explain the physical and technical attributes of a CPR. Jointness refers to use of a resource by more than one individual simultaneously, each with or without subtracting from the quantity available to the others, depending upon whether the CPR is mixed collective good¹ or a pure collective good². The term 'exclusion' refers to meant whether it is or is not possible to exclude from the use of a CPR those potential users contributing nothing to the maintenance of the resource in productive form, or in other words, those who are free riders. Indivisibility refers to the quality or attribute of non-divisibility, in the physical sense, of a CPR. A CPR may be divisible or indivisible in this sense. In general, most of the CPRs are characterised by partial jointness and some difficulty in excluding the free-riders. However, the precise characteristics may vary from CPR to CPR and from situation to situation.

Decision-making arrangements mainly consists of those rules, procedures, norms, customs, traditions, etc. Which influence individual and collective choices in the use of the CPR

1. A mixed collective good can be used jointly by many individuals but in such case each individual's use reduces the quantity available to the others, i. e. the consumption is subtractible.

2. A pure collective good is one that can be consumed/used simultaneously by many individuals without any adverse effect (subtraction) of consumption of any one of the individuals on the consumption of the others.

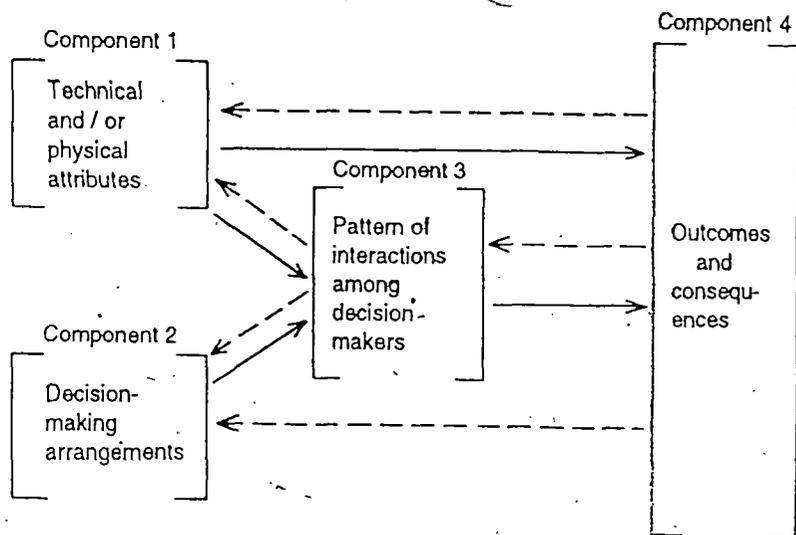


FIG. 4.4 A diagrammatic representation of the Oakerson model (Oakerson, 1986)

in question. Decision making arrangements or rules may be identified and listed at the operating level, collective choice level, and constitutional choice level (Kiser and Ostrom, 1982). Decision-making rule at each of the three levels can be changed by an appropriate authority located either at the same level or at the next higher level.

Patterns of interaction are reflected in the ways the individuals choose their strategies and relate to one another in a given situation. Presence or absence of reciprocity among a group of resource users determines whether the group will succeed or fail in the joint use of the resource in the larger interest of the group. Reciprocity requires that members of a resource user group contribute positively to each other's welfare; over a period of time. The absence of reciprocity is reflected in free-riding behaviour of members of a group and may lead to mutually destructive competition and/or conflict. Decision-making arrangements should encourage reciprocity among resource users and curb tendencies to free-ride.

Patterns of interaction produce outcomes that should be evaluated to determine the performance of the regime under which a CPR is being managed. Oakerson (1986) suggests the criteria of efficiency and equity for this purpose. The efficiency criterion can be operationalised by using the test of Pareto- Optimality : if, as a result of a change in the existing resource-use pattern, none of the members of a group could be made better off without making some one worse off, then the existing use pattern and its outcome are Pareto-optimal; conversely, the proposed change is Pareto-efficient. The main objective in applying this test is to identify a Pareto-efficient change, i.e. improvement in efficiency rather than on determining whether the present resource use pattern, or proposed change in it is Pareto-optimal. The equity criterion could be operationalised by asking this question: Is each member of the group going to get returns/benefits from the CPR commensurate with his contribution? If the answer is yes and if the efficiency criterion too is satisfied, then the present outcome passes the tests of both efficiency and equity.

Now let us see how the Oakerson model can be used to diagnose CPR problems and identify their root cause(s). To start with, we look at the outcome of a particular resource-use region and evaluate it using the sustainability and equity

criteria. If the outcome passes the tests of both sustainability and equity, then it can be said that there is no problem and the present management regime is Pareto-efficient. If the outcome is wanting on one or both the grounds, then we have to work backward through the model to trace the cause(s) of the problem. And for the purpose we may ask the following question : Is there anything wrong in the existing patterns of interaction (component 3) that is creating the problem? which characteristics of the decision-making arrangements (component 2) and the CPR in question contribute to the existing patterns of interaction and choice of present resource-use strategies? Is there any inconsistency or lack of congruence between the technical and physical attributes of the CPR (component 1) and the decision-making arrangements (component 2)? Is there any obstacles in the organisational structure that explain the observed pattern of interaction or whether there is difficulty at the constitutional level, i.e. in the by-laws of the organisation in question, which can be rectified only by an amendment of the by-laws. In the answer to these questions we may get the clues to the possible problems and also to their possible solutions.

Once the problems are diagnosed, to find solutions we need to work prospectively forward through the model. Looking at the components 1 and 2 we can ask ourselves about the kinds of modifications necessary in the physical and technical traits of the CPR in question and in the decision-making arrangements that would produce the desirable pattern of interaction and collective choice strategies and hence desirable outcome. We may also ask whether the benefits from these modifications would substantially exceed the costs. Answer to the former would need to be empirically substantiated and to the latter could be found by using the technique of social cost-benefit analysis.

The analytical models presented in this chapter are very much useful for diagnosing and analysing CPR problems. They are also very helpful in identifying the possible solution to them. In most cases, the solutions can be identified in the very process of diagnosis and analysis. In diagnosing and analysing a CPR problem, the CPR analyst could benefit from the logical use of conclusions reached by all the models.

4.6 Social Forestry : Origin, Evolution and Importance

The word 'Social Forestry' was first used by a forest scientist Westoby (1968) who defined it as 'forestry which aims at providing flow of protection and recreation of benefits for the community' (Tiwari, 1983). Thus conceptually there is no difference between 'traditional forestry' and 'social forestry', since both provide social benefits in one form or the other. But Westoby differentiated between these two by allotting production function to production forestry and protection as well as recreation function to social forestry. While the traditional forests meet the long term needs of the society in respect of oxygen supply, gradual release of water, large size timber etc., social forestry meets the immediate day to day requirements of fuelwood, leaf fodder, small timber etc. (Tiwari, 1983).

In reality, the concept of social forestry is a changing one and it varies from place to place and time to time. In the Indian context 'social forestry' has been defined as the science and the art of growing trees and/or other vegetation on all land available for the purpose, mainly outside traditional forest areas, with intimate involvement of the people to provide a wide range of goods and services to the individuals as well as to the society. In this respect, social forestry may be defined as the forestry of the people, by the people and for the people (Tiwari, 1983)

However, the full credit for evolving the integrated and dynamic concept of social forestry in the context of India goes to National commission on Agriculture. The commission (G.O.I, 1973) adopted the following as the objectives of social forestry, in order to fulfil the basic and economic needs of the community and thereby improving the conditions of living: i) fuelwood supply to the rural areas and replacement of cowdung, ii) small timber supply; iii) fodder supply; iv) protection of agricultural fields against wind; and v) recreational needs. Conceptually, it includes 'Farm Forestry' 'Extension Forestry', "Reforesting in degraded forests", and "Recreation Forestry", "Farm forestry implies raising rows of trees on the bunds or boundaries of fields and the individual trees in private agricultural lands; 'Extension Forestry' is mixed forestry, comprising raising of grass and leaf fodder, fruit trees and

fuel wood trees on suitable waste lands, panchayat lands¹ and on village commons, shelter-belts, & raising of plantations of different quick-growing species on lands on sides of roads, canal banks and railway lines; 'Reforestation in degraded forests' and 'Recreation Forestry' are more or less self explanatory.

The Commission advocated for a separate wing in the Forest Department for social forestry which is to act as catalytic agent for adoption of social forestry projects in India. At present all the State are implementing social forestry programmes of one kind or the other. It is interesting to note that some of the individual components of the present day integrated concept of social forestry in India were thought of more than a century ago. In 1873 it is Dr. Brandis, the first Inspector General of Forests who realised the importance of village forests to meet the needs of the rural people. In 1893, the importance of fuel, fodder plantation in the economy of India was recommended by Voelcker and accordingly in the next year Government of India issued the forest policy resolution of 1894. The Royal commission on Agriculture (Anonymous, 1928) and many other experts on rural development opined for the creation of village forests in order to meet up the requirements of the rural population for fuel, fodder, timber and raw materials for cottage industries. Though the idea of village forest were there, programmes were not carried out sincerely (Chaturvedi, 1950). After independence though the idea of Vanamahotsav² was accepted in 1950, it failed due to lack of concerted efforts. The National Forest Policy (Anonymous, 1952) recognised the need for evolving a system of balanced and complementary land use. During the Second Five year plan period farm forestry and extension forestry programmes were started in many states and implemented with varying degrees of success, depending upon the availability of financial, administrative and other supports. During the same period, gradual clearance and reduction in the area of forest brought about all the hue and cry of lessening of the forest areas, and acute shortage of firewood for the rural people. Under this background, it is the

1. Land owned by village level local governments (Panchayats).

2. Festival of the tree plantation during monsoon.

National Commission on Agriculture (1976) which stressed the socio-economic importance of social forestry in the rural community as well as in the management of forest resources. It was stated that by taking up the programme of raising trees, grasses and fodder in the farmer's own lands, village commons, wastelands and degraded forests close to habitations, it would be possible to meet the requirement of fuelwood, fodder, small timber for rural housing and agricultural implements, thorns for fencing etc. It was also stated that at the same time these programmes would remove a serious impediment in the practice of production forestry (GOI, 1976).

The Government of West Bengal adopted the social forestry programme after the forestry conference held in 1980 with the concept of forest resource development 'by' and 'with' the people instead of the usual 'for' the people (GOWB, 1983). In its guiding principles, the government recognises that forest management and planning in this state have to have two basic elements - "Production Forestry" and "Social Forestry" - not in a mutually exclusive manner, but as a complement to each other.

The most distinguishing feature of this programme is the people's participation in the management. Social Forestry in India is intended to be people's programme with technical and financial input from the Government, though there are two diagonally opposite views about the role of the people in the management of forest. According to the proponents of one of the views, the people have been provided unduly large concessions and rights in the forests and this has led to depletion of the forests (GOI, 1976). The other view holds that India's forest policy has alienated the people from forests with which they have lived symbiotically through the ages and this has caused deterioration of our forests (Guha, 1983). The latter of the two views is supported by Nadkarni (1989). According to him "minor and such other forests which could be called people's forests could be brought under cooperative community management, provided for equal rights to the produce of the forests.....". In his opening statements on "participatory forest management in West Bengal", Banerjee (1989) the then Additional Chief Conservator of Forests, West Bengal, says that State's disappearing forest can only be saved through a system of participatory resource management in which local people are meaningfully involved. The emerging new concept of joint forest

management, recognises that confrontation between forest departments and local communities should be removed. It has been given legal basis through the national government order of June 1, 1990 which clearly states that "The National Forest Policy, 1988 envisages people's involvement in the development and protection of forests. The requirements of fuelwood, fodder and small timber such as house-building material, of the tribals and other villagers living in and near the forests are to be treated as first charge on forest produce." The policy document envisages it as one of the essentials of forest management that the forest communities should be motivated to identify themselves with the development and protection of forests from which they derive benefits (GOI, 1988). Joint forest management of India's degraded forest lands offers great hope for the empowerment of local communities and new direction for India's forester (Campbell, 1992). Involvement of local people in forest management for reforestation on degraded forest land at Arabari in South West Bengal is a success story. Thus community involvement is not merely a goal, in the context of social forestry, but also a necessity if the forest needs are to be met (GOWB, 1986).

The existing practice of forestry is lagging far behind the need of the people—mainly the rural people. They want thorns for fencing, protection of agricultural lands against wind, agricultural implements, construction materials etc. To meet these demands 'social forestry' with its own institutional framework may be a more fruitful strategy.

Most of the rural people of the country have been getting their requirements of fuelwood partly from the tree grown on farm (extension forestry) and partly from the protected and reserved forests. But the demand has been rising continuously with the increase in population. It appears that there is no other viable way to fill up this widening gap except 'social forestry'.

Social forestry may provide an important source of income and employment in the rural areas since a number of people may find employment in groundwork, planting, protecting, tending, harvesting etc. Many may find employment in ancillary occupations. Chetty (1985) lists 69 cottage and small scale industries which get raw materials from social forestry.

Over grazing by ever increasing livestock population is a

chronic problem in the country like India. 'Social Forestry' can mitigate the problem by providing green or dry fodder or by providing grazing facilities to the cattle.

The report of the Fuel policy committee shows that fuelwood continues to be the main source of non-commercial fuels in the rural areas (GOI, 1965). The study of Chhedilal (1970) indicates that in India about 4000 million tonnes of wet dung are used as domestic fuel annually. Social forestry programme can release cowdung for its more valuable and cheaper use as manure and thereby enhance agricultural productivity by providing adequate fuelwood at reasonable prices. Success of social forestry can ensure the flow of all the environmental implications of forest resource.

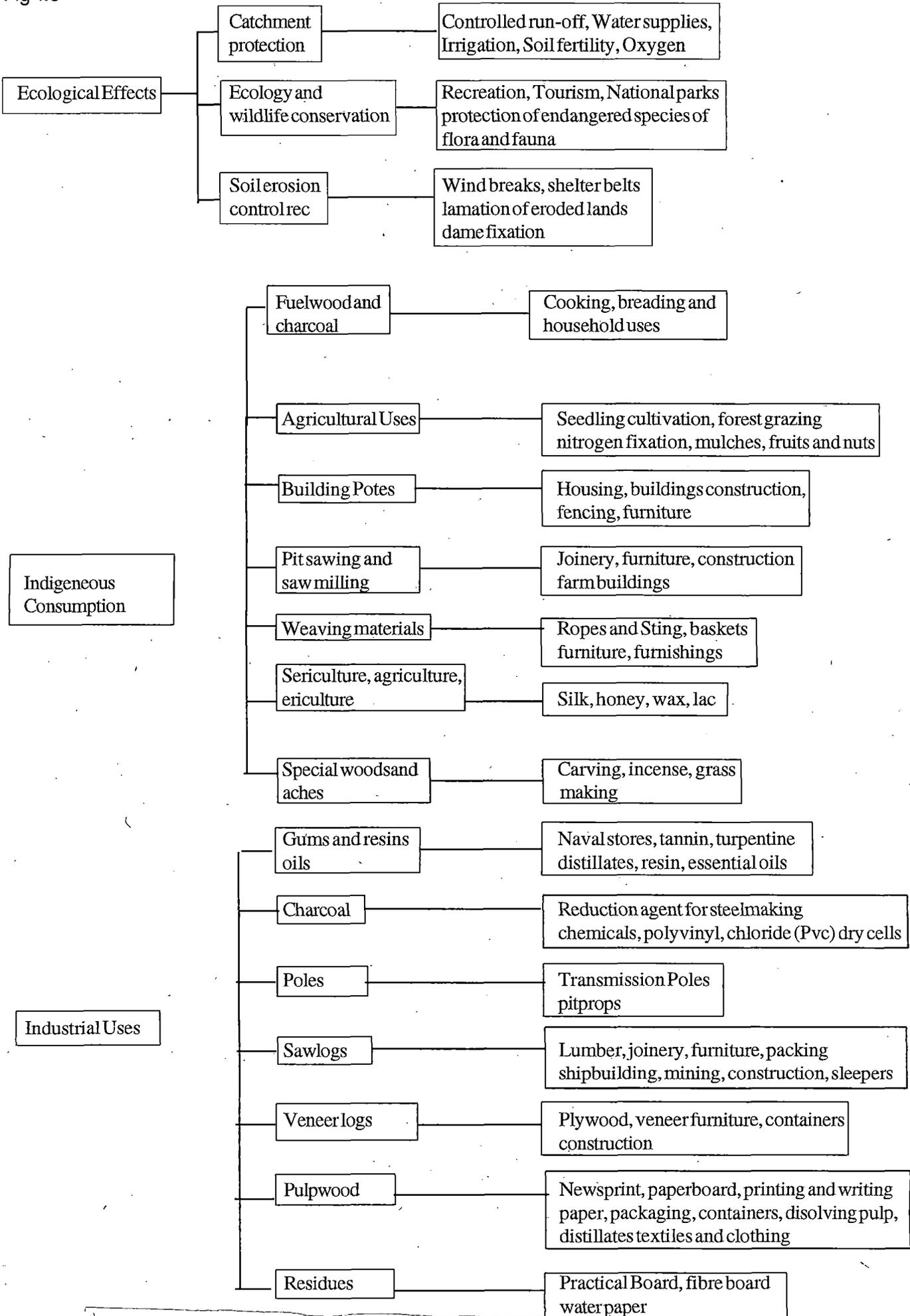
4.7 Social Forestry as a vehicle of rural Development

Social forestry can contribute greatly to rural development. Besides many direct benefits it has as already mentioned, many indirect benefits in the form of poverty alleviation, unemployment mitigation, increased consumption etc. Social forestry with its different components like, farm forestry, extension forestry, agro forestry, mixed forestry, village woodlots, community forestry etc. can help in catalysing the socio-economic development and checking the age-old rivalry between the major land uses particularly in the developing countries like India where capital is scarce, surplus labour is abundant, land-man ratio is high. It can offer the opportunity of creation of stocks of disposable assets in the form of renewable trees to supplement the subsistence requirements of the poor, who have little purchasing power, scant assets, and little political influence, in normal times and in contingencies. The multiplier effects and forward and backward linkages of social forestry in an agrarian economy such as India are enormous (Sharma et. al., 1990).

We may point out three important ways in which social forestry may contribute to rural development (FAO, 1981) :

a) maintaining its ecological balances; b) increasing the supply of products for local consumption; c) improving the benefits from industrial uses of timber. This role of social forestry in rural development can better be explained with the help of the following schematic form (figure 4.5) :

Fig 4.5



Source : World Bank. Forestry : Sector policy paper, washington. D.C.

Under 'ecological effects', some of the major conservation measures necessary to ensure catchment protection, soil erosion control, maintenance and safeguarding of supplies of usual species of flora and fauna have been included. The products of all the factors which are of concern to the maintenance of a viable farming system are included under "indigeneous consumption". The supply of fuelwood and charcoal is the main source of energy for the rural population and is also important in many places to the urban communities. Local supplies of forest products are the principal source of building materials, fencing and furniture in rural areas and in some places other products such as honey, silk and wood for carving are major sources of income.

"Industrial uses " include all major forest products which are produced for commercial purpose the sawlogs, poles, pulpwood etc. The possibility of income generation to the rural dwellers from the "industrial uses" depends upon the employment possibilities in felling and extraction, the economies of location of the processing plant etc. There are various factors which are very much important in determining the place of forestry in rural development as it has been explained in F.A.O forestry paper (FAO, 1981) as shown in figure 4.6 in the next page.

4.8 Working of the social forestry scheme in West Bengal.

As we have discussed in chapter 2, West Bengal , with an area of 88,752 sq. kms. extending from the sea coast in the south to the Himalayas in the north, supports a population of nearly 68 million with a high population density of 766 per sq. kms. as per 1991 census. The forest area of the State is only 13.4 per cent, bulk of which occur in three distinct zones in the north, south-west, and south. Despite of 125 years of scientific forest management in the state, the forest has been destructed, land has been degraded and thereby created a serious ecological and socio-economic crisis. In the three districts of Midnapur, Bankura and Purulia of the State, 272,000 ha land is suffering from serious land degradation (GOWB, 1992:P.5). The land utilisation position and the extent of different categories of wastelands available in the State is shown in table 4.3 and 4.4 repectively. These two tables show

FIGURE 4.6: FACTORS ANALYSING THE PLACE OF FORESTRY IN RURAL DEVELOPMENT

Factors

Possible response

Competition for land (trees are less intensive use of land than crops)

Intercrop trees and Crops

Competition for forest land

Allocate forest land rationally between trees and crops

Improve non-food benefit to forest Communities : forest and forest industries employment, Secondary forest product income, Social infrastructure

Competition for crop and grazing land to afforest

Plant trees on road sides, riverbanks field boundaries and other unused areas, areas marginal for crop production erodible areas unsuitable for crop production and grazing

Improve productivity on the better arable areas in order to release land for tree growing

Plant multiple - use species or mixtures of species to increase productivity

Intercrop trees with other crops or combine with grazing

Introduce additional sources of income (e.g. beekeeping)

Time scale for Forestry (delayed returns from tree growing)

Plant multiple - use species, or mixtures of species, which give some early return

Output from trees will not meet immediate needs

Provide financial support during the established periods : low-interest loans, grants, subsidies, wage employment

Introduce or expand complementary non-forestry sources of income

TABLE 4.3 LAND USE CLASSIFICATION OF WEST BENGAL (THOUSAND HECTARES)

Reporting area	Forests	Area put to non-agricultural uses	Barren and un-culturable land	Permanent pastures and other grazing land	Land under misc. tree and groves not included in net shown area	Culturable waste land	Fallow land other than current falllows	Current fallows	Net area sown	Total cropped area	Cropping intensity	Net irrigated area	Gross irrigated area
8846	1184	1293	121	4	162	374	61	82	5562	7004	125.9	1834	1834

Source : Government of India, National Wasteland Development Board, Ministry of Environment and Forests, Mission Document 1991, P.1

Table 4.4 Extent of different categories of Waste lands in West Bengal

(Area in Sq. Kms)

Name of Districts	Gullied or ravinous land	Upland with or without Scrub	Water logged and Marshy land	Land affected by Salinity/Alkalinity -coastal -inland	Underutilised degraded notified forest land	Shifting cultivation area	Degraded land under plantation crops	Degraded pastures /grazing lands	Mining Industrial wastelands	Sands/Deserts coastal	Steep sloping area	Bare Rocky /stony waste/sheet rock area	Snow Covered or glacial area	Total	Geographical area of district
Bankura	58.79	363.49	1.13	0.00	191.02	0.00	0.00	0.00	0.00	0.00	0.00	19.94	0.00	634.37	6882.00
Purulia	68.85	498.32	0.00	0.00	172.34	0.00	0.00	34.80	0.00	0.00	4.54	103.54	0.00	883.39	6259.00
Midnapur	43.08	118.37	11.06	32.23	232.82	0.00	0.00	23.48	0.00	126.80	0.00	6.56	0.00	594.40	14081.00
Total	171.72	980.18	12.19	32.23	596.18	0.00	0.00	58.28	0.00	126.80	4.54	130.04	0.00	2112.16	27222.00

Source : Government of India, National Wastelands Development Board, Ministry of Environment and Forests, Mission Document, 1991, P.31.

that there is enough scope of social forestry and indeed, the implementation of social forestry programmes has played an important role in this state in general and in the three districts viz. Bankura, Midnapur and Purulia in particular. This social forestry project-third in India, has been functioning with the assistance of World Bank since the year 1981-82. The objectives of this programme, as it has been stated in the guiding principles, social forestry project, west bengal (GOWB, 1980 : P.26) are :

a) To meet the most urgent requirement of fuelwood in the shortest possible time and to provide poles, small-timber, bamboo, fodder, fruits and other minor forest products for the basic requirements of the rural populace;

b) To induce community participation in creating, maintaining and protecting the plantation programme to be launched for such purpose so as to share the benefits in the contemplated joint management programmes; and

c) To provide employment to the unemployed and underemployed local people particularly the landless agricultural labourers including tribals, scheduled castes, other traditionally weaker sections of the rural communities. The programme includes creation of farm forestry on private lands of small and marginal farmers, establishment village woodlot, in the community land with the help of panchayat, plantations along the strips of roads, canals and railroads, reforestation and rehabilitation of degraded forests etc. There were twelve different models under the following four components of social forestry in the state (GOWB, 1982):

i) strip plantation (Model 1-4) ie. Model-1 : National Highway (Broad); Model-2 : National Highway (Narrow); Model-3 : State Highways and other roads; Model-4 : Embankment, canal bank, river bank, railway side.

ii) Village woodlot (Model 5-7) ie. Model -5 : Panchyat or other common land of Hill; Model-6: Government vested land, panchyat land of Gangetic plain; Model-7 : Panchayat lands of Laterite Zone.

iii) Farm Forestry (Model 8-10) ie. Model -8 : Private land in Hill; Model-9 : Private land in Gangetic Plain; Model-10 Private land in Laterite zone.

iv) Rehabilitation of Degraded forests (Model 1-12) ie.

