

**IMPACT OF SOCIAL FORESTRY PROJECT ON RURAL
COMMUNITY - A STUDY IN SOME SELECTED
DISTRICTS OF WEST BENGAL**

**THESIS SUBMITTED FOR THE DEGREE OF
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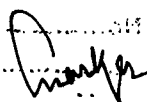
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CERTIFICATE

This is to certify that Sri Jayanta Kumar Das, M.Sc. (Ag.) in Agricultural Extension has been pursuing his research work under my supervision and guidance since March, 1991. I am forwarding his thesis entitled "Impact of Social Forestry Project on Rural Community - A Study in Some Selected Districts of West Bengal", being submitted for examination of Ph.D. Degree in Agricultural Extension of this Viswavidyalaya. I recommend that he has fulfilled all the required norms set up by this institution. This thesis or any part thereof has not been submitted elsewhere for any degree.


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CHAPTER - I

INTRODUCTION

Forests evoke a mix response of fond and fear to the people. Since antiquity, when man was in nomadic stage, they used to depend fully on forests for their sustenance of life. Existence of forests means existence of life. Human being is not the only creature in this vast living world. The flora and fauna alongwith numerous living being are the other components that makes the universe complete. And this we call our eco-system. Nature has a magical way of filling the world with wonders. Trees, one of the wonderful creations came into being just after water and land stepped into the universe.

Archaeological evidences are indicative of the fact that at the dawn of history about 91.67 per cent of the Indian sub-continent was covered by dense tropical wet evergreen forests and this was continuing till the period of the movement of the South Asian plate. As the plate joined the Asian mainland and with the upliftment of Himalayas, aridity increased in the North-west of the sub-continent leading to the spread of herbaceous flora. The said evidences further indicated that Indian forests made their appearance in the permo-carboniferous period i.e. 350 million to 225 million years back. North and East India supported dense forests older than 15 million years. Various artifacts like seals, pottery etc. obtained from sites of ancient civilisation revealed the existence of luxuriant forests during the Mohanjodaro, Harappan and Chunnudaro civilisation.

The status of forests in India had to face drastic changes with the Aryan invasion. Being betterly exposed under the dawn of human civilisation, they started practising agriculture by the time they invaded India. So, being the agriculturists they cleared vast tracts of forest to meet the demand of their burgeoning population of both human and livestock. As a consequent to this onslaught on forests the Aryan civilisation whose main line of thrust was eastward along the Himalayan foothills

North of the Ganges, started experiencing severe draughts, floods etc. which forced to either eliminate or to emigrate many of them.

It was the Mauryan which perhaps recognised the subject of forest protection as an important agenda of administration and a separate forest department was set-up for this purpose. With the passage of time and after the country passed through various turmoils with the changed land use scenario due to increase in population and due to growing demands for flourishing human civilisation as well, a country that sheltered millions of species of vertebrates, plants, insects etc. had to witness extinction of many living beings and has by now to come closer, with its vegetation and ecosystem, in the brink of a disastrous collapse.

Forest has manifold utilities. It assists in moderating the climate, maintaining soil mentle, regulating the water supplies, purifying the air, helping in noise abatement and extending recreation facilities. Moreover, it supports various sorts of economic activities through providing fuelwood, fodder, timbers and a score of minor forest produces like honey, wax, canes, kendu leaves, aromatic non-edible oils of various plant origin etc. In an effort to corroborate the positive relationship between density of forest and distributive pattern of rainfall, Warren (1974)* derived with the fact that due to reckless destruction of forests in the Ranchi Plateau and nearby areas of Chottanagpur in Bihar and Orissa during 1989 and 1940, adverse climatic changes occurred in that region. The average monthly rainfall between March and June decreased and so also the average Humidity from January to June.

As per present estimate, the country needs to produce 35 million tonnes of foodgrains additionally by 2002 A.D. to feed its swelling population, to maintain a steady food reserve of 10 million tonnes and also to keep up the rate of export target of around 5 million tonnes. Attainment of this target poses a serious challenge to the

* Warren, W.D.M. (1974), A study of Climate and Forests in the Ranchi Plateau - Parts I & II, Ind. For., 100 (485)

National Agricultural Research System (NARS) which requires to substantially boost up agricultural production (at least 4.5 per cent annually) from its existing level that is hovering around 2 per cent annually. Food production under this pressing situation could have been augmented rather easily had there been a good scope to increase the irrigation potential throughout the country. But the projection further unveils of the fact that by 2000 A.D. we would only be able to bring 48 per cent of our cropped area under assured irrigation even if there is 100 per cent growth in that frontier considering 1973 to be the base year. This indicates that Indian agriculture would compulsorily have to be continued substantially on rainfed basis. It is in this backdrop that the problem of forestry can not even be ignored by the agricultural scientists vis-a-vis farmers for many more years to come.

There is a French proverb which rightly says "Forests precede civilisation but desserts succeed them". This proverb may further gain ground from the revelations made by the National Commission on Agriculture (1976)* which pointed out "apart from climatic deterioration, reckless deforestation and overgrazing had exposed top fertile soil layers to strong winds and water. The soil lost by water erosion in overgrazed areas had been found to be 22,400 kg/hect. as compared to 306 kg/hect. in grassland under similar slope of storm intensity". These kinds of losses of soil had serious adverse effect on agriculture by considerably decreasing the soil fertility. Further, soil erosion in the catchment areas of plains in particular resulted to rise in bed levels of various rivers systems which in turn led to overflowing of river water during heavy rains. The rate of siltation in the dams also rose up resulting decrease in their water storing capacities. Both the desert as well as semi-desert areas also had to be affected seriously on a continued basis by soil erosion. And all these had been due to greying the green areas by the so called civilised people.

The process of forest destruction which was initiated by the Aryans as a stepping stone for the then primitive agriculture did not face any reversal afterwards.

* Anonymous (1976), Report of the National Commission on Agriculture, Part - IX, Govt. of India, p. 302

When the Britishers came to India, they saw Indian forests as an important resource to be exploited for the purpose of earning revenue through trade and commerce. Moreover, they adopted a general policy to encourage agriculture at the cost of forests for the purpose of ensuring food and industrial raw materials. Thus, forest destruction as a state sponsored programme got nourishment by the colonial rulers and this unfortunate process was intensified during the World War - II. It is indeed a lamentable fact that those things did not subside even after independence. Paradoxically, in the name of development the subject of ecological balance was sidelined by the policy-makers of independent India as well as by the forest administrators as a mere philosophical thinking. And much of our National Forest Policy, adopted in 1952, had to remain in the documents only with many idealistic views. As a natural consequence, the forest cover in India could be estimated to only 23.40 per cent (Table 1.1) of our geographical area substantially proving the National Forest Policy which vowed to ensure at least one-third of the geographical area under forest cover to be a simple farce.

A further perusal of table 1.1 is suggestive of the fact that the countries like USA, Canada, China, erstwhile USSR, Australia and even Zaire are far ahead of ours in terms of forest area. With 78 million hect. of forest area India ranks eighth among top ten countries of the world, although, with the earlier referred 23.40 per cent forest cover, per capita availability of forest in the country being only 0.09 hect. which is far less compared to the corresponding top ten countries (Table 1.2).

The most challenging task, therefore, is to save the existing forests and land from denudation by sensible afforestation programme for which at least 10 million hect. of degraded land needs to be brought under forest*.

As indicated earlier, centring around the issues of ecological balance a dichotomy seems appeared between the developmentalists and the environmentalists.

* N.C. Joshi (1988), Social forestry needs a major breakthrough, Kurukshetra, Vol XXXVI, No. 6, pp 4 - 7

Table 1.1 Forest Area, percentage of Forest and per capita Forest Area in Different Countries

Country	Forest area (Million ha)	Percentage of Forest area to Geographical area (%)	Per capita Forest area (Ha)
Australia	107	14.04	6.70
Brazil	553	65.40	4.10
Canada	436	47.30	17.00
Federal Republic of Germany	7.2	29.5	0.12
China	170	18.2	0.16
Italy	8.1	28.0	0.14
Japan	25.3	68.4	0.21
Sweden	27.8	67.5	3.36
France	15.1	27.7	0.28
Peru	72	55.90	3.60
U.K.	2.2	9.1	0.04
U.S.A.	298	32.7	1.25
U.S.S.R.	929	41.7	3.30
India	77.00	23.4	0.09
Zaire	178.00	78.00	5.40
World	4289	32.8	0.89

Source : 1. F.A.O. Production Yearbook

2. India's Forests, 1987, Ministry of Environment and Forests,
Government of India 1989.

Table 1.2 First Ten in the World Regarding Forest Area, Percentage of Forests and Per Capita Forest Area

Country	Forest area (Million ha)	Country	Percentage of forests	Country	Per capita area (in ha)
U.S.S.R.	929	Surinam	96.90	Surinam	44.60
Brazil	553	Gabon	80.00	Gabon	17.60
Canada	436	Zaire	78.00	Canada	17.00
U.S.A.	298	Finland	76.10	Australia	6.70
Zaire	178	Indonesia	69.70	Zaire	5.40
China	170	Japan	68.40	Finland	4.70
Indonesia	126	Sweden	67.50	Brazil	4.10
Australia	107	Brazil	65.40	Peru	3.60
India	78	Malaysia	64.40	Sweden	3.40
Peru	72	Peru	55.90	U.S.S.R.	3.30
World :	4289	World :	32.80	World :	0.89

Source : 1. F.A.O. Production Year Book

2. India's Forests, 1987

Ministry of Environment & Forests, Govt. of India.

While the school of thought bending more on development are finding forest areas to be their most happy hunting ground for the purpose like communication and industrial advancement, rehabilitations of growing population, creation of large sized irrigation infrastructure and fulfilment of domestic requirements for fuel, fodder, small timber etc., the perception of the school of thought concerned with environment and ecology may be narrated lending the comments made by Brown (1992) which speaks as “..... a minimum of 140 plant and animal species are condemned to extinction each day atmospheric levels of heat-trapping carbon dioxide are now 26 per cent higher than the pre-industrial concentration, and continue to rise..... the earth's surface was warmer in 1990 than in any year since record keeping began in the mid-nineteenth century; six of the seven warmest years on record have occurred since 1980 forests are vanishing at a rate of about 17 million hect. per year an area about half the size of Finland..... world population is growing by 92 million people annually, roughly equal to adding another Mexico each year; of this total, 88 million are being added in the developing world” .

Today, India supports roughly 16 per cent of World's population with 267 people per km². To add to the miseries, 17 million people are added each year. Thus, problems are being magnified everyday. According to the statistics, our population doubled in about 65 years from 1901 but redoubled in next 30 years. If this rate of population continues unabated, ecological surprises are in queue for us which will lead to dramatic changes and degradation of our life support system - it is being apprehended. Deforestation has not only caused immense damage to the ecology as a whole but also has changed the psyche of the society towards the resources resulting to the future of humanity uncertain. Forests which were, from the antiquity, treated as a collective resource are not being used as an open access resource where every person wants to lay his claim but only a few are prepared to contribute actively for its

* Brown, Lester R. (1992) State of the World : World Watch Institute Report, 1992, pp 3,4,17. Horizon India Books India

survival. The same community that identified itself with the forests now identifies itself with exploitive development for reasons like increasing heterogeneity, rising mistrust, uncertain future with higher risk, increasing material comfort, growing poverty etc. Forest, the wonder of nature perhaps now are silently voicing the words of an Australian aborigine to say “If you have come to help me, you can go home. But if you see my struggle as a part of your survival then perhaps we can work together”*. This is because of the unveiling of a hard reality by the fourth assessment of the forest cover done in 1993 on the basis of visual and digital interpretation of the satellite data pertaining to the period of 1989 to 1991 (on a scale of 1 : 250000) which could identify only 6.401 lakh sq. km. (excluding tea gardens) to be the forest cover in the country. And this was only 19.47 per cent of our geographical area. The soil survey also had a conventional component which revealed per capita availability of forest area in the country to be even less than 0.09 hect. as is being evident from glances at tables 1.3 & 1.4.

There is a common fallacy in the minds of many that forest soils are highly productive and bio-mass can be quickly regenerated and supplied unendingly. But the fact is that the richness and bio-diversity of the tropical forests do not depend on soil fertility but on efficient recycling of nutrients in ecosystem*. This is precisely the reason as to why the productivity of forests decline sharply once woody biomass is removed since the nutrient in the ecosystem is mostly in forest bio-mass not in the soil. Similarly, it is not possible for the available forest area to provide fuel, fodder and timber simultaneously. Growth and form of trees which are heavily lopped for fuelwood remain stunted and crooked. This was, in a nutshell, the other reason as to why ample thrust was provided by the National Commission on Agriculture (1976) on protecting the reserved and unclassed traditional forests from the hands of not only the contractor - illicit feller nexus but also from the villagers and forest dwellers who depend heavily on lopped and topped woody bio-mass for using those chiefly as

* A.K. Srivastava, and Pradeep Khanna (1995), “Restructuring forest eco-system”, *Social change*, Vol 25, No. 1 pp. 64 - 68

Table 1.3 : Geographical Area and Actual Forest Cover in India as per 1991 Assessment

(Area in sq. km.)

Sl. No.	State/Union Territories	Geographical area	Actual Forest cover	Percentage of actual Forest cover to geographical area
1.	Andhra Pradesh	275,068	47,256	17.2
2.	Arunachal Pradesh	83,743	68,661	82.0
3.	Assam	78,438	24,508	31.2
4.	Bihar	173,877	26,587	15.3
5.	Goa	3,814	1,250	32.6
6.	Gujarat	196,024	12,044	6.1
7.	Haryana	44,212	513	1.2
8.	Himachal Pradesh	55,673	12,502	22.7
9.	Jammu & Kashmir	222,235	20,443	9.2
10.	Karnataka	191,791	32,343	16.9
11.	Kerala	38,863	10,336	26.6
12.	Madhya Pradesh	443,446	135,396	30.5
13.	Maharashtra	307,690	43,859	14.3
14.	Manipur	22,327	17,621	78.9
15.	Meghalaya	22,429	15,769	70.3
16.	Mizoram	21,081	18,697	88.7
17.	Nagaland	16,579	14,348	86.5
18.	Orissa	155,707	47,145	30.3
19.	Punjab	50,362	1,343	2.7
20.	Rajasthan	342,239	13,099	3.8
21.	Sikkim	7,096	3,119	44.0
22.	Tamilnadu	130,058	17,726	13.6
23.	Tripura	10,486	5,538	52.8
24.	Uttar Pradesh	294,411	33,961	11.5
25.	West Bengal	88,752	8,186	9.2
26.	A & N Islands	8,249	76,261	92.4
27.	Chandigarh	114	5	4.4
28.	Dadra & Nagar Haveli	491	206	42.0
29.	Delhi	1,483	22	1.5
30.	Lakshadweep	32	-	-
31.	Pondicherry	491	-	-
Total :		3,287,263	640,107	19.5

Source : The State of Forest Report, 1992, Forest Survey of India, Ministry

Table 1.4 Summary Table on Categorywise Area and Percentage of Forest Cover in India

Category	Area in sq. km.	Percentage
A. Forest Cover		
1. Dense, Forest (Crown density 40% & above)	385,576	11.73
2. Open Forest (Crown density 10% to less than 40%)	250,275	7.61
3. Mangrove	4,256	0.13
	640,107	19.47
B. Scrub Area		
(Tree lands with less than 10% crown density)	58,943	1.79
C. Non-Forest		
	25,88,213	78.74
Grand Total :	32,87,263	100.00

Source : The State of Forest Report, 1993

Forest Survey of India, Ministry of Environment & Forests,
Govt. of India.

fuelwood and thus causing damage to the natural process of growth of the hapless forest trees.

Forestry was conceived as the theory and practice of all that constitutes the creation, conservation and scientific management of forests and the utilisation of their resources^{*}. It includes all thinking and all actions which pertain to the creation, conservation, protection and management of forests including harvesting, marketing and utilisation of all forest products and services. It includes not only management of existing forests but also the creation of new forests. In conformity with this conceptual framework and being concerned over the declining forest heritage in the country, the National Commission of Agriculture promulgated new concept in forestry practices when it proposed to classify forests as protection forests and production forests. While protection forestry would provide manifold protective assistance against erosion and other types of degradation in hill slopes, water-shed areas and in other vulnerable localities, the production forestry was conceived to be undertaken for the purpose of taking care the economic needs associated specially with the demand for various industrial raw materials^{**}.

In view of shifting the pressure from the above mentioned two kinds of forests, the commission further proposed to create forests in every nook and corner of the country in the name of SOCIAL FORESTRY. Social forestry is the practice of forestry which aims at meeting the requirements of rural and urban population. The objective as delineated, was to meet the basic needs of rural community with the aim to better the conditions of living through (i) meeting the fuelwood, fodder and small timber requirements, (ii) protecting agricultural fields against wind, (iii) meeting recreational needs and (iv) maximising production and increasing farm returns. Various forms of social forestry were suggested. The practice of forestry on lands outside the

^{*} Anonymous (1966), Abridged Glossary of Technical Terms (for use in forest college), F.R.I., Dehradun, pp 266

^{**} Anonymous (1976), Report of the National Commission on Agriculture, Part - IX (Govt. of India) pp 304 - 314

conventional forest area for the benefit of the local population was termed as Community Forestry with the assumption that it would seek the involvement of the community in the management of such forests*. Farm forestry was defined as the practice of forestry in all its aspects on farms and / or village lands generally integrated with other farm operations. The National Commission on Agriculture observed that the entire exercise might possibly be better termed as Extension Forestry that should include the activity of raising trees on farm lands, village wastelands, community forest areas and on lands along the sides of roads, canal banks and railway tracks. It was further conceived by the Commission that this sort of Extension Forestry would require substantial quantum of work force for preparing the planting materials, digging of pits, guarding of new plantations etc. which might be able to pump some fresh blood into the otherwise sickly rural economy characterised by heavy unemployment, surplus working population and high rate of under-payment of agricultural wages. Duly accepting the recommendations of the Commission, the Union govt. initiated the programme of "Social Forestry" country - wide during the Sixth Five Year Plan.

In close consonance with the trend in the national forest panorama, the state of West Bengal had also to expose itself under the severity of deplorable forest depletion process in the sense that all the four regional forest systems of the state viz. (i) the forests of Darjeeling Hills, (ii) the Terai forest in foot-hills of Eastern Himalayan range, (iii) the Lateritic sal forests in the South West and (iv) the Suthern Mangrove forest in the Gangetic Delta had to experience the severe odds of destruction. Consequently, 27.51 lakh hect. land mass in the state got exposed under the severity of soil degradation (Table 1.5). The status of degraded forests till 1987 was about 3.10 lakh hect. in the state as is being evidenced from Table 1.6.

The problem of forest areas in West Bengal has been getting aggravated further due to the growing population pressure since last few decades. The decennial percentage variations of population in the state were recorded to be 26.87, 23.17 and

* A.P. Dwivedi (1992), *Agroforestry : Principles and Practices*, Oxford and IBH Publishing Co. Calcutta, p. 28

Table 1.5 Status of human-induced soil degradation in West Bengal

Soil degradation type	Degree of degradation				Total area (%)
	Slight	Moderate	Strong	Extreme	
	(,000 ha)				
Water Erosion					
Loss of top soil (Wt)	899.8 (10.1)	794.0 (9.0)	57.6 (0.6)	-	1751.4 (19.7)
Terrain deformation (Wd)		1.3	-	-	1.3
Physical deterioration					
*Waterlogging (Pw)	531.3 (6.0)	67.0 (0.8)	11.3 (0.1)	-	609.6 (6.9)
*Flooding (Pf)	-	100.0 (1.1)	-	-	100.0 (1.1)
Area affected by more than one problem					
Salinization+Waterlogging (Cs + Pw)	130.5 (1.5)	39.0 (0.4)	-	-	169.5 (1.9)
Salinization + Flooding (Cs + Pf)	-	-	113.0 (1.3)		113.0 (1.3)
Wind Erosion+Salinization (Et + Cs)	6.5		-	-	6.5
Total area	1568.1 (17.6)	1001.3 (11.3)	181.9 (2.0)	-	2751.3 (30.9)
Wasteland not fit for agriculture					7.0
Rock outcrops					(0.1)
Stable Terrain					
Under natural conditions a) Forest					333.4 (3.8)
b) Mangrove vegetation					194.0 (2.2)
Land with no degradation problems					5329.6 (60.1)
Misc. area (road, rivers, habitations, etc.)					260.0 (2.9)
Total area					8875.2 (1000.0)

Wt - Water erosion (loss of top soil)

Cs - Chemical deterioration (salinization)

Wd - Water erosion (terrain deformation)

Pw - Physical deterioration (waterlogging)

Pf - Physical deterioration (flooding)

* Area under semi-aquatic crops, like paddy has not been considered.

Table 1.6 Area Statement of Degraded Forests in West Bengal (1987)
(Area in ha)

District	Area of Forest	Rootes waste	Scrub	Total
Darjeeling	1,20,400	-	1,900	1,900
Jalpaiguri	1,79,000	-	5,400	5,400
Cooch Behar	5,700	-	700	700
Midnapore	1,70,000	92,380	9,621	1,02,001
Bankura	1,48,200	42,200	50,586	92,786
Purulia	87,600	24,814	57,946	82,760
Burdwan & Hooghly	28,000	7,505	1,816	9,321
Birbhum	15,800	6,175	2,000	8,175
Nadia & Murshidabad	2,100	1,278	138	1,416
Malda & West Dinajpur	3,800	353	1,836	2,189
24-Parganas	4,26,300	-	-	-
Howrah	-	-	-	-
Calcutta	-	-	-	-
T o t a l	11,87,900	1,74,705	1,31,943	3,06,648

Source : State Report on West Bengal Forests, 1987-88.

Planning and Statistical Cell, Forest Department, Govt. of West Bengal.

24.55 for the periods 1961 - '71, 1971 - '81 and 1981 - '91 respectively. Even the density of population, as recorded in 1991 census, stood out to be rocketing 766 per km² as compared to only 273 Km² for the whole country (Table 1.7). This sort of rise in population put further pressure on the forests causing excessive encroachment of forest area in the state. Table 1.8 suggested that 17.19 thousand hect. of forest area was under encroachment till 1990. These alongwith growing incidences of illicit felling and unauthorised grazing might be considered to be the key factors behind the decay of forest wealth in the state of West Bengal. The lifeline of state forest was gradually (but steadily) advancing towards the peril with only 12.33 per cent being its share in the overall geography of the state.

It was under the threat to the above-mentioned heritage forests and to the overall ecological balance of the state that the Govt. of West Bengal took up the matter of forestry as a major part of its policy planning and state-wide launched the Social Forestry Programme alongwith adoption of revamped policy in other fields of supportive forestry activities since 1981 - 82. For the purpose of execution of the new policy in a proper fashion a new division was created under the State Forest Directorate. The said division was authorized to implement the major part of Social Forestry Project keeping close linkages with the Panchyat network of the state as well as with other relevant agencies / institutions. The IDA-World Bank sponsored 'West Bengal Social Forestry Project' was operationalised with four broad mandates viz, (i) establishment of village woodlots, (ii) creation of strip plantations, (iii) initiation of farm forestry and (iv) regeneration of degraded forests (R.D.F.). Under 'village wood lot' programme, suitable plant species were decided to be planted on the community land and / or village commons with a view to serve the requirements of fuelwood and small timbers of the rural people. 'Strip plantations' were proposed to be created throughout the state along the flanks of village roads, state highways, national highways, rivers and canals and even by the side of railway tracks. Under-vegetations were also proposed to be developed there to facilitate creation of artificial pasture lands. The theme behind 'farm forestry' was that it would facilitate establishment of

Table 1.7 : Growth and Density of Population in West Bengal and India

Particulars	1971		1981		1991	
	India	W.B.	India	W.B.	India	W.B.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Population (in lakhs)	5481.60	443.12	6833.29 (R)	545.81	8443.24	679.83
2. Decennial percentage variation of population	24.80 (1961-71)	26.87 (1961-71)	24.66(R) (1971-81)	23.17 (1971-81)	23.56 (1981-91)	24.55 (1981-91)
3. Density of population	171	504	216	615	267	766

R = Revised

Source : Economic Review, 1992-93, Govt. of West Bengal.