Model -11 : Government forest land where there are more than 200 trees/stem.

The performance of social forestry project in West Bengal till 1990 is very satisfactory when compared with any other state of India. The following table (Table 4.5) gives a glimpse of this.

TABLE 4.5 : Abstract of Physical Progress (1981-90) of West Bengal social Forestry Project

Components	Appraisal Target (ha)	Actual Achievement (ha)
1. Strip Plantations	20,000	23,784
2. Village Woodlot	6000	2405
3. Farm forestry	75000	1,50,554
4. Rehabilitation of Degraded Forests	15000	65,011
Total	1,16,000	2,41,754

It is observed from the table that the actual achievements have far exceeded the appraisal targets. In its completion report (GOWB, 1992), Forest department remarks, "The project has exceeded the overall planting targets set at appraisal. A total of 2,42,000 ha of plantations, including 1,50,000 ha of farm forestry, were established, or 260% of the appraisal target. However, seedlings planted were mainly fuelwood and timber species. Survival rates ranging from 60% to 80% under RDF (Rehabilitation of Degraded Forest), the Social Forestry Wing established a total of 11,926 ha of replanting of gaps using mainly eucalyptus in the complete sal degraded forest areas and managed about 53,100 ha of coppicing of sal stumps. The replanting was undertaken also with soil and water conservation measures and its performance was satisfactory".

Social forestry wing has successfully implemented the plantation programmes in the 7 divisions and 16 districts. Districtwise achievement of different categories of plantations are shown in table 4.6.

From table 4.6 it is clear that achievements in farm forestry were beyond expectations. A total of 266.5 million seedlings were distributed to about 4,60,000 farmers covering

TABLE 4.6 : DISTRICT WISE ACHIEVEMENT OF DIFFERENT CATEGORIES OF PLANTATIONS (in Ha).

District	Road side	Cannal bank	Embankment	River bank	Railway side	Village woodlot	Farm forestry	RDF(p)	RDF(C)	Total
Darjeeling	252	145	5	494	10	209	7,857	286	-	9,258
Jalpaiguri	502	41	40	1225	100	216	8,310	551	-	10985
CoochBehar	400	20	70	640	50	105	7590	500	-	9375
West										
Dinajpur	571	261	180	238	162	153	5885	145	-	7595
Maldah	564	248	222	145	168	152	361	158	-	5267
Murshidabad	562	222	66	55	184	22	2095	63	-	3269
Nadia	688	235	95	110	213	33	328	88	-	4750
Birbhum	933	1680	24	552	270	183	12,555	1340	1280	18817
Bankura	870	715	90	120	185	253	20282	3645	11156	37316
Midnapur	1244	1810	499	460	206	632	35701	3,465	28383	72400
Burdwan	887	874	71	231	291	262	14495	975	2618	20704
Purulia	533	135	-	120	330	60	13144	530	9648	24500
Howrah	181	259	17	40	71	21	3990	-	-	4579
Hooghly	131	118	22	40	51	63	4236	-	-	4661
24- Parganas	350	102	35	10	44	41	7516	180	-	8278
Total	8668	6865	1436	4480	2335	2405	150554	11926	53085	241754

Source : Monitoring Information 1981-90, Monitoring and Evaluation cell, social forestry wing Government. of West Bengal. about 1,50,554 ha of plantation, though the survival rate was low at about 46% due to inadequate maintenance and protection resulting from inadequate technical advice from social forestry wing (GOWB, 1992). In the state plantations were established in three different agro-climatic zones : one percent in the coastal zone, 24% in the alluvial zone and 75% in laterite zone. The project has increased the forest cover in the state. This is shown in table 4.7.

TABLE 4.7 : Districtwise % increase in tree cover from 1981 to 1990

District	Area (Ha)	Afforestation in Non-forest Area (Ha)	Percentage
Darjeeling	3,14,900	8,972	2.85
Jalpaiguri	6,22,700	10,434	1.68
Cooch Behar	3,38,700	8,875	2.62
Bankura	6,88,200	22,515	3.27
Midnapur	14,08,100	40,552	2.88
Burdwan	7,02,400	17,111	2.44
Purulia	6,25,900	14,322	2.29
Birbhum	4,54,500	16,197	3.56
Hoogly	3,14,900	4,661	1.48
Nadia	3,92,700	4,662	1.19
Murshidabad	5,32,400	3,206	0.60
Malda	3,73,300	5,109	1.37
West Dinajpur	5,35,800	7,450	1.39
24 Paraganas			
(incl. Calcutta)	14,24,000	8,098	0.57
Howrah	1,46,700	4,579	3.12
Total	88,75,2000	176,743	1.99

Source : Monitoring Information 1981-90, Monitoring and Evaluation Cell, Social Forestry wing, Government of West Bengal.

Field achievement of the project is also well beyond expectations which are in Table 4.8

1. Total Road length covered :
 - a) National Highways -1113 kms.
 - b) Other Road -12763 kms.
2. Total Length covered for :
 - a) Canal Bank -3922 kms.
 - b) River Bank -2546 kms.
 - c) Embankment -846 kms.
 - d) Railway Land -1341 kms.
3. No. of Panchayats involved in Village woodlot : 1939 Nos.
4. In farm forestry component :
 - a) Seedling distributed -26 crores 80 lakhs
 - b) Villages involved - 14580 nos.
 - c) Participants Received Seedlings - 429332 Nos.
 - d) Persons received incentives - 212275 nos.

Source ; Social forestry projects, West Bengal, highlights (1981-90), Monitoring and Evaluation cell Social Forestry Wing, 1992.

Before the publication of "Monitoring Information 1981-90" and "Highlights (1981-90)", social forestry wing published the following four interim evaluation reports covering upto 1988 plantations : i) "Evaluation : An interim report " covering plantation of 1981-82; ii) "Evaluation : Second Inerim Report" covering plantation of 1983, 1984, 1985; iii) "Interim Evaluation Report, second Assessment (1981-86)" containing review of plantations from 1981-85 and the first evaluation of the plantations of 1986; and iv) "Interim Evaluation Report 1987 and 1988"

Key findings of these four evaluation reports are almost the same and these can be summarised as follows :

- i) The project in general has been progressing well.
- ii) It was possible to identify the target group & response from them was overwhelming (where target group refers to rural

landless poor).

iii) Village woodlot could not make much headway.

iv) Social forestry was emerging as an alternative rural economy.

v) A shift from monoculture to polyculture could be effected successfully.

vi) Group farm forests was practised wherever possible.

vii) There was a glut in marketing of farm forestry produce.

viii) Marketing support system is not good.

ix) Staff shortage became a constraint.

x) Strip plantation and regeneration of degraded forests are satisfactory.

In these reports the Forest Department identified the key contributing factors for the success of farm forests. They are - i) availability of the wastelands, ii) Free supply of seedlings with additional materials like fertilisers, insecticides etc. and cash grants for compensating national income foregone; iii) Setting up of a network of well distributed nurseries within the convenient distance from the villages; iv) excellent interaction of field staff with the target groups; and v) prospect of favourable marketability of produce.

On the other hand, the Forest Department identified the following reasons for shortfall of village woodlot :

i) Lack of community land; ii) lack of suitable local leadership; iii) lack of technical and financial capacity; iv) somewhat obscure perceived individual benefit from village woodlot; and v) absence of social cohesion and the community being highly fragmented professionally and economically.

In its project report (GOWB, 1992), the social forestry wing claimed that overall, the project achieved its main objectives that are as follows : i) In terms of rural employment about 25 million mandays of employment were generated during the project implementation period compared with the appraisal estimate of 15 million man-days. Most of the people benefiting from employment were landless farm labourers, scheduled castes and tribes. ii) By and large, this programme stimulated people's awareness of the economic importance of

trees. There has been a marked improvement in enthusiasm of the people who got deeply involved in the programme and adopted it as an alternative farm production system and this has contributed to increase gross rural wealth. In the rural side, people are becoming more conscious about the land use pattern in the sense that they can put their so long unproductive capital to some use by way of tree planting which can generate subsidiary income for them in future years. Thus the object of the programme to enable poor rural populace including the tribals to lead to a life of more dignity and less tension has been fulfilled atleast to a limited extent.

iii) Social forestry programme developed sufficient awareness among the people for the ecological importance of trees. Long stretches of strip plantation, river bank plantation, reforestation of degraded forests and farm forestry become possible without fencing. In real sense, the attitude of the people has been changed and people developed a love for trees.

iv) This programme reduced the gap between forest officials and local people. Many forest officials have become people-oriented and have developed the skill of involving people in forestry activities. As a result community participation, in planning, management and benefit-sharing, though lacking in initial years, has considerably increased.

v) The project has developed sufficient skilled manpower for social forestry development programme and achieved the project objectives of forest production. There would be about 10.6 million tons of fuelwood 120000m³ of timber 15.7 million tons of fodder, and 15.9 million tons of poles and pulpwood. (GOWB, 1992). Winning the four "Indira Priyadarshini Brikshamitra" awards in 1987, the state positioned itself in the frontline of the social forestry programmes in India (GOWB, 1987). It also won the 'Paulgauti' award given by the World Wildlife Fund in 1994 for the best performance in India. These speak enough about the working of the schemes under social forestry programme in West Bengal.

CHAPTER 5

An Impact Analysis Based On Micro Studies

One important question related to the problem of social forestry is whether the benefits from this institutional modification would substantially exceed the costs. The answer could be found by using the technique of social Cost-Benefit analysis. This chapter attempts to make this exercise.

5.1

It has been stated in an earlier section that the Social Forestry wing of the Forest Department, Government of West Bengal (GOWB) has achieved its main objectives and generated significant positive impact. Here we shall examine these claims based on some in-depth micro level studies. We shall particularly attempt to see whether the Social Forestry schemes have been able to garner net social benefits. If so how and why. We shall also try to explore the implications of our findings for appropriate institutions for sustainable forest resources.

If distributive gains are important to society, then the society could well attach a higher importance to consumption increment of poorer individuals. This concept, as in Little-Mirrless (LM) System (Little and Mirrless, 1974) can be developed into a comprehensive system of social cost-benefit analysis¹.

The specific form of the social weighting functions proposed is:

$$d = MU_1 / MU_2 = (C_1)^n / (C_2)^n = (C_1 / C_2)^n$$

where the relative weight, d , of incremental consumption at income levels C_1 and C_2 (represented by the ratio of marginal utility to society of a rupees's consumption increment at the respective income levels) is the relative income level C_1 / C_2 , raised to some power n , which would be negative in the above formulation. Sometimes, n is considered to take a positive value and in this case the index is negative, $d = (C_1 / C_2)^{-n}$. The implication is that marginal utility of consumption

1. The following discussions draws mainly from Kumar (1992)

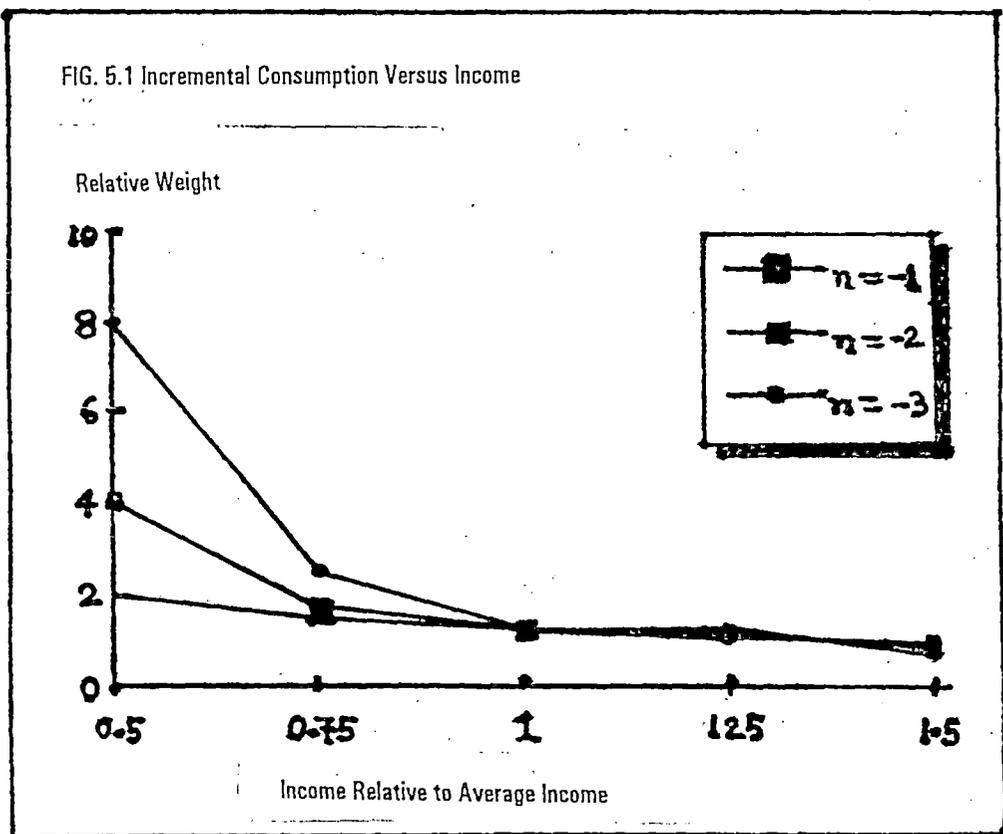
is related to income level by $MU=C^n$. Thus, the higher the income level, the lower is the relative social weightage attributed to consumption increments accruing to individuals at that income level, provided the absolute value of n is greater than 1. The parameter, n , is also termed the elasticity of marginal social utility of consumption:

$$\begin{aligned} & \text{Elasticity of marginal social utility of consumption} \\ & = \text{relative change in marginal utility/relative change in consumption} \\ & = \frac{dMU/MU}{dc/c} = \frac{-nc^{n-1} dc/c}{dc/c} = n \end{aligned}$$

If n is highly negative, say -3, the relative value of incremental consumption falls very steeply as income rises (shown in Fig-5.1). If n is less negative, say -1, the fall is less steep. In $n=0$, society values consumption increments equally whatever the income level of the consumer. A highly negative n is, therefore synonymous with high concern for redistribution. When applied to Government investment, it is expected that projects whose benefits flow directly to the poorer sections will be favoured, even if not economically efficient in the neoclassical sense. Since my study is mainly related to a target population -disadvantaged and poorer sections of village population, I opt for not bringing the issue of distributional weights in my Cost-Benefit exercise.

Principally, it is the discount rate that arbitrates between time intervals. To a private individual every use of investible funds has an opportunity costs either in the form of returns (financial) that could have been obtained from alternative uses or from simply investing them at the market rate of interest. For the society as a whole, the cost of using available investment funds in a particular project is the marginal rate of return. One needs to assume that such resources have been invested efficiently in the past. In the case of high return uses, the opportunity costs and hence the discount rate would be high. If this high rate were applied in a cost-benefit analysis (CBA) of all alternative uses, the neoclassical optimal use of investible resources would be attained. Conversely, the amount of investment and number of projects would be determined by the marginal discount rate applied.

FIG. 5.1 Incremental Consumption Versus Income



5.2

To make it operational, here I use the term "Social forestry" as the forestry which is undertaken "by" and "with" the people on common lands of villages or government (public) lands earmarked for the purpose. Here I hypothesise and try to prove on the basis of selected projects that social forestry is both economically and financially viable. So is also the case with the farm forestry on private holdings. To prove this I follow the traditional cost-benefit analysis which is part economics, part accounting and part good old-fashioned detective work (Nadkarni et.al., 1992)..

A social forestry project generate both direct and indirect benefits. But under the present socio-economic structure of our rural economy, indirect benefits are quite irrelevant in the sense that people do not bother much about it and they are mostly concerned about what they will be or are getting directly from the projects. Thus in the revenue side of benefits I consider only the direct benefits which they received from the projects. In this sense I under-estimate the benefits. The returns from social forestry projects may not always be in terms of direct pecuniary profits as in case of farm forestry but may also be returns in Kind, in the form of goods of local uses. I consider both cash and imputed monetary value of kind.

The direct benefits are in terms of green leaves harvested or expected to be collected for manufacturing disposable leafy plates etc., dry leaves or side branches harvested or expected to be gathered for fuel, fruits or seeds harvested or expected to be harvested, poles harvested or expected to be harvested, volume of timber expected from the mature trees etc. irrespective of whether they are sold or given free. The other questions of economic significance like optimum density, optimum life span of cutting down trees for timber etc, have been ignored here. The expenditures on preparation of soil, on manure, recurring expenditures on preparation of soil, on manure, recurring expenditure on watch and ward, opportunity cost incurred interms of grazing foregone etc. have been included. However, costs incurred on Government staffs in terms of their salaries or transport which are attributable to the projects have been excluded here. It is very difficult to

calculate the actual costs incurred on the staffs on a particular project as data are not available and as they have to look after the initiation of several projects and several works at different locations at a time. It will not under estimate the cost as I include additionally maintenance charge for watch and ward (actually incurred) even though there is no such official provision for these in actual practice.

In economic evaluation of projects, problems arise due to factors like time preference and inflation. Nadkarni et. al. (1992) resolve this problem by expressing the flows of benefits and costs in terms of constant prices, a reasonable rate of discount in real terms which is taken as the difference between average rates of interest on institutional lending and average rate of inflation in India during the last five years or so. It is claimed that this rate of discount is indicative of social time preference, netted for inflation and other factors like risk of default, social policy of discouraging investment in certain directions and so on. On the basis of such considerations I take a kind of judgemental discount rate as 4 percent and 6 percent. These are not actually derived since institutional lending rates vary widely in a given period of time. For sensitivity analysis, I evaluate benefits at variable rates of discount since future is uncertain and the risk premium for future uncertainty can increase with increasing horizon of time span even in real terms. I have used variable rates of discount, the rates being 4 percent for the first 10 years, 6 percent for the next 10 years and 9 percent for the remaining years beyond 20.

Pricing is also a great problem in economic evaluation of a social forestry project. Usually, Shadow prices are used to reflect real scarcity instead of market prices. Following Nadkarni et. al (1992) I use 1993-94 market prices prevailing in the villages concerned which the farmers either got or expected to get by selling their own timber, or other bio-mass, or where such prices are not available, I take ex-depot prices quoted by the forest department for timber or sal pole. In some instance, I take the prices which the villagers are prepared to pay to obtain such usefruct.

I undertook my field work in 1994. Not all the projects were initiated in the same year and some investments were

undertaken in earlier years. All investments here, are expressed in terms of 1993-94 prices by raising earlier figures by the same proportion as the rise in money wages paid to unskilled labours, in the region for soil work etc. I do it because social forestry projects involve mainly labour-intensive works. I use actual wage rates for labour hired in social forestry projects both at the initial and at the maintenance phases, instead of any shadow wage rate to assess economic as well as financial viability of the projects. I have estimated the opportunity cost as arising throughout the project period, for this I collected informations on the number of animals - cows, buffaloes, bullocks, sheep and goats - in standardised units (like Nadkarni et. al, 1992) from the selected villages.

In my study area of South-west Bengal there are enough barren, uncultivable up and high lands. Cultivable lands are also available for grazing for 6 to 9 months due to typical agricultural crop pattern practiced in the region. There is no boundary for grazing -cattle can move easily from one village area to another village area. So it is very difficult to calculate alternative available grazing lands for a particular village. Except during rainy season grass cover is usually very poor. For this reason opportunity cost is not treated as a very important factor. However, to calculate the opportunity cost I use a simple method which is popularly known as a woman's calculation (MEYELI HISAB) in the rural areas of Bengal. Here I take the valuation of grass on the basis of the deprivation of a standard unit of cattle due to plantation in the project. The household had to purchase this quantum from the local market if he/she so wished. This amount of grass is in addition to the agricultural crop residues (green or dry), fodder raised on the farms etc. usually given by the owner of the cattle for feed. The valuation of grass, as I get it, varies from Rs. 4 to Rs 6 per cattle per day. In the coppicing sal forests of South-West Bengal cattles are deprived of grazing facilities for only four months only in the first year of plantation (from June to September when other cultivable lands are not available for grazing). The growth of coppicing sal is very fast (in most cases it is more than 7 to 8 meters) in the initial years. Once it attains the height of 7 to 8 metres, the project is again made available for grazing purposes. For other plantations, I calculate the opportunity cost at the same rate using the same

method.

In the "farm forestry" and "river bank plantation" of North Bengal, opportunity cost does not arise as the project lands considered there have virtually no alternative uses. In the river bank, lands are sandy and some areas are covered with thatch grasses which are not consumed by cattles as food. Again, the lands used in the farm forestry, are small, scattered, and infertile and barren. They have either no other uses or have very insignificant uses. There is no provision for costs for watch and ward except for the three initial years in the new plantation (e.g. in the case of River bank plantation before handing over to the beneficiaries). However I assume it as between Rs. 500 to Rs. 700 per month per project. I think it is quite reasonable because patrolling-team required some contingency expenditure for smoking biri, battery, torchlight and for some other related appliances.