Table 1.8' Encroachment of Forest Area

District	Division	Forest Area encroached (ha.)
Darjeeling	Darjeeling	5.46
	Kalimpong	202.88
	Kurseong	<u>1273.78</u>
	Total :	<u>1482.12</u>
Jalpaiguri	Jalpaiguri	236.20
	Buxa	97.87
	Baikunthapur	90.29
	Cooch Behar	<u>634.87</u>
	Total :	<u>1059.23</u>
Cooch Behar	Cooch Behar	1759.90
Malda	Malda-West Dinajpur	174.04
West Dinajpur	Malda-West Dinajpur	13.68
Nadia	Nadia-Murshidabad	20.27
Bankura	Bankura (N) 1516.00	
	Bankura (S) 2112.00	3628.00
Midnapore	East Midnapore	1481.89
	West Midnapore	<u>2122.50</u>
	Total :	<u>3604.39</u>
Burdwan	Burdwan	348.64
Hooghly	Burdwan	2.15
Purulia	Purulia	5657.50
Birbhum	Birbhum	157.56
24-Parganas	Nadia-Murshidabad	0.08
Total :		<u>17907.56</u>

Source : State Report on West Bengal Forests 1990-91, Planning and Statistical Cell, Forest Department, Govt. of West Bengal.

plants on the bund of cultivated lands, in homestead lands, alongside ponds and in marginal as well as otherwise agriculturally unsuitable lands. Introduction of suitable agro-forestry vis-a-vis agro-silvicultural mixed farming models were also conceived of under this farm forestry programme. The salient feature of this component was that it was meant for private lands only. R.D.F. scheme was basically aimed at rejuvenation of those classified as well as unclassed forests which had to face severe degradation over the years. A good combination of worthy forest plants alongwith some quick growing species and silvi-pastural modules were planned to be included under this scheme.

Originally it was a project for six years. But due to depreciation of rupee with respect to SDR the total external aid of 25.8 million SDR could not be utilized within the stipulated time frame. Subsequently the projet period was extended upto 1990 - 91 financial year. And after registering tremendous publicity in the country and elsewhere for exciting achievements*, the project in reference ended up since 31st March, 1991. Initially, physical target for the project was fixed at 93,000 hect.** covering previously mentioned four major activities like strip plantation, village woodlots, farm forestry and rehabilitation of degraded forests (R.D.F.). Since the project period was extended a revised target of 1.16 lakh hect. was fixed subsequently covering the same activities. At the end of the project, the achievement went up to 2.42 lakh hect. which was nearly 108 per cent above the set out target. Encouraged by this achievement, the Govt. of West Bengal decided to let the activities of Social Forestry continue in spite of the formal termination of the project. As a matter of fact, social forestry is continuing in the state with some new facets and some additional areas of activity domain in the name of 'West Bengal Forestry Project'.

* Brief and Summarised Account of the performance of West Bengal Social Forestry Project has been furnished through tables 1.9 to 1.11

** Anonymous (-), West Bengal Social Forestry Project; Financial Evaluation report 1989 & 1990; Monitoring and Evaluation Cell, Social Forestry Wing, dir. of Forests, GoWB. P1

Table 1. 9 West Bengal Social Forestry Project District-wise Physi
Achievement : 1981-1991

(Area in

District	Strip	V.W.L.	F.F.	R.D.F. (P)	R.D.F. (C)	Total
Cooch Behar	1000	105	7590	650	-	9345
West Dinajpur	1404	1154	5005	145	-	7588
Jalpaiguri	1928	216	7880	451	-	10475
Murshidabad	1098	22	2095	83	-	3278
Bankura	1980	253	20282	3545	10358	36416
Burdwan	2405	282	14595	975	2618	20855
Midnapore	4361	832	36731	3645	28796	74165
Purulia	1118	60	13144	530	10735	25587
Maldah	1345	152	3610	158	-	5265
Nadla	1307	33	3288	88	-	4716
Birbhum	3459	183	11955	1260	580	17437
24-Parganas	457	41	7516	180	-	8284
Hooghly	442	83	3786	-	-	4291
Howrah	499	20	4340	-	-	4859
Darjeeling	891	209	7857	236	-	9193
Grand Total :	23784	2405	150554	11926	53085	241754

V.W.L. = Village Wood Lot
F.F. = Farm Forestry
FDF(P) = Representation of degraded forests (Planting)
RDF(C) = Reforestation of degraded forests (Coppicing)

Source : State Report on West Bengal Forests 1991-92
Planning and Statistical Cell
Forest Department, Govt. of West Bengal.

Table 1.10 Comparative Statement of Target and Physical Achievement in West Bengal Social Forestry Project :
1981-1991
(Area in ha)

	Strip plan- tation	Village wood lot	Farm Forestry	Reforestation of degraded Forests		Total
				Planting	Coppicing	
Target	20,000	6000	75,000	5,000	10,000	1,16,000
Achievement	23,784	2405	150,554	11,926	53,085	2,41,754
Percentage of Achieve- ment over Target	118.92	40.08	200.73	238.52	530.85	433.41
						208.40

Source : State Report on West Bengal Forestry 1991-92
Planning and Statistical Cell
Forest Department, Government of West Bengal.

Table 1.11 Summarised Field Level Performance of Social Forestry Project in West Bengal during 1981 to 1991.

A. STRIP PLANTATIONS :

1. Total area planted in Hectares :

a) Road side	-	8668 ha
b) Canal Bank	-	8865 ha
c) Embankment	-	1436 ha
d) River Bank	-	4480 ha
e) Railway land	-	<u>2335 ha</u>
Total	:	<u>23784 ha</u>

2. Length covered in Kms. :

a) <u>Roads</u> :	
i) National Highways	1182 kms
ii) State Highways and other roads	8734 kms
b) Canal Bank	4109 kms
c) River Bank	2884 kms
d) Embankment	890 kms
e) Railway land	1589 kms
3. Number of Panchayats involved	1276 Nos.
4. Area handed over to Panchayats	8885 ha
5. Number of Panchayats to whom plantation handed over so far	461 Nos.

B. VILLAGE WOODLOTS :

1. Total area planted in Hectares :

a) In hills	145 ha
b) In Alluvial Zone	1060 ha
x) In Laterite Zone	<u>1200 ha</u>
Total	<u>2405 ha</u>
2. No. of Panchayats/In situations involved	1939 Nos.

(Continued)

Table 1.11 (Contd.).

C. FARM FORESTRY :**1. Total Area under Farm Forestry**

	Under in- centive scheme	Under non- incentive scheme	Total (ha)
a) In hills	3,304	1,695	1,999
b) In Alluvial Zone	25,205	35,465	60,670
c) In Laterite Zone	63,298	21,587	84,885
	<u>91,807</u>	<u>58,747</u>	<u>1,50,554</u>
2. Total number of beneficiaries	1,86,215 nos.	2,74,066 nos.	4,60,281 nos.
3. Total number of seedlings distributed	14 crores 69 lakhs	11 crores 96 lakhs	26 crores 85 lakhs
4. Number of Villages			14,629 nos.
5. Characteristics of : Beneficiaries as per land holding.			
a) 0.1 - 1.9 ha	72.3%	60.7%	66.5%
b) 2.0 0 4.9 ha	16.9%	23.5%	20.2%
c) 5.0 ha & above	10.8%	15.8%	13.3%

D. REFORESTATION OF DEGRADED FORESTS :

- Total area represented in hectares :

a) By planting	-	11,926 ha
b) By Coppicing	-	<u>53,085 ha</u>
Total	:	<u>65,011 ha</u>
- Total number of F.P.C.'s formed so far : 1738 Nos. (out of which 865 are recognised).
- Total number of members (families) of F.P.C. : 1,79,485
- Forest area protected by F.P.C.'s; 2,38,000 (approx.) (out of nearly 4,50,000 ha forest area).

Source : State Report on West Bengal Forests, 1991-92, Planning and Statistical Cell, Forest Department, Govt. of West Bengal.

So, it would perhaps not be irrelevant if the experience gained from a decade of forestry activities (1981 - 91) in the state wherein the slogan was basically in the line of "forestry for the people, by the people and with the people to sustain our ecology and posterity" could be looked into and assessed for with special emphasis on strengths and weaknesses of the same. And this might help to take up appropriate course of action while handling the problems of identical nature in any of the future social forestry programme which would mandatorily have to be continued in this quarter of the country where in spite of sincere and toilsome efforts by the implementing team and rendering active support by the commoners, the forest cover could be raised to only 14.97 per cent upto 1993 compared to 12.33 per cent in the early eighties. This is far short of environmentalistic optimum i.e. around 33 per cent of the state's geographical area.

Keeping the preceding discussion in view and in consideration of the time pressure for a research study directed to Ph.D. degree that the present investigative endeavour was initiated in the first quarter of 1991 in three selected districts viz, Coochbehar, Murshidabad and Nadia of West Bengal with the following objectives :

1. To assess the overall performance of Social Forestry project in the light of its objectives and targets for the selected districts
2. To examine the performace of Farm Forestry component with reference to some socio-economic characteristics of the selected farm foresters
3. To understand the extent of people's participation in the project
4. To identify deviations, if any, from the objectives and norms of the project with particular reference to agro-ecological framework of the selected districts
5. To scrutinize the efficiency of research-extension support system in the project
6. To detrmine the training needs of the executing personnels associated with the project
7. To understand the impact of social forestry project in the selected areas and to explore the emerging sociological issues, if any, centring around the project

CHAPTER - II

REVIEW OF LITERATURE

The National Commission on Agriculture (1976) expounded the concept of 'Social /Extension Forestry' while promulgating a new conceptual framework of Indian forestry. The commission advocated the introduction of both protection forestry and production forestry in the otherwise denuding traditional forests of all categories. While protection forestry meant for providing various sorts of protective assistance against erosion and other types of degradation in hill slopes, watershed areas and other vulnerable localities, production forestry was conceived to be introduced for the purpose of catering the economic needs associated specially with the demands for various industrial raw materials.

In view of relieving pressures on the said production and protection forests and for the purpose of extending the facilities of forests beyond the boundaries of traditional forests, social / extension forestry was suggested for. While suggesting this, the commission further stressed that by taking up the programme of raising of trees, grasses and fodder in the farmers' 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 etc. It was also stated at the same time that these programmes would remove a serious impediment in the practice of production forestry.

Sagreiya (1967) spoke further about the concept and scope of a Social Forestry by saying "there are many requirements of the rural population that are satisfied from forest in the vicinity of their villages. Indeed, these villages as it were, live more or less symbiotically with the forest. They depend on the forest for their requirement of small timber, for agricultural pursuits, fuelwood for their hearths, grass and grazing for their livestock, thorns for fencing the fields and homesteads etc. and if available, bamboo for a variety purpose".

The aforesaid recommendation, perhaps, was major shift from the decisions adopted in National Forest Policy (1952) which declared that village communities should in no event be permitted to use forests at the cost of 'national interest' (para - 7) which was identified with defence, communications and vital industries. It declared (para - 13) that national forests should be used to produce valuable timber for industry and other national purposes only. Accordingly, plantations of teak and other commercial species and of conifers were raised on an area of about 3.94 lakh hectares of forest lands during 1961 - 69, while a further area of about 2.46 lakh hectares was planted with quick growing species under a new centrally sponsored scheme to meet the requirements of pulp and paper industries (GOI, 1970). Where reserve forests didn't have blanks, fast growing and non-browsable exotics like eucalyptus were often planted on protected forests, and later these were converted into reserve forests. The area of reserve forests thus increase from 31.6 million hectares in 1960 - 61 to 40.2 million hectares in 1986 - 87. Out of the 67 crore rupees spent on afforestation during 1966 - 74, roughly 56 crores was on production forestry alone (GOI, 1981).

The National Commission on Agriculture (1976) didn't completely negate the approach of National Forest Policy in the sense, "Production of industrial wood would have to be the *raison d'être* for the existence of forests. It should be project - oriented and commercially feasible from the point of view of cost and return". Following its recommendations, State Forest Corporations were established to which were transferred vast forest lands for raising industrial timbers and those corporations started destroying mixed forests vital for meeting people's needs.

Wilson (1979) reported that afforestation of government lands outside the reserved forests under the Farm Forestry Programme was taken up in the state of Tamil Nadu from 1960 onwards. The areas chosen were mainly foreshores of the large number of tanks in the state. Some planting were done on barren hillocks as well. The scheme has been successful and extensive areas have been planted. The revenue obtained by sale of the plantations raised is shared by the government and

the panchayats concerned on a fifty-fifty basis. The farm forestry scheme is now part of the larger Social Forestry Programme which has been introduced pursuant to the recommendations of the National Commission on Agriculture. New forest divisions have been constituted exclusively for Social Forestry, thereby facilitating a large coverage of areas. Other aspects of Social Forestry such as planting at roadsides & avenues and sale of seedlings to the public for planting on private land have also been taken up. There is immense scope for these items of work and the benefits that are likely to accrue to the community are great.

Sanyal (1981) reported that with the allocation of 46.4% land area under agriculture and 22.7% under forestry, the country will not be able to meet the requirements of its growing human and cattle population for food, fuel, fodder and timber. Hence, huge amount of money has to be spent on imports. Poverty and unemployment will be rampant. Extensive areas are now suffering from denudation as a result of heavy biotic pressure. Agro-forestry which is a multiple use concept of land management, is capable of meeting the challenge at least partially. Agro-forestry systems have tremendous scope and potential for rural development and can serve as base for various social forestry schemes. Needs for intensive research for development of the package of agro-forestry technologies to suit different agro-climatic zones in India has been stressed. Management implications have also been indicated.

Singh (1981) suggested that the energy budget of rural household is heavily dependent on traditional and non-commercial sources of energy. A qualitative comparison of various energy forms from the view-point of rural economy, indicates that in present circumstances there is no viable alternative to firewood as a source of basic energy of people living at subsistence level. As a matter of fact, the development potential of this indigenous renewable resource is not fully realized because the benefits derived from it does not occur in monetarized economy. The country, therefore, must adopt suitable energy policy and vigorously promote community forestry schemes for establishing village fuelwood forests, he suggested.

Tiwari (1981) explained that tomorrow's forest will be generally the small patches of tree lands being established under the Social Forestry Programmes along road sides, canal banks, railway lines, community lands, homesteads etc. It has been shown in some detail where the tree lands will be created under Social Forestry. The objects of management of such forests will be to cater to the needs of rural community by providing them fuel, fodder, fruits and small timbers. There is practically no data available about the silviculture and management of most of the tree species, being raised under Social Forestry.

Keita (1982) reported that forestry activities in West Africa provided the farmer with food, fodder, fertilizer, energy and raw material. The constraints to implement programme were land tenure system, demographic pressure on land and the viability of collective institutions. It was suggested that long term ownership to trees planted should be guaranteed for the farmers. Farm subsidy should give priority to nurseries, setting up market and processing activities.

Pal (1982) concluded that it is of the utmost importance to preserve the life support system embracing air, water and land and the tremendous diversity of life even though there is need for undertaking development on a vast scale to satisfy the increasing needs of human beings. Erosion of land resources, pollution of air and water, and even soil degradation has reached to almost an unprecedented stage. Many other activities also are taking place which are severely damaging the environment and its resources. Unless development is planned in the line of sustainability, the future appears to be bleak.

While commenting on the performance of social forestry programme in Uttar Pradesh, Sitaram (1982) expressed that inadequacy in planning and unavailability of the required staff were the chief constraints in making the programme a success.

The monitoring and Evaluation cell (1983) identified some adverse attitudes of the people in strip plantation in West Bengal which were attributed to (a) likely loss of grazing lands, (b) lack of adequate publicity, (c) inadequate extension

coverage, (d) consequent lack of awareness amongst local community about the benefit accrued to them from these plantations and (e) apprehension regarding loss of agricultural crop due to shade. It was further observed that in the village woodlot, the performance had not been upto the mark due to (a) lack of community land (b) lack of suitable local leadership, (c) lack of technical and financial capacity, (d) lack of adequate extension coverage, (e) perceived individual benefit from village woodlot somewhat obscure, (f) absence of social cohesion as community is being highly fragmented professionally and economically.

In an interim report of Social Forestry Project in West Bengal, the Monitoring and Evaluation cell (1983) identified some key contributing factors for success of farm forestry in the state which were :

1. Availability of wastelands
2. Supply of seedlings free of cost and additional material support in the shape of free supply of inputs like fertilizers, insecticides etc.
3. Settings up of a network of well distributed nurseries within convenient distance from the villages.
4. Extension activities by the field staff through repeated interaction with the target groups, mostly by face to face talk, discussion in small groups, meetings, seminars and field level workshop etc.
5. Suitable legal safeguard for trees planted on farm land
6. Prospect of favourable marketability of the produce
7. Government support in the programme

In the study on the impact of Tanzania's policy of village afforestation, Skutsch (1983) found that :

- i) Shortage of firewood was not merely an incentive to start a woodlot. Skills in planting and caring for young trees were the other considerations made by the planters.
- ii) The style of forestry extension work tended to encourage the starting of woodlots but not their planting and extension.
- iii) The transport of seedlings to the villagers at the appropriate time was a greater constraint than their actual production at the nurseries ; and
- iv) The communal aspects of organizing social forestry projects led to more difficulties than the physical aspects of silviculture.

The degradation of village lands and protected forests led to increased pressure on the reserve forests. The gap between the demand and supply of wood products in the country got widened and fuelwood and small timber suffered seriously from short supply due primarily to the large scale clearance of forest growth on many of the village wastes not recorded as forests in revenue papers and not under the control of Forest Department (Tiwari, 1983)

According to Foley and Bernard (1984), farm forestry is the name commonly given to programmes which promote commercial tree growing by the farmers on their own land. Programmes of this type are restricted to areas in which there is an existing market for wood or other tree products or where those can be created as part of the programme. The approach has been described as turning peasants into entrepreneurs and producers of timber and other forest products and has been used successfully in a number of parts in the world. Farm forestry is very much similar to agriculture except that the period of gestation is fairly long. Still the scarcity of fuelwood and timber and their scope to fetch more comparable return from that of crop agriculture in marginal lands has outplaced agriculture there leaving space for growing timber and fuelwood plants. The type and quality of land that would be so diverted would be governed largely by the relative economics of alternate use of such lands. By better and scientific use of poor lands, the land owners would benefit financially so that they

would be able to afford to purchase food grains required by them. Indian agriculture lean heavily on trees and tree products. By growing commercial tree crops these farmers would be at least self-sufficient for their own needs and to that extent the pressure on limited forest resources would be reduced (Shah, 1988).

Fortmann (1984) observed that agro-forestry and other tree projects in developing countries often simply fail to take women into account although women provide at least half the rural labour and in significant number of rural households that they are being the major users of fuelwood products. It is essential that women are to make participants in agro-forestry projects for ensuring maximum benefit. It is the intelligence, energy, initiative and labour of women that will determine whether agro-forestry and other tree projects work or not.

Accumulating experiences from Kolar district of Karnataka, Shiva *et al* (1984) expressed views that social forestry programme lacked in requisite organisational and economic capabilities to provide the basic needs of rural people. As new forest cover replaced the food crops, the situation of the marginal farmers and landless agricultural labourers was worsened in terms of employment and availability of food and fodder.

Wiersum (1984) reported that social forestry, encompassing small-scale forestry activity conceived and implemented largely through farmer's initiatives for their own socio-economic, ecological benefits, is progressively being regarded by land use policy makers and rural development planners in developing tropical countries as an effective means for achieving multiple objectives. These objectives include : generating income and stable employment opportunities for socio-economically disadvantaged rural population; stabilising and strengthening rural communities and institutions; producing vital commodities such as fuelwood, construction wood, fodder, green manure and food for local consumption and maintaining the productive capacity of land through minimising eco-degradation on a sustained basis. The four basic inputs to be considered in organising a forestry development project are land, labour, capital and technical knowledge. Other important elements are site and species

selection, seedling preparation, tree planting, weeding, plant protection and inter-cropping.

Wiff (1984) reported that women were involved by Honduras Forestry Development Corporation in construction of terraces and reforestation. Although the project was not aimed at women, but they proved more receptive to new ideas. Their success led to wider community participation in the project. However, many local and social obstacles remained to the participation of women in work and to take training outside because their primary role expectations were as mothers.

In speaking on forestry for livelihood vis-à-vis forestry with the people, Chowdhury (1985) viewed that participation of people would be easy to achieve if secured private land rights are given. But the staff engaged on project implementation have a different approach. They understand participation as getting people to agree to and go along with a project which has already been designed for them or to get support of a few leaders (Mahoni, 1987). 'I manage, you participate', had been the dominant underlying principle behind government project (Shingi *et al*, 1986).

Critically studying the trend of activities relating to social forestry in Assam, Goswami (1985) pointed out that the programme could attract only an enlightened section of rural community while most of the people in interior areas were still unaware of the programme. He further observed that the programme had failed in Assam due to the orientation on the part of the Govt. towards the affluent and educated sectors of rural community.

Kowero and Temu (1985) identified some major limiting factors of village forestry in Tanzania. these were - inadequate planning, poor follow up, lack of sufficient seedlings and lack of transportation. It was recommended that these programmes should be an integral part of development plans.

Ruangpanit (1985) described the forestry project in Thailand. He reported that the participation of the people in community forestry is very important. If they don't participate in the planning and implementation, the community forestry project will

not satisfy individual and local needs. It was also pointed out by him that in order to fulfil the objectives, emphasis should be given on agro-forestry. Special attention should be given so that rural people get additional income through forest and forestry-based processing activities. Knowledge of forestry should be given to the people to involve them in the programme.

Referring to a study conducted in West Bengal by Sen *et al* (1985), it may be pointed out that :

1. an environment of trust and confidence should be created to make a community forestry programme successful;
2. people must feel certain about their rights and tree tenure to become interested over the programme;
3. role of local leaders in the innovation-decision process is crucial ; and
4. providing practical training to rural people through the use of personnel localite sources of appropriate nature is important.

Assessing the performance of social forestry programme in West Bengal, Sen *et al* (1985) pointed out further that the programme had created an impact due to the orientation on the part of the State Govt. itself towards the weaker section of the society. However, they were of the opinion that the participants had failed to realize the programme as a means of fulfilling their basic requirements of fuel, fodder and timber. They emphasized the need to promote peoples participation in the programme.

Tilander (1985) in a study of the North Bengal Agro-silviculture Project, identified some problems which included availability of land too late for planting agricultural crops, wild animals consuming inter-planting crops, too much work, involved in the associated activity, and limited job opportunities for villagers.

A study conducted by Gupta (1986) derived with the conclusion that Farm Forestry had been more popular with relatively large land-owners, absentee land

owners including urban dwellers and businessmen. Not only was their orientation towards cash incomes higher and their capacity to respond to new enterprises better, but also tree crops offered the advantages of cash in labour management. Market oriented farm forestry, he observed, enables the rich to save taxes on the unaccounted income from other economic activities as incomes from forestry and agriculture were exempted from many taxes.

Based on some field studies conducted in India, Keith (1986) reviewed the role of economic and non-commercial incentives in persuading farmers to grow trees despite risks and difficulties. Formal and informal education via school, media and organisations encouraged people to grow trees. But people need economic support for long-term benefits. Economic support may stimulate large farmers but smaller farmers may require additional market and credit schemes for financial security before tree harvesting.

Skutsch (1986) threw some more light into the subject of socio-economic impact of farm forestry. He elucidated that trees were mainly being planted by the better-off gentry only with a kind of clear commercial perspective. Such occurrences, Skutsh feared, were posing threats to farm forestry in achieving its prime objective to serve the rural have-nots.

In a proposal to strengthen forestry extension in India, Banerjee (1987) suggested that in farm forestry, farmers have to be motivated to plant trees on their own land at their own cost. This may mean of using land lying waste (including planting on bunds around farms), switching over from the present land use to tree farming, allocating a part of one's labour to an activity which is not immediately rewarding. The aim of all these activities is for better economic returns to the farmer and for production of fuelwood, fodder and small timber for direct use at his home. The technology required to achieve these benefits has to be specifically extended to the farmers. This technology should include how to raise the maximum volume of

wood in a minimum time. It takes time to realize the benefits of tree planting. Extension, therefore, has to be a continuous process.

Trees have a potential contribution to security and self-respect for the poor people as they consider it to be their saving banks and means to meet contingencies (Chambers and Leach, 1987). The same views were expressed by Vidyarthi (1984), Slater (1918) and Hill (1982).

ChandraSekhar *et al* (1987) criticized government-big farmer - industrialist nexus to absorb the creams of the social forestry programme and felt that it had to tally deprive the rural poors and the destitutes who were the main target group of the said project.

Dadhwal (1987) reported that agro-forestry system could be well established to even at subsistence level in the Garhwal Himalayas. The farmers undertook cultivation of various crops (seasonal as well as biennial) with trees in mixtures on the same piece of land. Farm animals and poultry formed essential components of the systems. The intimate association of different species provided both subsistence and commercial products which gave additional income to the farmers. The paper describes the socio-economic conditions of the area and the characteristics of existing agro-forestry practices and tendered some suggestions for their improvement.

Onweagba (1987) reported that the Shelter-belt project to control desertification in Northern Nigeria had been seriously hindered by lack of communication with local land owners. Proposed measures for better communication support were : increased client participation in the programme, establishment of extension units in the forestry service, reorganisation of local sections of the Information Ministry into Field Communication Centres to provide communication, training and package for agency personnels.

Lending conceptual base from National Commission of Agriculture, Patel and Patel (1987) came out with an elaborate definition of Social Forestry by saying it as a

special programme with the aim of getting fuel, fodder and small sized timber for rural population as well as for promoting environmental protection.

Premkumar (1987) reported that the trees planted around houses in the villages which were for increasing shade and food supply had almost of 100% survival rate.

With the new awareness of the need to include the residents as major actors in efforts to solve social forestry problems, programme designers were more conscientiously talking with community leaders or village councils. These leaders, almost invariably were men, unfortunately, ignored women. Programme after programme had failed because participation of women, so essential to the programme's success, was overlooked. For example in regions where men planted and women performed the maintenance tasks, the trees that the men agreed to plant would certainly die if the women had no interest, time or perception of the real benefit to come from their input.

Although there was a negative general attitude against plantation of trees on community and private lands, there had been exceptions where the poor got the benefit from tree programmes. The Group Farm Forestry Programme in West Bengal (Shah, 1987) was one example with Farm Forestry. The Forest Farming for the Rural Poor Programme of Orissa was another.

While assessing the gains from social forestry in West Bengal, Shah (1987) stated that Arabari Forest Range in Midnapore District signified a unique opportunity to use wasteland afforestation as a means to improve livelihood of poor people. Vested land distribution programme of West Bengal government would not help poor people greatly except through farm forestry since more vested land, especially in laterite districts, is unfit for productive agricultural use. Further, the 99 years land 'Patta' has helped to instil in 'patta holders' a confidence and a feeling of ownership that has encouraged them to invest effort in improving the productivity of their land. Whether the shorter term 7 - 10 years tree 'pattas' that some other states are contemplating will

be able to produce the same sense of security and ownership is an open question, but the answer most likely is negative as pointed out Shah (1987).

In an attempt to assess the performance of 'Social Forestry Project' in Tamilnadu, Varadan (1987) observed that out of a total of 90 million seedlings distributed during 1982 - 86, only a small portion could reach the poor households and whenever those poor people planted trees, survival rate and yields were low. An empirical evidence seems to be not finding out of place if the study conducted by Anderson (1988) gets referred in this context, where he indicated that only just over 10 percent of seedlings reached the poor consisting of the landless and the marginal farmers.

Casas (1988) showed the result that the two ISF (Integrated Social Forestry) project generally fell short in achieving their objectives to uplift the socio-economic conditions of the beneficiaries, and in developing a feasible and sustainable agro-forestry technology including environmental protection and conservation. This was shown by the facts that the income of the respondents in both the sites did not substantially increase as a result of the project. Moreover, the construction of soil conservation measures were only done when they were closely supervised and paid, for the job. While the administrative capacity of the Abucay Project was found to be relatively adequate compared to Nula-tula (Project) in terms of manpower and financial resources, it nevertheless failed to achieve its objectives likewise, the projects were found to have been saddled with problems like low incentives and delay in the release of funds, and low morale of project implementors. These factors could have resulted in more serious problems like indifferences of people to the project. Said problems in turn, might have led to the poor commitment to the project on the part of the project implementors/ personnel themselves. These findings indicate that adequate financing and manpower resources are not the guarantee for the success of any similar undertakings.

Dvopak (1988) suggested that socio-economic factors play an important role in the adoption of new technology especially if the technology has been designed for a target group of farmers. So, socio-economists have to provide guidelines for studying farmers' perceptions and have to indicate some of difficulties which can arise in collecting and evaluating socio-economic data.

The adverse impact of tree plantation on cropped lands had also commented upon in a FAO study (1988) of farm forestry in Gujrat.

Ferguson (1988) analysed briefly the financial returns from growing trees in Australian Agricultural System with particular reference to woodlots and agro-forestry (Silvopastoral system) in pastoral production systems. This use was discussed in terms of exotic conifers (Monetary pine *Pinus radiata*, *P. elliottii* and *P. coribaea*), native species (*Acacia melanoxylon* & *Araucaria cunnighamii*) and other exotics (*Populus Pseudotsuga menziesii* and *Juglans nigra*) . It is noted that the motivation for growing trees on agricultural land is not solely for direct financial returns but also for land improvement and for protective and amenity purposes.

Ganguly and Sharma (1988) highlighted the role and significance of forest resources in the overall economic progress of the country in terms of preservation of the ecological system and supply of forest products. The requirement of bringing one-third of the area of the country under forest was, according to them a vital need and all efforts had to be made to attain this target before approaching to the twenty first century.

The strategy to achieve the above objective they constituted the following ingredients :

1. conservation of ecologically fragile eco-system and preservation of biological diversity in terms of fauna and flora ;
2. increasing the vegetative cover by massive afforestation through social forestry, farm forestry and other plantation programmes in a substantial manner;

3. meeting the basic needs of the people in respect of fuel, fodder, minor forest, produce and small timber ;
4. creating a wide-ranging awareness to minimise the use of forest resources as fuel; and
5. building a massive people's movement for achieving the above objectives

Ghosh (1988) opined that as long as the forest department continues to function in isolation, and not working with and in a way for the benefit of the local populace, the results are inevitably going to be discouraging. This, in fact was a major rationale for decentralisation of economic activity for the development of the panchayat system for the devolution of greater authority to the elected panchayats. The forest department, according to him, could then work in consultation and co-operation with the panchayats and devise a system whereby the villages would provide the required protection to the young saplings. One easy way to secure such co-operation would be to fence off the official forest areas - these fences would not last without the active co-operation of the local population and to allow grazing facilities to the villages on condition of protection to the young saplings. The rural population needs firewood. Either such firewood is provided on a systematic basis, or there would be illegal felling of trees.

The village woodlot programme or community woodlot programme was conceived to be an integral component of social forestry project. Its aim was to utilize the village commons in a better manner through greening them with quick growing trees. But this component had not been so successful in sheer quantitative terms as both the farm forestry as well as strip plantation components had been. There had been shortfalls in achievement of targets in community woodlots programme at West Bengal (GOWB, 1988), Orissa (SIDA, 1987), Madhya Pradesh (USAID, 1985) and Uttar Pradesh (GOUP, 1985). Evaluation reports of community afforestation schemes in India such as those of Tamil Nadu (SIDA, 1988), Orissa (SIDA, 1987), Uttar Pradesh (USAID, 1988) and Andhra Pradesh (CIDA, 1988) had in general found little evidence of communal interest or of management capabilities.

In speaking further of the farm forestry IIPO (1988) made it a point that half of the block plantation (in the fields) by farmers had been on previously cropped lands. Similar conclusion was reached by ILO(1988) which estimated that 50 percent of the land, covered under the farm forestry component was good agricultural land and this sort of tree planting on land, previously used for agricultural crops, tended to displace labour and to substitute male for female employment.

Joshi (1988) expressed deep concern over the fact that no government programme in India had been surrounded by as much confusion, or had received as much media attention as social forestry. Both its approach and its achievements were matters of disputing the programme which began in 1974 and needed then to be put on a firm footing by removing all misgivings about its viability and strength. It was said that though the planting activity under the various components of social forestry had on the whole been satisfactory, the programme had failed to achieve its broader objectives on three counts viz. (a) It had subsidised the richer farmers, (b) it had not produced wide ranging social and environmental benefit, and (c) in some cases it worsened the position of the poor because tree-planting could be an attractive financial proposition where there was a market for the wood. The benefits from the programme were generally appreciated by bigger farmers. It was believed that the initial success of social forestry in Gujrat, Uttar Pradesh, Haryana and Punjab was because of the response of small and marginal farmers (with less than 2 hectares) and large farmers (more than 4 hectares) coupled with the rising price of wood. The failure of social forestry to fulfil the basic needs of the poor stemmed from instances like big farmers were growing eucalyptus instead of the traditional ragi, thereby making less food available locally pushing food prices up and agricultural workers losing their jobs as eucalyptus requires less care.

Based on a case study of USAID/ Haiti Agro-forestry research Project, Murray (1987) stated that successful agro-forestry projects, even under the most different institutional, technical and motivational circumstances and under the most trying political economic and environmental conditions can succeed, if based on sound

ethnographic theory and practice and if implemented by interdisciplinary teams that understand local realities such as land tenure and incentive structures. These realities, including control of assets, outputs and shared benefits must be addressed in appropriate ways. Regarding utilization of fuel, Bhattacharya (1993) reported that ninety percent was used for household consumption and negligible amount was taken to the market for sale by all categories of farmers. It was found that ninety six percent of timber produced by the medium farmers and about seventy to eighty percent of timber produced by the small and marginal farmers were sold to the market.

Patel (1988) in the study 'How and why Agro-forestry' pointed out the advantages which are as follows : (i) Agro-forestry contributes significantly to the improvement of soil and aggregate production of food, wood for fuel, animal products are also always found to be higher than the yield of single crop (ii) It provides wind breaks that reduce the wind velocity and decrease evaporation which directly / indirectly helps moisture conservation along with protecting crops against the hot as well as cold winds prevailing in hot weather and winter season respectively (iii) As crops provide food and trees make available raw material for various industries, potentialities of agro-forestry for revitalising the rural / cottage industries have been tremendous and unexploited (iv) It opens new avenues for providing employment opportunities in the field of agriculture, animal husbandry, silviculture by way of raising them as well as their processing and marketing. (v) It also prevents encroachment on the reserve forest area in search of firewood and saves the use of cowdung as fuel.

Among some suggestions to revamp social forestry operations, the observations made by Patnaik (1988) deserves special mention . He suggested that as tree planting called for heavy investment in first year of its formation without any return in the initial years, it was not advisable to take up extensive tree planting unless one had other sustainable sources of income.

Although the problem of eco-degradation was considered to be the chief factor behind launching of social forestry as could perhaps be established through the preceding discussions the same justification might again be given lending the words of Rao (1988) . He mentioned that crop production, livestock economy, rural poverty and environment were highly inter-related. The problem of environmental degradation should, therefore, be seen essentially as a consequential result of the failure to cope with the rising demand for resource accessibility from all possible sources of livelihood that interplay in the rural socio-economic structure. Even technological changes that took place during the recent past and institutional arrangements for management of technology transfer vis-a-vis resource allocations should also not be studied separately.

According to Shah (1988), Social Forestry production system has a direct bearing on agricultural production. In a tropical country as ours, it is feasible to produce more food and more wood by integrating social forestry with agriculture in the form of a three dimensional mixed production system. Under harsh climatic condition, standing trees in the form of wind breakers and shelter-belts provide a protective umbrella to agriculture. Trees help ameliorate the effects of climatic excesses and erosion. He further stated that social forestry production has a great impact on the forest production system in the country. The most effective as well as economic way of controlling illicit feelings is to augment production as well as to establish a mutually reinforcing relationship between the forest department and the people so that they feel as much concerned about the protection of forests as the forest department does. People should, according to him, be made partners in the management of forests i.e., growing, protecting, harvesting and marketing.

Srivastava (1988) suggested that for to overcoming the timber deficit, fuelwood crisis, pollution, land clearing and spatial imbalance hazards, the integration of forestry with agriculture is the only solution. Systematic plantation of *Eucalyptus* and cultivation of agricultural crops together can ensure manifold returns beyond imagination. A case study of Indra Farms at Kanpur (Uttar Pradesh) can be mentioned

here. From a farm of 3 acres managed under agro-forestry with Eucalyptus as tree crop and mustard, gram, coriander, fenugreek, onion, garlic and turmeric as agricultural crops, a net income of over 2.75 crores in first rotation of 6 years and 4.7 crores in second rotation at the end of 12 years could be earned besides the cost of land prevalent at that time. This agro-forestry system could also generate employment of 1,12,960 mandays in first rotation. The study finally emphasized on practicing agro-forestry for ecological stability and environmental conservation.

There appears to have been a misdiagnosis that given access to land and funds, communities and the poor would prefer fuelwood plantations rather than trees for food, fodder and incomes. Urban fuelwood shortages have been projected on the rural areas. The USAID report (1988) too called for a re-appraisal of the original premises as “fuelwood is a lesser priority for rural households than increased income”. Moreover, the poor face many other shortages and have many other concerns besides fuelwood including food, employment and cash. “For rural communities, woodfuel is only one useful product of trees, trees are only one form of woody biomass and woody biomass in only one aspect of much broader farming or land use systems. Woodfuel problems must, therefore, be tackled indirectly” (Leach, 1987).

Verma (1988) reported that a 4 ha. plantation was established in 1974 on community grazing land in the village of Dhaneri in Gujrat. As part of the state village forest scheme *Casuarina equisetifolia* was planted because it suited the site and the villagers wanted it. The trees were felled in 1983-84 and the distribution of benefits determined by the village panchayat. The internal rate of return was 35 %. Villagers benefited from fuelwood and small timber for house construction and repair and from the employment generated therefrom. The success of the project led the village to recognize itself into a tree Growers’ Society and undertake further planting in 1984-86. The demonstrative effect of the woodlot leading to 200 ha. of plantations is being established in the area. The poor benefited considerably from the

project but if they had a greater say in the deliberations of the panchayat, the benefits could have been even greater.

Vinaya Rai and Natarajan *et al* (1988) reported that experiments were conducted at the Forest Research Station Mettupalayam to determine the following in respect of *casuarina equisetifolia* : (i) The optimal seed rate for nursery, (ii) the optimal polypot size for containerisation and effect of delayed containerisation, and (iii) the optimal plant density for field planting. Results indicate 10 gm/m² and 20 × 15 cm. to be the optimal seed rate and polypot size respectively. Retention of seedlings in the mother bed beyond 75 days restrained seedling quality. Close spacing of 1.0 × 1.0 m. promoted height and growth under field condition.

Blum (1989) investigated the use of various sources of information at different stages in the decision making process by traditional Arab farmers in the Nazareth region of Israel and in the Gaza strips. Interviews were conducted with 48 farmers from 4 villages in Nazereth region and 56 farmers from 5 villages in the Gaza strip. The types of innovations adopted were influenced by the length of time during which each region was exposed to an intensive agricultural knowledge system and to changing socio-economic conditions. Empirical evidence substantiates the argument that at persuasion stage in the adoption process a 'worth' type of knowledge should be added to a 'how-to' type of knowledge and that farmers tend to go to different sources to obtain advice on these two central issues. Extension had a strong influence on the farmers' decision making process, especially by giving 'how-to' advice. The large majority of farmers who had contact with advisers stated that these had the strongest influence on their adoption of an innovation.

In an effect to assess the performance of 'Social Forestry Project' in Tamil Nadu which began in 1981-82 with the primary objective of meeting the fuelwood and fodder needs of the poor, Chambers *et al* (1989) deplored that the said project in fact could do very little help to the poor and thus belied its objectives. Most of the community forestry plantations which were created on village lake foreshores in

Tamil Nadu were being sold to urban areas instead of being used to meet the local demands of fuelwood indicated by SIDA (1988) in its evaluation report. Wilson (1986) estimated that only 5.7 percent of the total quantity of wood produced in Community Forestry Programme was actually utilized by the rural people and the rest was all sold to the urban areas. Shepherd (1987) unveiled the fact as regard to implementation of Tamil Nadu Social Forestry Project that “..... providing tree cover to common lands also meant depriving access of the poor to the grazing lands. The government did not issue clear instructions as how to tackle such conflicts ... which virtually meant the forest department could continue planting non-browsable crops on land meant for grazing. Women’s involvement in decision making was negligible ... villagers were indifferent because they were not consulted, because the trees were planted not by the villagers because it was not clear who owned the trees”. The pattern as presented by Wilson (1986) and Shepherd (1987) is also reflected in the same manner from the studies conducted by CENDIT (1985) and SIDA (1987).

In a bid to delineate the gainers and / or losers from Community Forestry, Chambers *et al* (1989) were highly critical, as a general case, about government managed community plantations. While commenting upon this phenomenon, they pointed out that those government managed community plantations were less equitable from the viewpoint of distributive pattern of benefits as compared to the traditionally managed forests. Chambers *et al* (1989) clarified their views further in the sense that “in community plantations, who gains and who loses has been affected by the choice of species. Fodder is crucial to the economy of Indian villages land loss of most of the states forbid the use of grazing lands for purposes other than producing grasses and fodder. Yet, Forest department has planted non-browsable species like *eucalyptus* on such lands thus depriving the poor villagers and sheep owners of an important resource”. This criticism finds ground from a few other studies conducted by PEO (1988) in Gujarat, Brokensha (1988) in Karnataka, Indian Institute of Management (1985) in Uttar Pradesh, etc.,

Considering the need to ensure the benefits of social forestry to the poor at the earliest, Chambers *et al* (1989) came out with the proposition that, "For quick benefits to the poor, long gestation trees need to be supplemented with an understorey of grasses, bushes and shrubs so as to satisfy their immediate needs". In the absence of bushes and shrubs large trees like tamarind, jackfruit, jamun etc. tend to be hacked for fuelwood although those should remain to yield their usufructs (Shyamsunder and Reddy, 1986). Chambers *et al* (1989) posed another dimension of the inherent weakness in the policy of social forestry project in this country. They argued heavily in favour of *prosopis juliflora* as a better substitute than that of controversial eucalyptus species. The arguments stands in the following manner as ".....Thus there would be a world of difference between plantation of eucalyptus and of *prosopis juliflora* on road sides. Eucalyptus benefits urban markets and industry, whereas *prosopis* does not only solve the fuelwood problem of poor families, but also generate self-employment for the poor. *Prosopis juliflora* is a neglected tree. Although the forest department ignores it in social forestry projects, it grows naturally on degraded soil. Field studies conducted in dry areas with low employment opportunity in slack season like Anantpur in A.P. (CIDA, 1988) and Mathura in V.P. (Saxena, 1988) showed that *prosopis* on its own could solve the fuelwood crisis besides providing employment to many who pruned the branches and sold it in urban areas. Another study showed that its yield on degraded soils in Bhavanagar was as high as 3 tonnes per hectare per year (Patel, 1987). *Prosopis* produces double the bio-mass on similar soils as compared to eucalyptus (Banerjee, 1986). It is thoroughly lamentable that in spite of having all such comparative advantages, *prosopis* has yet been considered by the forest department to be a low value tree and has got the unfortunate label of being described as a weed (GOI, 1987).

Protected and village forests which were meant for meeting village needs continued to get degraded for several reasons. First, as they were close to village habitations the foresters did not believe that efforts to regenerate them would bear fruit because of biotic pressure. So little attention was paid to them beyond lip

service. Second, central assistance as well as funds from the states were mostly concentrated on reserve forests for industrial plantations. Third, rights and privileges which village communities had in their areas were not compatible with their regeneration unless concentrated efforts were made to work with the 'corporations of the people' (Chambers *et al*, 1989). Thus, as pointed out further by the authors, village forests as open access resources were victims to the 'tragedy of the commons' phenomenon.

Broadly speaking, three phases of forest policy can be found existent in independent India : the first phase was plantation phase spanning upto 1975 which neglected village lands and promoted industrial plantations on forest lands; the second was social forestry phase which sought tree planting on village and private lands to draw pressure off the forest lands; the third - environment and people phase was emerging in 1988 (Chambers *et al* 1989).

Eisemon (1989) reported that relationship between schooling and agricultural productivity may be attributed to the knowledge and skills acquired from formal education. Such skills help increase capacities to effectively use modern technological inputs such as agricultural chemicals and fertilizers that boost farm output. Four implications of this study are of special significance. First, effort to modernize peasant agriculture by increasing the distribution of agricultural chemicals and fertilizers will not have much impact on farm output unless cultivators know how to use them. Second, school instruction in agriculture has a powerful influence on how school leavers think about and practise agriculture. However, increasing the educational attainment of the rural population does not necessarily increase their capacity to use modern inputs. In order to develop such capacities, the quality of primary schooling must be improved. Finally, in addition to increase school resources, the development of such capacities involve changes in instructions and assessment that promote application of school knowledge and skills to perform tasks in everyday life.

Fortmann and Fairfax (1989) observed that the inflexible technical professionalism, arising out of the American forestry tradition's commitment to comprehensive, large scale planning, was one of the prominent reasons for the failure of international forestry projects, particularly in developing countries. Rigid adherence to the fundamental tenets of professional forestry - technical expertise, macro-level planning, promotion of commercial fibre production, and a narrowly biological perception of forestry - had led to a blinkered world - view that ignored relevant social factors. They pleaded for a re-evaluation of this tradition as a pre-condition for the success of forest development projects.

As the exponents of characteristic features of social forestry under Indian context Patnaik *et al* (1989) featured social forestry as forestry for the people and by the people as they were the direct beneficiaries out of entire activities. And the entire concept of social forestry stood out to be implemented with people's participation at its widest sense. They went on clarifying further that it was forestry on a small scale and was an undertaking by an individual, a household, a group of households, or a community. If resources are made available through community or governmental action, they observed, the scale of production inputs which were otherwise limited due to limited resource base of the abovesaid entrepreneurs could be increased as well.

In a study, Ray (1989) indicated that anticipating the profitability of farm forestry in comparison to conventional agriculture "the larger size-class farming gentry did put more amount of their possessed land under tree plantation as compared to their lower size-class counterpart". While explaining the causal factors behind such motive, he put forward the remarks that (i) the big farmers were in a better position not only to put larger proportions of their owned land under farm forestry but also might have emerged out with commercial bent to profit more through planting a good number of economic plants; and (ii) tree farming happened to be a time consuming venture and hence practising this proposition might act as a facilitating agent to shrug off the growing pressures of wage movement at least for

quite a few years after completion of planting activities because little or none of the rich farmers in West Bengal directly engage themselves in farming operations.

Sharma, Chand and Bhatti (1989) estimated the fuelwood, timber and fodder requirements of three farm size groups in the hill areas of Himachal Pradesh. Data were collected from 226 farmers selected from three zones (low hills, mid hills and high hills). The results indicated a high dependence on forests. The nature and degree of dependence varied on purpose, agro-climatic conditions and income status. An inverse relationship was found between the dependence on forests for fuelwood and fodder and farm size. They suggested that in view of the heavy reliance of local people on forests, efforts should be made to encourage the protection, regeneration and development of forests.

Dizon, J.T. (1990) reported that factors / combination of factors which significantly affected production per farm, production per hectare based on total farm size and production per hectare based on actual area cultivated differed in the two sites and at the aggregate level. These findings only point out that upland areas vary not only in terms of bio-physical conditions but also in terms of socio-economic characteristics.

Virtudazo, A.Z. (1990) on the basis of his study reported that 98% of the respondents who adopted Agro-forestry were formally educated with an average formal schooling of 5.38 years. Of the total gross income, only 38 % or P 4762.00 came from CSC (Certificates of Stewardship Contract) areas and a bulk of 62 % or P 7,631 came from outside CSC area. Majority were classified under low level of living. Generally recipients had high level of perceptions and favourable attitudes towards agro-forestry systems, knowledgeable on the specific provisions of the stewardship agreement, high level of aspiration and awareness on the importance of trees to ecological balance. Majority had high value orientation and almost half claimed to be non-traditional. Most of them observed and believed that climatic conditions, soil type and topography of the area are good and not a hindrance to

agro-forestry farming. Average size of CSC area planted was 2.35 hectares and average percentage of area developed was 89.4 %. All of the respondents have adopted the agro-forestry system. About half (47 %) were considered as innovators. Multistorey agro-forestry system was the most adopted system. Simple correlation analysis using Spearman Rank Order Correlation Co-efficient, showed that income inside CSC farm, total gross income, level of living, values, size of CSC area and percentage of the area developed were significantly related with adoption of agro-forestry system. Hence, these factors must be given due attention by the implementors of the Integrated social forestry projects.

Joshi (1991) in his study observed that India's forest cover was 19.52 percent of the land area as against about 22 percent at the time of Independence. In view of the growing depletion of traditional forestry, there was an urgent need, according to the author, to launch massive programmes of social forestry throughout the country with the help of Central and State Governments, Voluntary agencies and forest lovers. Social forestry, the author argued, can solve the problems of soil erosion, reclamation of marginal lands, high wind velocity, shortage of rains, water logging, shortage of fuelwood, timber and other forest products. He also stressed the need to achieve maximisation of the bio-mass on our limited land resource so as to be shared by all concerned in the community. He cautioned that the present efforts in the direction are just not adequate to meet the actual requirements in times to come.