In our economic evaluation another important consideration is the time period for which the stream of benefits and costs to be calculated. In this study I consider the flows of benefits and costs over a period of 55 years for South-Bengal projects and 40 years for the North-Bengal projects¹. I consider these time periods on the basis of my interview with villagers and forest officials. Most of the species available in the South-Bengal projects are sal, cashew, akashmani, kend, mahua etc². Which may last well beyond 55 years. The species planted in the North-Bengal projects are Sisso, Akashmani, Teak, Khair, Sirish, Gamar, Mandani, Chikrashi, Ghora-Neem, Simul, Kadam, Subabul, Minjiri, Jarul etc. which may last well beyond 40 years but the Forest Department suggests and advices to cut it down within 40 years. There are some species like Subabul, Ghora Neem, Kadam etc. whose life span is much shorter than 40 years. I ignore replanting and consider the flows pertaining to plantation as existing during my field work. I collected data on benefits and costs and other informations related to projects at two levels. I collected project level data through questionnaire method, visiting the project area

1. Details of the geographical division follows.

2. Section on Glossary contains the details.

and spending several days in respective spots and interviewing participant villagers local forest officials. Apart from initial expenditure I took note of recurrent expenditure, number of trees observed or reported, type of species, leaves, sidebranches collected by villagers etc. I collected secondary data from the officials involved in the projects. I met a number of forest officials and villagers to collect the information regarding the life span, the average age at which they are expected to be cut, usufruct expected every year and their prices in the respective villages in 1993-94, the volume of timber expected from a mature tree and the prices expected from their sale etc. for different types of trees. Details of the estimate is shown in Appendix - 1. Composition of the sum of benefits and costs at present (discounted) values is shown in Appendix - 2.

To assess the economic and financial worthwhileness I use three measures (FRASER, 1977) ; net present value (NPV), benefit-cost ratio (BCR), and internal rate of return (IRR). The NPV refers to a discounted measure of future flows of net benefits in rupee terms. The stream of benefits and costs are discounted to get the present values and then NPV is obtained. As the project areas differ widely I calculate PV, NPV on per hectare basis (as are shown in the following respective tables) so that NPVs can be compared across different projects. The second measure BCR refers to the ratio between discounted benefits and the discounted costs (ie. $BCR = \text{Discounted benefits} / \text{Discounted costs}$). The third measure IRR refers to that rate of discount which would make the NPV zero ie. discounted benefits = Initial costs. It has been derived by calculating discounted benefits and discounted costs with several discount rates and plotting the discount rate against NPV. Thus IRR is that rate of discount where discounted present value of benefits is equal to the initial cost of the project. It may be pointed out here that it is not known exactly what level of IRR is economically worthwhile but where it is high enough it may not create any significant problem. (Nadkarni et.al., 1992)

The social forestry projects in the state of W.B. are well established. I choose three districts - Bankura, Purulia and Midnapur from the South and three districts -Cooch Behar, Darjeeling and Jalpaiguri from the North.

THE SOUTH

In my study presence of forest protection committees plays an important role. Forest protection committees refers to the legal committees constituted for the purpose of regeneration, maintenance and protection of moribund sal and other hardwood forests with the active participation and involvement of local people where beneficiaries acting as members of such committees shall be allowed, as a measure of incentive, 25% of the usufructs. The early experience from the pilot project at Arabari in West Bengal paves the way for formation of such committees in the state. This approach totally changed the attitude and concept of forest management and attracted attention from forest administrators and planners at national and international levels.

I choose seven forest protection committees (FPCs) arbitrarily from the three districts of south-west Bengal where the 'joint forest protection committee' programme is well established : Karapara FPC, Asnasoli patharmari-Indkuri FPC, Suribanka FPC, Bansraya FPC, Sumaidihi FPC, Birkham FPC, and Dharagram FPC. A profile regarding the FPCs are presented below in table 5.1 which shows their location, year of registration/starting, the type of species planted, population of respective villages as in 1994 and animal population in standardised unit, tree density etc. All the committees were set up for degraded forest land and organised by the Forest Department.

As observed, in the coppicing sal forests of south-West Bengal benefits start flowing from the second year of the initiation. In the 2nd and 4th year, they provide 6-7 cartload of firewood @Rs. 25 per cart-load (buffalo) per hectare or Rs. 30 per cartload (Bullock) per hectare and in the 7th year they give 10-12 stacks of firewood per hectare [one stack = $1.5m^L \times 1m^H \times .75^B = 1.125 m^3$ where L, H & B stand for length, height and breadth] at the rate of Rs.160-170 per stack. In the coppicing year i.e. 11-12th year they provide 800-850 poles per hectare at the rate of Rs.15 per pole (ex-auction rate), 30-50 stacks of firewood per hectare at the rate of Rs. 160-70 per stack and 12-15 cartload of buckles per hectare for firewood at the rate of Rs. 25 per cartload, 15-16 cartload of brushwood per hectare at the rate of Rs. 25 per cartload. Along with these benefits, a moderate sal forest gives green leaf for sal-plate over 6-7 months (from April to October) the value of which amounts to Rs. 1000 per hectare per year; kend leaf for biri worth Rs 300 per hectare per year for two months (from february to march); mushrooms worth Rs. 1000-1500 per hectare

per year (from July to September) ; Mahua (from march to april) worth Rs. 400-500 per hectare per year; and dryleaf (from December to February) worth Rs. 200-300 per hectare per year.

TABLE 5.1 : PROFILE OF THE PROTECTION COMMITTEES AND CONCERNED VILLAGES

(Protection Committees)

Feature	Karapara	Asnasoli	Suribanka	Bansraya	Samaidihi	Birkham	Dharagram
1. Location [†] (District)	Bankura	Midnapur	Midnapur	Puruliya	Puriliya	Bannkur	Bankura
2. Year of Starting/ registration	1990-91	1990-91	1990-91	1990-91	1990-91	1989-90	1989-90
3. Project Area (HQ.)	40	406	101.59	100*	177.33	61.96	69.33
4. Village Population (1994)	292	822	512	640	1236	223	416
5. Animal in standardised units (1944)**	213	548	256	300	855	120	152
6. Type of plantation and main tree species	Mixed: Sal, Kend	Mixed: Sal, Mahua Kend	Commercial: Kazu, Eucaly -tus.	Mixed: Sal, Mahu Kend	Mixed: Sal, Mahua Kend	Mixed: Akashmani Eucalyptus	Mixed: Akashmani Eucalyp tus
7. Tree den- sity per Hectare***	800	800	354	800	800	1425	1425

Notes :

+ Details can be found in Appendix Fig A-1 to A-7

* In Bansraya FPC actual forest existing at present is 100 Ha but officially it is 232.72 Ha.

** One animal unit = 1 cow = 1 bullock = 1 buffalo = 5 sheep = 5 goats

*** Tree density has been calculated on the basis of the report of the forest officials and participant villagers supported by visual observation of projects and not by actual counting.

In south West Bengal sal is coppiced generally after every 10-12 years for better growth in the next period. I take 11 year rotation period of coppicing. The last rate of price available at the time of survey of a 11-years old pole was found to be worth Rs. 15 only. During the current year (1994) no auction of sal forest occurred as the GOWB banned it due to high rate of deforestation in the region. The rate of sal pole is quite low. There are only a few auctioners (in most cases two or three), as it is reported by the experienced villagers, who can easily negotiate within themselves and oligopsonistically purchase it at a very low price. However, in the absence of alternative information, in my exercise I use this rate. In this sense benefits are underestimated here since felling of Mahua and Kend has been banned by the GOWB, timber value of Mahua and Kend are not considered here.

Initial cost of coppicing sal forest is almost nil or very negligible. In the initial year i.e. coppicing year, the coppicing expenditure varies from 12-14 labour (or mandays) per hectare at the wage rate prevailing in the market (i.e. Rs. 36.19 per labour in 1993-94). In this study I do not include this cost as neither the corresponding benefits were distributed among the villagers nor the villagers did participate in the process at that point of time. It is only after coppicing that the forest came under the purview of joint committees formed with forest officials and villagers. The cost of multiple-suit cutting (M.S) in the 3rd/4th and 7th year varies from 6 to 8 mandays/labour per hectare. In the 11th year, coppicing expenditure is Rs. 8 per pole which includes felling, debarking, stacking and carriage up to depot, and final stacking for auction. Firewood i.e. branches, tops and lops, barks are sold on the spot basis by contract system for which there is no cost for the purpose.

SENSITIVITY ANALYSIS OF ECONOMIC VIABILITY

I use different sets of assumptions to try out the robustness of the results through what is known as sensitivity

analysis. First I take benefits at full value of benefits as estimated by me. Then I uniformly reduce them by 50 per cent as expected benefits may fail in some years. Against the probability of full benefits realised (1) or none (0), a probability of 0.5 of the benefits being realised, does not seem an unreasonable assumption for the sensitivity analysis. From the two different sets of benefit levels ie. full and half, I deduct two different levels of costs. One excludes the opportunity costs in terms of grazing deprived on the social forestry project area and the other includes opportunity costs. These give 12 possibilities in deriving NPV and BCRs. In the case of IRR, the rate of discount is derived and not assumed and so there are only four possibilities. TABLE 5.2 presents the absolute magnitude of benefits (gross returns) and costs separately (in thousand rupees) per hectare of project areas.

Table 5.3 presents net present values (NPV) obtained after deducting costs from gross returns. They are sums of the present (discounted) values of flows of benefits, costs and NPV respectively up to 55 years. It may be recalled that not all flows are up to 55 years and that the flows for trees like eucalyptus, cashew and acacia auriculiformis are much shorter, but no replanting and resumed flows are assumed in these cases. It may, therefore, be misleading to divide the sum of present values of benefits and costs by 55 to derive the average value per year per hectare.

It is interesting to note that the FPC at Dharagram has both the highest benefits as well as highest costs and also the highest NPV per hectare (as it is seen from Table 5.3). It may be noted from Table 5.1 that the density of trees is highest in places containing eucalyptus and akashmani. The soil of the project is red laterite and it is on the slope of the masak hill. Quick growing species like eucalyptus and akashmani are appropriate. The Project is well managed where Panchayat members and people take active interest in the project.

On the other extreme, there is Karapara FPC which has the lowest, though positive NPV per hectare. It is a coppicing sal forest and it was completely degraded before the formation of FPC. As it is far from Urban areas, it suffers heavily from the greed of external forces like contractors, auctioners etc.

Table 5.2 PRESENT VALUE OF BENEFITS AND COSTS PERHECTARE OF PROJECT AREAS

(At 1993-94 prices summed up for flows up to 55 years)

(Values in thousand Rs.)

FPCS							
Rate of Discount	Karaparà	Asnasoli-Patharmari-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Present value of benefits (gross returns) Per hectare							
1. At full value of benefits estimated							
4 per cent	75	99	571	94	102	1181	1712
6 per cent	52	69	385	66	71	838	1204
4, 6 and 9 per cent	42	58	313	36	59	862	1229
2. If estimated value of benefits were to be lower by 50 percent							
4 per cent	38	50	285	47	51	590	856
6 per cent	26	35	192	33	36	419	602
4, 6 and 9 per cent	21	29	156	28	30	431	614
B Present value of costs per hectare							
1. Excluding opportunity cost in terms of grazing deprived							
4 per cent	17	14	9	15	14	11	11
6 per cent	11	9	8	10	9	10	10
4, 6 and 9 per cent	8	7	8	7	7	10	10
2. Including opportunity cost in terms of grazing deprived							
4 per cent	24	16	14	19	21	16	17
6 per cent	17	10	13	13	15	14	16
4, 6 and 9 per cent	14	8	13	10	12	15	15

Note : 1 the flow of benefits are summed up for 55 years. Life span of sal is taken as 55 years, the highest life span assumed for a tree and I take 11 years as the rotation period ie. coppicing is considered on 11 th yr, 22nd yr., 33rd yr., 44th yr., and 55th yr. Shorter life span are considered for quite a few trees like eucalyptus, cashew, akashmani, and no replanting and resumed flows are taken into account in such cases. For this reason, it would be misleading to convert the present values of costs and benefits into flow per year (divided by 55).

2. The costs exclude the overhead administration & supervision cost incurred by the department in terms of their salaries and transport.

3. The benefits and cost are comparable accross projects because they are all at 1993-94 prices and also expressed in terms of per hectare of respective project areas.

4. In two cases the benefits and costs are discounted at a uniform rate over the entire project period-in one case at 4 per cent, in another at 6 percent. In the third case I use variable rates of discount over the project period where the first ten years are discounted at 4percent , the next ten at 6 percent and the remaining period at 9 per cent.

Another test of economic viability considered here is a BCR. It indicates the productivity per unit of cost. It is shown in TABLE 5.4. It is the reciprocal of cost per unit of output. However, this is not a satisfactory criterion, because an enterprise can earn more profits than another in absolute terms even if the former has the lower productivity per unit of cost or higher cost per unit of output. But it is, nevertheless, important to make investment in social forestry as cost-effective as possible and from this point of view BCR is a useful indicator.

From the Table 5.4 it is seen that Dharagram has the highest BCR among the seven FPCs and Karapara has the lowest. It is interesting to note that Karapara FPC has the lowest NPV as well as the lowest BCR. Nonetheless, even this project obtains two times more benefits compared to cost incurred under the most rigorous test (Table 5.4 last row). Thus even a project, that seems to be least efficient or productive per unit of cost among the selected FPCs , is still economically worthwhile.

Table 5.5 presents the economic viability of the FPCs in terms of IRRs. Even the least IRR, applying the most rigorous test, is 32.5 per cent in the case of Karapara (as it is shown in the last row of table 5.5). This is quite high considering that the flows are at constant prices.

TABLE 5.3 : NET PRESENT VALUE OF PER HECTARE OF PROJECT AREA (1993-94 prices summed up for flows up to 55 years)

(Values in thousand Rs.)

FPCS							
Rate of Discount	Karapara	Asnasoli- Patharmari- Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full benefits net of costs excluding opportunity cost of grazing (A.1 minus B.I in table 5.2)							
4 per cent	58	85	561	80	88	1169	1702
6 per cent	41	60	376	56	62	827	1194
4, 6 and 9 per cent	34	50	304	48	52	852	1219
B Full benefits net of costs including opportunity cost of grazing (A.I minus B.2 in Table 5.2)							
4 per cent	51	83	556	75	80	1164	1696
6 per cent	35	58	371	53	56	823	1188
4, 6 and 9 per cent	29	49	299	46	48	847	1214
C Benefits reduced by 50 percent net of costs excluding opportunity cost of grazing (A.2 minus B.I in Table 5.2)							
4 per cent	21	35	276	32	36	579	845
6 per cent	15	25	184	23	26	409	592
4, 6 and 9 per cent	13	22	148	21	22	420	604
D Benefits reduced by 50 per cent net of costs including opportunity cost of grazing (A.2 minus B.2 in Table 5.2)							
4 per cent	13	33	271	28	30	574	840
6 per cent	9	24	179	20	21	404	587
4, 6 and 9 per cent	7	20	142	17	18	416	599

Notes: 1. See notes below Table 5.2.

2. The NPVs are here calculated from original figures and then rounded off. As such they may not accurately represent differences between respective A-s and B-s in Table 5.2 as they are also rounded off to thousand rupees.

TABLE 5.4 : BENEFIT-COST RATIOS.

(Present value of benefits per unit of present value of costs in rupees)

FPCs							
Rate of Discount	Karapara	Asna-Path-Indukuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full benefits over costs excluding opportunity cost of grazing							
4 per cent	4.5	7.0	61.6	6.4	7.2	105	154
6 per cent	4.6	7.4	45.4	6.8	7.6	83	120
4, 6 and 9 per cent	5.0	8.4	36.2	7.7	8.6	81	117
B Full benefits over costs including opportunity cost of grazing							
4 per cent	3.1	6.2	39.5	4.9	4.8	73	103
6 per cent	3.0	6.4	28.9	5.0	4.8	57	79
4, 6 and 9 per cent	3.1	7.0	22.9	5.4	5.1	56	77
C Benefits reduced by 50 percent over costs excluding opportunity cost of grazing							
4 per cent	2.3	3.5	30.8	3.2	3.6	52	77
6 per cent	2.3	3.7	22.7	3.4	3.8	41	60
4, 6 and 9 per cent	2.5	4.2	18.1	3.9	4.3	40	58
D Benefits reduced by 50 per cent over costs including opportunity cost of grazing							
4 per cent	1.5	3.0	19.7	2.5	2.4	36	51
6 per cent	1.5	3.2	14.4	2.5	2.4	28	40
4, 6 and 9 per cent	1.5	3.5	11.4	2.7	2.5	27	38

Notes : See Notes in Table 5.2

Therefore, all the three criteria- NPV, BCR and IRR - show the economic viability of the selected projects in a favourable light even under some more rigorous assumptions and they stand the test of sensitivity analysis. We now turn to financial viability.

FINANCIAL VIABILITY

In terms of financial viability, I try to find out whether the financial return expected from that part of the produce which is sold is commensurate with the paid out costs. The opportunity cost is not included here among the costs, since the analysis is in terms of actual cash return and cash costs.

TABLE 5.5 ; ECONOMIC VIABILITY IN TERMS OF INTERNAL RATES OF RETURNS
(per cent at constant prices)

	FPCs						
Assumption	Karapara	Asna-Path- Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full benefits, costs excluding opportunity cost of grazing	1133	8186	56.4	3858	7373	57.2	59.2
B Full benefits, costs including opportunity cost of grazing	56.4	323	50.2	141	96.6	53.2	54.7
C Benefits reduced by 50 per cent costs exclude opportunity cost of grazing	567	4095	43.6	1941	3696	46.8	48.7
D Benefits reduced by 50 per cent cost including opportunity cost of grazing	32.5	162	38.6	76	52.0	43.4	45.0

Notes : 1. Error considered for calculating IRR is \pm 1 per cent.

2. The initial cost of coppicing sal is very low, that is why IRRs are exceptionally high for those projects.

In this calculation I include the full value of timber, poles, kend leaf, sal leaf and cashewnut and since almost half is used for self-consumption 50 percent of the fuelwood, 50 percent of Mushroom, 50 per cent of Mahua flower/fruits. Almost a half of all firewood, mahua and mushroom are given free to the participants. That is why one half is included in financial analysis.

As in the case of economic viability analysis, here returns are considered at two levels - full and half. That means that at the half levels - only 25 percent of the firewood, mushroom, mahua are being included since 50 percent of them is taken at full returns level. The price used in both economic and financial analysis are the same. The results of financial viability analysis are presented in tables 5.6 to 5.9.

Table 5.7 shows that NPV of financial returns is positive from all FPCs at the discount rates of 4 and 6 percent, both for full returns and for returns taken as half. It is so even when the more rigorous variable rates of discount of 4, 6 and 9 percent are applied. Thus all the FPCs can be taken to be financially viable. The ranks of different FPCs are also stable across sensitivity analysis. Similar picture is shown by Table 5.8 where the financial returns over the costs are analysed.

TABLE 5.6 : PRESENT VALUE OF FINANCIAL RETURNS OF PROJECT AREA

(1993-94 prices summed up for flows up to 55 years)

(Values in thousand Rs.)

FPCs							
Rate of Discount	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Present value of gross returns per hectare :							
1 At full value of timber, poles cashewnut and 50 per cent of the value of fuelwood harvested at the end and 50 per cent of mashroom, mahua :							
4 per cent	58	71	547	70	75	1021	1455
6 per cent	40	49	367	50	53	717	1005
4, 6 and 9 per cent	32	41	293	42	44	733	1012
2 At 50 per cent of the value of timber, poles, cashewnut and 25 per cent of the value of fuelwood, mashroom and mahua :							
4 per cent	29	36	274	35	38	511	728
6 per cent	20	25	183	25	26	358	503
4, 6 and 9 per cent	16	21	147	21	22	367	506
B Present value of costs per hectare (paid out costs):							
(Excluding opportunity cost in terms of grazing)							
4 per cent	17	14	9	15	14	11	11
6 per cent	11	9	8	10	10	10	9
4, 6 and 9 per cent	8	7	8	7	6	10	10

Note : Mushroom and Mahua flowers have good local market. 50 percent of these are assumed to be sold in the market.

The financial viability seen in terms IRRs (as shown in table 5.9) is very much encouraging. The results range from 46.8 percent per annum in Dharagram to 5609 percent in Asna-pathar-Indkuri at full value of returns and from 39.5 percent to 2806 percent in the same FPCs respectively when gross returns are valued at half their normal level. Even the lowest rate of 39.5 per cent is satisfactory when it is considered that these are real rates for output valued at constant prices and not nominal rates. Here IRR figures for Karapara, Path-Asna-Indkuri, Bansraya and Sumaidihi are unexpectedly high because these are natural forests where initial cost i.e., coppicing cost are either very low or negligible.

TABLE 5.7 : NET PRESENT VALUE OF FINANCIAL RETURNS PER HECTARE OF PROJECT AREA

(1993-94 prices summed up for flows up to 55 years)

(Values in thousand Rs.)

FPCs							
Rate of Discount	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full returns from timber, poles, cashewnut and 50 percent from fwelwood, mashroom, mah net of costs:							
(A.1 minus B in Table 5.6)							
4 per cent	41	57	538	56	61	1010	1444
6 per cent	28	40	358	39	43	706	995
4, 6 and 9 per cent	24	34	284	34	37	723	1001
B Returns (A) reduced by 50 percent net of costs							
(A.2 minus B in Table 5.6)							
4 per cent	12	21	264	20	24	499	716
6 per cent	9	15	175	15	17	348	492
4, 6 and 9 per cent	7	13	138	14	15	356	495

Note : As in Table 5.6

From the above analysis of financial viability it can be said that though the main justification for social forestry is to meet the local needs of the rural economy it can yield a financial net return which is high enough to generate a surplus. Thus it may really become a way of life in future as well as a viable rural institution for sustainable greening of our country.

Now we turn to the socio-economic aspects of the participants. This we do to see whether the social forestry programme could really benefit the most disadvantaged sections of the rural community. One aspect of the success and sustainability of the programme crucially hinges on this caste-based distribution of the households presented in table 5.10 through 5.18.