Mameril, R.J. (1991) reported, based on findings of the study; Nazuni ISF (Integrated Social Forestry) Projects (p- 2) performed best among the three projects based on four indicators of performance. The factors which significantly affect the extent of participation were income, education, age, sex and occupation. Land size and household size were not significantly related to the extent of participation. Survival of agro-forestry crops was significantly affected by the amount of nitrogen and phosphorus in soil. Rainfall variation partly explains variation in survival percentages. Species richness had no significant effect on survival of agro-forestry crops. The factors found to have significant effect on CDA's (Community

Development Assistance), extent of participation and assistance of knowledge of the programme, skills in programme implementation and motivation. The increase in income of the respondents was found to be greatest in the Tiolas ISF Project (p- 2). However, this was not brought about by the increase in income from the CSC (Certificate of Stewardship contract) farm and by other livelihood activities of the project. Only the Nazuni ISF project (p- 2) showed that the increase in income was brought about by the increase in income from the CSC farm. Ecological sustainability indicated by extent of SWC showed that p- 2 was more ecologically sustainable than p- 1 and p- 3. Regarding the impact on productivity, there was an increase in terms of income from agro-forestry farms and p- 2 had the highest increase. Based on Gini ratios, equity in income distribution was found to have improved in all sites.

Mondal (1991) in his study on development management by Gram Panchayat Organization' in Nadia and Hooghly districts of West Bengal found that the Gram Panchayat Pradhans considered 'tree plantation' and 'protection of trees' important as it contributed towards improving the quality of rural life. It was suggested that the Gram Panchayat has to play an important role in restoring and improving the ecological balance in the rural areas through plantation of trees and their proper maintenance.

Bhatnagar (1992) emphasized the role of Non-Governmental Organizations (NGOs), besides the governmental activities, in creating awareness for serving forest resource and accepting new technologies as alternative sources of energy. He cited a number of successful instances achieved by NGOs and went on to conclude that with concerned effort, the NGOs could be pressed in mobilising the masses for taking up afforestation of the available waste land in the villages and towns with a missionary zeal as they have an advantage of functioning at the grass-root levels for overall community development.

Koppalkar *et al* (1992) reported that tree cultivation on farm land gained momentum with the massive afforestation programme in Karnataka under Social

Forestry Project launched during 1983-84. The Social Forestry Wing of the Forest department is the sole agency providing the development support to farm forestry in the state. The extension back-up and supply of seedlings constitute the development package provided for farm forestry. The Kishan Nurseries form the main source of supply of seedling besides the departmental nurseries. Small and marginal farmers are the prime beneficiaries both in terms of nursery raised and seedling distributed. In the recent years, privatisation of seedlings production is picking up. There is increasing the need for revitalising the developmental assistance in terms of extension and finance.

In the Final Evaluation Report of farm forestry in West Bengal the Monitoring and Evaluation cell (1992) concluded that marketing of farm forestry produce is a vital aspect which required immediate attention. When these plantations would become mature, huge quantity of such produce would come into the market. If proper price is not received by the farmers, the programme may receive a setback. Ways and means should, therefore, be devised to provide extension support to people for setting up small scale forest based industries with this farm produce. Unless some internal market is developed, possibly this programme in future may not be so interesting as it is to day.

In the final evaluation report of Social Forestry Project in West Bengal, the Monitoring and Evaluation cell (1992) concluded that it was necessary to deliver the proper message to the people about the importance of timely planting, spacing, thinning etc. For the poor section of the society, good amount of incentive should be given, otherwise the whole purpose will be lost. The cell suggested that : (i) Choice of species should be done after discussion with the people. For choice of species, more emphasis should be given to local needs. Percentage of timber and fruit species should be increased. (ii) Dialogue and meetings with the local community and forest protection committee should go on regularly. Intensive motivation programme for

awareness of development should continue. (iii) Stress should be given on more production of minor forest produces.

Bhattacharya (1993) reported that important motivation for adopting farm forestry in Midnapore district of West Bengal were need for fuel, high lumpsum return, utilization of unproductive land and need for timber. Simultaneously he observed that farmers who adopted farm forestry programme came from weaker section with low social participation, small land holding, Kutchha house, little farm power, and few improved agricultural implements. He spoke further in this regard that the problems in farm forestry, as perceived by the farmers, in order of importance, were attack of termite, biotic damage, pilferage, lack of fertilizer in subsequent years, lack of seedlings, lack of technical knowledge, lack of insecticides in later years, lack of funds and problems in marketing.

Durvedi (1995) reported that the understanding of the environmental relationship to health and nature as found in Charak Samhita is so great that it even astonishes modern scientists. This ancient Indian medical treatise declares that nature is totally connected with the human body. Ancient treaties, like Arthosastra and Manusmriti, have given much emphasis to the laws regarding selection and development of cities as well as environmental purity.

Sikligar (1995) in his research paper entitled 'Afforestation programmes in tribal areas' put forth a number of suggestions to make afforestation programmes a success in tribal areas, to promote greenery and their further happiness some of which are : (i) To arrange facilities such as gohar gas, solar-energy, kerosene etc. at concessional rate for their cooking purposes in order to protect against further destruction of shrubs, tree etc. (ii) To create awareness about the pernicious impact of forest destruction through meetings, seminars, workshops, posters, pamphlets, advertizements and cinema etc. and to mobilies their opinion and co-operation for massive afforestation. (iii) To propagate interesting forest based songs, tales, traditional dramas etc. in fairs and Vanamahotsava to highlight the importance of

forest and forest-based resources. (iv) To allow the tribals grow plants according to their own techniques and efficiency as they know which species are best adopted to a particular micro climate. (v) To keep away from cumbersome bureaucratic procedures and transfer of dedicated staff (vi) To give preference to species such as bamboo, beer, bowaryia, dhok, mahua, palash, pipal, neem and teak etc. with other commercially utilised trees such as mango, eucalyptus sal, sisam, tendu etc. for stabilising their economy. Similarly, priority should also be given to more fruit bearing species. (vii) To implement afforestation programmes in coordination with other rural oriented programmes such as IRDP, JRY, NREP, RLEGP, TRYSEM etc.

Srivastava and Khanna (1995) attributed the degraded forest eco-system of the country due mainly to an unsustainable pattern of consumption alongwith an incongruous population growth. They also suggested ways and means to rejuvenate the eco-system before it is too late. Tree cover area needed to be increased alongwith achieving a high level of productivity by self - restraint, active participation and cooperation of society and selective removal of biomass vis-a-vis time. Besides this, lot of financial and technical input were also advised as required.

Pawar and Garande (1996) in their study 'Economic Appraisal of Eucalyptus in Agroforestry' brought out that the eucalyptus plantation in agroforestry systems though economically viable gave near about marginal per hectare net returns as compared to agricultural crop rotation. He concluded and suggested that in a country like India, where agricultural land is struggling with fast growing population, the farmers should be encouraged to plant the eucalyptus tree along the boundaries of the field, low-lying areas, cultivable pasture land, sides of water canals etc. to earn the highest returns and to meet the deficit of the forest in the state.

Thus, the preceding discussion tried to focus the central subject of social forestry from social, ecological and economic dimensions by way of drawing experiences of the concerned scientists and institutions to develop the theoretical orientation of the present study.

CHAPTER - III

Research Methodology

A. Design of Research

The present study was designed to be carried out by the following steps :

Step I : Derivation of Hypothesis

The following working hypothesis were set up and accordingly the study was carried out to test those hypothesis in order to derive at the logical consequence .

Hypothesis (Hp) 1:

There exist association between some socio-economic vriables of the farm foresters with those of the performane of the Social Forestry Project.

Hypothesis (Hp) 2:

People's participation in West Bengal Social Forestry Project is by no meanas impressive.

Hypothesis (Hp) 3:

Due to higher spatial oportuinity, big farmers are poised for accruing more benefit of the farm forestry programme compared to their land - poor counterpart.

Hypothesis (Hp) 4:

There exists variations in selection of species according to the location-specific suitabilities of different agro-ecological regions.

Hypothesis (Hp) 5:

Sustainable Social Forestry Programme requires appropriate technological and extension back-up.

Hypothesis (Hp) 6:

Functionaries of Social Forestry Project has maintainted desired inter-institutional functional linkage and co-ordination.



Step II : Pilot Study

The study was conducted by employing personal interview technique. Before construction of the data collection schedule, a pilot study was made in some of the selected areas to gather first hand information on the subject of the present study. Informal discussions were arranged with the reported farm foresters, resourceful villagers, panchayat personnels and forest department personnels for this purpose.

Step III : Development of Tools and Techniques for Data Collection

Duly considering the specific requirement of the present study as well as the information gathered from the pilot study, a draft data collection schedule was prepared in this phase. The said draft schedule had three integral components in it. The first component meant for collecting information from the individual farm foresters who planted trees in their land, the second for panchayat personnels entrusted to look after the project activities, and the third for various rank and file of the Forest Department Officials.

To understand and to analyse the situation of farm foresters in terms of land and other related aspects which generally influence their socio-economic condition, a socio-economic status scale developed by Pareek and Trivedi (1964) was applied. The items of the scale which were supposed to measure socio-economic status of the selected farm foresters were, caste, occupation, education, social participation, land holding, house type, farm power, material possession and type of family. As per provision of the scale, after adding the scores of individual respondent against each of the aforesaid items, total score might be obtained to determine the socio-economic status for that particular respondent.

The scoring techniques followed in the different items are described below :

1. Caste : Caste is still playing a crucial role in Indian context. The scale sub-group the caste and accordingly the score is to assign to each item viz. 'Schedule Caste', 'Lower caste', 'Artisan caste', 'Agricultural Caste' and 'Dominant Caste' 'Prestige caste' with a scoring key of 1, 2, 3, 4, 5 and 6 respectively.
2. Occupation : The occupation of a person generally signifies the socio-economic status of that person. Several occupational groups were identified in the study area with the help of the scale namely. 'Labour', 'Caste Occupation', 'Business', 'Independent profession', 'Cultivation' and 'Service' with a scoring key of 1, 2, 3, 4, 5, and 6 respectively.
3. Education : The level of literacy which is considered as an important indicator of economic and social development is categorised as 'Illiterate', 'can read only', 'can read and write', 'Primary', 'Middle', 'High school' and 'Graduate' with scoring of 0,1, 2, 3, 4, 5 and 6 respectively.
4. Land : Land is basic unit of agricultural production. This has naturally an impact over socio-economic status. The respondents of this study were classified according to size of holding viz. 'less than 1 acre', '1 - 5 acres', '5- 10 acres', '10 - 15 acres' and '15 - 20 acres' and more than 20 acres with the scoring key of 1, 2, 3, 4, 5 and 6 respectively.
5. Social Participation : Given an individual exposed to different social institution his out look may be changed and developed which helps to try and adopt the new technology for betterment of their life. In this study, respondents were grouped into classes according to their participation informal organisation viz. 'No membership', 'Member of one organisation', 'Member of more than one organisation', 'Office bearer' and 'Wider public leader' with the scoring pattern of 0, 1, 2, 3, and 6 respectively.

6. **Material Possession** : It signifies the status or economic condition of the respondents and also indicates the modernity as well. The materials are ‘ Bullock cart’, ‘Cycle’, ‘Radio’, ‘Chair’, ‘and, ‘Improved agricultural implements’ giving the score of 1, 1, 1, 1, and 2 respectively.
7. **House** : Housing occupies an important place often it reflects as status symbol in rural areas. The houses of the respondents are classified and putting the assigned score accordingly. The categories are ‘Hut’ Kutcha (mud) house,’ ‘ Mixed house’, ‘Pucca (brick) house’ with the score of 1, 2, 3 and 4 respectively.
8. **Farm Power** : It can be used as income generating tools for hire basis as well as for own use. The classification of farm power of the respondents are viz. , ‘No drought animal’ ‘1- 2 drought animals’, ‘3 - 4 drought animals’ or ‘one or more prestige animals’, ‘5 - 6 drought animals’ or ‘Power tiller’ or ‘Tractor’ with corresponding scores 0, 2, 4, and 6 respectively
9. **Family** : a) **Type** : This has been classified on the basis of ‘Single or ‘ Joint’ Family of the respondents and the scores are 1 and 2 respectively.
 b) **Size** : It means the number of family members present in the family of respondents and were classified ‘up to 5’ and ‘above 5’ with 1 and 2 scores respectively

Step IV : Pre-testing of Schedule

The draft schedules, meant for the three above mentioned categories of respondents, were administered for pre-testing on fifteen persons who were drawn out from those three categories and who were not considered for collecting final information. Duly considering their feed-back, the items and / or statements of the draft schedule were revised or modified as per need. Thus, data collection schedule for each category of respondents were finalised. Translated version of the entire schedule is furnished in the appendix.

B. Selection of Study Area

i. District

As explained earlier, one of the focal objectives behind launching of the 'West Bengal social Forestry Project' was to shift pressure from traditional forest belts of the State. And this essentially meant extending the facilities of forests as well as multiplying the canopy cover of trees at even the farthest country side's of the areas having no such background of traditional forestry. Keeping this in view and in order to gain more understanding on the dynamics of social forestry in backdrop of divergent agro-climatic setting of the state, the present investigation purposively included Coochbehar District of Terai Region having the background of traditional forests and Murshidabad as well as Nadia districts of Lower Gangetic Plain Region where, excepting the man made reserve forest of Bethuadahari, no traditional forest does exist.

ii. Block

After selecting the three districts, next stratification was block. Two blocks from each districts were selected by random sampling method following the area sampling technique. Thus altogether six blocks were selected for field level investigation of the present research study. The blocks were Tufanganj - I and Dinhata - I in Coochbehar district, Kandi and Domkal in Murshidabad district, and Chakdah and Haringhata in Nadia district.

iii. Gram Panchayat

To reach the target group of respondents for collecting primary data for the study, sixteen Gram panchyats were selected while selecting the gram panchayats excepting Kandi and Haringhata Blocks of Murshidabad and Nadia district respectively, three gram panchayats from each of remaining four selected blocks were pooled randomly. In case of Kandi and Haringhata block only two gram panchyat were selected. The identified gram panchyats were chilakhana, Natabari, Maruganj, Baro solmari, Baro atiabari, Putimari-ii for Coochbehar district, 2no. Jeetpur, 3no. Ajimganj, 4no. Domkal

Jashohari Anokha, Sundarpur for Murshidbad district; and Aroali, Chanduria , Raotari, Birohi, Neemtala for Nadia District.

C. Selection of respondents

Keeping in view the objectives of the study and for better comprehension of the social forestry project, ~~three~~ categories of respondents were identified for interview during the time of pilot survey. They were :

1. Farm forester - Village people who planted at least five trees on their farm
2. Panchayat personnel - Pradhans / Upa-pradhans, Sabhapaties or the persons associated with social forestry project on behalf of panchayat.
3. Forest Officials - Staff of forest department attached to social forestry project viz. D.F.O, Range Officers, Beat Officers, Forest Extension workers Motivators etc.

Given the fact that no complete list was available to the formal agencies like Forest Department and Panchayat, the present investigator conducted Participatory Rural Appraisal (PRA) as an alternative in all the selected Gram Panchayats. Firstly, with the help of focused interviews with the interested members of the selected G.Ps., Motivators and other knowledgeable personnels of Social Forestry / Territorial Divisions of Forest Department draft lists of farm foresters were prepared. Secondly, each list was placed for triangulation before the villagers of concerned gram panchayat during the PRA exercise. By this way 411 number of farm foresters were listed out from sixteen selected G.P.s. Then following the list sampling techniques, 40 per cent i.e. 165 farm foresters from the lists of each G.P. for all three districts were selected for personal interview. The account of farm forester is being presented in Table 3.1

Table 3.1 Number of Selected Farm Foresters According to District, Block & Gram Panchyat

District	Block	Gram Panchyat		Farm Forests	
		Sl.NO.	Name	Available (No.)	Selected (No.)
Coochbehar	Tufanganj - 1	1	Chilkhana	25	10
		2	Natabari	28	11
		3	Maruganj	23	9
		Total		76	30
Coochbehar	Dinhata - 1	4	Baro solmari	32	13
		5	Baro Atiabari	27	11
		6	Pitumari - 2	16	6
		Total		75	30
Murshidabad	Domkal	7	2no. Jeetpur	36	14
		8	3no. Ajimganj	21	8
		9	4no. Domkal	19	8
		Total		76	30
	Kandi	10	Joshohari	33	13
		11	Anokha Sundarpur	26	10
	Total			59	23
Nadia	Chakdah	12	Aroali	23	9
		13	Chanduria	19	7
		14	Raotari	14	6
		Total		56	22
	Haringhata	15	Birohi	44	18
		16	Neemtala	31	12
		Total		75	30
	Grand Total			414	165

In contrast to the selection procedure adopted for the farm foresters where samples survey technique was taken recourse to census method was followed for collecting data and classified information from all the other target group of respondents excepting Forest Department Staff. Fifteen Panchayat Pradhans, seven

Upa-pradhans, six Panchayat Samity Sabhapaties, eight representative of gram panchayats, two range officers one D.F.O, two Forest Extension Workers, two Beat Officers, and six motivators were finally available for giving interviews to the present researcher and accordingly interview was organised as per the convenience of the interviewees.

D. Collection of Data

Primary data collection from all the selected target groups for the presented study was done by employing the structured schedule in all the three districts. Starting from first half of 1992, it took little over two years time to complete the field investigation.

For collection of a good volume of required secondary information all the relevant formal agencies were approached and utilised. And it took nearly six months to collect the secondary information. thus, the data collection phase could be completed by the end of 1994.

Primary data collection was done by administering personnel interview schedule. Mostly data were collected from the farm forester at their field. But residence and panchayat offices were also used for data collection after getting prior information from Panchayat members, Neighbours and family members of the respondents to save time and more coverage. For better output, Bengali version schedule was employed before all the respondents for better comprehension. It took nearly two and a half of hour time in filling up one schedule.

Secondary data were collected from the selected Pradhan, Upa-pradhan, Sabhapaties or their representatives from the respective Gram panchayats, Panchayat Samities and Zilla parishads under study. Before collecting the data most of the time self introduction was made by the researcher in each and every tier. Frequent visit also helped the process of building rapport. Data were collected through administering schedule meant for that target group at the offices of the respective body. Time taken for completing each schedule was forty five minutes to one hour.

Data were also collected from D.F.O's Range Officers, Beat Officers, Motivators and Forest Extension workers from the respective Divisional Forest Offices. Schedule made for DFO/Range officers were employed at their offices and took almost one and a half of hour to complete. But schedule for forest extension worker/ motivator/ beat officers were employed at their respective area of operation and took only twenty minutes to half an hour to complete.

E. Scoring Tabulation, Analysis and Interpretation of Data

The data collected from primary and secondary sources were processed and utilized as per the need of the present study. Tabulation were done in various ways with suitable titles be fitting the objectives set forth for final analyses. In doing this decoding of information was done frequently to present the message in tabular form.

Statistical tools and techniques employed for computation of data during analysis and interpretation stage are given below :

F. Tabulation, Statistical Analysis and Interpretation of Data :

Keeping in view the specific purpose of present study the field data, collected through personal interview method, and the secondary information, collected from various documents and records during the micro-level studies, were scored / aggregated and treated. For final analyses, tabulation was done in different ways so that the objectives of the study might be explained and analysed in a purposeful manner. In doing this, formats of tabulation were designed first and dummy tables with captions were then prepared item and purpose wise.

The study took recourse to some standard statistical techniques during the analysis and interpretation phase. Those were percentage analyses, analyses of variance and linear correlation coefficient as well as multiple regression coefficient analyses. These were done through IBM 300 GL Computer System fitted with SPSS / PC⁺ software package. The formulae employed to obtain the results from the aforesaid analysis are briefly presented in the following section.

- i. For measuring the degree of association between any two variable linear regression equations were set up and corresponding 'r' values were calculated to explore the correlation coefficients.

$$Y = a + bx$$

where Y = Dependent / Determining Variable
(Y₁ Y_x)

a = Interception values

b = Regression coefficient.

x = Independent / Antecedent variable
(x₁ x_n)

- ii. For testing the 'r' values, students 'T' values at 5% and 1% levels of significance were also calculated .

$$T = \frac{r \sqrt{(n-2)}}{\sqrt{(1-r^2)}} \quad \text{d.f.} = n-2$$

Where, r = linear correlation coefficient, n = no. of observation.

- iii. For measuring joint contribution of independent /antecedent factors on dependent / determining factor (s), multiple regression coefficient (R) values were calculated. The multiple linear trend equation was developed for each study.

$$Y = b + b_1x_1 + b_2x_2 \dots\dots\dots b_nx_n \quad R$$

(x₁ x_n)

Where

Y = Dependent / Determining variable
(x₁.... x_n)

(x₁.... x_n) = Independent / Antecedent Variable

b = Interception

- R = Multiple regression coefficient.

iv. For testing the multiple 'R' values, calculated F values at 5% and 1% levels of significance were obtained .

$$F = \frac{(n - p - 1) R^2}{p (1 - R^2)} \text{ with } p \text{ and } p-n-1 \text{ degrees of freedom}$$

Where, R = Multiple regression coefficient

p = Number of independent / antecedent variables.

n = number of observation

CHAPTER - IV

RESEARCH SETTING

The State

West Bengal is situated in the eastern part of India, located between 21°31' and 27°14' North latitude and 85°53' to 89°53' East longitude. The tropic of cancer passes through the districts of Nadia, Burdwan, Bankura and Purulia which are situated in the middle of the state. Geographically, the state is bounded by Bay of Bengal on the South, Sikkim and Bhutan, on the North, Assam and Bangladesh on the East and Bihar as well as Orissa on the West. The state is divided into 18 administrative districts including metropolitan city district of Calcutta as the capital. All the districts, except Calcutta, are divided into 57 sub-divisions, 426 police stations and 343 blocks. The democratic people's institution like panchayat is functioning through the district level Zilla Parishad with Sabhadhipati as the head of people's representative. At block level there are 332 Pachayat samities headed by the Sabhapati and at village level there are 3243 gram Panchayats with Pradhan being the head of that institution. The state is composed of 40911 mouzas, 37910 inhabited village and 379 towns.

DEMOGRAPHIC PROFILE :

The density of population is 766 per. sq. km.. It is second most densely populated state in India. The male and female ratio is now 1000:917. The literacy rate in West Bengal is in a rise with 57.72 per cent in 1991 as against meagre 33.20 Per cent in 1971. Some salient features as regard to demography are getting presented in the following pages.

Table - 4.1(a) : Decadal Variation in Population & their Composition

1911	1921	1931	1941	1951	1961	1971	1981	1991
% Variation	- 2.91	+ 8.14	+ 22.93	+ 13.22	+ 32.80	+ 26.87	+ 23.17	+ 24.55

Table - 4.1(b) : Population by Community, 1991

Total population	Hindu	Schedule caste (Sc.)	Hindu other than Sc.	Muslims	Others
68077965	(74.72)	(23.62)	(51.10)	(23.61)	(1.67)

Table - 4.1(c) : Rural and Urban Population, 1991

Total Population	Rural	Urban
68077965 (100.00)	49370364 (72.52)	18707601 (27.48)

Note : Figure in the parenthesis indicate percentage to respective total

Table -4.2 : Representation in Panchayat Bodies by Backward Classes

	Total members	SC.	ST
Gram Panchayat	61398	12546 (20.43)	242 (0.39)
Panchayat Samity	9510	1813 (19.06)	411 (4.32)
Zilla Parishad	664	119 (17.92)	28 (4.22)

Note : Figure in the parenthesis indicate percentage to respective total

Table 4.3 : Occupational Structure in West Bengal

Description	Male	Female
Total	35510633	32567332
A. Main Workers	17989505	2571543
i) Cultivators	5424497	420496
ii) Agricultural Labourers	4073895	981583
iii) Household industry (manufacturing processing, servicing and repiring)	510048	293635
iv) Other workers	7981065	895829
B. Marginal workers	262414	1071312
C. Non-workers	17258714	28904477

Source : Statistical Abstract,
West Bengal 1994-95
Bureau of Applied Economics and
Statistics, Govt. of West Bengal

Table -4.4 : Progress of Literacy in West Bengal by Sex and by Districts

District	Percentage of Literates			
	1981		1991	
	Male	Female	Male	Female
Burdwan	50.9	33.8	71.12	51.46
Birbhum	43.0	24.2	59.26	37.17
Bankura	49.4	23.1	66.75	36.55
Midnapore	55.3	29.7	81.27	56.63
Howrah	60.7	40.8	76.11	57.83
Hooghly	57.9	38.8	75.77	56.90
24-Parganas (North)	55.4	35.4	74.72	57.99
24-Parganas (South)			68.45	40.57
Calcutta	73.2	63.1	81.94	72.09
Nadia	43.7	29.4	60.05	44.42
Murshidabad	32.4	17.3	46.42	29.57
Dakshin Dinajpur	36.1	17.1	49.79	27.87
Uttar Dinajpur				
Malda	31.5	14.2	45.61	24.92
Jalpaiguri	38.5	20.40	56.00	33.20
Darjeeling	51.60	32.40	67.07	47.84
Cooch-Behar	40.00	19.30	57.35	33.21
Purulia	45.60	13.30	62.17	23.24
West Bengal	50.50	30.30	67.81	46.56

Note : Literates excluding children in the age group 0-4 for 1981 Census and 0-6 for 1991 census respectively

Source : Census of India, 1991
Series - 1, Paper - 2 of 1992

PHYSIOGRAPHY :

The greater part of the state (almost 65 per cent) belongs to gently undulating alluvial plains. The flat alluvial plain portion begins from the foothills of the Himalayas and extends upto the Bay of Bengal. The western part of the state consists of uplands. It is divided by the river Ganges into north and south plains. The northern part has been developed from the silts carried down by the rivers Teesta, Jaldhaka, Mahananda and their tributaries. On the contrary, the southern plains have developed with the deposition of silts by the river Ganges and her tributaries. In the north, at the foothills of the Himalayas, along the districts of Darjeeling, Jalpaiguri and Coochbehar, there runs a belt of forest. The portion lying west of the river Teesta is

known as Terai and portion lying east of the river is called as Dooars. The plain lands are found in the Siliguri sub-division of Darjeeling and in the districts of Jalpaiguri, Coochbehar, North Dinajpur, West Dinajpur, Malda, Murshidabad, Nadia, North 24-Parganas, South 24 - Parganas, Howrah, Hooghly and in parts of the districts of Burdwan, Midnapore, Birbhum and Bankura. The extreme southern part of the plains has low lands, which is inundated frequently by brackish water from the Bay of Bengal. The largest delta basin thus has formed and is known as the 'Sunderbans'. In the western part of the state appears the lands of Chotanagpur and the hills of Santhal Parganas. Spurs project here and there along with low laterite swelling ridges in Western Bankura. Undulating lands with isolated peaks and flat plains are the characteristic physical features of land in the district of Purulia, Western parts of Midnapore and the Asansol sub-division of Burdwan. The area under this physical features are chronically drought prone in the rabi season and only occasionally drought prone in the kharif season.

Many rivers and rivulets flow along the state. While the main rivers are the Ganges, Mayurakshi, Ajoy, Damodar, Rupnarayan, Subarnarekha, Mahananda, Teesta, Torsha and Jaldakha; and the rivulets are Vidyadhari, Kalindi, Bhabani, Kangsabati, Shilabati, Bhairav, Jalangi, Churni, Ichamati, Reli, Rishi, Mechi, Raidak, Sankosh, Kaljani etc.

The extreme north of the state consists of steep hilly areas and are a part of the Himalayan range. The mountain spurs of the Himalayas rise up from the plains to an altitude of 600 to 1500 metres above the sea level in the Darjeeling district (excluding the major portion of Siliguri sub-division) and the northern fringe of Jalpaiguri district. Mountain peaks of various heights and deep valleys constitute the characteristic features of land in these areas.

SOILS AND CLIMATE

The soils of West Bengal was first classified during the middle of twentieth century by the rapid reconnaissance survey based on 9.6 km. grid system with the

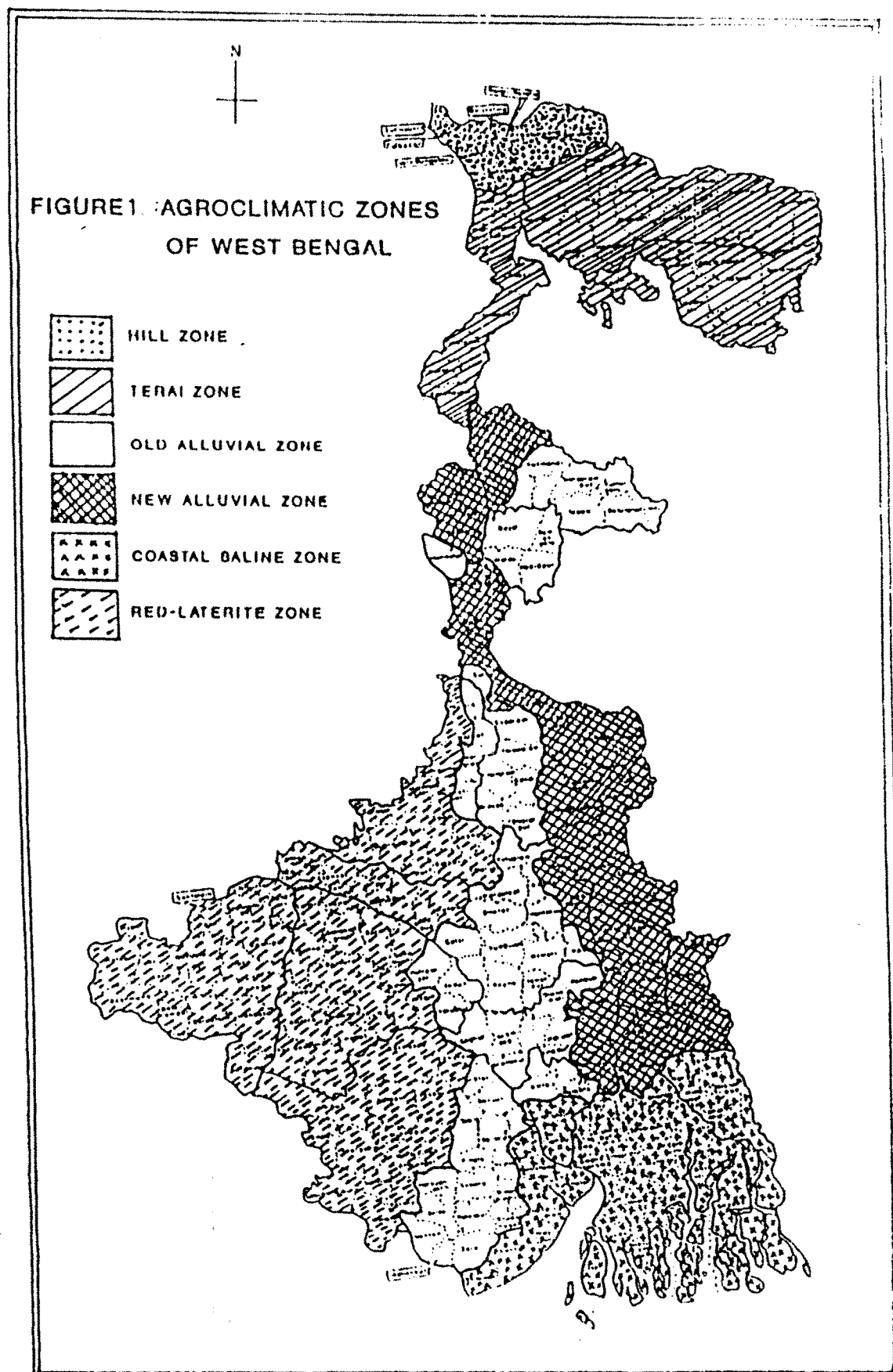
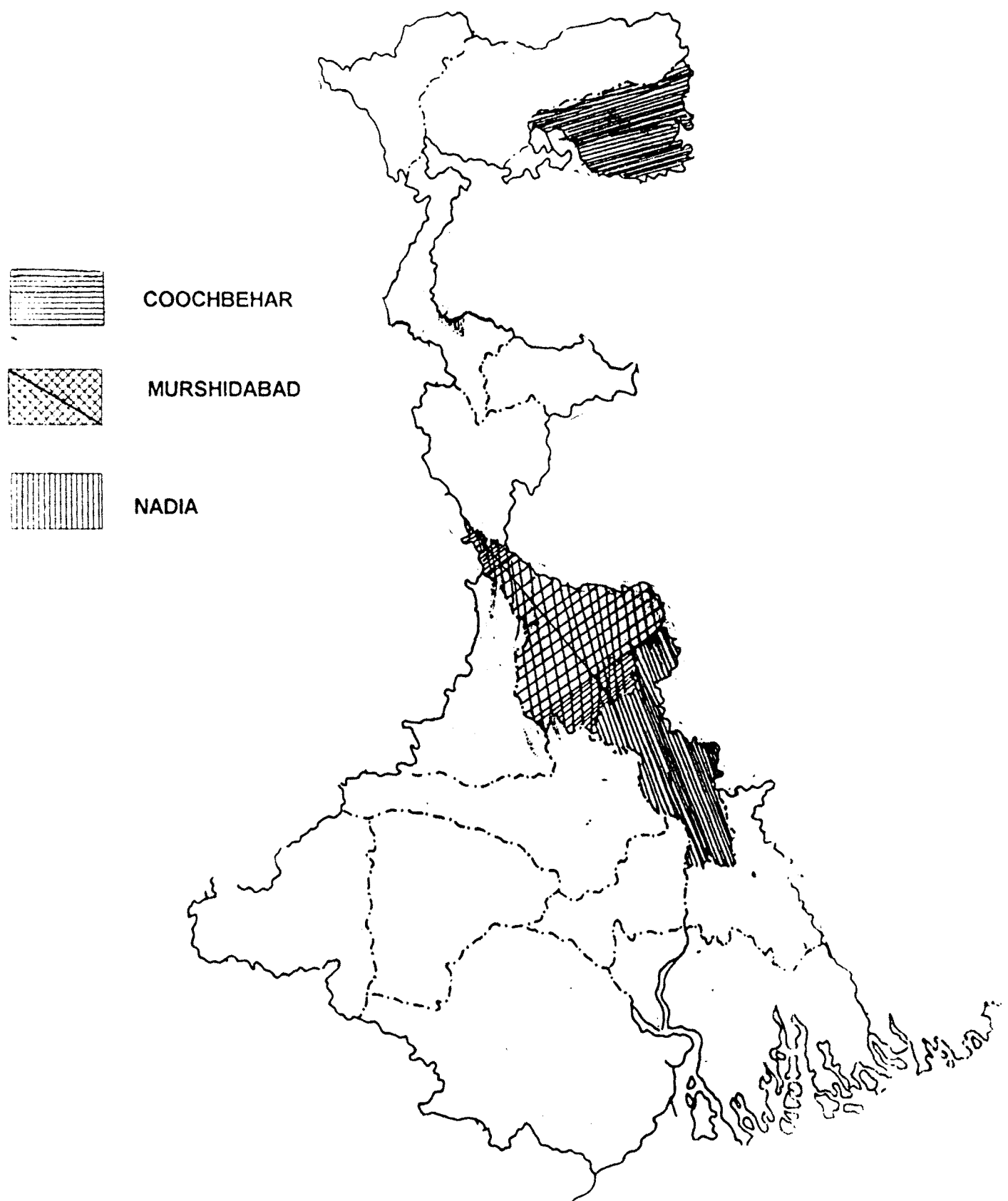


FIGURE 2 : LOCATION OF SELECTED DISTRICTS IN WEST BENGAL



launching of Steward scheme by the department of Agriculture, West Bengal in collaboration with I.C.A.R. It was broadly classified into seven units viz., i) Gangetic alluvium ii) Vindhya alluvium, iii) Terai and Teesta alluvium iv) Coastal, v) Laterite, vi) Red gravely and vii) Brown forest.

Based on rainfall, temperature, soil type and topography of land, West Bengal is broadly classified into six agro-climatic zones (Fig. 1) viz. Terai Zone, Hill Zone, Old Alluvial Zone, New Alluvial Zone, Red and Laterite Zone and Coastal - Saline Zone.

i) Terai Zone : Comprising the plains of Jalpaiguri and Coochbehar district, Siliguri sub-division of Darjeeling district and Islampur sub-division of North Dinajpur district.

ii) Hill Zone : Comprising Darjeeling district (excluding Siliguri sub-division), and northern fringe of Jalpaiguri district.

iii) Old Alluvial Zone : Comprising western parts of Murshidabad and Hooghly districts. Eastern parts of Birbhum and Bankura districts, Central parts of Burdwan & Midnapore districts and Northern part of Howrah district.

iv) New Alluvial Zone : Comprising Nadia district and parts of Malda, West Dinajpur, Murshidabad, Burdwan, Hooghly and 24-Parganas districts.

v) Red and Laterite Zone : Comprising Purulia, Birbhum, Bankura and western parts of Burdwan and Midnapore districts besides small pockets in Malda and West Dinajpur districts.

vi) Coastal - Saline Zone : Comprising larger part of south 24-Parganas district, southern part of north 24-Parganas and Howrah district and south-eastern part of Midnapur district.

LAND USE PATTERN :

In West Bengal, 62.80 per cent of its 8.695 million ha. land mass is now being put under crop cultivation. And those are 13.80 per cent, 18.90 per cent, 2.50 per cent and 2.0 per cent respectively for the forest area, waste land, area under current fallow and other uncultivated areas. Percentage of cropping intensity in the state stands out to be 164 with the gross cropped area being around 8.94 million ha. More details in this regard gets presented through tables 4.5 to 4.7.

TABLE - 4.5

Net Cropped Area, Gross Cropped Area and Cropping Intensity in West Bengal

Year	West Bengal		
	Net cropped area (in hectares)	Gross cropped area (in hectares)	Cropping intensity (in percent)
(1)	(2)	(3)	(4)
1990-91	54,63,424	86,62,286	159
1991-92	54,76,883	86,66,257	158
1992-93	54,94,165	85,40,246	155
1993-94	54,59,430	86,80,488	159
1994-95	54,63,587	87,18,166	160
1995-96 (P)	54,61,925	89,44,562	164

Source : Directorate of Agriculture, Evaluation Wing Government of West Bengal.

TABLE - 4.6

Utilisation of Land in West Bengal
(Area in thousand hectares)

Classification	1980-81		1985-86		1993-94 (P)		1994-95 (P)		1995-96 (P)	
	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(i) Net area sown	5,608	63.4	5,262	59.5	5,357	61.5	5,464	62.9	5,462	62.8
(ii) Current fallows	84	0.9	65	0.7	191	2.2	209	2.4	220	2.5
(iii) Forests	1,186	13.4	1,186	13.4	1,191	13.7	1,189	13.7	1,196	13.8
(iv) Area not available for cultivation	1,373	15.5	1,730	19.6	1,743	20.0	1,638	18.9	1,642	18.9
(v) Other uncultivated land excluding current fallows	598	6.8	606	6.8	226	2.6	181	2.1	175	2.0
Total reporting area	8,849	100.0	8,849	100.0	8,708	100.0	8,681	100.0	8,695	100.0

Note : Figures for 1980-81 and 1985-86 are estimated on the basis of crop survey results of the bureau of Applied Economics and Statistics except the figures of three hilly sub divisions of Darjeeling district which were received from the Directorate of Agriculture, West Bengal. Figures for the rest of the years are based on E.A.R.A.S. Survey.

Sources :

- (1) Directorate of Agriculture, West Bengal.
 (2) Bureau of Applied Economics & Statistics, West Bengal.
 (3) Principal Chief Conservator of Forests West Bengal.

P = Provisional

TABLE - 4.7
Area, Production and Yield Rates of Principal Crops in West Bengal

Crop	1992-93			1993-94			1994-95			1995-96		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Aus Rice	532.44	315.31	1719	539.63	908.19	1683	518.84	837.91	1615	510.53	854.46	1674
Aman Rice	4301.42	7955.14	1849	4290.85	7961.18	1855	4210.65	8384.96	1991	4282.80	7615.19	1778
Boro Rice	680.71	2574.96	2992	1045.04	3241.54	3102	1043.25	3013.01	2888	1160.13*	3417.34*	2946*
Total Rice	5694.57	11445.41	2010	5875.52	12110.91	2061	5772.74	12235.38	2120	5953.46*	11886.99*	1997*
Wheat	272.15	587.30	2158	306.90	632.08	2060	325.64	744.46	2286	337.83*	725.29*	2147*
Total Cereals	6046.97	12190.22	2916	6262.45	12929.97	2065	6166.52	13144.04	2132	636249*	12743.63*	2003*
Pulses	275.97	198.93	721	268.99	170.86	635	227.39	134.95	593	212.65*	142.55*	670*
Total Food grains	6322.94	12389.75	1959	6531.44	13100.83	2006	6393.91	13278.99	2077	6575.14*	12886.18*	1960*
Oilseeds	321.93	410.76	787	532.35	415.84	781	530.88	414.31	780	496.65*	370.78*	747*
Jute ++	493.87	5347.20	10.84	475.20	5568.95	11.72	507.94	5934.42	11.68	515.84	5671.29	10.99
Potato +	220.75	4779.10	21649	230.92	5171.59	22396	232.34	5558.89	23925	255.89	6258.03	24456

++ Production in .000 bales (1 bale = 180 kg) Yield Rate in Bales/Hectare.
W.B.

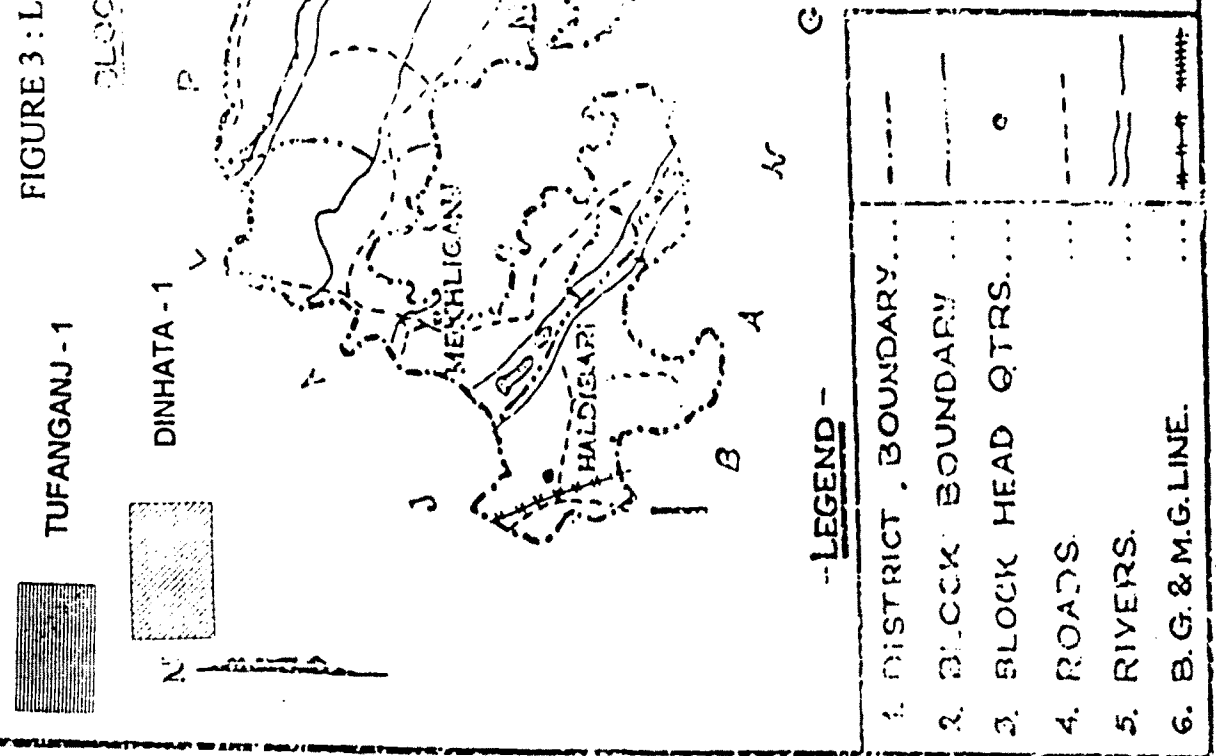
Source : Department of Agriculture, Government of

+ Including Summer Potato of Darjeeling.

Note : A = Area in .000 Hectares., P = Production in .000 Tonnes.,

Y = Yield Rate in Kg. /Hectare., * = Provisional for 1995-96

FIGURE 3 : LOCATION OF SELECTED BLOCKS IN COOCHBEHAR DISTRICT



The Districts :

As mentioned earlier, the present study was carried out in three selected districts of West Bengal viz., Coochbehar, Murshidabad and Nadia. The profile of the selected districts would be getting presented with the help of tables 4.8 to 4.10 and figures 3 to 5.

Table - 4.8 : District Profile of Coochbehar

Height above mean sea level : 44.2 metre

Latitude		Longitude	
N	S	E	W
26°32'20"	25°57'40"	89°54'35"	88°47'40"

A. Area and population

Total Area : 3387 sq.km

Density of population (per km²) : 641.00

Total population : 21,71,145

Male : 11,22,306

Female : 10,48,839

SC. : 11,23,719

Male : 5,80,384

Female : 5,43,335

ST : 13,275

Male : 6,957

Female : 6,318

B. Literacy

Literate : 8,06,107 (45.78)

Male : 5,23,981 (57.35)

Female : 2,82,126 (33.31)

C. Distribution of working population

i) Total main workers :

	Person	Male	Female
Rural	616014	557071	58943
Urban	47410	40752	6658

ii) Cultivators :

	Person	Male	Female
Rural	318134	305360	12774
Urban	1508	1429	79

iii) Agricultural labourers :

	Person	Male	Female
Rural	171232	141580	29652
Urban	1532	1355	177

D. Forest area :

56.99 sq.km Forest area as % of reporting area : 1.67

E. Distribution of operational holding (area in acres) :

Category	No. of holdings	Area of holdings
a) Marginal Farmers ((less tacren 1 acre.)	320265	159886
b) Small Farmer (1-2 acre)	81013	120827
c) Semi-medium Farmer (2-4 acre)	35983	105948
d) Medium Farmer (4-10 acre)	7900	43566
e) Large Farmer (10 acre & above)	50	1558
Total	Average holding	0.96

F. Land Utilisation in Agriculture : (In thousand hectors)

Total area according to village papers	Forest	Current Fallow	Other fallow land excluding current fallow	Net cropped area
614.0	8.8	3.4	-	248.9

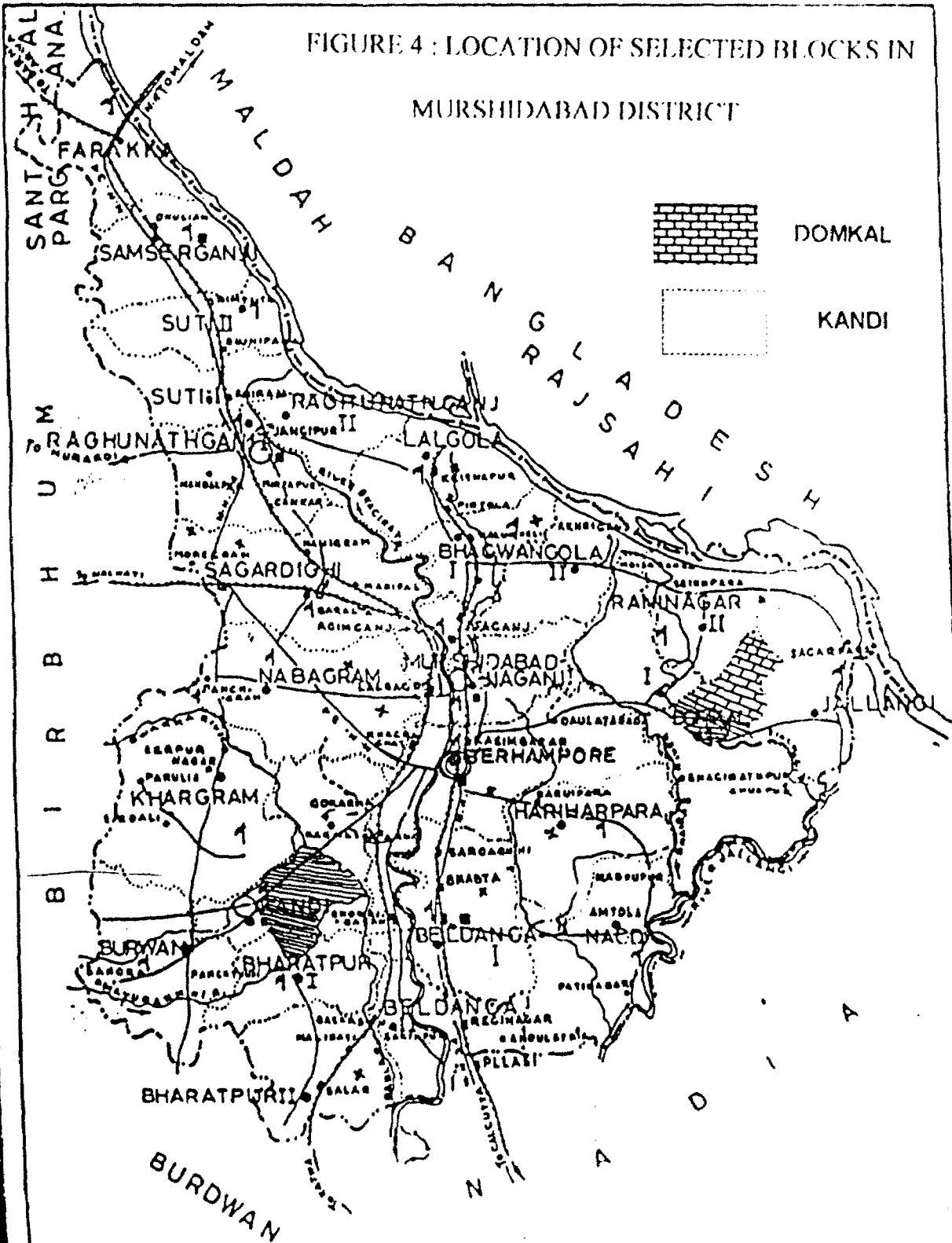
G. Irrigation : (In thousand hectors)