TABLE 5.8 : FINANCIAL RETURN-COST RATIOS

(Present value of return per unit of present value of costs in repees)

FPCs							
Rate of Discount	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full returns from timber, poles, cashewnut and 50 percent from fuelwood, mahua mushroom over costs:							
4 per cent	3.4	5.0	59	4.8	5.3	91	131
6 per cent	3.5	5.3	43	5.0	5.6	70	101
4, 6 and 9 per cent	3.8	5.9	34	5.7	6.3	69	97
B Returns (A) reduced by 50 per cent over costs							
4 per cent	1.7	2.5	29	2.4	2.6	45	66
6 per cent	1.7	2.6	22	2.5	2.8	35	50
4, 6 and 9	1.9	2.9	17	2.8	3.1	34	48

Note : As in Table 5.6

TABLE 5.9 : FINANCIAL VIABILITY IN TERMS OF INTERNAL RATE OF RETURN (PERCENT)

(At constant prices)

FPCs							
Assumptions	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dharagram
A Full returns from timber, pole cashewnut and 50 percent from fuelwood, mashroom, mahua							
	866	5609	54	2776	5313	50	46.8
B Returns (A) reduced by 50 per cent							
	432	2806	42	1400	2666	41	39.5

Note : As in Table 5.6

Table 5.10 shows that the households participating in social forestry (FPCs) belong to disadvantaged classes of the society. They represent about 63 percent (sc-12% and ST-51%). Therefore it seems that, as it has been stated in the objectives of the projects, benefits of the projects have really reached to target group.

TABLE 5.10 : CLASSIFICATION OF SAMPLE HOUSEHOLD BY CASTE

Name of the FPCs	S.C.	S.T.	General	Total
1. Karapara	-	12	3	15
2. Asna-Path-Indkuri	-	20	6	26
3. Suribanka	8	-	15	23
4. Bansraya	-	20	5	25
5. Sumaidihi	-	13	12	25
6. Birkham	-	12	-	12
7. Dharagram	10	-	15	25
Total	18 (12%)	78 (51%)	56 (37%)	151 (100%)

The data on the age of the members of FPCs show that about 78 percent are in the age interval 20-50 while there are 30 members aged less than 30. The distribution of FPC members according to age is presented in the following table 5.11.

TABLE 5.11 : DISTRIBUTION OF SAMPLE FPC MEMBERS IN AGE-GROUPS

Age group.	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara-gram	Total
20-30	4	1	1	4	9	3	8	30
31-40	3	8	7	9	5	8	3	44
41-50	4	8	9	8	7	1	7	44
51-60	3	8	6	2	4	-	4	37
61-above	1	1	-	2	-	-	3	7
Total	15	26	23	25	25	12	25	151

The literates among the participant household constitute only 55 percent of the sample. The data on literacy among the participant members are furnished categorically in tabel 5.12.

Of the total participants 42% are engaged completely in agriculture while 16 per cent are agricultural labourer and 35 per cent have to earn their livelihood from more than one sources who have less fertile and small holdings in their possession. Table5.13 gives the break-up of the participating members according to their respective occupation.

TABLE 5.12 : LITERACY AMONG THE MEMBERS STUDIED

Literacy	Karapara	Asna-Path- Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara- gram	Total
Illiterate	8	12	6	15	13	3	11	68
up to								
class IV	2	6	14	4	2	1	6	35
up to								
class VIII	3	3	2	3	7	5	1	24
Above								
class VIII	2	5	1	3	3	3	7	24
Total	15	26	23	25	25	12	25	151

Note: Illiterate includes newly literate under the literacy programme of the state.

TABLE 5.13 : OCCUPATIONAL DISTRIBUTION AMONG SAMPLE MEMBERS STUDIED

Occupation	Karapara	Asna-Path- Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara- gram	Total
Service	-	3	-	-	-	1	-	4
Agriculture	6	4	10	16	14	7	6	63
Agricultural								
Labourer	1	6	5	1	-	4	8	25
Mixed	7	13	7	8	11	1	6	53
Traders	-	-	-	-	-	-	2	2
Others	1	-	1	-	-	-	2	4
Total	15	26	23	25	25	12	25	151

Note : 1. Mixed occupation refers to the combination of more than one of the following agriculture, agricultural labour, grossery, owner of tea or sweet shops, minor forest products, forest related activities, blacksmith, carpenter, hair-cutter, helper of contractor etc.

2. Others refers to the people who are in the single occupation like haircutter, black smith, carpenter, washman etc.

TABLE 5.14 : DISTRIBUTION OF FAMILY SIZE IN THE FPCs STUDIED

Family size	Number of households							Total
	Karapara	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara-gram	
1-3	2	2	1	4	1	1	2	13
4-5	7	8	6	8	11	5	10	55
6-8	4	16	9	9	11	5	6	60
9-10	-	-	2	-	-	1	3	6
10 and above	2	-	5	4	2	-	4	17
Total	15	26	23	25	25	12	25	151

The survey data collected on the size of the families of participant households indicate that about 45 per cent household have less than 6 members and 85 percent have less than 9 members. The table 5.14 given below provide the distribution pattern of households according to the size.

The value of household assets reflect the economic status of the participating households. About 27 percent of the households have assets valued less than Rs. 15000 and 56 percent households have assets worth Rs. 25000 and above. A glance at the following tabel 5.15 will indicate the distribution of household assets:

TABLE 5.15 : DISTRIBUTION OF HOUSEHOLD ASSETS AMONG MEMBERS STUDIED

Value (Rs)	Number of households							Total
	Kara-para	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara-gram	
0-5000	1	3	4	-	-	-	7	15
5000-10000	-	4	3	2	-	-	1	10
10000-15000	2	6	-	2	1	1	4	16
15000-20000	3	4	-	-	4	-	-	11
20000-25000	2	3	3	-	3	1	2	14
25000-99999	4	5	9	18	13	9	6	64
Above 99999	3	1	4	3	4	1	5	21
Total	15	26	23	25	25	12	25	151

TABLE 5.16 : DISTRIBUTION OF MONTHLY INCOME AMONG THE MEMBERS STUDIED

Income Group (Rs)	Kara-para	Asna-Path-Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara-gram	Total
0-250	-	-	-	1	3	-	-	4
250-500	7	10	6	13	14	1	3	54
500-750	3	7	6	7	2	4	11	40
750-1000	1	1	3	3	3	3	2	16
1000-1250	-	4	2	-	1	2	4	13
1250-1500	1	-	-	1	1	-	2	5
1500-1750	1	1	3	-	-	1	-	6
1750-2000	1	1	1	-	1	-	-	4
2000-9999	1	2	2	-	-	1	3	9
Total	15	26	23	25	25	12	25	151

The social forestry programme, as observed earlier benefits the target group (basically disadvantaged) to a large extent and is also supported by the data on monthly income of the households. For example, 65 percent of the sample households are in the income level of Rs. 750 and below per month. This is very much pronounced in all the seven FPCs and could be seen in the following table 5.16.

Data on distribution of land-holding also corroborate the observation that FPCs have been successful in reaching its target groups. The sample data on distribution of land holding shows that about 84 percent of the household have less than 3 acres of land, 43 percent have less than one acre and 11 percent are landless. Table 5.17 providing the distribution of land owned, shows that majority of the households participating in the programme belong to small farmers group.

Data on indebtedness of households show that 52 percent of the sample households are having debt, out of which a sizeable proportion of them have borrowed for agricultural purposes (36 percent), followed by cattle loan (23 percent) and domestic needs (19 percent). Table 5.18 gives the details of the amount borrowed, purpose of the loan and sources of loans. The amount borrowed is less than Rs. 1000 in the case of 19 percent of the indebted households and at the same time 72 percent of them have borrowed more than Rs. 1500. The main institutions provid-

ing credit facilities are agricultural cooperatives -38 per

TABLE 5.17 : DISTRIBUTION OF LANDHOLDINGS AMONG THE MEMBERS STUDIED

Land Hold- ing size (acre)	Kara- para	Asna-Path- Indkuri	Suribanka	Bansraya	Sumaidihi	Birkham	Dhara- gram	Total
Landless	2	2	4	2	-	1	6	17
.01-.99	5	15	7	2	6	4	9	48
1-1.99	3	4	3	10	9	4	3	36
2-2.99	2	5	5	4	6	2	2	26
3-3.99	-	-	3	4	-	-	1	8
4-4.99	1	-	-	-	4	1	1	7
5-5.99	2	-	1	3	-	-	-	6
6-6.99	-	-	-	-	-	-	2	2
7-7.99	-	-	-	-	-	-	-	0
8-8.99	-	-	-	-	-	-	-	0
9-9.99	-	-	-	-	-	-	1	1
10 and above	-	-	-	-	-	-	-	0
Total	15	26	23	25	25	12	25	151

cent, followed by panchayat (DRDA, IRDP. etc)- 28 percent, Banks - 14 percent and Tribal Development schemes (like TSP, LAMP)- 13 per cent. These data show that there is only one FPC (ie. Bansraya) where tribal development board is well functioning and in other tribal areas it is either absent or is non-functioning.

Table 5.19 shows the demand for fuelwood per household per month with their respective sources before and after the formation of FPCs. Fuelwood demand in Suribanka is seen to be exceptionally higher than that of any other project area because most of the villagers here are engaged in the business of curd (milk-products) which required more fuelwood for its preparation. Before the formation of FPCs all the members of FPCs used to collect their required fuel through illegal felling from the traditional forests.

TABLE 5.18 INDEBTEDNESS POSITION OF THE SAMPLE HOUSEHOLDS STUDIED

Name of FPCs	NO. of Households		Amount of loans			Purpose of loans					Sources of loans			Total		
	Having loans	Having no loans	Less than 1000	1000-1500	1500and above	Agricultural needs	Domestic needs	Business Inputs	Cattle loan	Cooperatives	Banks Money Lenders,	Tribal D. B. T.S.P. Lamp etc	Panchayat (IRDP DRDA etc.)			
1. Karapara	5	10	5	-	-	1	1	-	-	3	2	2	-	-	1	5
2. Asna-Path-14	12	1	2	11	10	2	-	1	1	6	2	1	-	5	14	
3. Suribanka	21	2	3	2	16	12	7	1	1	-	12	1	1	-	3	21
4. Bansraya	10	15	0	2	8	-	-	5	3	2	-	-	-	10	-	10
5. Sumaidihi	4	21	4	-	-	-	-	1	-	3	2	1	-	-	1	4
6. Birkhan	9	3	1	-	8	-	-	4	-	5	3	-	-	-	6	9
7. Dharagram	16	9	1	1	14	5	5	3	-	3	5	5	-	-	6	16
Total	79	72	15	7	57	28	15	14	5	17	30	10	2	10	22	79

Note : In Suribanka FPC there are four persons who have taken loans from relatives.

TABLE 5.19 : DEMAND FOR FUELWOOD PER MONTH PER FAMILY

Name of FPCs	Averagedemand for fuelwood per family per months (K.g.)	Source	
		Before FPCs	After FPCs
1. Karapara	294	Illegal Felling	FPC
2. Asna-Path-Indk.	249	Illegal Felling Collection through departmental permit in Dec-Jan.	FPC
3. Suribanka	347	Market plus illegal felling	FPC and Market
4. Bansraya	250	Illegal Felling & Collection	FPC
5. Sumaidihi	246	Illegal Felling	FPC
6. Bihrkham	224	Illegal Felling	FPC
7. Dharagram	263	Market	FPC and Market

Since the inception of joint forest management programme in the state they have been collecting these from the FPCs. Only in two cases, Suribanka and Dharagram, a part of the total demand comes from outside FPCs and some people of these two villages also use coal and kerosene as fuel.

TABLE 5.20 : Average time spent by female members for collection of fuelwood* in the FPCs.

Name of FPCs	Avarage time spent by female members per day per month to collect fuelwood (in hours)
1. Karapara	1-2
2. Asna-Páth-Ind	2-3
3. Suribanka	3-4
4. Bansraya	2-3
5. Sumaidihi	3-4
6. Birkham	less than 1
7. Dharagram	2-3

Note : *Fuelwood includes collection of Akashmani Seeds

THE NORTH

I choose three 'river bank' plantation and three social

forestry beat¹ for 'farm forestry' arbitrarily from the three districts of North Bengal where social forestry schemes have been taken up. These are Binnaguri in Jalpaiguri district and Bara Atharakotha and Harinchawra in Cooch Behar district for river bank plantation and Phansidewa and Naxalbari beat in Darjeeling district and Tufanganj beat in Cooch Behar district in the extreme north of northern part of West Bengal for farm forestry. A profile of the projects are presented in Table 5.21 which refers to their location, year of plantation, type of plantation main species and tree composition, tree density per hectare etc. River bank projects are initiated and initially implemented by forest department (F.D). The F.D plant trees and protect them for the first three years and then hand over the project to the beneficiaries selected by the Panchayats (GP). Forestry under 'farm forestry' is undertaken by individual farmers who are scattered over a large zone. In order to compare across the projects I convert them into a single unit (ie. on per hectare basis).

In the case of river bank projects for stump planting flow of returns start from the 2nd year and for other cases from the 4-5th year. All these flows are usually in terms of thinning or pruning or both. I assume that thinning takes place at the rate of 25 per cent in every alternate five years. Actually forest officials try to impress upon the beneficiaries this method and procedure. Life span of trees is assumed to be 40 years. Details about the estimation of different quantities and flows of costs and benefits are given in appendix - 3. Appendix 4 shows the composition of the sum of benefits and costs at present (discounted) values.

SENSITIVITY ANALYSIS OF ECONOMIC VIABILITY

Here I follow more or less the same procedure as I have done previously for the projects of South-West Bengal. Economic viability test of the social forestry projects in North Bengal is presented in Table 5.22 through 5.25.

1. Beat is consist of one or more than one existing general administrative blocks where plantation has been raised.

TABLE 5.21 PROFILE OF THE SOCIAL FORESTRY PROJECTS OF NORTH BENGAL

Features	Projects under Riverbank Plantation			Projects under Farm Forestry Plantation		
	Binnaguri	Bara Athara Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj
1. Location (District)	Jalpaiguri	Cooch Behar	Cooch Behar	Darjeeling	Darjeeling	Cooch Behar
2. Year of Plantation	1986-87	1989-94	1988-89			
3. Project area (Ha)	45	10	10	-	-	-
4. No. of Participants	45	20	20	-	-	-
5. Type of Plantation	commercial	commercial	commercial	commercial	commercial	commercial
6. Tree density per Ha in project area	1600	1430	1425	3000	4000	2500
7. Main species and Tree composition	sisso 20% Sirish 15% Akashmani 15% Chikrashi 15% Teak 10% Ghora Neem 10%	sisso 70% Khair 10% Sirish 10% Simul 10%	sisso 45% Sirish 14% Khair 17% Simul 17%	sisso 75% Teak 10% Gamar 10% Others 5%	sisso 55% Teak 20% Chikrashi 10% Gamar 10% Others 5%	Gamar 50% Sisso 25% Ghoraneem 10% Teak 6% Sirish 6% Others 3%

Note: Tree Density has been arrived at by deducting the trees reported to have died up and flooded over upto 1994 from the number of trees reported to have been planted and supported by visual observation of plantation, not by actually counting all the trees.

TABLE 5.22 PRESENT VALUE OF BENEFITS AND COSTS PER HECTARE OF PROJECT AREA

(1993-94 prices summed up for flows upto 40 years)

(Values in thousand Rs.)

Rate of Discount	River banks		Projects		Farm Forestry	
	Binnaguri	Bara Athara	Harinchawra	Phansidewa	Naxalbari	Tufanganj
A Present value of benefits (gross returns)						
per hectare						
1 At Full value of benefits estimated						
4 percent	547	965	874	1012	820	2047
6 percent	333	500	453	564	493	1220
4, 6 and 9%	237	253	228	330	331	836
2 If estimated benefits were to be lower						
by 50 percent						
4 percent	273	482	437	506	410	1023
6 percent	166	250	226	282	246	610
4, 6 and 9%	119	126	114	162	166	418
B Present value of costs per hectare						
4 percent	70	34	32	70	105	50
6 percent	46	24	23	45	67	35
4, 6 and 9%	36	21	20	33	48	31

Notes: 1. See notes to table 5.2

2. The flows of benefits are summed up to 40 years.

Here the period involved in considering the stream of benefits and costs is 40 years from the start of the project. I believe, based on my interviews with farmers and local officials, this to be a reasonable period.

TABLE 5.23 NET PERSENT VALUE OF PER HECTARE OF PROJECT AREA

(1993-94 prices summed up for flows upto 40 years)

(Values in thousand Rs.)

Rate of	River banks			Projects		
	Binnaguri	Bara Athara	Katha	Harinchawra	Phansidewa	Naxalbari
A Full benefits net of costs						
(A 1 minus B, in Table 5.22)						
4 percent	477	931	842	942	715	1997
6 percent	287	476	430	519	426	1185
4,6 and 9%	201	231	208	296	283	805
B Benefits reduced by 50 percent net of costs						
(A. 2 minus B in Table 5.22)						
4 percent	203	448	404	436	304	973
6 percent	120	225	203	237	179	575
4,6 and 9%	82	105	94	131	117	386

Notes : 1. See notes to Table 5.3

TABLE 5.24 : BENEFIT-COST RATIOS

(Present value of benefits per unit of present value of costs in rupees)

Rate of Discount	Riverbanks			Projects		Farm Forestry	
	Binnaguri	Bara Athara Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj	
A Full benefits over costs							
4 percent	8	28	26	14	8	40	
6 percent	7	20	19	12	7	34	
4, 6 and 9%	6	12	11	9	6	26	
B Benefits reduced by 50 percent over costs							
4 percent	4	14	13	7	4	20	
6 percent	3	10	9	6	3	17	
4, 6 and 9%	3	6	5	5	3	13	

Note : See notes to Table 5.2.

TABLE 5.25 : ECONOMIC VIABILITY IN TERMS OF INTERNAL RATES OF RETURNS

(Percent at constant prices)

Assumption	Riverbanks			Projects		Farm Forestry	
	Binnaguri	Bara Athara Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj	
A Full benefits	33.4	59.6	58.8	40.6	41.7	65.2	
B Benefits reduced by							
50 percent	26.9	42.0	41.3	32.3	33.6	52.4	

FINANCIAL VIABILITY OF SOCIAL FORESTRY PROJECTS

For financial viability, I include full benefits of timber, poles and 50 per cent of the fuelwood since about half of the available fuelwood be distributed to the beneficiaries free. As in the case of economic viability analysis, returns are considered at two levels - full and half. This implies that here in financial viability analysis, only 25 per cent value

of firewood is included at a half level. Financial viability analysis is presented in Table 5.26 through 5.29.

TABLE 5.26 : PRESENT VALUE OF FINANCIAL RETURNS OF PROJECT AREA

(1993-94 prices summed up for flows up to 40 years)

(Values in thousand Rs.)

	Riverbanks			Projects	Farm Forestry	
	Binnaguri	Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj
A Present value of gross returns per hectare :						
1 At full value of timber, poles and 50 percent of the value of fuelwood harvested at the end.						
4 percent	535	878	793	993	804	2012
6 percent	324	442	399	550	401	1193
4, 6 and 9%	229	204	183	316	319	811
2 At 50 percent of the Value of timber, poles and 25 percent value of fuelwood						
4 percent	267	439	396	496	402	1006
6 percent	162	221	199	275	240	596
4, 6 and 9%	114	102	92	158	159	405
B Present value of costs per hectare (paid out costs)						
4 percent	70	34	32	69	105	50
6 percent	46	24	23	45	67	35
4, 6 and 9%	36	21	20	31	48	31

From table 5.27 it is seen that NPV of financial returns are positive from all the projects at the discount rates of 4, 6 and 9 per cent, both for full returns and for half returns as well. Thus conclusions similar to projects of South of West Bengal follow.

TABLE 5.27 : NET PRESENT VALUE OF FINANCIAL RETURNS PER HECTARE OF PROJECT AREA

(1993-94 prices summed up for flows upto 40 years)

(Values in thousand Rs.)

Rate of	Bara Athara					
Discount	Binnaguri	Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj
A Full returns from timber, poles and 50 percent from fuelwood net of costs						
(A 1 minus B in Table 5.26)						
4 percent	465	844	760	923	699	1961
6 percent	278	410	378	505	414	1158
4, 6 and 9%	193	182	163	205	270	779
B Returns (A) reduced by 50 percent net of costs						
(A.2 minus B in Table 5.26)						
4 percent	197	405	363	427	296	996
6 percent	116	196	176	230	173	561
4, 6 and 9%	78	80	71	127	111	374

TABLE 5.28 : FINANCIAL RETURN-COST RATIOS

(Present value of return per unit present value of costs in rupees)

Rate of	Bara Athara					
Discount	Binnaguri	Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj
A Full returns from timber, poles and 50 percent from fuelwood over costs						
4 percent	7.6	26	24	14	7.6	40
6 percent	7.0	19	17	12	7.1	34
4, 6, and 9%	6.3	9	9	10	6.6	26
B Returns (A) reduced by 50 percent over costs						
4 percent	3.8	13	12	7	3.7	20
6 percent	3.5	9	8	6	3.5	16
4, 6 and 9%	3.1	5	4	5	3.3	13

Again, as we did in the case of South Bengal, we try to explore the possible impacts of Social forestry on the target population of the programmes.

TABLE 5.29 : FINANCIAL VIABILITY IN TERMS OF INTERNAL RATE OF RETURN (PERCENT)
(At Constant Prices)

Assumptions	Bara Athara					
	Binnaguri	Katha	Harinchawra	Phansidewa	Naxalbari	Tufanganj
A Full returns from timber, poles and 50 percent from fuelwood	31.6	45.1	43.5	37.1	38.6	57.5
B Returns (A) reduced by 50 percent	25.8	31.1	30.1	30.2	31.7	40.0

TABLE 5.30 : CLASSIFICATION OF HOUSEHOLDS BY CASTE

	Name of the project	S.C.	S.T.	General	Total
Riverbank	1. Binnaguri	15	1	9	25
	2. Bara Athara Kotha	-	-	15	15
	3. Harinchawra	-	-	14	14
	Total	15	1	38	54
Farm Forestry	4. Phansidewa	13	1	6	20
	5. Naxalbari	12	3	1	16
	6. Tufanganj	8	-	12	20
	Total	33	4	19	56

The households by caste participating in the riverbank projects belong mainly to general (70 per cent) caste and 28 percent belongs to S. C. Where as in farm forestry about 59 per cent belongs to S.C and 34 percent belongs to General caste. Classification of households by caste is furnished in Table 5.30.

TABLE 5.31 : Distribution of Participating Households in Age-Group

Age group	Riverbank			Total	Projects		Farm Forestry		Total
	Binnaguri	Bara Athara	Harinchawra		Phansidewa	Naxalbari	Tufanganj		
			Katha						
20-30	3	4	1	8	3	1	-	4	
31-40	7	6	3	16	3	10	7	20	
41-50	12	3	8	23	9	3	7	19	
51-60	3	1	2	6	2	1	4	7	
61-above-	-	1	-	1	3	1	2	6	
Total	25	15	14	54	20	16	20	56	

The data on the age of the members of riverbank plantations show that about 87 percent are in the age group of 20-50 while there are only 8 members (15%) aged less than 30. The data on farm forestry show that about 77 per cent belongs to the age interval 20-50 while there are only 4 members aged less than 30. The distribution of riverbank plantation and farm forestry members according to the age is presented in the table 5.31.

TABLE 5.32 LITERACY AMONG THE MEMBERS STUDIED

Literacy	River banks			Projects	Farm Forestry			
	Binnaguri	Bara Athara	Harinchawra		Total	Phansidew	Naxalbari	
		Katha						
	Tufanganj	Total						
Illiterate	12	9	10	31	3	3	-	6
Up to class IV	10	1	4	15	8	3	6	17
Up to Class VIII	3	5	-	8	3	4	3	10
Above class VIII	-	-	-	-	6	6	11	23
Total	25	15	14	54	20	16	20	56

The illiterates among the participant households in riverbank plantation constitute about 57 per cent whereas in farm forestry it is about 8 per cent only. The percentage of literate above class VIII is about 41 but in river bank plantation it is nil. The data on literacy among the participant members are furnished categorically in Table 5.32.

TABLE 5.33 OCCUPATIONAL DISTRIBUTION AMONG SAMPLE PARTICIPANTS STUDIED

Occupation	River banks			Projects	Farm Forestry			
	Binnaguri	Kath	Harinchawra	Total	Phansidewa	Naxalbari	Tufanganj	Total
Service	-	-	-	-	4	2	5	11
Agriculture	8	5	-	13	7	9	7	23
Agril. Labour	1	-	-	1	1	-	1	2
Mixed.*	16	3	-	19	5	3	2	10
Traders	-	-	-	-	2	2	5	9
Others**	-	7	14	21	1	-	-	1
Total	25	15	14	54	20	16	20	56

Notes : ** Others - including non-agricultural labourers, Rickshaw puller, cleaner, Kamla, Helper, Talioringetc.

* Mixed refers to more than one occupation at a time like small business, Agriculture, Service etc.

Of the total participants 24 percent are engaged in agriculture in riverbank project and 41 per cent are engaged in agriculture in farm forestry. Percentage of agricultural labour is almost nil in both the types in North Bengal. Table 5.33 gives the occupational distribution among the sample members studied.

The survey data collected on the size of the families of participant households indicate that about 39 percent in river bank projects and 48 per cent in farm forestry have less than 6 members.

Table 5.35 shows the distribution of household assets among the participant members under farm forestry and river bank plantation. It shows a quite interesting picture. Data on farm forestry show that about 72 percent fall in the slab of above Rs. 99999 where as in riverbank plantation scheme it is nil. This is because in case of river bank plantations the Gram Panchayats (local administrative body) select the beneficiaries (participants) who belongs to the targeted group i.e., landless labourer, poor artisans or agriculturists etc.

TABLE 5.34 DISTRIBUTION OF FAMILY SIZE IN THE PROJECTS STUDIED

Family Size	River banks			Projects		Farm Forestry		
	Binnaguri	Katha	Harinchawra	Total	Phansidewa	Naxalbari	Tufanganj	Total
1-3	3	2	5	10	6	2	1	9
4-5	4	2	5	11	8	4	6	18
6-8	13	9	4	26	6	7	9	22
9-10	3	-	-	3	-	2	1	3
10-above	2	2	-	4	-	1	3	4
Total	25	15	14	54	20	16	20	56

TABLE 5.35 DISTRIBUTION OF HOUSE HOLD ASSETS AMONG THE MEMBERS STUDIED

Value (Rs.)	River banks			Projects		Farm Forestry		
	Binnaguri	Katha	Harinchawra	Total	Phansidewa	Naxalbari	Tufanganj	Total
0-5,000	-	4	8	12	-	-	-	-
5,000-10000	-	5	5	10	-	-	-	-
10000-15000	-	6	1	7	-	-	-	-
15000-20000	2	-	-	2	-	-	1	1
20000-25000	2	-	-	2	-	-	-	-
25000-99999	21	-	-	21	9	4	2	15
above 99999	-	-	-	-	11	12	17	40
Total	25	15	14	54	20	16	20	56

TABLE 5.36 shows that in case of river bank projects about 50 percent participant are in the income level of Rs. 750 and below per month whereas in farm forestry about 50 per cent are in the income level of Rs. 1500 and above per month.

Table 5.37 represent that about 84 per cent of household have less than 3 acres of land (as it is in case FPCs), 34 percent have less than one acre and 26 percent are landless in river bank projects. In case of farm forestry the picture is quite different- 45 percent have less than 3 acres of land and 18 percent have more than 10 acres.

TABLE 5.36 DISTRIBUTION OF MONTHLY INCOME AMONG THE PARTICIPANT HOUSEHOLDS STUDIED

Family Size	River banks			Projects		Farm Forestry			Total
	Binnaguri	Katha	Harinchawra	Total	Phansidewa	Naxalbari	Tufanganj		
0-250	-	-	-	-	-	-	-	-	-
250-500	-	2	2	4	4	1	2	7	
500-750	6	10	7	23	1	5	3	9	
750-1000	8	3	3	14	1	2	-	3	
000-1250	11	-	1	12	2	3	4	9	
1250-1500	-	-	1	1	1	-	-	1	
1500-1750	-	-	-	-	2	2	2	6	
1750-2000	-	-	-	-	-	1	1	2	
2000-9999	-	-	-	-	9	2	8	19	
Total	25	15	14	54	20	16	20	56	

TABLE 5.37 DISTRIBUTION OF LANDHOLDINGS AMONG THE PARTICIPANT HOUSEHOLDS STUDIED

Family Size	River banks			Projects		Farm Forestry			Total
	Binnaguri	Katha	Harinchawra	Total	Phansidewa	Naxalbari	Tufanganj		
Landless	-	1	13	14	-	-	-	-	
0-.99	-	3	1	4	1	2	2	5	
1-1.99	9	4	-	13	5	-	6	11	
2-2.99	10	4	-	14	2	3	4	9	
3-3.99	5	2	-	7	4	3	3	10	
4-4.99	1	1	-	2	1	-	-	1	
5-5.99	-	-	-	-	-	1	-	1	
6-6.99	-	-	-	-	1	3	1	5	
7-7.99	-	-	-	-	-	1	1	2	
8-8.99	-	-	-	-	-	-	-	-	
9-9.99	-	-	-	-	1	1	-	2	
10-ABOVE	-	-	-	-	5	2	3	10	
Total	25	15	14	54	20	16	20	56	

TABLE 5.38 : INDEBTENESS POSITION OF THE SAMPLE HOUSEHOLDS STUDIED

Name of the Projects	No. of households		Amount of loans				Purpose of loans					Sources of loans			Total
	Having loans	Having no loans	Less than 1000	1000-1500	1500 & above	Agriculture/ forestry	Domestic needs	Business	Input	Cattle	Cooperatives	Banks	Panchayat IRDP, DRDA etc	Money lender	
Binnaguri	17	8	-	-	17	17	-	-	-	-	-	-	17	-	
BaraAtharaKotha	2	13	-	-	2	-	2	-	-	-	-	-	2	-	
Harinchawra	3	11	2	-	1	-	-	1	-	2	-	-	3	-	
Total	22	32	2	-	20	17	2	1	-	2	-	-	22	-	22
Phansidewa	2	18	-	2	-	1	1	-	-	-	-	-	2	-	
Naxalbari	2	14	2	-	-	2	-	-	-	-	1	-	1	-	
Tufanganj	11	9	4	4	3	3	5	2	-	-	2	-	7	2	
Total	15	41	6	6	3	6	6	2	-	-	3	-	10	2	15

TABLE 5.38 represent the indebtedness position with amount of loans, purposes and sources of loans in details of the sample households. 41 percent of the sample households are having debts, out of which a sizeable proportion of them have borrowed for either agriculture or forestry (77%), and the major source of that loan is Panchayat ie. in the form of DRDA or IRDP etc in case of riverbank projects. The forest officials helps to get the loan for forestry purpose to motivate people in social forestry projects. In case of farm forestry only 27 per cent have taken loan and that is also mainly for business or domestic purposes. However, in both the cases Panchayat is the main credit supplier in the rural areas.

TABLE 5.39 DEMAND FOR FUELWOOD PER HOUSEHOLDS STUDIED

Name of the Project	Averaged demand for fuelwood	Source	
		Before Project	After Project
Binnaguri	237	Illegal Felling	Project
Bara Athara Kotha	82	Market	Project
Harinchawra	146	Market	Project
Phanshidewa	304	Market	Project market.
Naxalbari	262	Market	Project market.
Tufanganj	323	Market	Project Market

TABLE 5.40 AVERAGE TIME (HOUR) SPENT BY FEMALE MEMBERS

Name of the Project	Averaged time spent by female members to collect fuel wood (in hour)
Binnaguri	2-3
Bara Athara Kotha	Less than 1
Harinchawra	1-2
Phanshidewa	nil
Naxalbari	1-1 ¹ / ₂
Tufanganj	Nil

Note : Fuelwood collected by hired labour is not included.

Fuelwood collection by female members is related to caste, economic status of family.

APPENDIX

TABLE A-1 NORMS ADOPTED* IN ESTIMATING BENEFITS IN SOUTH WEST BENGAL

A Items	Months	Average benefit in quantity available per Ha per annum**	Rate (Rs.)
1. Dry leaf cartload	Dec-Feb	220-250 cartload	Rs. 3/
2. Green leaf (Thali)	April-Sept.	65000-70000	Rs. 15/1000
3. Kedu ⁺⁺ leaf (Biri)	Feb-March	40000-50000	Rs. 7.50/1000
4. Mahua ⁺⁺ flower/seed	Mar-Apr/ July-Aug	80-100 kg	Rs. 12/kg
5. Mushroom	July-Sept.	25-30 kg	Rs. 40/kg

B Species	Lifespan	Average yield	Rate(Rs.)	Yield of	Rate(Rs)***	Timber/ Pole
	Assumed of usufruct/ Tree/Annum**			of fuelwood/ Tree when Tree is felled		
1. Eucalyptus ⁺	20 years	3-10kg	.60	150 kg.	.60	2 pole 200/ pole
2. Akashmani	20 years	6-40 KG	.60	500 KG	.60	15cft 150/cft
3. Cashew	40 years	5-20 kg (raw fruit)	70/kg.	250 kg.	.60	- -

*Based on norms given by different forest officials as well as the village level data obtained at the time of survey.

**Variations in the yield of usufruct has been considered as it varies according to the age of the tree.

***Fuelwood rate, as I get at the time of survey at different projects, varies from .60-1.00 but I consider the least ie. .60 to under estimate the benefit.

+ In case of eucalyptus, I assumed output will be harvested two times during its life span ie, 1st harvest when trees become 10 years old and 2nd and final when coppices became old of 10 years again.

++ Mahua and Kend are banned by Government from felling so Timber value or usufruct for fuelwood has not been considered here.

APPENDIX

**TABLE A-3 NORMS ADOPTED* IN ESTIMATING DIFFERENT TYPES OF BENEFITS IN
NORTH BENGAL**

Species	Life span	Average yield of usufruct/ Tree/Annum**	Rate(Rs.)	Average ⁺ Yield of fuelwood per tree when tree is felled	Rate(Rs.)	Average ⁺⁺ Timber/ Yield/ Tree	Rate ⁺⁺⁺ (Rs.)
1. Sisso	40 years	5-8 kg.	.60-80	500-700kg.	.80-1	40-60 ft	150-250/ cft
2. Teak	40 years	-	-	350-500 kg.	.80-1	50-60cft	200-300/ cft
3. Gamar	40 years	5-10kg	.60-80	300-400kg	.80-1	35-55cft	250-300/ cft
4. Akashmani	20 years	5-10kg	.60-80	200-250kg	.80-1	15-20cft	100-150/ cft
5. Kadam	15 years	2-5kg	.60-80	100-150kg.	.80-1	30-40cft	40-50/ cft
6. Khair	40years	-	-	-	-	30-35cft	100-150/ cft
7. Chikrashi	40years	3-8kg.	.60-80	400-500kg	.80-1	60-75cft	100-150/ cft
8. Ghoraneem	15 years	4-8kg	.60-80	100-150kg	.80-1	30-40cft	60-80/ cft
9. Minjiri	15years	5-20kg	.60-80	800-1000kg	.80-1	-	-
10. Sirish	40years	4-8kg	.60-80	300-400kg	.80-1	50-60cft	200-250/ cft
11. Simul	40years	-	-	500-700kg.	.80-1	150-200cft	50-60/ cft
12. Eucalyptus	20years	3-5kg	.60-80	100-150kg.	.80-1	2poles	200/ poles

Note: *Based on norms given by the forest officials as well as our own figures recorded as per the projects level data obtained at the time of our survey.

**I have assumed variations in the yield of usufruct (mainly dryleaf, side branches and seeds in case of Akashmani), since it varies according to age of the tree.

*I have assumed variations in the yield of fuelwood per tree when tree is felled since it varies according to soil, space, maintenance, tending, thinning etc.

**I have assumed variations in the yield of timber per tree since it varies according to soil, space maintenance, tending, thinning etc. from project to project.

***I consider the minimum rate to outweigh the extraction cost but market rate is much higher.

TABLE A-2 COMPOSITION OF COST AND BENEFITS (PER CENT)
(Based on Discounted Present Values)

Items	FPCs																					
	Karapara			Asna-Path-Indkuri			Suribank			Bansraya			Sumaidihi			Birkham			Dharagram			
Discount rates (Percent)	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	
A. Costs																						
1. Initial	0.70	0.8	1.0	0.2	0.3	0.4	2	6.6	28.3	27.8	0.3	0.4	0.6	0.1	0.2	0.3	24.0	25.9	25.2	23.3	25.9	24.4
2. Recurring cost with-																						
out opportunity cost	67.6	63.8	60.5	87.5	85.4	83.2	37.4	35.1	34.5	76.8	73.4	70.1	67.0	62.9	58.9	45.3	42.7	43.5	43.2	40.7	41.5	
3. Opportunity cost	31.7	35.4	38.5	12.3	14.3	16.4	36.0	35.6	37.7	22.9	26.2	29.3	32.9	36.9	40.8	30.7	31.4	31.3	33.5	34.3	34.1	
4. Total Cost	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	
B. Benefits																						
1. Fruits/Flower	-	-	-	8.9	9.2	9.8	77.5	75.0	66.6	9.3	9.6	10.0	8.6	9.0	9.5				-	-	-	
2. Firewood	28.3	27.9	27.4	25.3	24.7	23.9	8.1	9.3	12.4	17.9	17.8	17.7	21.8	21.1	20.2				21.1	22.4	22.9	
3. Salleaf (Thali)	17.6	18.4	19.8	22.3	23.1	24.4	-	-	-	22.9	23.4	24.4	21.4	22.1	23.3				-	-	-	
4. Kend leaf	8.8	9.2	9.8	-	-	-	-	-	-	7.0	7.2	7.5	6.5	6.7	7.1				-	-	-	
5. Mashroom	17.6	18.4	19.8	22.3	23.1	24.4	-	-	-	22.9	23.4	24.4	21.4	22.1	23.3				-	-	-	
6. Poles	27.7	26.1	23.2	21.2	19.9	17.5	14.4	15.7	21.0	20.0	18.6	16.0	20.3	19.0	16.6				10.6	11.2	12.1	
7. Timber	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				68.3	66.4	65.0	
8. Total benefits	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)				(100)	(100)	(100)	

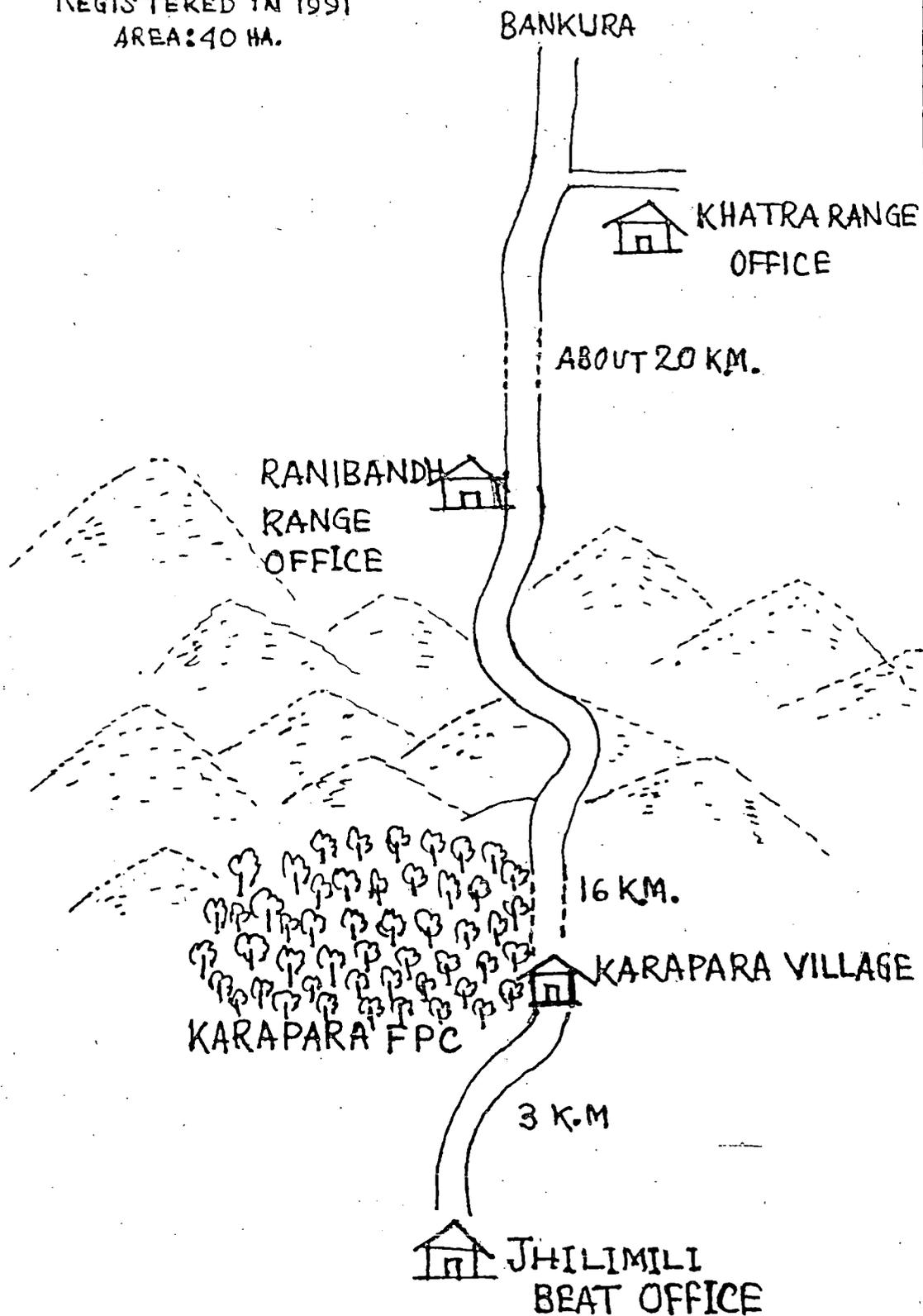
TABLE A-4 : COMPOSITION OF COSTS AND BENEFITS (PER CENT)

(Based on Discounted Present Values)

Items	Riverbanks Projects									Farm Forestry									
	Binnaguri			BaraAtharaKotha			Harinchawra			Phansidewa			Naxalbari			Turanganj			
Discount rates (Percent)	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	4	6	4,6,9	
A. Costs																			
1. Initial	7.6	11.2	14.6	16.9	22.9	26.5	16.1	22.1	25.9	6.0	9.2	12.6	3.7	5.6	8.0	5.8	8.0	9.1	
2. Recurring cost	92.4	88.8	85.4	83.1	77.1	73.5	83.9	77.9	74.1	94.0	90.8	87.4	96.3	94.4	92.0	94.2	92.0	90.9	
3. Total cost	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	
B. Benefits																			
1. Firewood	4.5	5.3	7.0	18.0	23.2	39.1	18.7	23.7	38.9	3.7	5.0	8.5	4.3	5.3	7.7	3.4	4.4	6.2	
2. Pole	2.6	2.9	3.9	4.8	7.3	16.0	4.9	7.4	16.3	0.8	1.1	2.3	0.9	1.3	2.3	0.3	0.4	0.7	
3. Timber	92.9	91.8	89.1	77.2	69.5	44.9	76.4	68.9	44.8	95.5	93.9	89.2	94.8	93.4	90.0	96.3	95.2	93.1	
4. Total benefits	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	

FIG. A.1 : MAP OF KARAPARA FPC UNDER JHILIMILI BEAT, RANIBANDH RANGE.

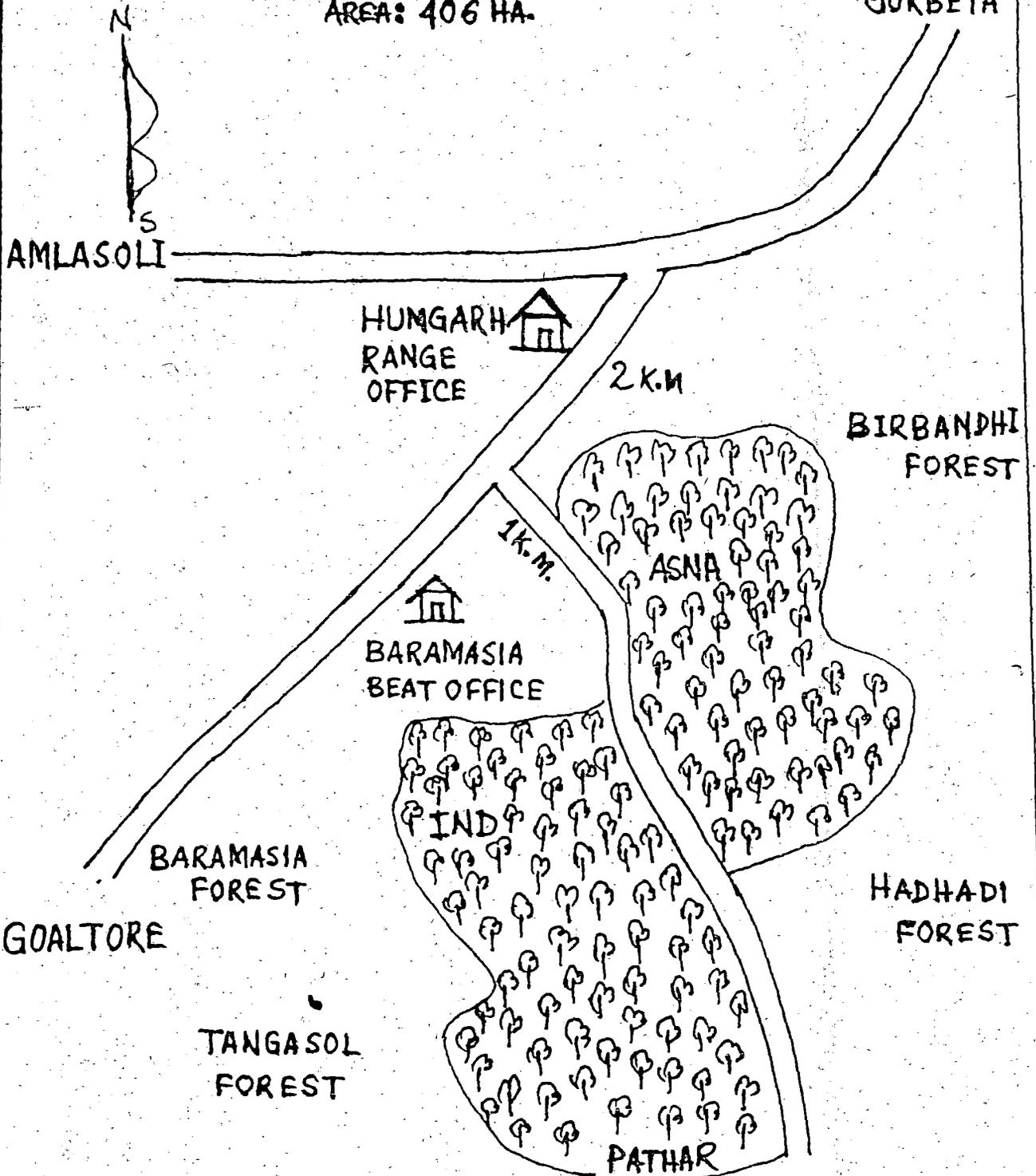
REGISTERED IN 1991
AREA: 40 HA.