	Govt. Canals	Pvt. Canals	Tanks	Wells	Other Sourus	Total
Area	0.50	1.70	1.92	-	19.89	24.12

Minor Irrigation : Number

Deeptube well	River lift irrigation	Shallow tubewell
21	103	90

FIGURE 4 : LOCATION OF SELECTED BLOCKS IN
MURSHIDABAD DISTRICT



H. Ten years' Average Rain fall (1985-94) in M.M.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
15.1	24.7	29.7	307.8	307.8	608.7	670.4	597.7	522.9	145.0	7.5	5.9

I. EDUCATION :

1.	No. of Primary Schools	:	1722
2.	No. of Middle Schools	:	94
3.	No. of High School	:	111
4.	No. of H.S. School	:	27
5.	No. of Colleges	:	8
6.	No. of University	:	1
7.	No. of Technical Institution:		16

J. Transport & communication :

1.	PWD Roads	:	1028 km.
2.	Local bodies Roads	:	1118 km.

H. Other facilities

1.	No. of post offices	:	349
2.	No. of co - operative societies	:	362
3.	No. of members	:	99685
4.	No. of Bank Branches	:	16

Table - 4.9 : District Profile of Murshidabad

Height above mean sea level : 18.9 metre

Latitude		Longitude	
N	S	E	W
24 ⁰ 50'20"	23 ⁰ 43'30"	88 ⁰ 46'00"	87 ⁰ 49'17"

A. Area and population

Area : 5324 sq. km. Density of population (per km²) : 890

Population - 4740149 Nos

Male : 2439342 (51.46)

Female : 2300807 (48.54)

S.C. : 634971 (13.40)

S.T. : 61513

Rural : 4245802 (89.57)

B.	Panchayat Structure : Inhibited villages	Panchayat Samites	Gram Panchayat
	1939 Nos.	26 Nos.	255 Nos.

C. Literacy

Male : 899266 (46.42)

Female: 535186 (29.57)

Total : 7434452 (38.82)

D. Distribution of working population

i) Total main workers :

	Person	Male	Female
Rural	1270502	1124527	145975
Urban	153987	119180	34807

ii) Cultivators :

	Person	Male	Female
Rural	442320	436995	5325
Urban	5949	5795	154

iii) Agricultural Labourers :

	Person	Male	Female
Rural	407874	389732	18142
Urban	9306	8744	562

iv) Household and other than household (Manufacturing processing)

	Person	Male	Female
Rural	153917	53880	100037
Urban	40401	17678	22723

E. Distribution of land holding category (in acre)

Category	No. of holdings	Area of holdings
a) Large Farmers (10 acre & above)	76	993
b) Medium farmer (4 acre -10 acre.)	2789	13596
c) Semi-medium Farmer (2-4 acre)	42088	106326
d) Small farmer (1-2 acre)	121045	158911
e) Marginal farmer (bellow acre)	46652	182518

F. Forest Area (9n thousand hect.) : 0.8

G. Land Utilisation category :

Total area according to village papers	Forest	Current Follow	Other fallow land excluding current fallow	Net cropped area
532.38	7.88	1.95	Not available	407.65

H. Irrigation : (In thousand hectors)

Source	Area irrigated
Govt. canals	49.60
Pvt. canals	--
Tanks	25.28
Wells	105.50
Other sources	22.16
Total	200.54

Minor Irrigation : Number

Deeptube well	River lift irrigation	Shallow tubewell
21	103	90

I. Ten years' Average Reliefall (1985-94) in M.M.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
5.1	28.4	22.3	39.5	131.1	253.0	327.0	247.0	193.0	95.2	12.7	12.3

J. EDUCATION :

1.	No. of Primary Schools	:	2992
2.	No. of Middle Schools	:	164
3.	No. of High Schools	:	267
4.	No. of H.S. Schools	:	54
5.	No. of Colleges	:	13
6.	No. of Technical Education:		8

K. Transport & Communication :

L.	A)	1.	Surface	:	1559 km.
		2.	un-surfaced	:	1959 km.
	B)	No. of post offices	:	544	

M. Consumptions of fertilizer ('000 tonnes)

Year	N	P	K	Total
1991-92	25.4	14.4	12.3	52.1
1992-93	31.0	14.8	7.4	53.2
1993-94	30.4	12.2	10.6	53.2

N. Primary Agricultural (Co-operative) credit Society :

Number	Member	Working capital
501	135761	121000

Table - 4.10 : District Profile of Nadia

Height above mean sea level : 18.9 metre

Latitude		Longitude	
N	S	E	W
24°11'	22°53'	88°48'	88°09'

A. Area and population

Area (sq.km)	Population (lakh)	Density of population (per km ²)	Percentage to total population				
			Male	Female	SC	ST	Rural
3927	38.52	981	51.66	48.34	29.01	2.35	78.41

B. Panchayat Institution	Panchayat Samitis (No.)	Gram (No.)	Panchayat	Village (No.)
	17		187	1248

C. Literacy *

Male		Female		Person	
No. (lakh)	Per cent	No. (lakh)	Per cent	No. (lakh)	Per cent
10.01	60.05	6.86	44.42	16.87	52.53

* Literates exclude children in the age group 0-6 years as per 1991 census.

D. Distribution of working population

i. Total main workers :

	Person	Male	Female
Rural	863882 (28.99)	813348 (52.65)	50534 (3.52)
Urban	245949 (28.21)	215919 (48.51)	30030 (7.04)

NOTE : Figure in the parenthesis indicate percentage to total population.

ii. Cultivators :

	Person	Male	Female
Rural	315871 (8.200)	312958 (8.124)	2913 (0.076)
Urban	9737 (0.253)	9519 (0.247)	218 (0.006)

NOTE : Figure in the parenthesis indicate percentage to total population.

iii. Agricultural Labourers :

	Person	Male	Female
Rural	287880 (7.473)	271914 (7.059)	15966 (0.414)
Urban	17089 (0.444)	15830 (0.411)	1259 (0.033)

NOTE : Figure in the parenthesis indicate percentage to total population.

iv. Livestock, Forestry, Plantations and Orchards :

	Person	Male	Female
Rural	13089 (0.340)	12544 (0.326)	545 (0.014)
Urban	5344 (0.139)	4912 (0.128)	432 (0.011)

NOTE : Figure in the parenthesis indicate percentage to total population.

E. Percentage of Forest Area : 0.33

(Av. of 5 yrs. succeeding 1982-83)

F. Percentage Distribution as per Land Ownership pattern

a) Large Farmer (more than 2 ha.) : 10.0

b) Small Farmer (1-2 ha.) : 35.0

c) Marginal Farmer (Less than 1 ha.) : 55.0

G. Land Utilisation in Agriculture

Area according to village papers ('000 ha.)	Percentage of				
	Net area sown	Current fallow	Area not available for cultivation	Other uncultivated land excluding current fallows	Cropping intensity
390.90	80.65	0.56	15.15	3.31	216

H. Irrigation

Source item	Deeptubewell	Shallow tube well	River lift	Canals	Tanks	Others	Total
Area Irrigated (ha.)	16367	42161	15656	87	1439	10699	86409
Percentage share to gross irrigated area	18.9	48.8	18.2	0.1	1.7	12.4	-

I. Ten years' Average Reliefall (1985-94) in M.M.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
7.2	31.7	30.4	40.6	125.5	232.3	327.0	251.0	215.5	91.3	19.9	13.4

J. Consumption of Fertilizer (.000 tonnes)

1991-92				1992-93				1993-94			
N	P	K	Total	N	P	K	Total	N	P	K	Total
25.9	14.0	10.9	50.8	30.2	14.5	6.5	51.2	30.0	12.1	8.9	51.0

K. Estimated Production of Cow and Buffalo Milk (I .000 tonnes)

1988-89	1989-90	1990-91	1991-92	1992-93	1993-94
190	184	183	235	271	319

L. Primary Agricultural (Co-operative) Credit Society (As on 31.3.93)

Number	Member (In thousand)	Working capital (Rs. in lakhs)
336	209	2425

M. Number of Commercial Banks

1981	1991	1992	1993	1994
81	179	179	179	180

N. Educational Institution :

1.	No. of Primary schools	:	2373
2.	No. of Middle School	:	160
3.	No. of Secondary School	:	222
4.	No. of H.S. Schools	:	56
5.	No. of Colleges	:	14
6.	No. of Universities	:	2
7.	No. of Technical Institution	:	12
8.	No. of Adult Education centre	:	895
9.	No. of public libraries	:	113

O. Forest : 5304.904 hect.

P. Power :

No. of village electrified : 1254 Nos.

Q. Transport & Communication :

a)	Under PWD (Roads)	Surface	Unsurface
		934	11
b)	Under Local Bodies	334.73	776.86
c)	Under Municipalities	576.00	141.00
d)	Nearest Railway station	5 km.	
	from District H/Qtrs.		

R. Other facilities

1.	No. of Post Office	:	447
2.	No. of Bank Branches	:	179
3.	No. of Co-operative societies	:	489
4.	No. of members inco - operative societies.		2,47,000

The Blocks :

As it has been mentioned earlier, the present investigation was carried out in six selected blocks viz. Dinhata-I, Tufanganj - I, Domkal, Kandi, Haringhata and Chakdaha. Brief accounts of those selected blocks have been getting presented in the following section through tables 4.11 to 4.16.

Table - 4.11 : Background Information of Dinhata - I Block

A. General

1.	Geographical Area	:	278.22 sq.km
2.	Nos of Gram Panchayat	:	16 Nos
3.	Nos. of Mauza	:	130 Nos
4.	Nos. of villages	:	127 Nos

B. Population

1.	Total population	:	239962,
2.	Density fo population	:	840 person / sq.km
3.	No. of S.C. Population	:	103080
4.	No. of S.T. population	:	608
5.	No. of landless labourers	:	14015
6.	No. of bargadars	:	4920
7.	No. of patta holders	:	5202
8.	Nos. of Small farmer house holds	:	7758
9.	No. of marginal farmer house holds	:	9353

C. Land Utilisation (inflect)

1.	Area under cultivation	:	23777
2.	Area under pasture & orchard	:	430
3.	Cultivable Waste land	:	230
4.	Home stead land	:	4706
5.	Forest land	:	4942
6.	Residual area	:	Nil
7.	Area cultivated more than once	:	15912
8.	Area of vested land	:	2053
9.	Land distributed	:	1443
10.	No. of assignees	:	5202

D. Irrigation

Source	Number	Area (in hect)
I) D. T.W.	5	209
ii) R.L.I.	11	472
iii) S.T.W.	1	47
iv) Tank	48	Not available
v) Cauals	2	Not available
vi) Others source	300	800
vii) Total Source	367	1528

E. No of villages electrified 125**F. Area, production & productivity of major crops**

Crops	Area ('000 hect)	Production ('000 tonnes)	Yield (kg) /hect)
Aus	84.5	138.3	1637
Aman	162.57	273.1	1680
Boro	32.0	81.2	2542
Jute	73.0	571.0*	8**
Wheat	36.4	64.7	1780
Potato	14.0	165.4	11838
Mustard	2.7	1.9	695

* In '00 bales of 180 kg each

** In bales / hect

G. Education :

1.	No. of primary School	:	168
2.	No. of Middle Schools	:	9
3.	No. of Secondary School	:	6
4.	No. of H.S. School	:	3
5.	No. of colleges	:	Nil
6.	No. of Technical Institution	:	1

H. Financial Institution

1.	No. of Bank Branches	:	9
2.	No. of Co-operative societies	:	64

I. Transport & Communication : (in km)

	Surface	Unsurfaced
1. PWD Roads	80	Nil
2. Local Bodies	7	48

Table - 4.12 : Background information of Tufanganj - I Block**A. General**

1.	Geographical Area	:	319.86 sq.k.
2.	Nos. of Gram Panchayet	:	14 Nos
3.	Nos of Mouza	:	73 Nos
4.	Nos of village	:	72 Nos

B. Population :

1.	Total population	:	191455
2.	Density of population	:	606 person / Km ²
3.	Nos. of S.C. population	:	92112
4.	Nos of S. T. Population	:	155
5.	Nos. of landless labourers	:	12119
6.	Nos. of bargadars	:	5898
7.	No. of patta holders	:	12280
8.	Nos. of small farmers households	:	3471
9.	Nos of marginal farmerhouse holds	:	8932

C. Land Utilisation (in hect)

1.	Area under cultivation	:	57399
2.	Area under pasture andor chard	:	Nil
3.	Cultivable waste land	:	Nil
4.	Home stead land	:	5120
5.	Forest land	:	3220
6.	Residual area	:	Nil
7.	Area cultivated more than once	:	40500
8.	Area of vested land	:	6856
9.	Land distributed	:	4980
10.	No of assigness	:	12280

D. Irrigation

Source	Number	Area (in hect)
1. D. T.W.	1	120
2. R.L.I.	8	187
3. S.T.W.	1470	2307
4. Tank	752	1560
5. Canals	5	610
6. Others source	1500	1420
7. Total source	3736	6204

E. Power :

No. of villages electrified - 71

F. Area, production & productivity of major crops

Crops	Area ('000 hect)	Production ('000 tonnes)	Yield (kg) hect)
Aus	62.7	68.3	1091
Aman	107.5	270.7	1443
Boro	23.2	56.3	1433
Jute	39.5	316.2*	8**
Wheat	23.7	44.3	1874
Potato	6.5	83.3	12817
Mustard	15.6	10.0	64.1

* In '00 bales of 180 kg each

** In bales / hect

G. EDUCATION :

1.	No. of Primary Schools	:	135
2.	No. of Middle Schools	:	10
3.	No. of Secondary Schools	:	9
4.	No. of H.S. Schools	:	1
5.	No. of Colleges	:	Nil
6.	No. of Technical Institution	:	Nil

H. Financial Institution :

1.	No. of Bank Branches	:	10
2.	No. of Co-operative societies	:	51

I. Transport & Communication : (in km)

	Surface	Unsurfaced
1. PWD Roads	70	Nil
2. Local Bodies	5	10

Table - 4.13 : Background Information of Domkal Block**A. General :**

1.	Geographical Area	:	305.19 sq.km
2.	Nos. of Gram Panchayat	:	13 Nos
3.	Nos of Mouza	:	87 Nos
4.	Nos of village	:	72 Nos

B. Population :

1.	Total population :	253349,
a)	Male	: 131055
b)	Female	: 122294
2.	Density of population	: 830 person / Km ²
3.	No. of S.C. population	: 9819
4.	Nos. of S.T. population	: 622
5.	Nos. of landless labourers	: 28793
6.	Nos. of Bargadors	: 3927
7.	Nos. of Patta holders	: 6012
8.	Nos. of small farmer households	: 3493
7.	Nos of marginal farmer house holds :	9655

C. Land Utilisation (in hect)

1.	Area under cultivation	: 22995
2.	Area under pasture and orchard	: 493.38
3.	Cultivable waste land	: Nil
4.	Home stead land	: 1980.25
5.	Forest land	: 25.30
6.	Area cultivated more than once	: 3498.17
7.	Area of vested land	: 4.50
8.	Land distributed	: 18.45
9.	Residual area	: 905.39
10.	No of assigness	: 158

D. Irrigation

	Source	Number	Area (in hect)
1.	D. T.W.	60	2100
2.	R.L.I	25	1000
3.	S.T.W.	48	192
4.	Tank	1360	1400
5.	Canals	--	--
6.	Others source	1800	3600
7.	Total sources	3293	8292

E. No. of villages electrified : 70**F. EDUCATION :**

1.	No. of Primary Schools	: 127
2.	No. of Middle Schools	: 10
3.	No. of Secondary Schools	: 11
4.	No. of H.S. Schools	: 3
5.	No. of Colleges	: Nil
6.	No. of Tedenical Institution	: Nil

G. Financial Institution :

1.	No. of Bank Branches	:	14
2.	No. of Co-operative societies	:	35

H. Transport & Communication :'(in km)

	Surface	Unsurfaced
1. PWD Roads	40	13
2. Local Bodies	69	10

I. Area, production & productivity of major crops

Crops	Area ('000 hect)	Production ('000 tonnes)	Yield (kg/ hect)
Aus	38.5	67.5	1752
Aman	51.0	64.6	1268
Boro	36.9	119.4	3233
Jute	160.1	2391.2*	15**
Wheat	100.2	262.5	2619
Potato	2.6	39.6	15533
Mustard	23.3	24.1	1034

* In '00 bales of 180 kg each

** In bales / hect

Table - 4.14 : Background Information of Kandi Block**A. General :**

1.	Geographical Area	:	227.48
2.	Nos. of Gram Panchayet	:	10
3.	Nos of Mouza	:	93
4.	Nos of village	:	84

B. Population :

1.	Total population	:	1,59,795,
a)	Male	:	82304
b)	Female	:	77941
2.	Density of population	:	830 person / Km ²
3.	Nos. of S.C. population	:	30680
4.	Nos. of S.T. population	:	2401
5.	Nos of landless labourers	:	13098
6.	Nos. of Bargadors	:	3974
7.	Nos. of Patta holders	:	3599
8.	Nos. of small farmers house holds	:	4966
9.	Nos of marginal farmerhouse holds	:	6407

C. Land Utilisation (in hect)

1.	Area under cultivation	:	18955
2.	Area under pasture aud orchard	:	98.19
3.	Cultivable waste land	:	295.12
4.	Home stead land	:	3562.00
5.	Forest land	:	10.12
6.	Residual area	:	149.50
7.	Area cultivated more than once	:	3099.04
8.	Area of vested land	:	Nil
9.	Land distributed	:	Nil
10.	No of assigness	:	Nil

D. Irrigation

	Source	Number	Area (in hect)
I.	D. T.W.	15	530
2.	R.L.I	18	282
3.	S.T.W.	4	28
4.	Tank	1200	1182
5.	Canals	1	1500
6.	Others source	2100	4205
7.	Total sources	3338	8045

E. No. of villages electrified : 152**F. EDUCATION :**

1.	No. of Primary Schools	:	120
2.	No. of Middle Schools	:	4
3.	No. of Secondary Schools	:	9
4.	No. of H.S. Schools	:	2
5.	No. of Colleges	:	Nil
6.	No. of Technical Institution	:	Nil

G. Financial Institution :

1.	No. of Bank Branches	:	5
2.	No. of Co-operative societies	:	25

H. Transport & Communication : (in km)

		Surface	Unsurfaced
1.	PWD Roads	64	--
2.	Local Bodies	21	49
3.	No. of post offices	23	

I. Area, production & productivity of major crops

Crops	Area ('000 hect)	Production ('000 tonnes)	Yield (kg/ hect)
Aus	2.3	6.9	2979
Aman	180.0	500.3	2780
Boro	40.8	122.4	3002
Jute	3.4	38.5*	11**
Wheat	9.9	23.9	2412
Potato	1.1	23.9	20270
Mustard	12.1	11.6	962

* In '00 bales of 180 kg each

** In bales / hect

Table - 4.15 : Background Information of Haringhata Block

A. General :

1.	Geographical Area	:	16,802.85 hect
2.	Nos. of Gram Panchayet	:	10 Nos.
3.	Nos of Mouza	:	89 Nos.
4.	Nos of village	:	112 Nos.

B. Population (As per 1991 Census) :

1.	Total population	:	1,77,781
a)	Male	:	92,251
b)	Female	:	85,530
2.	Density of population	:	1052 person / sq.km.
3.	No. of S.C. population	:	56,061
4.	Nos. of S.T. population	:	9,064
5.	Nos of landless labourers	:	45,396
6.	Nos. of Bargadars	:	1,405
7.	Nos. of Patta Holders	:	2,160
8.	Nos. of small farmers household	:	6,625
9.	Nos of marginal farmerhous hold	:	9,500

C. Land Utilisation (in hect)

1.	Area under cultivation	:	12,160 hac.
2.	Area under pasture	:	Nil
3.	Area under Orchard	:	190 hac.
4.	Cultivable waste land	:	32 hac.
5.	Forest land	:	52 hac.
6.	Area cultivated more than once	:	12,100 hac.
7.	Cropping intensity	:	329 percent

D. Irrigation

	Source	Area irrigated
1.	Nos. of D.T.W. a) State own 32	1280 hect.
	b) C.A. D.P. 14	<u>160 hect</u>
	Total	1440 hect
2.	Nos. of R.L.I. 3 (State)	140 hect.
3.	Nos. of S.T.W. a) State own 48	
	b) C.A.D.P 17	7966 hect.
	c) Private 3095	
4.	Nos. of Tank 275	115 hect.
5.	Other Source (Beels and River)	310 hect.
6.	Gross irrigated area	32,804.59 hect.
7.	Net irrigated area	9971 hect.

E. Power :

1.	No. of Mouzas electrified	87 Nos.
2.	No. of Pumpset energised	1950 Nos.

Table - 4.16 : Background Information of Chakdaha Block**A. General :**

1.	Geographical Area	: 328247 hect.
2.	Nos. of Gram Panchayet	: 17 Nos.
3.	Nos of Mouza	: 195 Nos.
4.	Nos of village	: 193 Nos.

B. Population :

1.	Total population	: 303629
	a) Male	: 157113
	b) Female	: 145516
2.	Density of population	: 1230 person / sq.km.
3.	No. of S.C. population	: 144557 Nos.
4.	Nos. of S.T. population	: 16211 Nos.
5.	Not of landless labourers	: 24185 Nos.
6.	Not. of Bargadars	: 2628 Nos.
7.	Nos. of Patta Holders	: 4680 Nos.
8.	Nos. of small farmers household	: 6296 Nos.
9.	Nos of marginal farmerhouse hold	: 11704 Nos.

C. Land Utilisation :

1.	Area under cultivation	:	22415 hect.
2.	Area under pasture	:	Nil
3.	Area under Orchard	:	1016 hect.
4.	Cultivable waste land	:	145 hect.
5.	Forest land	:	324 hect.
6.	Area cultivated more than once	:	22415 hect.
7.	Cropping intensity	:	288 percent

D. Irrigation

		Source	Area irrigated
1.	Nos. of D.T.W.	59 Nos.	3722.3 hect..
2.	Nos. of R.L.I.	11 Nos.	880.57 hect.
3.	Nos. of S.T.W.	5218 Nos.	13897.14 hect.
4.	Nos. of Tank	405 Nos.	90 hect.
5.	Other Source	canal etc.	910 hect.
6.	Net irrigated area	19508 Hect.	

E. Power :

1.	No. of Mouzas electrified	195 Nos.
2.	No. of Pumpset energised	S.T.W.-3215 Nos. D.T.W.-59 Nos.

CHAPTER -V

Results and Discussion

The entire findings of present research study have been getting presented in this chapter wherein analyses and interpretations using appropriate statistical techniques have also been presented. Moreover, and to satisfy the specific requirement of the study, secondary information are also being used and analysed. A resume of the findings are now being presented hereunder in the following manner:

I. Physical Performance

“West Bengal Social Forestry Project” was implemented with having four integral components, viz, Strip-Plantation, Village Woodlot, Farm Forestry and Regeneration of Degraded forests (R.D.F.) Hence, the study put endeavour to understand the performance of the project, firstly, in the light of its overall physical achievement as per its various components. The secondary information as could be gathered in this regard (Table 5.1) is suggestive of the fact that during the entire period

Table 5.1 : Component-wise Physical Performance of Social Forestry Project in the Selected Districts during 1981 - 1991. (Area in Hect.)