FIGA-2 LOCATION OF ASNASOLI-PATHARMARI-INDKURI FPC

REGISTERED IN 1991
AREA: 406 HA.

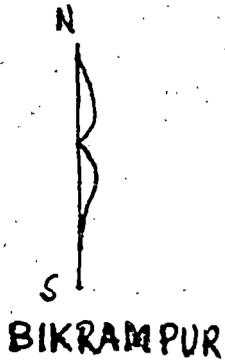
GORBETA



FIGA-3 MAP OF SURIBANKA FPC UNDER AMLASOLI BEAT, HUNGARH RANGE

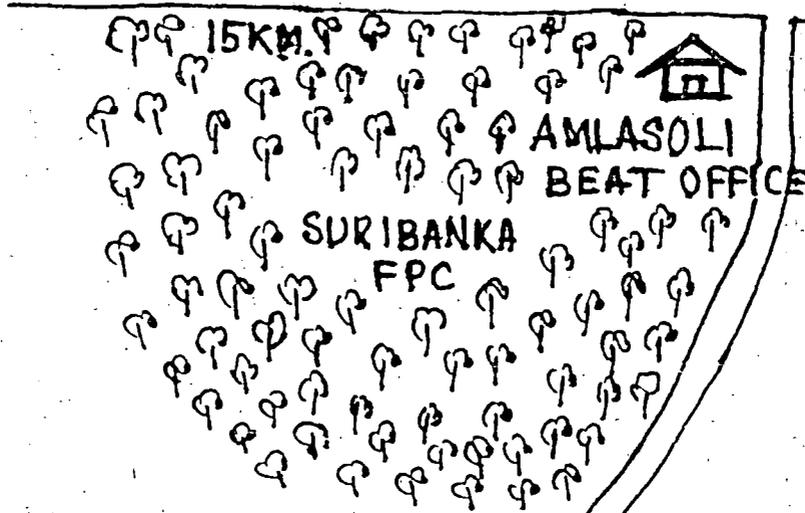
REGISTERED IN 1991

AREA : 101.59 HA.



SURIBANKA VILLAGE

HUNGARH



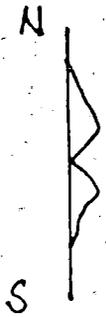
AMLASOLI FOREST

AMLASOLI-KANTI MAKLI ROAD
15KM.

TESKONA

FIG A-4 LOCATION MAP OF BANSRAYA FPC UNDER KASHIPUR BEAT & RANGE

REGISTERED IN 1991
AREA: 232.72 HA.



5 KM

ADRA

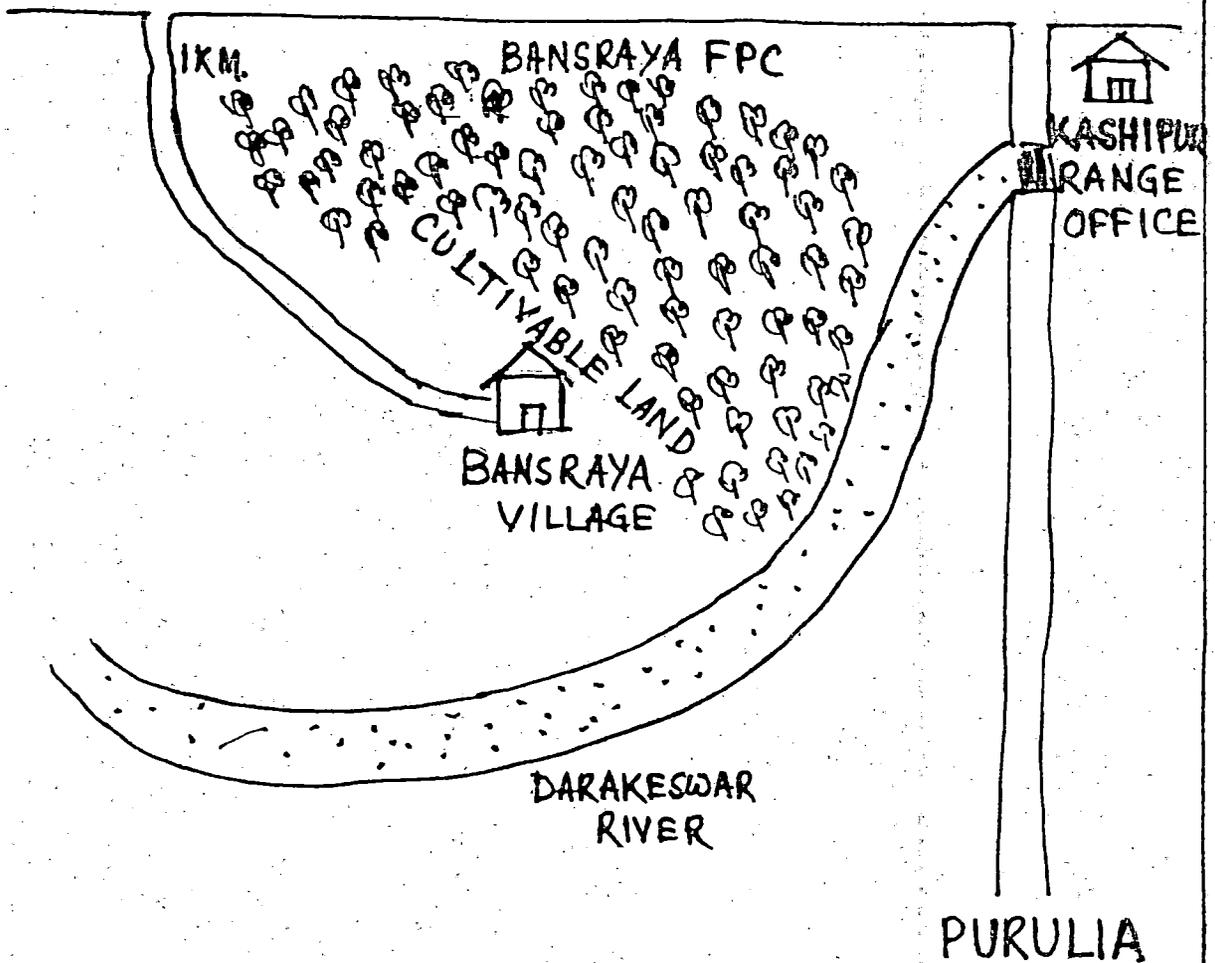
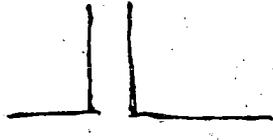


FIG A-5 SUMAIDIHI FPC UNDER KASHIPUR RANGE & BEAT

REGISTERED IN 1991
AREA: 177.33 HA.



ADRA



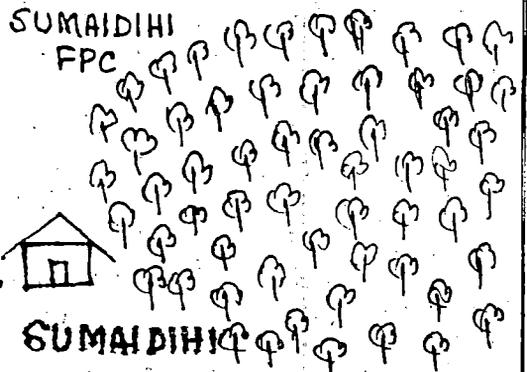
KASHIPUR
RANGE OFFICE

6 K.M.



GAMARKURI
VILLAGE

TUSHARDIHI



SUMAIDIHI
FPC



SUMAIDIHI
VILLAGE

BARADIHA

2 KM

PURULIA

HURA

FIG A-6 LOCATION MAP OF BIRKHAM FPC UNDER
KHATRA RANGE & BEAT (BANKURA SOUTH)
REGISTERED IN 1990
AREA : 61.96 HA

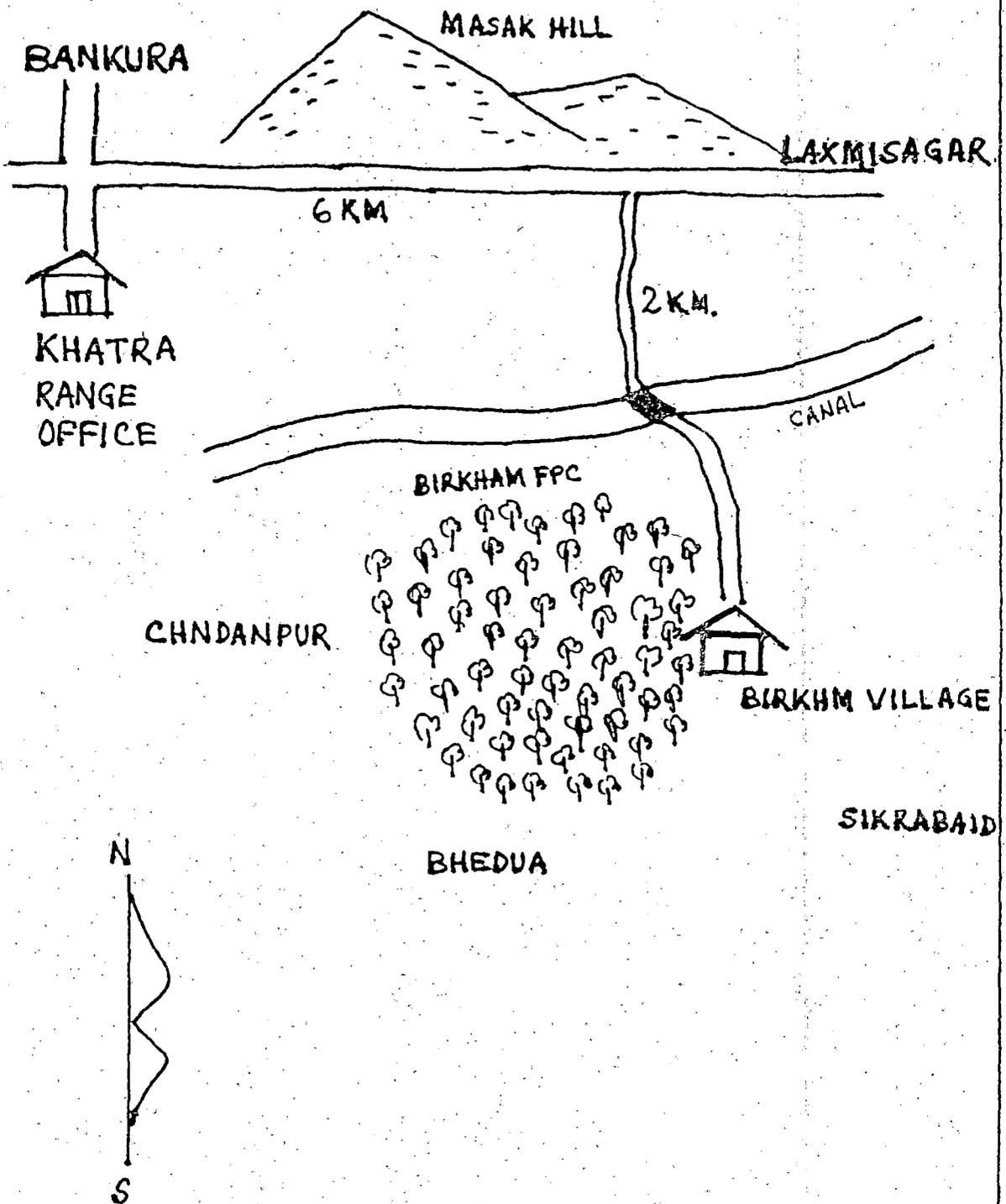


FIG. A-7 LOCATION OF DHARAGRAM FPC UNDER
KHATRA BEAT & RANGE (BANKURA SOUTH)

REGISTERED IN 1990
AREA : 63.33 HA.

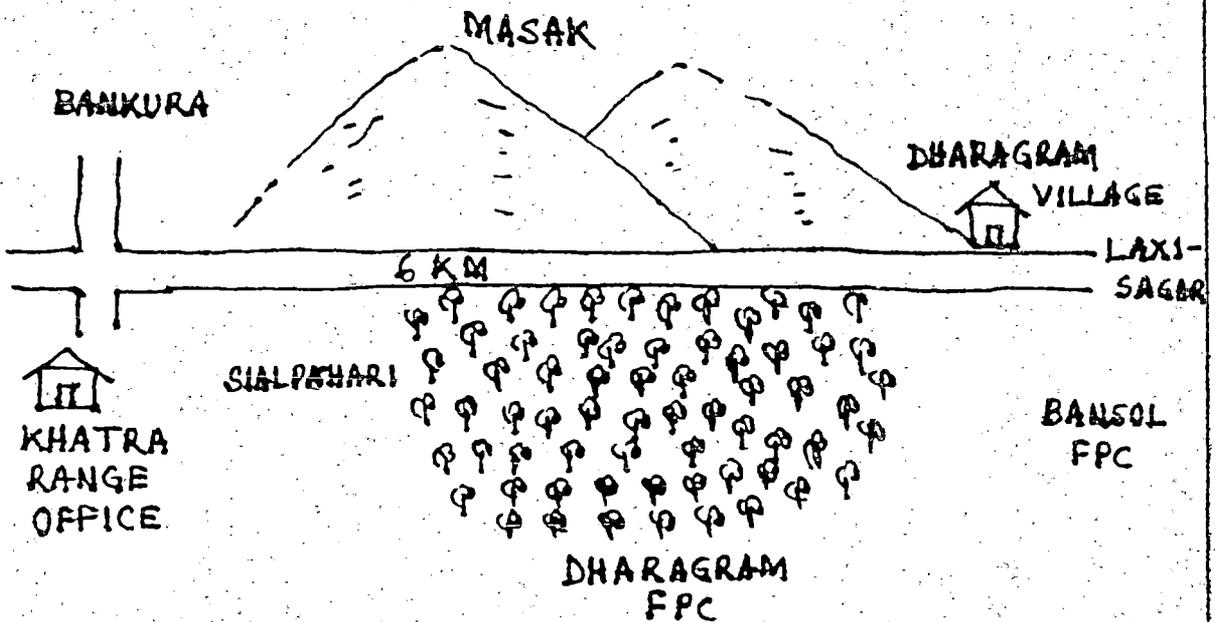


FIG. A-8 LOCATION OF BINNAGURI RIVERBANK PROJECT UNDER SILIGURI RANGE (JALPAIGURI DIST)

**ESTABLISHED IN 1985-86
AREA : 45 HA**

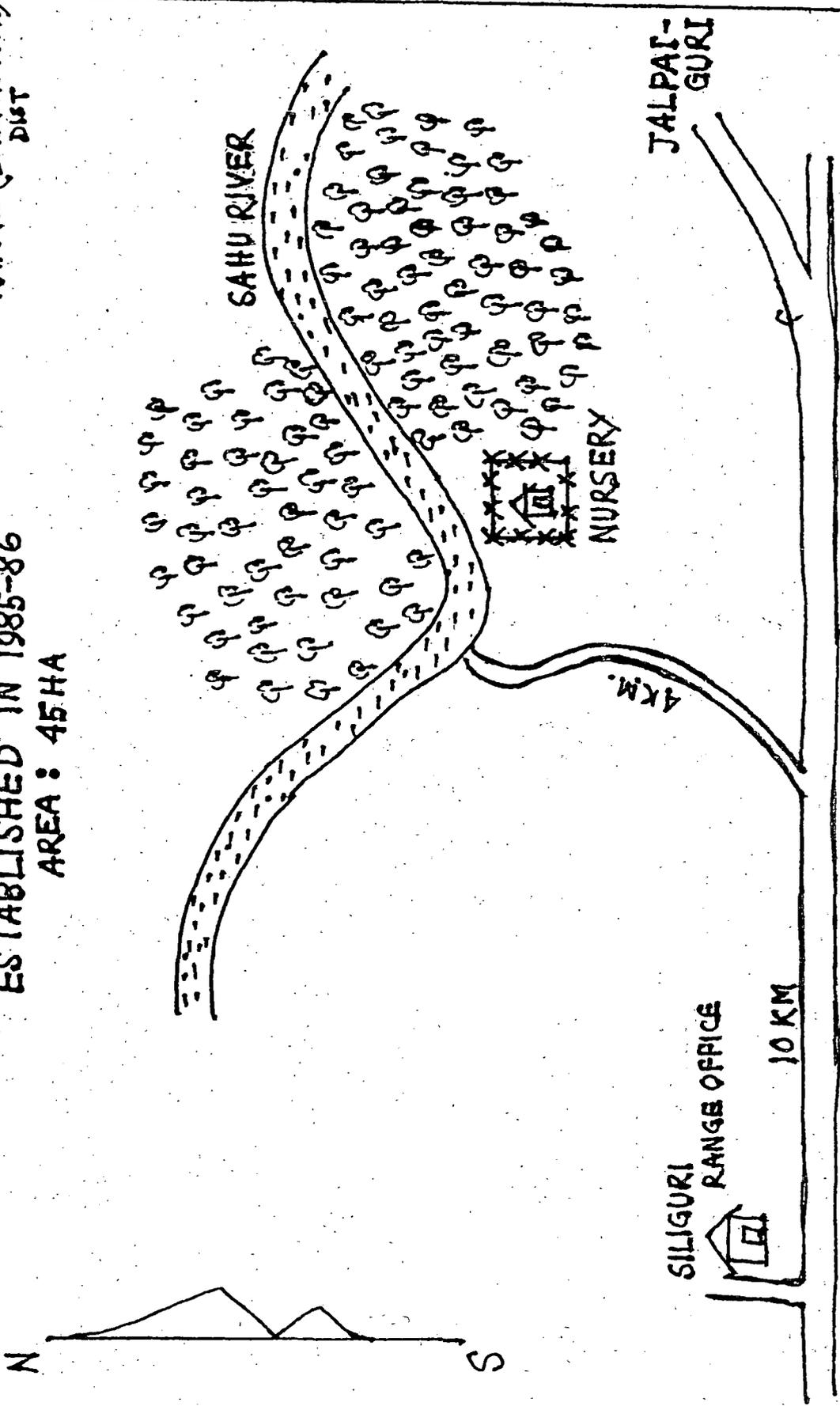


FIG.A-9 LOCATION MAP OF BARA-ATHARKOTHA

RIVERBANK PLANTION UNDER COOCHBEHAR

ESTABLISHED IN 1990

AREA: 10 HA.