District	Strip Plantation	Village Woodlot	Farm Forestry	Regeneration of Degraded forest			Grand Total	Percentage Contribution to total forest area created
				Planting	Coppicing	Total		
Cooch-behar	1000 (10.70)	105 (1.12)	7590 (81.22)	650 (6.90)	—	650 (6.96)	9345 (100.00)	53.83
Murshidabad	1098 (33.30)	22 (0.67)	2095 (63.52)	83 (2.51)	—	83 (2.51)	3298 (100.00)	19.00
Nadia	1307 (27.71)	33 (0.70)	3288 (69.72)	88 (1.87)	—	88 (1.87)	4716 (100.00)	27.17
All districts combined	3405 (19.62)	160 (0.92)	12973 (74.73)	821 (4.73)	—	821 (4.73)	17359 (100.00)	—

NOTE : Figure in the parenthesis indicates percentage to corresponding overall physical achievement.

of execution of the project, from the periods between 1981 and 1991, around 17.36 thousand hect. of land could be put under tree cover of which 'Farm Forestry' component singularly accounted for 74.73 percent followed in descending order by 'Strip Plantation' (19.62%), R.D.F. (4.73%) and 'Village Woodlot' (0.92%). It is further evident from a glance at Table 5.1 that among the selected districts Coochbeher shared nearly 54 percent of the forest cover that could be developed in the selected districts of the present study. And those were 27.17 percent and only 19.00 percent by Nadia district and Murshidabad district respectively. While the village woodlot stood out to be the weakest performer among all the components of the project keeping parity with the overall trend of the state as being evident from table 5.2, farm forestry

Table 5.2 Component-wise Physical Achievement of Social Forestry Project in West Bengal during 1981 - 1991.
(Area in hect.)

Sl. No.	Component	Achievement
1	Strip Plantation	23,784 (9.84)
2.	Village Woodlot	2,405 (0.99)
3.	Farm Forestry	1,50,554 (62.89)
4	Regeneration of Degraded Forest	
	i) Planting	11,926 (4.93)
	ii) Coppicing	53,085 (21.95)
		2,41,754 (100.00)

component has been showing some sort of skewness between the districts under study when we understand its relative shares to be 81.22 percent, 63.52 percent and 69.72 percent for the districts of Coochbeher, Murshidabad and Nadia respectively. The standing of Coochbehar district in this respect has also been found to be well above the scenario of entire study area where it was 74.43 percent of the total social forestry area. This is a sign that without but the sponsorship of rural commoners, the otherwise exciting achievements of the project in reference might have cut a sorry figure as the basic philosophy behind the said farm forestry was that it would be done

by the individuals in their own land receiving saplings from the implementing agency(s) or elsewhere. However, some more details on the subject of 'Peoples Participation' would be presented for further discussion in section 3.1 of the present chapter.

II. Inter Relationship between Socio-economic Characteristics of the Selected Farm Foresters and Perceived Determinants of Farm Forestry

In 'West Bengal Social Forestry Project, Farm Forestry was conceived to be the most vital component. And this idea found to be substantiated from the experiences gained in both Tables 5.1 & 5.2. While the achievements in the farm forestry front was indeed remarkable, some issues, however, emerged centring around this component as to which section of the landed gentry did actually reap the benefit out of the said exercise. In the backdrop of that emerging issue, an attempt was made by the present researcher to estimate inter relationships between some important Socio-economic characteristics of the selected farm foresters with those of two perceived explaining variables of the performance of farm forestry. An account of the antecedent socio-economic variables and that of the two-perceived explaining variables of farm forestry project has been furnished hereunder as :

- A. Explaining Variables of the performance of farm forestry**
 - 1. Number of trees Grown during Farm Forestry (Y_1)
 - 2. Area allocated under Farm Forestry (Y_2)
- B. Antecedent Socio-Economic Variables of the Farm Foresters**
 - 1. Educational attainment (x_1)
 - 2. Gross Family Income (x_2)
 - 3. Socio-economic status (x_3)
 - 4. Area of land under possession (x_4)
 - 5. Irrigation status in the operated land (x_5)

The analysis of inter-relationships between the aforesaid socio-economic variable with those of Y_1 and Y_2 were done by employing both linear correlation as

Table 5.3 : Interrelationships Between Antecedent Socio-Economic Variables and Perceived Determining Variables of the Performance of Farm Forestry

Variables		Linear Regression	r	Level of Significance
District : Coochbehar				
$Y_1 = V_s$	X_1	$Y = 459.30 + 95.232X$	0.152	NS
$Y_1 = V_s$	X_2	$Y = 495.09 + 0.176X$	0.336**	Significant at 1% level
$Y_1 = V_s$	X_3	$Y = -130.87 + 41.218X$	0.274*	Significant at 5% level
$Y_1 = V_s$	X_4	$Y = 60.97 + 378.574X$	0.230	NS
$Y_1 = V_s$	X_5	$Y = 627.18 + 3.365X$	0.123	NS
$Y_2 = V_s$	X_1	$Y = 0.60 + 0.012X$	0.035	NS
$Y_2 = V_s$	X_2	$Y = 0.59 + 0.000X$	0.116	NS
$Y_2 = V_s$	X_3	$Y = 0.37 + 0.012X$	0.152	NS
$Y_2 = V_s$	X_4	$Y = 0.12 + 0.377X$	0.441**	Significant at 1% level
$Y_2 = V_s$	X_5	$Y = 0.67 - 0.000X$	-0.020	NS
District : Murshidabad				
$Y_1 = V_s$	X_1	$Y = 293.98 + 24.904X$	0.095	NS
$Y_1 = V_s$	X_2	$Y = 391.47 - 0.002X$	-0.005	NS
$Y_1 = V_s$	X_3	$Y = -510.04 + 34.697X$	0.398**	Significant at 1% level
$Y_1 = V_s$	X_4	$Y = 326.69 + 29.562X$	0.058	NS
$Y_1 = V_s$	X_5	$Y = 248.75 + 2.238X$	0.172	NS
$Y_2 = V_s$	X_1	$Y = 0.44 + 0.062X$	0.155	NS
$Y_2 = V_s$	X_2	$Y = 0.37 + 0.000X$	0.266	NS
$Y_2 = V_s$	X_3	$Y = -0.25 + 0.036X$	0.269	NS
$Y_2 = V_s$	X_4	$Y = -0.15 + 0.398X$	0.512	Significant at 1% level
$Y_2 = V_s$	X_5	$Y = 0.90 - 0.004X$	-0.191	NS
District : Nadia				
$Y_1 = V_s$	X_1	$Y = 19.33 - 0.239X$	-0.030	NS
$Y_1 = V_s$	X_2	$Y = 17.54 + 0.000X$	0.027	NS
$Y_1 = V_s$	X_3	$Y = 18.24 - 0.005X$	-0.003	NS
$Y_1 = V_s$	X_4	$Y = 16.60 + 0.678X$	0.043	NS
$Y_1 = V_s$	X_5	$Y = 22.55 - 0.051X$	-0.119	NS
$Y_2 = V_s$	X_1	$Y = 0.74 - 0.003X$	-0.007	NS
$Y_2 = V_s$	X_2	$Y = 0.73 + 0.059X$	-0.008	NS
$Y_2 = V_s$	X_3	$Y = 0.47 + 0.009X$	0.105	NS
$Y_2 = V_s$	X_4	$Y = 0.23 + 0.221X$	0.280*	Significant 5% level
$Y_2 = V_s$	X_5	$Y = 1.36 - 0.007X$	-0.346**	Significant at 1% level
All Districts Combined				
$Y_1 = V_s$	X_1	$Y = 433.30 + 0.296X$	0.001	NS
$Y_1 = V_s$	X_2	$Y = 389.72 + 0.018X$	0.042	NS
$Y_1 = V_s$	X_3	$Y = -36.58 + 18.580X$	0.141	NS
$Y_1 = V_s$	X_4	$Y = 236.81 + 93.762X$	0.085	NS
$Y_1 = V_s$	X_5	$Y = 443.43 - 0.126X$	-0.006	NS
$Y_2 = V_s$	X_1	$Y = 0.54 + 0.034X$	0.098	NS
$Y_2 = V_s$	X_2	$Y = 0.57 + 0.000X$	0.139	NS
$Y_2 = V_s$	X_3	$Y = 0.22 + 0.018X$	0.191*	Significant at 5% level
$Y_2 = V_s$	X_4	$Y = -0.10 + 0.368X$	0.460**	Significant at 1% level
$Y_2 = V_s$	X_5	$Y = 0.80 - 0.002X$	-0.104	NS

NOTE: Antecedent Socio Economic Variable

X_1 = Educational attainment
 X_2 = Gross family income
 X_3 = Socio-economic status
 X_4 = Area of land under possession
 X_5 = Irrigation status in the operated land

Perceived Determining Variables

Y_1 = Number of Trees Grown During Farm Forestry
 Y_2 = Area Allocated Under Farm Forestry

well as multiple regression analysis in order to derive a meaningful conclusion through interpretations.

The linear correlation coefficient indices as are being revealed from a perusal of Table 5.3 is suggestive of the fact that in all the selected districts as well as for all the district combined there exists significant relationships between area of land under possession (x_4) and area allocated under farm forestry (Y_2). Further it is being evident that socio-economic status (x_3) of the farm foresters had also significant relationship with area allocated under farm forestry (Y_2) when the entire study area was taken for consideration. But when the same 'r' values were examined following the 'Linear Regression' equation for each of the selected three districts separately, no significant relationship could be traced out between the said Y_2 and X_3 in any of the cases which might be due to smaller sample sizes when districts were treated separately.

In comparison to Y_2 , when the other explaining variable of the performance of farm forestry i.e., Y_1 (Number of Trees grown during farm forestry) was considered for examining its relationship with those of the antecedent variables like x_1 , x_2 , x_3 , x_4 , and x_5 , no significant relationship could be established from their corresponding 'r' values being calculated and presented in Table 5.3 for the entire study area, although variables x_2 and x_3 in case of Coochbeher district and only the x_3 in case of Murshidabad district were found to have significant relationships with Y_1 .

As the area of land under possession (x_4) was found to be significantly related with the area allocated under farm forestry (Y_2) and keeping in view the probability that more there is the area allocated for farm forestry operation more would be number of trees grown while performing the farm forestry, linear regression analyses were then done between the two perceived determinants of the performance of farm forestry and while exploring this interdependence, Y_2 was conceived as to be X assuming the said variable as to be one of the explaining factors of Y_1 . The observation thus made from 'r' values of Table 5.4 revealed that area allocated under farm forestry (X) was significantly related to number of trees grown during farm

forestry (Y_1) not only in each of the selected districts but in entire study area also where effects of all selected districts combined was considered.

In view of understanding the trend of joint contributions of the antecedent socio-economic variable of farm foresters, identified here in as $x_1, \dots, x_5$, on the perceived determinants of the performance of farm forestry (i.e. Y_1 & Y_2) the

Table 5.4 : Interrelationships Between the Perceived Determinants of the Performance of Farm Forestry by Districts.

District	Variables	Linear Regression	r	Level of Significance
Coochbeher	Y_1 vs X	$Y = 0.43 + 0.000X$	0.514**	Significant at 1% level
Murshidabad	Y_1 vs X	$Y = 0.35 + 0.001X$	0.547**	Significant at 1% level
Nadia	Y_1 vs X	$Y = 0.16 + 0.031X$	0.617**	Significant at 1% level
All Districts Combined	Y_1 vs X	$Y = 82.49 + 0.001X$	0.376**	Significant at 1% level

Note : Y_1 = Number of Trees Grown During Farm Forestry
 X = Area Allocated Under Farm Forestry

multiple regression coefficients and their corresponding interception values were then developed and analysed. Computation of the standard errors of b_4 (x_4) values are expressive of the fact that for the districts of Coochbeher and Murshidabad those are significantly better compared to the other 'b's (i.e. x_1, x_2, x_3 and x_5) which establishes relatively larger influence of possessed land on area allocated under farm forestry. And the same trend persists when the entire study area also comes into consideration. This evidently means that size of holding of the persons executing farm forestry has the greatest influence on allocation of area under the said forestry endeavour when joint contribution of x_1, x_2, x_3, x_4 and x_5 on Y_2 is taken into consideration.

A further perusal of Table 5.5 unveils of the fact that only excepting Murshidabad district where standard error of $b_3(x_3)$ has been significantly better compared to the other 'b's (x_1, x_2, x_3 and x_5) indicating relatively larger influence of socio-economic status on number of trees grown during farm forestry operation (Y_1),

Table 5.5 : Multiple Regression Between Antecedent Socio- Economic Variables and Determining Variables of Performance of Farm Forestry

Determining Variable	Antecedent Variable	Multiple Regression Equation	Multiple R	Level of Significance
District: Coochbehar				
Y ₁	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = -163.06 - 46.51 X_1 + 0.17 X_2 - 7.13 X_3 - 228.05 X_4 + 2.996 X_5$	0.390	NS
Y ₂	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = -0.07 - 0.002 X_1 + 0.00001 X_2 - 0.013 X_3 + 0.48 X_4 - 0.0020 X_5$	0.482**	Significant at 1% level
District : Murshidabad				
Y ₁	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = -579.94 - 35.52 X_1 - 0.03 X_2 - 49.88 X_3 - 92.84 X_4 + 0.89 X_5$	0.465*	Significant at 5% level
Y ₂	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = 0.094 + 0.057 X_1 + 0.0000049 X_2 - 0.0057 X_3 + 39.99 X_4 - 0.0021 X_5$	0.545**	Significant at 1% level
District : Nadia				
Y ₁	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = 24.368 - 0.611 X_1 + 0.00040 X_2 - 0.029 X_3 + 0.57 X_4 - 0.059 X_5$	0.149	NS
Y ₂	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = 1.131 - 0.040 X_1 + 0.0000020 X_2 - 0.0033 X_3 + 0.199 X_4 - 0.00722 X_5$	0.429	NS
All District Combined				
Y ₁	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = 11.299 - 49.20 X_1 - 0.0070 X_2 + 27.30 X_3 + 4.73 X_4 - 0.746 X_5$	0.171	NS
Y ₂	X ₁ X ₂ X ₃ X ₄ X ₅	$Y = 0.074 + 0.028 X_1 + 0.000016 X_2 - 0.00817 X_3 + 0.396 X_4 - 0.0023 X_5$	0.489**	Significant at 1% level
NOTE : Antecedent Socio-Economic Variable X₁ = Educational attainment X₂ = Gross family income X₃ = Socio-economic status X₄ = Area of land under possession X₅ = Irrigation status in the operated land Determining Variable Y₁ = Number of trees grown during farm forestry Y₂ = Area allocated under farm forestry				

none of the other multiple regression coefficients and their corresponding interception values has been found to be establishing any significant betterness of standard error values over Y_1 not only for the districts of Coochbeher and Nadia but also for all the districts combined, the trends of joint contribution of x_1 x_5 on Y_1 , hence, have been ignored and are being left out of any further discussion.

The preceding discussion on the basis of statistical trend thus establishes the fact that in spite of not having much mention-worthy relations between x_1 x_5 and Y_1 , there exist definite significant relationships between some of the important socio-economic variables like “area under possessed land” (x_4), socio-economic status (x_3), irrigation status in the operated land (x_5) etc. and the other perceived determinant of the performance of farm forestry viz, number of trees grown during farm forestry (Y_1).

Hence, hypothesis-1 of the present study which reads as “There exists association between some socio-economic characteristics of the farm foresters with those of the performance of the social forestry project” is hereby accepted.

III. Social Impact of Social Forestry : A Resume

3.1. Mechanism of people’s participation

The underlied philosophy of ‘Social Forestry Project’ was that it would be implemented in such a manner as to ensure highest degree of sponsorship from the part of the rural commoners wherein the newly created Social Forestry Division of the State Forest Department and the grass-root level people’s organisation like panchayat were to play complementary roles. Those were specially delegated with the responsibility to look after various supply and service components associated with the project. People’s participation in the project got extreme priority due to the fact that the farm forestry component was contemplated to be executed entirely in the private lands owned by the commoners. Even for the other components like strip plantation, village woodlot and R.D.F. also the role of rural people was defined and duly recognized.

While people's participation was conceived to be the key behind success of West Bengal Social Forestry Project with farm forestry component as to be a vital area of its sub-activity, this sort of people-based curriculum really paid great deal of dividend in the sense that the physical achievement could easily surpass the set out target of creation of 1.16 lakh hect. forest, within 10 years time frame preceding 1981, by over 208 percent. (Table 5.6). And in this entire process of remarkable achievement, farm forestry component accounted for around 62 percent of the total physical coverage accomplished with its share being over 1.50 lakh hect (Table 5.2) within the above mentioned tenure of the project. This is an indication that the project really enjoyed the sponsorship of people as was envisaged on the policy planning centring around social forestry in West Bengal.

Table 5.6 : Target of Social Forestry Project in West Bengal

(Area in hect.)		
Sl. No	Component	Target
1.	Strip Plantation	20,000 (17.24)
2.	Village Woodlot	6,000 (5.17)
3.	Farm Forestry	75,000 (64.66)
4.	R.D.F.	15,000 (12.93)
Total		1,16,000 (100.00)

NOTE : Figure in the parenthesis indicates percentage to overall physical target

Now let the position of actual study areas be explored in this regard. Table 5.7 suggests that 165 numbers of surveyed farm foresters put nearly 112 acres of their possessed land under farm forestry operation wherein around 72 thousand saplings of various species were planted during the said project tenure. It is further being revealed from the table among the entire sample farmers, coverage of forestry area per family appearing to be 0.678 acre and those were 0.649 acre, 0.668 acre and 0.722

Table 5.7: Relative Share of Selected Districts According to Number of Planters, Coverage of Farm Forestry and Number of Trees Planted during 1981-1990.

District	No. of planters participated	Coverage of farm forestry (in acre)	Per family coverage (in acre)	No. of trees planted	Per family no. of trees planted	Trees survived per family
Cooch-behar	60 (36.36)	38.964 (34.81)	0.649	50223 (70.04)	837	473 (56.47)
Murshi-dabad	53 (32.12)	35.420 (31.64)	0.668	20537 (28.64)	387	296 (76.56)
Nadia	52 (31.52)	37.550 (33.55)	0.722	942 (1.32)	18	17 (99.36)
All districts combined	165 (100.00)	111.934 (100.00)	0.678	71702 (100.00)	435	274 (62.79)

NOTE : Figures in the parenthesis indicates percentage to respective total

Table 5.8 : Trend of Progress in Farm Forestry at the Selected Area

Year	Number of Saplings Planted D I S T R I C T			All districts combined	Percentage of survival
	Coochbehar	Murshidabad	Nadia		
1981	1287 (2.56)	200 (0.97)	-	1487 (2.07)	40.69
1982	1498 (2.98)	1608 (7.83)	-	3106 (4.33)	47.26
1983	4843 (9.64)	2325 (11.32)	-	7168 (9.10)	58.98
1984	6173 (12.29)	-	-	6173 (8.61)	70.27
1985	5084 (10.12)	-	-	5084 (7.09)	65.37
1986	2035 (4.05)	675 (3.29)	290 (30.79)	3000 (4.18)	69.10
1987	7173 (14.28)	4351 (21.19)	20 (2.12)	11544 (16.10)	65.91
1988	6439 (12.82)	4096 (19.94)	176 (18.68)	10711 (14.94)	68.33
1989	5288 (10.53)	4375 (21.30)	-	9663 (13.48)	64.36
1990	10403 (20.71)	2907 (14.15)	456 (48.41)	13766 (19.20)	56.95
Total	50223 (100.00)	20537 (100.00)	942 (100.00)	71702 (100.00)	62.79

NOTE : Figure in the parenthesis indicates percentage to respective column total.

acre for the districts of Coochbehar, Murshidabad and Nadia respectively when they were treated separately. Interestingly enough, although allocation of landed area for farm forestry per family was lowest for the district of Coochbehar those farm families however, went for the planting operation most intensively compared to other two districts. Whereas in Nadia, average number of trees planted per family could be estimated to be only 18 it was far higher for Murshidabad district with 387 plants and highest for Coochbehar with as high as 837 number of plants. Thus, the average number of trees planted per family for all districts combined came out to be 435. This is a clear indication that in spite of high inter-district variation in terms of plantation activities, the farmers in the selected districts have been showing a greater degree of uniformity so far as the allocation of own land for farm forestry is concerned. Although the district of Nadia has been lagging far behind the other two districts in terms of number of trees planted per family still it would perhaps not be wise to brand the Nadia district as to be weak sponsor of farm forestry programme. Table 5.7 suggests that although the respondents planted far lesser number of saplings there, they, however, were successful in making as high as 99.36 percent of those plants to be survived compared to 76.56 percent by Murshidabad farmers and only 56.47 percent by the farmers of Coochbehar district.

As regards the trend of progressive growth of farm forestry in the areas of investigation, perusal of table 5.8 unveils of the fact that the people of both Coochbehar and Murshidabad districts made themselves involve right from the year of initiation of the project whereas the Nadia farmers entered into the farm forestry scenario as late as in 1986. It is further evident from table 5.8 that although there were some skewness in the pattern of progress from the viewpoint of plantation activities over the districts, the rate of survival of the saplings planted could, however, keep a steady pace of growth starting from the year of initiation of the project till its termination in 1990 excepting minor variations in 1995 and 1997. This growth curve, however, started declining from 1989 and still declined in 1990. Altogether 62.79 percent of the 71.7 thousand plant, those were raised during the ten years tenure of

Fig. 6 Trend of Progress in Farm Forestry at the Selected Area

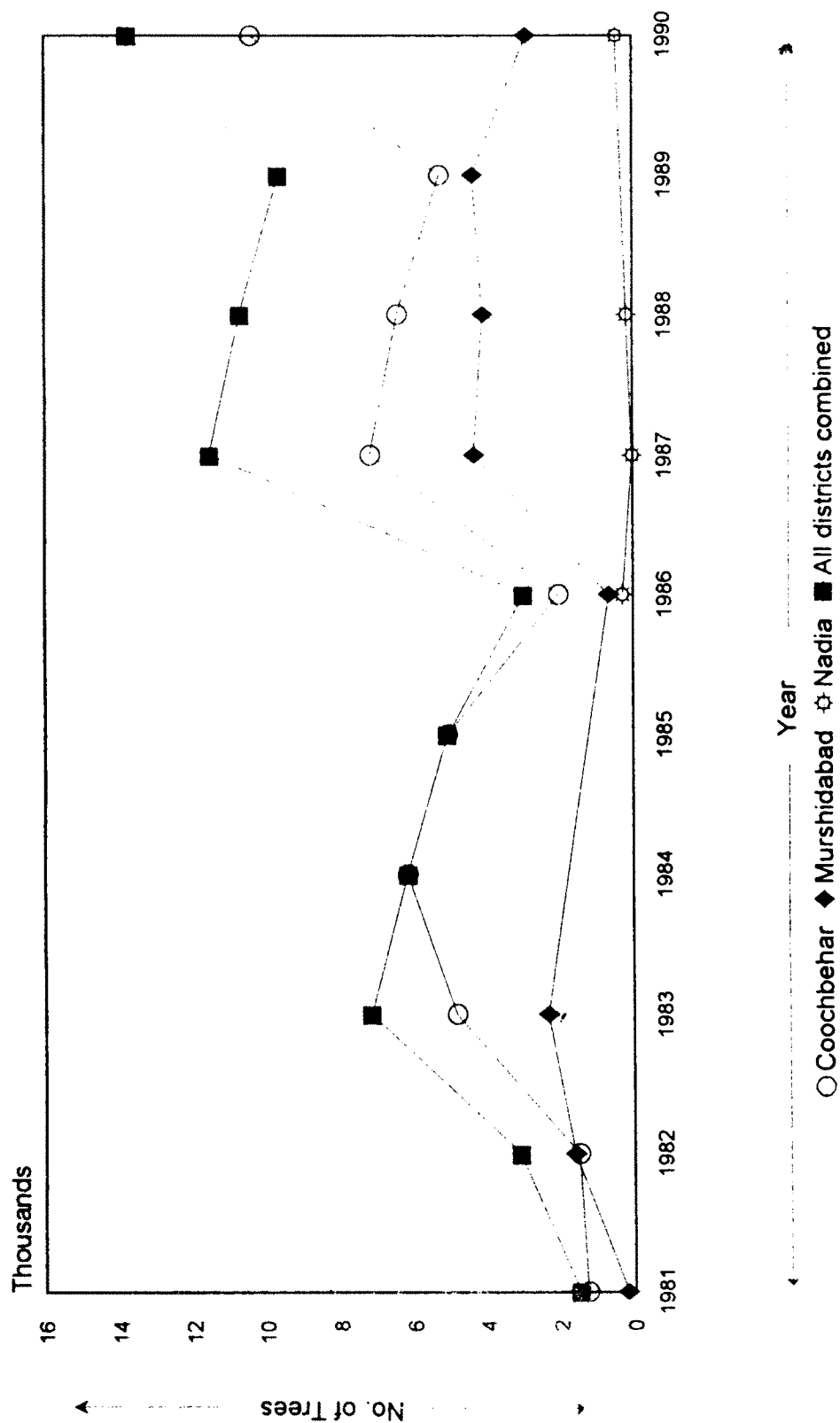


Table 5.9 : Relative Ranking of the Perceived Causes of Planting Trees

		Districts									
Sl.	Utility	Coochbehar		Murshidabad		Nadia		All districts combined			
No.		Frequency	Rank	Frequency	Rank	Frequency	Rank	Frequency	Rank		
1.	For Fuel wood	23 (17.42)	II	31 (16.76)	II	48 (20.43)	II	102 (18.48)	II		
2.	For future income	53 (40.15)	I	49 (26.49)	I	51 (21.70)	I	153 (27.71)	I		
3.	For green fodder	--	-	5 (2.70)	VIII	10 (4.25)	VII	15 (2.72)	VII		
4.	For quality timber	9 (6.82)	V	34 (18.38)	III	38 (16.17)	III	81 (14.67)	III		
5.	To maintain ecological balance	19 (14.39)	III	21 (11.35)	V	36 (15.32)	V	76 (13.77)	IV		
6.	To cheek pollution	12 (9.09)	IV	14 (7.57)	VI	11 (4.68)	VI	37 (6.70)	VI		
7.	To increase availability of oxygen	9 (6.82)	V	24 (12.97)	IV	4 (1.70)	VIII	37 (6.70)	VI		
8.	To check soil erosion	7 (5.30)	VI	7 (3.78)	VII	37 (15.74)	IV	51 (9.24)	V		
	Total	132 (100.00)		185 (100.00)		235 (100.00)		552 (100.00)			

NOTE : Figure in the parenthesis indicates percentage to respective column total

farm forestry programme, could be made survive by the respondent farmers in the selected districts.