- 1

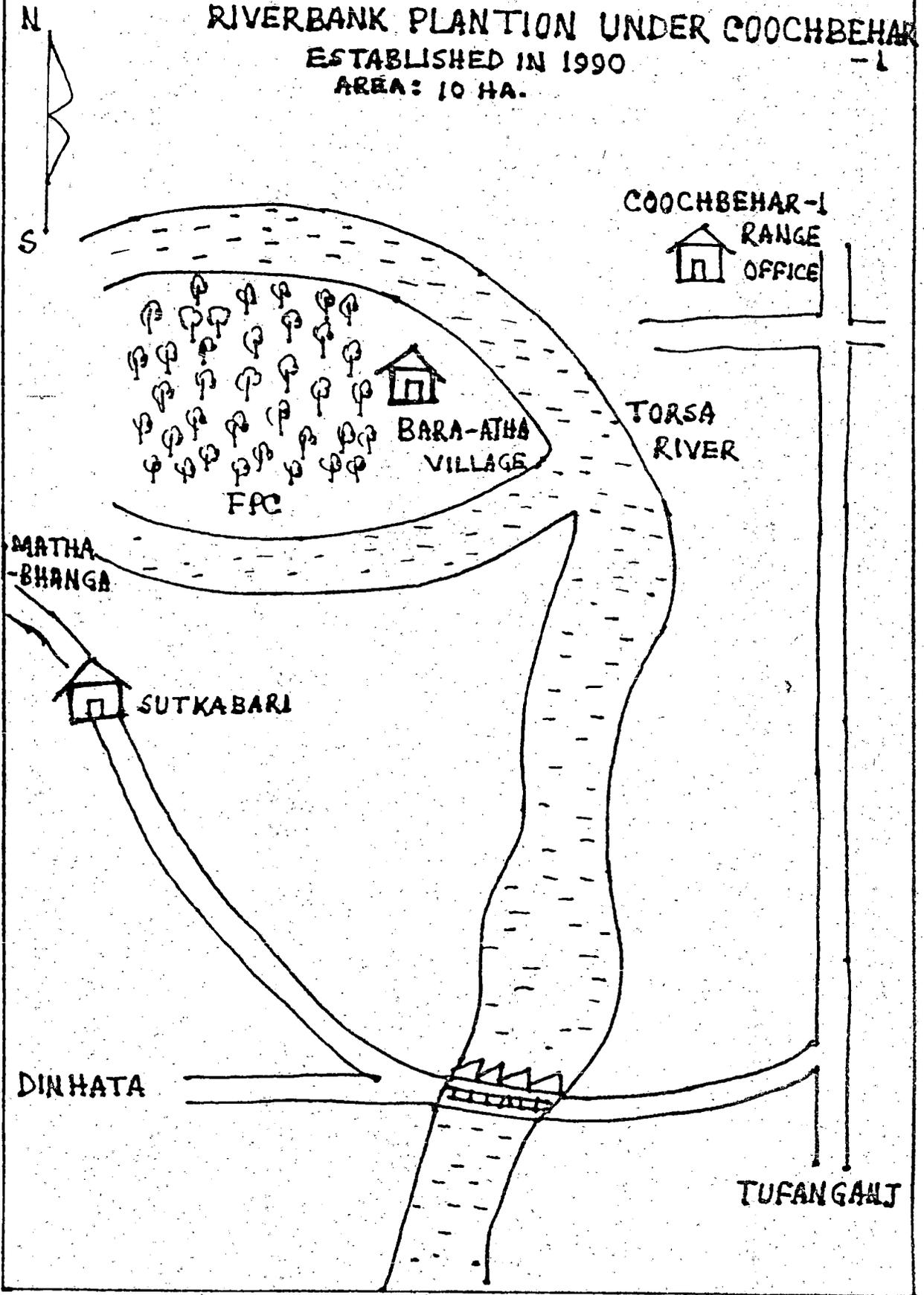
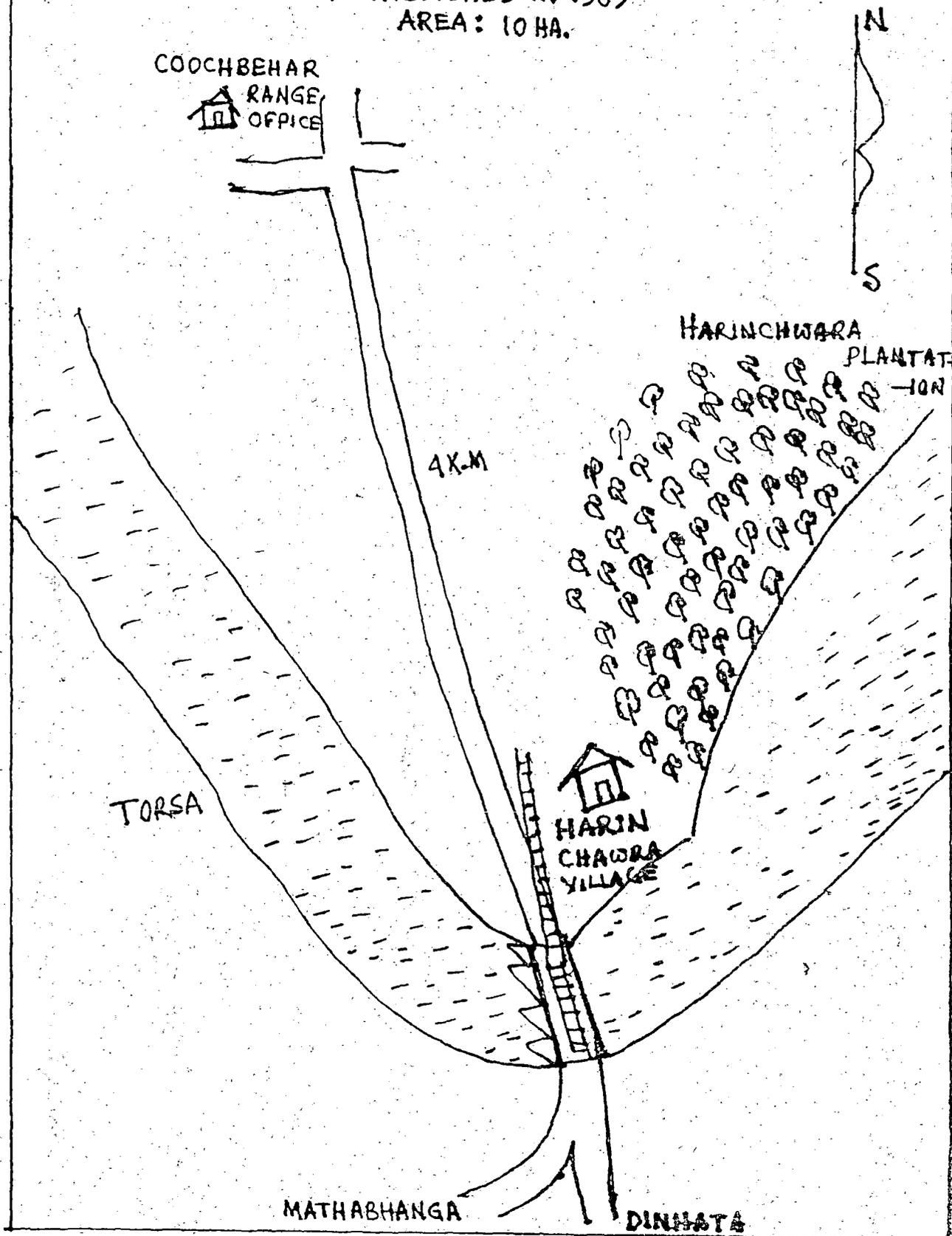


FIG.A-10 LOCATION MAP OF HARINCHAWRA RIVER-BANK PLANTATION UNDER COOCHBEHAR

ESTABLISHED IN 1989

AREA: 10 HA.



CHAPTER 6

6.1 Some Issues and Options

Like other areas in India, forest in West Bengal had undergone severe degradation and denudation due to Commercial exploitation, illicit felling and lopping, and mismanagement. To reduce the pressure on high forests and to regenerate, protect and manage the natural forests, "Social Forestry Programme" was initiated in West Bengal more than a decade ago through people's involvement and cooperation. And now it is a success story being replicated in many states in India and certified by the experts of World Bank- the donor agency of the programme. According to a recent statistics there are 2055 Forest Protecting Committee protecting and using 300,000 ha of forest land i.e., 26 per cent of total Forest area in the state (Wood Energy News-1992: PP21). However, experience of Social Forestry Programme has raised certain issues as has been identified during the course of my field survey. These are presented below:

Various problems are arising out of interactions between Forest Department and villagers, between Forest Protection Committees, (FPCS) and Government agencies like LAMP (which is the sole authority to purchase minor forest products), between FPCs and the villagers outside the committees and among members of the same protection committee. Most of the forest staffs and villagers are not sufficiently conscious about their social responsibilities. In our country forest staffs were trained and oriented to manage forest to earn revenue, ignoring the sentiments and requirements of the rural poor. The concept of participatory or joint management of forests are yet to dawn in their minds. On the other hand beneficiaries, villagers or members of the FPCs think that they are the poor, they are the destitutes, they are the sufferers. So as free riders they are only to take and give nothing to the society. They are not in a position to think about the impact of deforestation, about the vagaries of monsoon, about their future generation, as if they have no future. They will only expropriate what the Forest Department will give, what the Government will give. Both the Forest Department staffs and villagers are concerned with their respective direct economic gains only. In the case of joint Forest Management Programme, being a member -secretary of the

FPCs, the Beat Officer often tries to avoid to convene meetings of the FPC. Sometimes, they write resolutions of fictitious meetings to maintain official files and collect signature from the FPC members who usually come to "Hat" (local market per week) or office for other purposes. Many other works are done in the office campus by the Forest Department which are supposed to be done in the field. They create unnecessary troubles to the poor and ignorant committee members. Most interestingly, as villagers observed, foresters become more reluctant than ever before, in protecting the forest after the formal initiation and initial implementation of the Government Order of 1989 and 1990. Before the formation of FPCs, these forest lands were a kind of open access property and were used by all (though illegally) the neighbouring and distant villagers. But after the formation of FPCs/beneficiary schemes, the distant villagers who are not included in the committee, are creating problems and trying of denude it by hook or by crook. For example, in Sumaidihi FPC, the villagers of Tanra are creating problems. Again the relationship between F. D. and Panchayat is not always encouraging. Most of the Panchayats do not pay much attention to the programme except the compliance of the formal duties allotted to them by Government G.O. Rambani FPC in Purulia district under Kashipur Range has failed due to lack of initiative from both the FD and the Panchayat. The Rambani FPC was formed in 1990-91 with about 300 members from two adjacent villages, namely Napara and Rambani. This committee is adjacent to Bansraya and Gamarkuri FPCs and hardly 1¹/₂ to 2 Km. away from the Kashipur Range Office. Trees of Loginuari FPC under the Baramasia Beat, Humgarh Range in the district of Midnapur were uprooted by distant villagers of Anramara and were converted into cultivable land with the help of irrigated water of Kangsabti. On the other hand, most of the forest officials and other functionaries, at present, spent their time mainly on making official papers and vouchers and somehow manage to submit their returns in time. According to some forest officials, they have less scope to think about plantation. "Keep your papers ready" is the slogan in the Forest Department. There is a provision for meetings involving all forest staffs once in a month to discuss about problems, progress, prospect and future planning of Social Forestry Project. But at present it occurs once in a year and that too not very seriously. There are some extension workers but there is no proper job division for them. They have no power to take

any decision regarding any matter related to the S.F. Programme. They are losing their incentive to work. There is the provision for filling up "Micro Planning" form to collect grassroot level data for better planning and for better performance. But at present the F.D. is yet to fill up these forms either due to shortage of workers or due to mere negligence or administrative laps. It is a matter of great distress that the FD staffs lost their enthusiasm/motivation in S.F. Programmes as soon as flows of money (foreign) dries up. Thus provision should be made to organise and motivate both F D staffs and villagers towards their non direct economic benefits. A good rapport between FD and FPC members, between F D and Gram Panchayat, between FPC and outside villagers and between FPC and LAMP needs to be built up. Above all the traditional attitude of keeping people alienated has to change to ensure the survival and successful implementation of the programme. Further experiments with newer incentive structure and institutional arrangements need to be explored to replace conflict by cooperation.

Local level politics has become a serious impediment in the implementation of the Social Forestry Programmes in the state. Each and every S.F. Projects whether it is FPC or beneficiary schemes is under G.P. Which is controlled by political parties. And to a political party vote is more valuable than a forest. Voters (villagers) are taking the advantage of such opportunity. In beneficiary schemes Government involved the G.P. in determining beneficiaries. But political considerations in determining beneficiaries create conflicts instead of co-operation. As for example, a large portion of eucalyptus plantation of Bansraya FPC in the district of Purulia under Kashipur Range were looted before the last Panchayat Election. Formation of FPCs have become an assiduous task due to adverse local politics. In the district of Bankura, the Ranger of Khatra has failed to register Banbedia FPC due to political opposition from Panchayat Pradhan (head) (BANANI, 1994). Teskona FPCs has failed to protect its forest due to political rivalry among the villagers who are strongly divided into three political parties. Teskona is adjacent to Suribanka FPC in the district of Midnapur under Amlasoli Beat. Rangiladihi and Panrashol FPCs under Kashipur Range in the district of Purulia have failed due, again, to political rivalry and disputes among the members of the executive committee. G.P.s are very much involved in the implementation of

their own programmes and are not showing enough interest in S. F. Programmes.

Uncertainty about the benefits from the social forestry schemes become a problem in the implementation of the S.F. Programme. Rural people hesitate to participate and it stems from their suspicion that once you make a good forest, whether it is on private, on government land or on degraded forest land the F.D. will take it over subsequently. The initial acquisition of private forest land by the Government and their subsequent deterioration into degraded lands and the strained relation and distrust between FD and local peoples over several decades are the main factors behind such attitude of the people. For historical reasons they are not in a position to believe that they will really get 25 per cent share from FPCs. Even if some one raises good plantation on private or government land, he may not be able to sale his trees freely due to various restrictions on "transit permit"¹. It is a compulsory requirement for any transaction of forest products (as per Indian Forest Act 1927). It is quite impossible for a layman to complete the process. Most of the village people consisting of landless labourers, small & marginal farmer, economically and socially backward people are unable to go through such hazards. Vehement opposition are also coming from the people who have lost their rich forests due to Forest Acquisition Act of 1954. They are resisting the formation of FPCs and saying that "The Government is fraud, the Government has cheated us. The Government did not pay our legitimate compensation." To resolve this type of problem more and more communications and discussions with communities are required. Other income-generating schemes

1 To get, a transit permit first one have to apply to Range Officer for a transit permit, 2) then one have to produce a sketch map of the plot where plantation has been raised by a requisite surveyer, 3) One have to show a no objection certificate from BLRO, 4) One have to show a approval letter from Bon-o-Bhumi Sanskar Sthayee Samitee of the local Panchayat, 5) One have to produce a no-objection certificate from co-sharer certified by the concerned G.P. 6) Then with all these documents one have to fill up a form and Beat Officer will assign a value of the tree and at last FD will humbering (seal) on the trees for passing it from one place to another

for rural development need be offered. A clear-cut and transparent policy regarding share of benefits, transit of forest product should be offered by the FD to seek peoples involvement and participation at large.

Time lag between the formation or plantation and the returns from the final harvest become a problem. People prefer to convert their lands into agricultural ones for immediate gain (within 3-4 months only) rather than to regenerate, protect and wait for several years. In the coppicing sal forests of South-West Bengal, normally, it takes 10 to 12 years to obtain benefits. According to Government Order 1989, members have to wait and protect forest for at least 5-10 years to get usufruct or other benefits from the protected forest. Since most of the people are very poor in the rural areas they can not wait for such a long period. In the absence of complementary non-forestry sources of income, poor participants can not desist themselves from taking the advantage of free access and engage themselves in felling and lopping. Thus the immediate need is to provide the rural poor with complementary sources of income and employment on a sustainable basis. For the purpose greater integration and coordination among the different Govt. and non-govt Departments (Like Agriculture, Horticulture, Irrigation, West Bengal Tribal Development Corporation, Zilla Parishad, Panchayat Samities, Village Panchayats etc.) are required.

Field (local) level committees under the different S. F. schemes are facing problems as no powers commensurate with their duties and functions have been delegated to them. They have no power to settle any dispute or conflict, to penalise the offenders, to participate in planning or decision-making agenda regarding the scheme. Forest offices are far away from the acting committees and even forest officials are not available in time. As a result of these facts they feel helpless and highly demoralised when in the remote area they face reality. There is therefore a need to empower the committees with necessary powers and full support from the F.D. so that they can protect and manage their forests effectively and smoothly.

Processing and marketing is a great problem of S.F. projects for both the wood and non-wood forest products. In case of river banks and farms forestry extraction cost is very

high due to backwardness of site. People who grow their plantation in such backward sites do not get fair prices. People are also not getting fair prices for their non-wood products. For example, the only marketing agents LAMP is running under complete pandemonium in the state.

Being the sole purchaser of minor forest products (Government order 1989, Clause 4-iv, PP4) LAMP is quite absent in many areas or even where present, is present for a few days throughout the year. Even in many cases members have not been paid the sale prices. FPC Members are frustrated with the functioning of the LAMPS. Therefore, to overcome the situation small scale economically viable processing units need be set up, transport facilities in backward sites need be developed. Forest producers' cooperative marketing societies may be organised and the existing marketing arrangements through LAMPS need be rectified and strengthened.

Sometimes operation and functioning of S. F. Schemes become ineffective due to lack of sufficient funds. Fund available is always less than proposals. In most cases, FD can't keep their word for developmental works in the region/village (like well, ponds, jorbandhi, road or culvert construction) due to lack of funds. Since social forestry provide positive externality to the society Government need to provide sufficient fund for the purpose.

In certain cases, though not generally, caste differences among the people of the same village create problems in the formation and protection of S. F. projects. In such situations upper caste people (mainly Brahmins, Kayastha, Khatriya) are not willing to work jointly with lower caste people (mainly, Bauri, Shayer, or other tribals). It has led to subdivision and fragmentation of forest land. In some cases, for example, the F. D had to form more than one FPC in the same village, in some cases the F. D had failed to form any committee and all due to this factor. Again, inter committee or intra committee conflicts arise out of the functioning of more than one FPCs in the same zone. For example, in Kashipur village under Khatra Beat and Range in the district of Bankura, the FD has failed to form FPC due simply to Caste antagonisms. The upper class Utkal Brahmins are not willing to work together with the lower caste Bauri or Shayer. In Keshia village under Keshia Beat and Khatra Range two FPCs based on caste are operating simultaneously (Banani, 1994 PP.6). This is a long standing social problem and

the F. D alone probably cannot solve the problem.

In our traditional poor village society women are more responsible than men in a family. As women have to cook for her family, usually they have to collect fuelwood. Generally they also collect minor forest products, fodder etc. As a matter of fact, their suffering has increased with the degradation of forests and have greater stakes in S. F. programmes than men. It is interesting to note that in many instances wives present their drunken husbands as offender at the Beat office for punishment where FPCs are operating. Unfortunately, the FD have failed to involve women in S. F. projects. So it is an urgent need to include more and more active women as members in the schemes.

In the North, in contrast to the South, my study concentrates mainly on farm forests. Thus social forestry programme becomes less significant to the people of the projects whose primary occupation there is agriculture. The main season (June to August) of agricultural activities coincide with the main season of tree plantation (June to 1st week of August) under social forestry programme. People who are completely dependent on agriculture remain very much occupied with the agricultural activities. They do not have enough option to pay much attention to plantation of trees. Very often they do not plant any seedlings even though they collect these from nursery. It is only after the completion of all agricultural activities that they usually plant trees which by that time become almost damaged or weak. As a consequence the survival rate of the tree seedlings is normally very low. Thus it is necessary to convince the rural people that in terms of allocation of time tree plantation and paddy cultivation are not substitute but complementary. It is a fact that since traditional natural forests are still existing in the region people are not interested in S. F. and they have no perceived crisis of fuelwood or timber. However, for self help and partial recovery of cultivation tree plantation may be highly important. Non availability of project land is also a major problem in the North Zone because land is rapidly becoming scarce. Influx of people from neighbouring countries and tea gardens are creating pressure on Government vest lands, wastelands, riverbanks or beds and roadsides. Land reform measures initiated by the Government is also creating problems in getting the waste or vestlands for S. F. projects.

Pricing of seedlings by the F. D. for farm forestry is a problem to the poor rural people even if they provide some concession to economically disadvantaged sections of the rural population. But it hampered the process in two ways : first, people become lukewarm when price is introduced for seedlings in place of free distribution. Secondly, economically disadvantaged sections of the rural people getting the seedlings at a concessional rate, instead of planting the seedlings on their own land resale them to others at some higher prices to earn some quick money. Again, it has been observed that marginal farmers and disadvantaged class of our society are so poor that they are not able to purchase the seedlings even at a concessional rate offered by the F. D. No evaluation has been made so far to see the impact of pricing of seedlings over the programme. The F. D. need to re-evaluate this price policy.

Another problem experienced by the S. F. programmes is the absence of fenced boundaries or watch ward. People neglect it as they do not have enough money to spend on boundaries or enough time to spend on watchward. In case of the F. D, watchwards are paid only if funds permit. It is a real constraint where cattle population is high and indiscriminate grazing is a recurring issue.

6.2 Lessons And Implications

This study concentrates on sample survey over six districts covering the three basic models of Social Forestry Programmes out of twelve models (GOWB, 1982). Thus it would be misleading to draw any general conclusion. However the following important lessons can be drawn on the basis of the experiences gathered from the select FPCs, River bank projects and Farm Forestry in the State:

i) Regeneration, protection and management of degraded forest land and establishment of other social forestry projects are possible through the new challenging concept of people's participation even under the prevailing constraints. This method is cost-effective and equitable.

ii) It is also evident that if-special weightage in decision making, a long-term exclusive rights of use over the forest resource, certainty of getting a share in the sale proceeds from the harvest of timber or pole, alternative source

of income and employment are given to local people, they are more likely to cooperate and participate in establishing, regenerating, protecting and managing forests.

iii) Successful implementation of the S. F. Projects through people's participation largely depends on the political will of the Government, change in the traditional attitude of forest management by F. D. staffs, faith in the local people's ability to identify and solve their problems, decentralisation of management of forest resources through empowering and strengthening the local democracy like G. P., and changes in the objectives of the forest policies of the Government.

iv) Unless there are monetary incentives built into S. F. projects for the local committees to take over their management after establishment or regeneration, projects will continue to remain as ventures of the FD without people's participation and hence they may never become self-sustaining. To involve people in such schemes it is essential to ensure and that the private benefits from the projects be substantially higher than private costs of participation.

v) Management of the common property resource like forest through people's participation is only of recent origin, compared to over 125 years of traditional forest management. Therefore it is obvious that it will take some time to get a concrete shape and root and to emerge as a new institution.

vi) For better establishment and regeneration, protection and management, local organisations (executive committee of the FPCs or beneficiary schemes) need be controlled and governed by its constituent members (who must live in the same locality) only and be accountable to the society. It should be empowered to frame, enforce its own rule; monitor and impose penalties on offenders and violation of norms. This idea is well recognised in WCED (1987). The Government will only provide technical information and guidance and at the same time ascertain that these organisations will not be captured by a few vested interests. To ensure this it is necessary to develop a new model where the administration of Gram Panchayats can be merged with the Forest Department's technical experience. Certainly this is a necessary condition but not sufficient. The sufficient condition is that there must be a firm political commitment or will of the ruling Government to implement such programmes.

GLOSSARY

Akashmani : *Acacia auriculiformis*

Bon-O-Bhumi Sanskar Sthayee Samiti : Standing Committee of Forest and Land Development

Cashew : *Anacardium occidentale*

Chikrashi : *Chuckrasia tabularis*

Eucalyptus : *Eucalyptus hybrid*

Gamar : *Gmelina arborea*

Ghoraneem : *Melia azadirach*

Khair : *Acacia Catechu*

Kend : *Diospyros melanoxylon*

Kadam : *Anthocephalus cadamba*

Mahua : *Madhuka spp*

Minjiri : *Cassia Siamea*

Minor forest produce : Non-wood forest produce such as leaves, flowers, fruits, seeds, roots, barks etc.

Open access : A resource which is not owned by anybody, is accessible to everybody, and whose use is not regulated by any rules, regulations, conventions etc.

Panchayat Samiti : An elected body next higher to a village panchayat and responsible for development administration at the block level.

Simul : *Bombax Ceiba*

Sirish : *Albizia spp*

Sal : *Shorea robusta*

Sissoo : *Delbergia Sissoo*

Teak : *Tectona grandis*

Unclassed forests : Forests which are not legally demarcated and categorised.

Vested land : Land declared surplus under the land ceiling and the estate acquisition acts are vested in the state Government and are known as Vested lands. They are nominally held by village panchayats.

REFERENCES

- Arrow K.J. (1951) "Social Choice and individual values", John Wiley and Sons, Inc, Newyork.
- Anonymous (1952) The National Forest Policy, Ministry of Food and Agriculture. Resolution No. 13/52-F dated 12-5-52, Government of India. New Delhi.
- Anonymous (1928) Report of the Royal Commission on Agriculture in India, Government of India, Central Publication Branch, Calcutta.
- Anonymous (1984) India's Forest, Forest Research Institute, Dehradun.
- Agarwal, Anil (1985), 'Human-Nature Interactions in a Third world Country' in Partnership in Progress : Water, Issue No 15, June 1987, Lutheran World Services' (India), Calcutta.
- Axelord, R (1984) The Evolution of Co-operation, Basic Books, New York.
- Agarwal, A (1992) "Economy and Environment in India" in A. Agarwal Ed. "The Price of Forests", Centre For Science and Environment (C.S.E.) New Delhi.
- Agarwal, B (1992) "The Gender and Environmental Debate : Lessons from India", cited in "Common Property, Collective Action and Ecology" by Subir Sinha and Ronald Herring, Economic and Political Weekly, July 1993.
- Arnold J. E.M and W. C. Stewart (1991) 'Common Property Resource Management in India', Tropical Forestry Paper No. 24, Oxford Forestry Institute, Oxford University, Oxford.
- Baumol, W.J. (1968) "On the Social rate of discount", American Economic Review, 58, P.P. 788-802
- Bhatia, R (1988) "Energy Pricing and Household Energy Consumption in India", The Energy Journal, Special issue.
- Brundtland (1989) "Key note address and Franklin Lecture at the Forum on Global Change and our Common Future", Washington D.C. May.
- Braybrooke, D (1985) 'The insoluble Problem of the Social Contract' in R. Campbell and L. Sowden (Edn) Paradoxes of Rationality and Cooperation, University of British Columbia

Press, Vancouver.

Bray and Gorham (1964) "Litter Production in the Forest of the world". In J.B. Cragged, *Advances in Ecological Research*, Academic Press.

Barraclough S and K Ghimire (1990) *The social Dynamics of Deforestation in Developing countries: Principal issues and Research Priorties*. UNRISD, DP-16 (United Nations Research Institute for Social Development), Geneva, Switzerland.

Berkes, F and T. M. Farvar (1989) 'Introduction and Overview', in Berkes Ed. (1989) *Common Property Resources : Ecology and Community - Based Sustainable Deveopment*, London, Belhaven Press.

Buchanan J. M. and G. Tullock (1965) *The Calculus of Consent*, Ann Arbor : University of Michigan Press.

Bromely, D. W. (1991) *Environment and Economy : Property Rights and Public Policy*, Oxford : Basil Blackwell, Inc.

— (1986) 'The common property challenge' in National Research Council (NRS) 'Proceedings of the conference on Common Property Resource Management, Washington, D. C. : National Academy Press.

Brown, L (1981) *Building a Sustainable Society*, Newyork: W.W. Norton.

Biswas, P.K. (1988) "Sociological Issues in Forestry" in the *Indian Journal of Social Science*, Vol-1, No.2, Sage Publications, New Delhi/Newbury Park/London.

Binswanger, H (1991) "Brazilian Policies that Encourage Deforestation in the Amazon" *World Department/Development*, Vol. 19, No.7

Bautista, G.M. (1990) "The Forests Crisis in the Philippines : Nature, Causes and issues", *Developing Economies*, Vol-28, No.1, March.

Banerjee, U (1989) "Participatory Forest Management in West Bengal" in K. C. Malhotra and M. Poffenberger (Eds.), *Forest Regeneration Through Community Protection: The West Bengal Experience*, West Bengal Forest Department, Calcutta.

Banabithi (1988) *A Quarterly Journal of West Bengal Government*, No.3, July-Sept.

Banabithi (1989) A Quarterly Journal of West Bengal Government, No. 3, July-Sept.

Banabithi (1990) A Quarterly Journal of West Bengal Government, No. 3, July-Sept. Government of West Bengal, Calcutta.

BANANI (1994) A Monthly by Forest Department, Bankura (South), No.2, January, PP-6.

Chandra N.S. and M. Poffenberger (1989) "Community Forest Management in West Bengal: FPC case studies" in K. C. Malhotra and M. Poffenberger (Eds) "Forest Regeneration Through Community Protection: The West Bengal Experience, West Bengal Forest Department (Calcutta).

Clawson, M (1975) Forest for Whom and For What? Johns Hopkins University Press, Baltimore.

Campbell, R and L. Sowden (Eds) (1985) Paradoxes of Rationality and Cooperation : Prisoner's Dilemma and Newcomb's Problem, University of British Columbia Press, Vancouver.

Campbell, J.Y. (1992) "Joint Forest Management in India", Social Change: March, Vol.22, No.1

Chaturvedi, M.D. (1950) "Grow More Fuel to Grow More Food," Indian Forester, 76.

Champion and Seth (1968) General Silviculture For India, Manager Publications, Delhi.

Cernea, M.M. (1981) "Land Tenure Systems and Social Implications of Forestry Development Programmes", World Bank Staff working Paper No. 452 April.

Chetty, R.N.V. (1985) "Social Forestry and Forest based small scale rural industries", Indian Forester, Vol.III No.9, P.P. 678-689

Chandrashekhar, D.M., B. M. Krishnamurti and S. R. Ramswamy (1987) "Social Forestry in Karnataka -An Impact Analysis", Economic and Political Weekly, Vol. XXII, No. 24, June 13.

Chakravorty, K (1991) Man, Plant and Animal Interaction, Darbari Prakashan, Calcutta.

Chakravorty, S (1992) "Sustainability: The concept and its

Economic Application in the context of India" in A. Agarwal Ed. "The Price of Forest", C.S.E., New Delhi.

Colchester, M (1992) Sustaining the Forests: The community-Based Approach in South and South-East Asia, UNRISD, DP-34 United Nations Research Institute for Social Development, Geneva.

Chopra, K., G. K. Kadekodi, M. N. Murty (1990) Participatory Development -People and Common Property Resource, Sage Publication, New Delhi.

C.S.E. (1985) The State of India's Environment: The second citizen's Report Centre for Science and Environment, New Delhi.

Deweese, P.A. (1989) "The Woodfuel Crisis reconsidered: Observations on the dynamics of abundance and scarcity", World Development, Vol.17 No.8.

Dorner, P and W. C. Thiesenhusen (1992) Land Tenure and Deforestation: Interactions and Environmental Implications, UNRISD, DP-34, United Nations Research Institute for Social Development, Geneva.

Datt and Sundharam (1992) Indian Economy, S. Chand & Company Ltd., Ram Nagar, New Delhi.

Dasgupta, P (1993) An Inquiry into well-being and Destitution, Clarendon Press, Oxford.

Ehrlich, P.R. and A.M. Ehrlich (1972) Population, Resource, Environment -issues in Human Ecology, 2nd Edn. W. H. Freeman and Co., Sanfransisco.

Eckholm et. al (1984) Fuelwood: The Energy Crisis that won't Go Away, Earthscan, London, in Barraclough and Ghimire, The Social Dynamics of Deforestation in Developing Countries : Principal Issues and Research Priorities, UNRISD, DP-16, Geneva, Switzerland, 1990.

Fraser, A.I. (1977) A Manual on the Management of Plantation Forests, International Forest Science Consultancy. 21 Bigger Road, Silverburn, Penicuik EH 269 LQ Midlothian Great Britain.

Fortman, L and J. W. Bruce (1988) Whose Trees: Proprietary Dimensions of Forestry, Boulder, Westview Press.

Fisher, B (1993) "Creating Space: Development agencies and

local institutions in natural resource management" Forest, Trees and People, News letter, No. 22, November.

F.A.O. (1982) Production Year Book, Rome.

F.A.O. (1986) Production Year Book, Rome.

F.A.O., CFCS1 (1988) "Case studies on farm forestry and wasteland development in Gujrat, India" by S. Jain Ed. by K. Rorison, Bangkok.

F.A.O (1988) An Interium Report on the State of Forest Resources in the Developing Countries, Rome.

F.A.O. (1989a): Forestry and Food Security, Rome.

F.A.O. (1991) Forestry and Rural Development, Food and Agricultural Organisation of the United Nations, Forestry Paper No. 26, Rome.

Goodland R and G. Ledec (1987) "Neo-classical Economics and Principles of Sustainable Development", Ecological Modelling 38: PP. 19-46.

Goodland, R (1991) "Tropical Deforestation: Solutions, Ethics, Religions, Environment". working paper No. 43, World Bank, Washington D.C.

Gadgil, M (1991) India Deforestation Patterns and Processss": Society and Natural Resources, Vol. 3 No. 2.

Gadgil, M (1992) "Changing Pattern of CPR (Common Property Resources) Usage in Uttarkannada District in Southern India", Co-authored with S. Rao in "Common Property, Collective action and Ecology", by S. Sinha and R. Herring in Economic and Political Weekly, July 3-10.

Gardon, H. S (1954) 'The Economic Theory of a Common Property Resource : The Fishery', Journal of Political Economy, April.

Gregersen, Hans, Sydney Draper and Dleter Elz, eds (1989). People and Trees : the Role of Social forestry in sustainable Development. Washington D.C.: The World Bank

Grainger, A (1990) The Threatening Desert, Earthscan, London.

Gardner R and E. Ostrom (1987) "The Nature of Common-Pool

Resource Problems', Paper prepared for the Common Property Resource Management Conference, Workshop in Political Theory and Policy Analysis, Indian University, Bllomington, IN.

Guha, R. (1983) "Forestry in British and Post-British India -A Historical Analysis". Economic and Political Weekly, Vol. XVIII, No. 44, Oct.29.

Guha, R, (1988) "Ideological Trends in Indian Environmentalism," Economic and Political Weekly, Vol. XXIII, No.49, December 3.

Guha, R, (1994) "Forestry Debate and Draft Forest Act -who wins, who Loses?" Economic and Political Weekly, August 20.

Guha, R (1991) The Unquite Woods. Oxford University Press.

Gibbs, J. N and D. W Bromely (1989) 'Institutional Arrangements for Management of Rural Resources : Common Property Regimes' in Berkes, F Ed. Common Property Resources : Ecology and Community Based Sustainable Development, London, Belhaven Press.

Gadgil, M and R. Guha (1992) The Fissured Land: A Ecological History of India, Oxford University Press, New Delhi and University of California Press, Berkeley.

Global 2000 Report (1980) The Global 2000 Report to the President: Entering the Twenty First Century Prepared by the Environmental Quality and the Development of State, U.S. Government Printing Office.

G.O.I. (1967) Report of the Committee on Tribal Economy in Forests Areas, Delhi.

-(1973) Interim Report on Social Forestry, National Commission on Agriculture. Government of India, New Delhi, August.

-(1965) Report on Fuel Policy for the seventies, Ministry of Steel and Mines, Government of India, Delhi.

-(1894) Forest Policy, Revenue and Agricultural Department (Forests), Government of India, Circular No. 22F, dated October 19, New Delhi.

-(1984) Report of the Committee on the Forestry Programmes for Alleviation of Poverty, Government of India, New Delhi.

G.O.I. (1985) National Forest Policy, Lokshava Secretariat, Government of India, New Delhi, May.

G.O.I. (1988) National Forest Policy, Ministry of Environment and Forests, Government of India, New Delhi.

G.O.W.B. (1980) Social Forestry Project, West Bengal, Forest Directorate, Government of West Bengal, Calcutta, October.

-(1983) Evaluation: An Interim Report, Monitoring and Evaluation Cell, Social Forestry Wing, Forest Directorate, West Bengal.

-(1986) Assessment of Extension and communication systems of Social Forestry Programmes in West Bengal, sponsored by Social Forestry Wing, Directorate of Forest, Govt. of W.B. Administrative Staff College of India, Hyderabad.

-(1987) Gramin Ban O Samaj, A Quarterly Technical Bulletin, Dwitiya Barsa, Tiritiya Sankhya, Oct-Dec. Samaj Bhattik Bana Srijan Shakha.

-(1991) State Report on West Bengal Forests (1990-91), Planning and Statistical Cell (Statistics), Office of the Principal Chief Conservator of Forest, West Bengal, Calcutta.

-(1992) Key Extracts From the Project Completion Report of West Bengal Social Forestry Project, Monitoring and Evaluation Cell, Government of West Bengal, March.

-(1982) Prakalpa Parichiti, Samaj Bhattik Banasrijan, Bana Bibhag, Paschim Banga Sarkar, Kalikata.

GATT (1994) General Agreementss on Trade and Tariff. Agreements, Final Text of Uruguay Round, Part XIII, Annex-2, MVIRDC, World Trade Centre, Bombay.

Hewlett and Halvey (1970) Effects of Forest clear-cutting on the Storm Hydrograph Water Resource Research in "One earth one Future-our Changing Global Environment" by C. S. Silver, Affiliated East West Press Pvt. Ltd.

Houghton, H (1989) "Emmission of greenhouse gases" in Barraclough, s and K. Ghimire, The Social Dynamics of Deforestation in Developing Countries. Principal issues and Research Priorities, UNRISD, DP-16, Geneva. Switzerland.

Hardin, R (1982) Collective Action, Jhons Hopkins University Press, Baltimore.

Hyde and Newman with a contribution by R.A. Sedjo (1994): Forest Economics and Policy Analysis - An Overview, World Bank, D.P, No. 134.

Hardin, G (1968) 'The Tragedy of the Commons', Science, 162

Hirshleifer, J. (1987) 'Evolutionary Models in Economics and Law : Cooperation Versus Conflict Strategies', in Jack Hirshleifer (ed.) Economic Behaviour in Adversity, University of Chicago Press, Chicago.

Jodha, N.S. (1985) 'Population growth and the decline of common property resources', Population and Development Review. Vol.2, No. 11.

Kiser, L.L and Elinor Ostrom (1982) "The Three Worlds of Action : A metatheoretical synthesis of Institutional Approaches" in Elinor Ostrom (Ed.) Strategies of Political Inquiry Beverly Hills : Sage Publications.

Kalla, J.C (1988) "Forestry and Economic Development," Indian Journal of Agricultural Economics, Vol. 43, No. 3 July - September.

Kulkarni, S. (1989) 'Forests : Laws Vs. Policy', Economic and Political weekly, April 22.

Kumar, P.J.D (1992) 'Economic Analysis and the Question of sustained yield in Forestry' in Anil Agarwal Ed., The Price of Forests, Centre for Science and Environment, New Delhi.

Kanjilal, B, R.N. Bhattachaya and E.J. Luzer (1994) Sustainable Development Approach - Relevance to less developed Countries. Unpublished manuscript.

Lal Chhedi (1970) 'Conservation of Cowdung and Problem of fuel in rural areas - Agriculture and Coal industry', Coal Utilisation Council, New Delhi, PP. 44

Little, I.M.D and J.A. Mirrlees (1974) Project Appraisal and Planning for developing Countries, Heinemann Educational Books Ltd., London.

Lanly, J.P (1982) Tropical Forest Resources, Forestry paper No. 30, F.A.O, Rome.

Mitra, A (1953) An account of land Management in West Bengal 1870-1950, West Bengal Government Press, Aipore, Calcut-

ta.

McNamara, R.S (1972) Address to the United Nations Conference on the Human Environment as President, World Bank Group.

Magroth, W. B. (1986) 'The Challenge of the commons : Nonexclusive Resources and Economic Development : Theoretical Issues', Working Paper, World Resource Institute, Washington, D. C.

Manshard, W (1974) 'Tropical Agriculture', Longman, London.

Muranjan, S.W (1987) 'Management of Social Forestry in Maharashtra', ARTHAVIJNANA, June, No. 2

Mellor, J.W (1988) 'The Intertwining of Environmental Problems and Poverty' Environment, November.

Mckean, M. A. (1987) 'Success on the commons : A Comparative Examination of Institutions for common property Resource Management', Paper presented at a Conference on Advances in Comparative Institutional Analysis at the Inter-University centre of Post Graduate studies at Dubrounik, 19-23 October. Duke University, Durham.

Myers, N (1989) Deforestation Rates in Tropical Forests and their Climatic Implications, Friends of Earth, London.

Mahar, D.j. (1989) Government Policies and Deforestation in Brazil's Amazon Region, World Bank Publication, Washington D.C.

Muthayya, B.C. and M. Loganathan (1992) "Community Participation in Social Forestry (A Dialogical Assessment)," Journal of Rural Development, Vol. II, No. 6, NIRD, Hyderabad, India.

Nadkarni, M.V (1989) The political Economy of forest Use and Management, sage Publications, New Delhi/ Newbury Park/ London.

Nagabrahman, D. and D. Sambrani (1983) 'Women's Drudgery in Fire Wood Collection', Economic and Political weekly, 18 (1 and 2)

Nadkarni M.V., K. N. Ninan, S. A. Pasha (1992) "Social Forestry Projects in Karnataka, Economic and Financial Viability," Economic and Political weekly, June 27. PP. A-65-74.

N.C.A (1976) National Commission on Agriculture, Part IX, Ministry of Agriculture and Irrigation, Government of India, New Delhi, PP. 230.

Neher, P. A (1990) Natural Resource Economics, Cambridge University Press.

Ovington (1955) Woodlands, The English University Press Ltd. London.

Oakerson, R. J. (1986) 'A model for the Analysis of Common Property Problems' in National Research Council (NRS) 'Proceedings of the conference on Common Property Resource Management, Washington D. C. National Academy Press.

Oza, G.M. (1992) "The Earth Summit 1992", Indian forester, Vol. 118, No. 5, May.

Olson, M (1971) The Logic of Collective Action :Public Goods and the Theory of Groups, Cambridge, MA. Harvard University Press.

Ostrom, E. (1990) Governing the Commons : The Evolution of Institutions for Collective Action, Cambridge University Press, New York.

Palit,s (1989) 'Present Status of Forest Protection Committees' in K.C.Malhotra and Poffenberger (Eds.), Forest Regeneration Through Community Protection :The West Bengal Experience, Calcutta, West Bengal Forest Department.

Price, C (1976) "Blind alleys and open prospects in forests economics", Journal of Forestry, Vol. 49, No.2, PP. 99-107.

Postel,S (1984) Protecting forests, The State of World 1984, World Watch Institute, Washington D.C.

Pearce, D, A. Markandya and E. Barbier (1989) Blue Print for Green Economy, Earthscan, London.

PUDR (1982) Undeclared Civil War : a critic of the forest policy, People's Union for Democratic Rights, Delhi, June.

Ribbentrop, B (1900) Forestry in British India, Superintendent of Government, Printing Press, Calcutta.

Rieger, H.C. (1976) "Floods and droughts in the HImalyaya and the Ganges plain as an ecological system", Mountain Environment and Development, SATA, Kathmundu.

Repetto, R and M. Gills (1988) Ed. Public Policies and the Misuse of Forest Resources, Cambridge University Press, Newyork.

Roy word (1978) Floods - A Geographical Perspective, The Macmillan Press Ltd. PP 136.

Raju, V.T, A.R. Babu and P.R. Ram (1988) "Trends and Distributional Pattern of forests in Andhrapradesh", Indian Journal of Agricultural Economics, Vol. 43, No. 3, July-September.

Row,C, H.F.Kaiser and J. Sessions (1981) 'Discount rates for long-term forest service investments' Journal of Forestry, 79, PP. 367 - 69.

Runge, C. Ford (1986) 'Common Property and Collective Action in Economic Development' in National Research Council (NRS) 'Proceeding of the conference on Common Property Resource Management, washington Dc. National Academy Press.

Roy, S.B (1992) "Forest Protection Committees in West Bengal", Economic and Political weekly, July 18.

Rao, H (1994) 'Agricultural Growth, Rural Poverty and Environmental Degradation in India', Oxford University Press, Delhi/ Bombay/ Calcutta/ Madras.

Stebbing, E.P. (1926) The Forests of India, Vol. I-III, Jhohn Lane the Bodley Head Ltd. London..

Singh, H (1988) "Comparative Economics of the trees and crop production in Hariyana", Indian Journal of Agricultural Economics, Vol. 43, No. 3 July-Sept.

Sinha, R (1984) Landlessness : A Growing Problem, F.A.O., Rome.

Sedjo, R.A.and M. Clawson (1984) 'Global Forests' in Barraclough and Ghimire the Social Dynamics of Deforestation in Developing Countries : Principal issues and Research Priorities, UNRISD, DP - 16, Geneva, Switzerland, 1990.

Shukla,R (1988) "Issues in Planning For Full Employment Through Wasteland Development", Indian Journal of Agricultural Economics, Vol. 43, No.3, July-Sept.

Saxena, N.C. (1989) Development of Degraded village Lands

in India : Experiences and Prospects, Regional wood Energy Development Programme in Asia, Field Document No. 15, Bangkok.

Sharma, R.A., J.F. Blyth and M.J. Macgregor (1990) "The Socio-Economic Environment of Forestry Development in India (Since British period) : A Historical Perspective", The Indian Forester, Vol. 116, No. 7, July.

Silver, C.S and R.S DeFries (1991) One Earth, One Future - Our changing Global Environment, Affiliated East West Private Ltd. PP. 124. New Delhi.

Southgate D and C. F. Runge (1990) 'The Institutional Origins of Deforestation in Latin America', paper No. P90-5, Department of Agriculture and Applied Economics, University of Minnesota - Minneapolis, January.

Shiva, B (1991) Ecology and the Politics of Survival - conflicts over Natural Resources in India, United Nations University Press and Sage Publications, New Delhi / Newbury Park / London.

Soni, P., H.B. Vasistha and O.Kumar (1992) "Global Environment Security : Role of Tropical Forest therein". Indian Forester, Vol. 118, No.5, May.

Singh, K (1994) Managing Common Pool Resources - Principles and Case Studies, Oxford University Press.

Sengupta, N (1991) Managing Common Property: Irrigation in India and the Philippines, Sage Publications, New Delhi, London.

Tiwari, K.M. (1983) 'Social Forestry in India', Nataraj Publishers, DehraDun.

-(1985) 'Influence of Policy and Law on the Forest Resource Management in India'. Indian Forester, Vol. XI, No. 3.

USAID (1970). A survey of India's Export Potential of Wood and Wood Products United States Agency for International Development, Vol. I, New Delhi.

UNEP (1989) United Nations Environment Programme Statement on Sustainable Development, Governing council, Fifteenth session, 23rd May.

Walton, H.G. (1911) DehraDun Gazetter, Allahabad: Government Press, in Bandana Shiva's 'Ecology and Politics of Survival'. United Nations University Press and Sage Publications, New Delhi /Newburry Park/ London.

W.R.I. (1986) World Resource Institute, Newyork, Basic Books. WRI

-(1992) World Resources 1992-93 : A Report by the World Resource Institute in Collaboration with the United Nations Environment Programme and United Nations Development Programme, Newyork, Oxford University Press.

W.C.E.D (1987) World (Brundtland) commission on Environment and Development, our common future. Oxford University Press, London.

W.E.N (1991) Wood Energy News, August, Vol.6, No.2 Issued by the Project Regional wood Energy Development Programme in Asia (G.C.P /RAS/ 131/ NET).

W.E.N (1992) Wood Energy News August 1992, Vol. 7 No. 2, Issued by the Project Regional Wood Energy Development Programme in Asia (GCP/RAS/131/NET), Bangkok 10200 Thailand, P. 2.1.

World Bank (1978) Forestry-Sector Policy Paper, N.W.Washington.

World Bank (1988) Annual Report, Washington D.C. 20433, PP. 44

World Bank (1991) Forest Policy Paper, Agricultural and Rural Development Department, Washington D.C., May 10.

Young R.A. and R.H. Haveman (1985) 'Economics of water resources : A Survey, in Allen V.Knees and J.L.Sweeney Ed. Handbook of Natural Resource and Energy Economics, Vol. II

Zimmerman, R.C (1982) Environmental Impact of Forestry - Guideline for its assessment in Developing Countries, Forest Resource Division, Food and Agricultural Organisation of the United Nations, Rome.

SECRET
CONFIDENTIAL
TOP SECRET