3.2 Why Farm Forestry

In chapter one of the present study, it was amply made clear the context in which West Bengal Social Forestry Project was launched. Redressing the rapidly denuding ecological balance due to loss of forest cover and to relieve the mounting pressure on newly conceived production as well as protection forestry to be undertaken in the classified and unclassified traditional forest by way of extending the forest facilities to even the farthest dwellers of countryside West Bengal were precisely the main driving force behind launching of the said project by the government. And as already highlighted, sponsorship of people was earnestly solicited for its successful accomplishment. In section 3.1 of the present chapter attempt was put forward to understand people's response on the call of people's forestry made by the government. The analysis made their ensured that the people responded to the call positively. Now an attempt will be made through the following discussion of this section to gain knowledge as to why did the people sponsored farm forestry programme. Table 5.9 presents relative ranking of the causes which acted as motives behind planting of trees by the farm foresters in the areas under study. While the most important cause, as was indicated by the respondents, was 'For Future Income' the next most important perceived cause was 'For Fuel wood'. These were succeeded in order of ranking by the causes like 'For Quality Timber' and 'To Maintain Ecological Balance'. Although, there are some other perceived causes in table 5.9, the present researcher still would like to concentrate more on the aforesaid first four causes. This is more so because the purpose of the government and the perspective of the people on planting trees are found to be getting converged when it is being learnt that tapping the facilities of forests as well as maintaining ecological balance were in a broad sense appeared to be the chief motives of the sample farm foresters behind planting trees under farm forestry programme.

In rural India wood is the chief source of fuel for cooking purpose. So, the

Table 5.10: Account of Wood Fuel Supplementation Through Farm Forestry

District/ Region	Families involved	No. of Survived plants per family	Family-wise Annual Wood Fuel Account		
			Demand (Quintal)	Out-turn from own plantation (Quintal)	% contribution of own- plantation
A.					
Cooch- behar (Terai Region)	60	473	36.87	35.44	96.18
B.					
a. Mur- shidabad	53	297	28.82	19.40	67.33
b. Nadia	52	18	22.10	12.78	57.83
Lower Gangetic Plain Region (a+b)	105	159	25.49	16.12	63.24
All Regions Combined (A+B)	165	273	29.63	23.15	78.12

NOTE : While preparing this account, case studies were conducted in all three selected districts. And this is a projection prepared through those case studies where 55 per cent of the total respondents of each district were included. Thus, 33 farm foresters in the district of Coochbehar were considered against 29 from Murshidabad and 28 from Nadia district.

sample respondents perhaps indicated that assured supply of fuel wood was one of the most important causes behind their planting trees. With a view to substantiate this observation an attempt is hereby made in table 5.10 to furnish an account as to how wood-fuel supplementation could be made possible after adopting farm forestry programme. In the district of Coochbehar 96.18 percent of total annual requirement of wood-fuel could be made available by the surveyed families from their household plantation itself created under the auspices of farm forestry programme. And those were 67.33 percent and 57.83 percent for the districts of Murshidabad and Nadia respectively. Effort has also been made in the said table to furnish a projection of annual demand of wood-fuel per family according to districts, regions and entire area studied. Side by side the annual out turn of wood-fuel per farm forester family that is being available from own plantation has been presented for those areas. The findings suggest that annual demand of wood-fuel is highest for Coochbehar district with 36.87 quintal followed in descending order by Murshidabad (28.82 quintal) and Nadia (22.10 quintal). The reason behind this differential annual demand perhaps lies with the physiographic, agro-climatic and land use patterns of the constituent districts in the regions studied. Among the districts, there is a large variation between Coochbehar and those of the districts of Nadia and Murshidabad in terms of land use pattern and cropping intensity. The district of Nadia in the lower Gangetic plain region is considered to be one of the most progressive agricultural districts in the state. The farmers there get substantial quantity of crop/plant residues and by-products for using those as fuel for greater part of a year which is not the picture for Coochbehar district of Terai Region where agriculture is far lagging in terms of productivity, production, cropping intensity etc., depriving the farmers there to have the access of steady supply of fuel from agricultural sources particularly during prolonged monsoon months and winter. Consequent to this handicap, the rural populace in Coochbehar district are to depend heavily on wood-fuel which has been getting reflected from its demand presented in table 5.10. The agriculture in Murshidabad district has also progressed much compared to its Coochbehar counterpart but as yet it has not

Table 5.11: Distribution of Area and Saplings Planted According to Land Size of Farm Foresters

Name of Districts	Size-class of land holding (in acre)	Participating farm foresters	Average area under farm forestry (in acre)	Average number of saplings planted
Cooch-behar	Less than 1 acre	11	18.33	0.248
	1-5 acres	37	61.67	0.63
	5-10 acres	10	16.67	1.03
	10-15 acres	2	3.33	1.31
	15-20 acres	-	-	-
	20 acres & above	-	-	-
	Total	60	100.00	0.649
Murshidabad	Less than 1 acre	14	26.41	0.264
	1-5 acres	28	52.83	0.64
	5-10 acres	9	16.98	1.00
	10-15 acres	-	-	-
	15-20 acres	1	1.89	3.32
	20 acres & above	1	1.89	1.49
	Total	53	100.00	0.668
Nadia	Less than 1 acre	-	-	-
	1-5 acres	41	78.85	0.65
	5-10 acres	10	19.23	1.03
	10-15 acres	1	1.92	0.66
	15-20 acres	-	-	-
	20 acres & above	-	-	-
	Total	52	100.00	0.722
All Districts Combined	Less than 1 acre	25	15.15	0.228
	1-5 acres	106	64.24	0.640
	5-10 acres	29	15.57	1.02
	10-15 acres	3	1.82	1.09
	15-20 acres	1	0.61	3.32
	20 acres & above	1	0.61	1.49
	Total	165	100.00	0.678

attained the kind of agricultural growth that has been accomplished by the district of Nadia although both of these two districts are lying in the same region. So, due to higher opportunity of getting plant / crop residues and by-products from their agricultural pursuits as against the farmers of Coochbehar, the annual demand for wood-fuel is less for the earlier case than the latter one. In fine, table 5.10 indicates that farm forestry was practiced by the sample respondents with a real motive for assured supply of fuel wood for cooking purposes in their families. And the farm forestry in turn satisfied this intention of the planters almost in entirety at Coochbehar district and substantially at the districts of Murshidabad and Nadia.

3.3. Land Use Pattern in Farm Forestry

There is a proposition among many a critics of Social Forestry Project that it was basically a foresters' forestry programme with an ascribed social overtone. In the backdrop of this skeptic views let the pattern of execution of the project be reviewed in a threadbare manner. The earlier sections assisted us in understanding the fact that commoners also did participate in the project activities and planted trees in their own lands. Now, let us have a look at the mechanism of land use under the said farm forestry programme. A glance at table 5.11 is expressive of the fact that even 15.15 per cent of the lowest land owning class also participated in the programme throughout the areas under study and when the constituent districts were treated separately, the district of Coochbehar suggested that 18.33 per cent of the lowest land owning category among the sample farmers in that district entered into farm forestry programme as against 26.41 per cent in Murshidabad district. Although none of the sample farm foresters came from the same category in Nadia district, as high as 78.85 per cent of those planters, nevertheless were found to have belonging to the immediately upper category which, for all practical purposes, might safely be termed as the small farmer category. Again these groups of small farmers accounted for 61.67 per cent of the total participating planters in Coochbehar district and 52.83 per cent in Murshidabad district. Thus, the first two categories of land owning class, as being presented in table 5.11, who forms the small and marginal farmers' stratum,

Table 5.12: Raising of Plants According to land Holding and Categories of Land in Coochbehar District
(Area in acre)

Size-class of land holding (in acre)	No. of farm foresters	Plants raised in different categories of land												Total	
		Cat -1		Cat-2		Cat-3		Cat-4		Cat-5					
		Area	No.	Area	No.	Area	No.	Area	No.	Area	No.				
Less than 1 acre	11	1.084 (39.65)	1081 (29.57)	-	-	-	-	1.65 (60.35)	2575 (70.43)	-	-	2.734 (100.00)	3656 (100.00)		
1-5 acres	37	2.44 (10.47)	1881 (6.08)	-	-	0.90 (3.86)	3632 (11.74)	14.32 (61.43)	19236 (62.18)	5.65 (24.24)	6187 (20.00)	23.31 (100.00)	30936 (100.00)		
5-10 acres	10	2.67 (25.92)	3908 (27.57)	-	-	1.00 (9.71)	4000 (28.22)	2.33 (22.62)	2145 (15.13)	4.30 (41.75)	4120 (29.07)	10.30 (100.00)	14173 (100.00)		
10-15 acres	2	0.41 (16.65)	300 (20.58)	-	-	1.55 (59.16)	800 (54.87)	-	-	0.66 (25.19)	358 (24.55)	2.62 (100.00)	1458 (100.00)		
Total	60	6.604 (16.95)	7170 (14.27)	-	-	3.45 (8.85)	8432 (16.79)	18.30 (46.97)	23956 (47.70)	10.61 (27.23)	10665 (21.24)	38.964 (100.00)	50223 (100.00)		
RANK		III				IV		I		II					

Cat-1 = Home-Stead Land

Cat-2 = Orchard

Cat-3 = Pond-side Land

Cat-4 = Agricultural Land

Cat-5 = Fallow Land

NOTE: Figures in the parenthesis indicates percentage to the total of respective row.

Table 5.13: Raising of Plants According to Land Holding and Categories of Land in Murshidabad District
(Area in acre)

Size-class of land holding (in acre)	No. of farm foresters	Plants raised in different categories of land												Total	
		Cat-1		Cat-2		Cat-3		Cat-4		Cat-5					
		Area	No.	Area	No.	Area	No.	Area	No.	Area	No.				
Less than 1 acre	14	0.34 (9.21)	355 (11.00)	-	-	.33 (8.94)	25 (0.78)	2.56 (69.38)	2575 (79.84)	0.46 (12.47)	270 (8.37)	3.69 (100.00)	3225 (100.00)		
1-5 acres	28	0.36 (2.00)	323 (2.35)	2.16 (12.05)	730 (5.31)	1.89 (10.55)	440 (3.20)	11.76 (65.63)	11460 (83.36)	1.75 (9.77)	795 (5.78)	17.92 (100.00)	13748 (100.00)		
5-10 acres	9	1.90 (21.18)	687 (25.37)	-	-	3.82 (42.35)	829 (30.61)	0.46 (5.10)	700 (25.85)	2.82 (31.37)	492 (18.17)	9.00 (100.00)	2708 (100.00)		
15-20 acres	1	-	-	1.66 (50.00)	241 (50.10)	-	-	1.66 (5.00)	240 (49.90)	-	-	3.32 (100.00)	481 (100.00)		
20 acres & above	1	-	-	0.83 (55.70)	188 (50.13)	-	-	-	-	0.66 (44.30)	187 (49.87)	1.49 (100.00)	375 (100.00)		
Total	53	2.60 (7.34)	1365 (6.65)	4.65 (13.13)	1159 (5.64)	6.04 (17.06)	1294 (6.30)	16.44 (46.41)	14975 (72.92)	5.69 (16.06)	1744 (8.49)	35.42 (100.00)	20537 (100.00)		
RANK		III		IV		IV		I		II					

Cat-1 = Home-Stead Land

Cat-2 = Orchard

Cat-3 = Pond-side Land

Cat-4 = Agricultural Land

Cat-5 = Fallow Land

NOTE: Figures in the parenthesis indicates percentage to the total of respective row.

Table 5.14: Raising of Plants According to Land Holding and Categories of Land in Nadia District
(Area in acre)

Size-class of land holding (in acre)	No. of farm foresters	Plants raised in different categories of land										Total	
		Cat -1		Cat-2		Cat-3		Cat-4		Cat-5			
		Area	No.	Area	No.	Area	No.	Area	No.	Area	No.		
1-5 acres	41	-	-			24.74 (91.21)	637 (87.64)	-	-	2.32 (8.79)	88 (12.14)	27.06 (100.00)	725 (100.00)
5-10 acres	10	-	-			8.23 (83.72)	194 (92.82)	-	-	1.60 (16.28)	15 (7.18)	9.83 (100.00)	209 (100.00)
10-15 acres	1	-	-			0.66 (100.00)	8 (100.00)	-	-	-	-	0.66 (100.00)	8 (100.00)
Total	52	-	-			33.63 (89.37)	839 (89.06)	-	-	3.92 (10.63)	103 (10.94)	37.55 (100.00)	942 (100.00)
RANK		III				I				II			

Cat- 1 = Home-Stead Land

Cat-2 = Orchard

Cat-3 = Pond-side Land

Cat-4 = Agricultural Land

Cat-5 = Fallow Land

NOTE: Figures in the parenthesis indicates percentage to the total of respective row.

Table 5.15: Raising of Plants According to Land Holding and Categories of Land for Entire Study Area

Size-class of land holding (in acre)	No. of farm foresters	Plants raised in different categories of land (Area in acre)												Total
		Cat-1		Cat-2		Cat-3		Cat-4		Cat-5				
		Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	
Less than 1 acre	25	1.42 (22.16)	1436 (20.87)	-	-	0.33 (5.14)	25 (0.36)	4.21 (65.54)	5150 (74.84)	0.46 (7.16)	270 (3.92)	6.42 (100.00)	6881 (100.00)	
1-5 acres	106	2.80 (4.10)	2204 (4.85)	2.16 (3.16)	730 (1.61)	27.53 (40.31)	4709 (10.37)	26.08 (38.19)	30696 (67.60)	9.72 (14.23)	7070 (15.57)	68.29 (100.00)	45409 (100.00)	
5-10 acres	29	4.57 (15.69)	4595 (26.89)	-	-	13.05 (44.80)	5023 (29.39)	2.79 (9.58)	2845 (16.65)	8.72 (29.93)	4627 (27.07)	29.13 (100.00)	17090 (100.00)	
10-15 acres	3	0.41 (12.50)	300 (20.46)	-	-	2.21 (67.38)	808 (55.12)	-	-	0.66 (20.12)	358 (24.42)	3.28 (100.00)	1466 (100.00)	
15-20 acres	1	-	-	1.66 (50.00)	241 (50.10)	-	-	1.66 (50.00)	240 (49.90)	-	-	3.32 (100.00)	481 (100.00)	
20 acres & above	1	-	-	0.83 (55.70)	188 (50.13)	-	-	-	-	0.66 (44.30)	187 (49.87)	1.49 (100.00)	375 (100.00)	
Total	165	9.20 (8.22)	8535 (11.90)	4.65 (4.15)	1159 (1.62)	43.12 (38.52)	10565 (14.73)	34.74 (31.04)	38931 (54.30)	20.22 (18.06)	12512 (17.45)	111.93 (100.00)	71702 (100.00)	
RANK		IV		V		I		II		III				

Cat-1 = Home-Stead Land

Cat-2 = Orchard

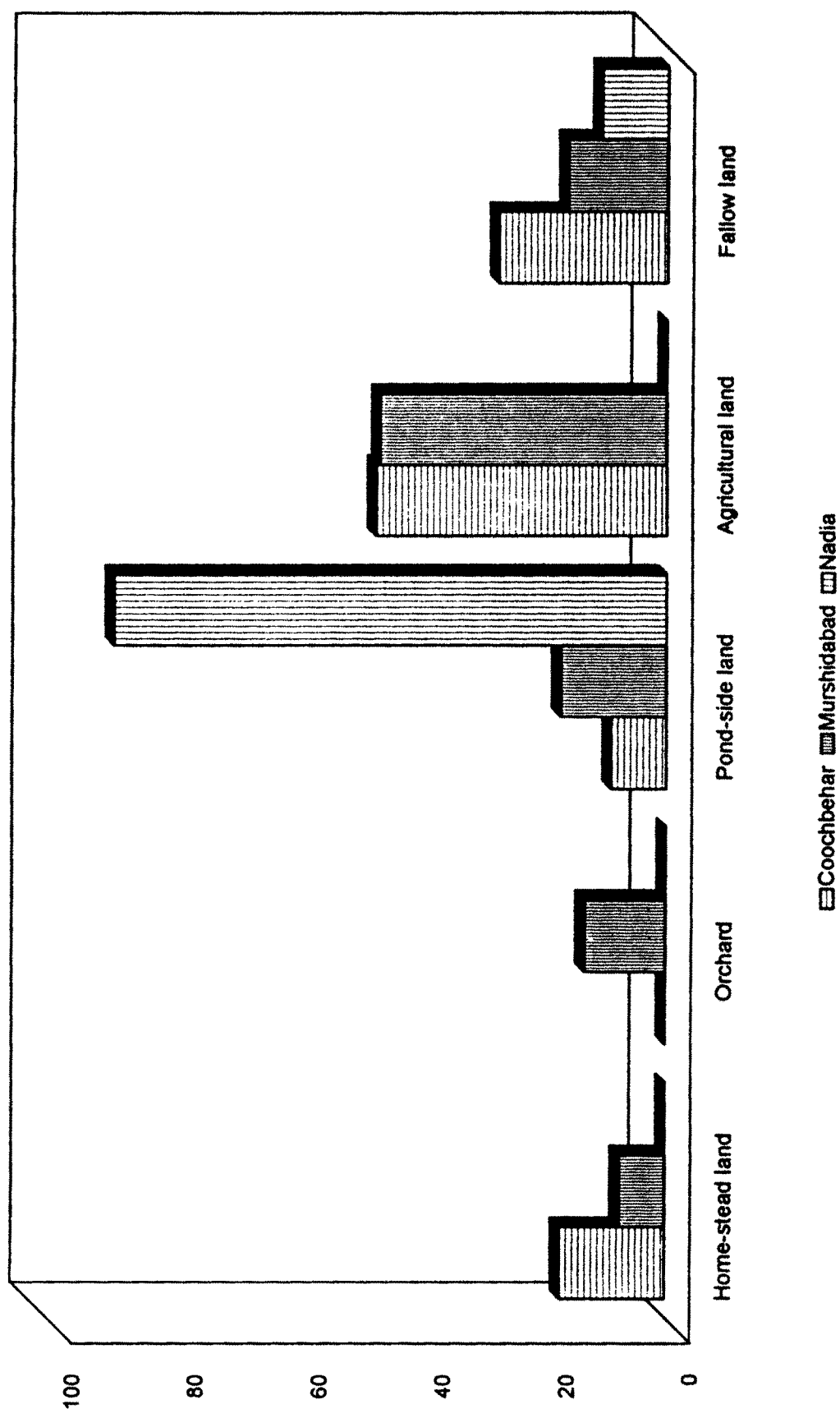
Cat-3 = Pond-side Land

Cat-4 = Agricultural Land

Cat-5 = Fallow Land

NOTE: Figures in the parenthesis indicates percentage to the total of respective row.

Fig.7 Land Utilisation Pattern In Farm Forestry at the Selected Area



has been occupying 79.39 per cent of the total farm foresters selected during the course of present study. In addition to the small and marginal farmers, who generally operate under poor resource base and complex diverse as well as risk-prone (CDR) situations and still have been found to be participated generously in farm forestry activities, the higher land owning classes are also found to have been taking part in the same as is being revealed from table 5.11. But numerically they were being outnumbered by their small size-class counterpart.

So, it is now evident that, in spite of variation in number with respect to various land owning categories, all section of farmers, however, did participate in the grow-more - tree programme launched under the auspices of Social Forestry Project.

Hence, hypothesis-2 of the present study which conceives "People's participation in West Bengal Social Forestry Project is by no means impressice", may be rejected.

Analyses of field data as are now being presented through tables 5.12 to 5.15 have been indicating that five different categories of land were put under the command of planting programme by the farm foresters viz. homestead lands (category-1), orchards (category - 2), pond - side lands (category - 3), agricultural lands (category - 4) and fallow lands (category -5) . In terms of available micro-level data, farm foresters of Coochbehar district have been found to be utilized agricultural land (category - 4) mostly (46.97 %) for the purpose of farm forestry which was followed by category-5 (27.23 %), category -1 (16.95 %) and category -3 (8.85 %). No land from orchard i.e. category -2 have been observed to be utilised by the planters in Coochbehar district. In Murshidabad district also lands earmarked as category -4 have been found to be utilized mostly (46.44%) for farm forestry operations while there appears to be variations when the question of putting other categories of land comes to the fore. As per the rank order, category - 3 comes out to be holding second rank with its share being 17.05 per cent followed in descending

order by category - 5 (16.06 %), category -2 (13.13 %) and category -1 (7.37 %). In the district of Nadia, no land of categories - 1 & 4 appears to be utilized for planting programme under farm forestry by the sample farm foresters. Among the two available categories that were utilized, the share of category-3 (i.e. pond-side lands) has assumed topmost rank with 89.37 per cent followed next by category -5 (10.63 %). While consideration has been made for the entire area under study, table 5.15 suggests that lands under category-3 has been utilized mostly by the farm foresters with its share being 38.52 per cent. And the other descendants are category -4 (31.04 %), category-5 (18.06 %), category -1 (8.22 %) and category-2 (4.15 %) as per their rank orders. As regards quantum of plants raised by different land owning classes, marginal and small farmers (size of holding upto 5 acres) have been found to be raised 72.93 per cent of the total 71.70 thousand saplings planted by the entire sample farmers indicating to the fact that the land-poor farmers not only participated more in the farm forestry exercise but they also did plant more number of trees in various categories of land.

Keeping the preceding discussion in view, hypothesis-3 of the present study, which assumes “Due to higher spatial opportunity, big farmers are poised for accruing more benefit out of the farm forestry programme compared to their land-poor counterpart” may be conceived as rejected .

3.4 Plant Mortality and Follow-up Care

One of the basic objectives of “West Bengal Social Forestry Project” was to develop substantial area covered by tree canopy with a view to redress the depletion in forests caused by various factors. So, the said redressal would be successful only if the saplings are made survived after their planting. An attempt, hence, was made through the present study to develop understanding on the rate of survival of the saplings planted during farm forestry operations. Table 5.7 is suggestive of the fact that in spite of keenness shown by the respondents on farm forestry in terms of plantation activities, more than 37 per cent of the saplings could not be made survived

Table 5.16 : Districtwise Ranking of causes of plant mortality

Sl. No.	Cause	Districts					
		Coochbehar		Murshidabad		All districts combined	
		Frequency	Rank	Frequency	Rank	Frequency	Rank
1.	Grazing	39 (30.95)	I	12 (21.43)	I	51 (28.02)	I
2.	Lack of self management	11 (8.73)	V	10 (17.86)	III	21 (11.54)	III
3.	Water logging	31 (24.60)	II	11 (19.64)	II	42 (23.08)	II
4.	Water stress	12 (9.52)	IV	9 (16.07)	IV	21 (11.54)	III
5.	Destructive attitude of neighbouring people	18 (14.29)	III	--		18 (9.89)	IV
6.	Poor soil condition	4 (3.17)	VIII	1 (1.78)	VI	5 (2.75)	VIII
7.	Pest & Disease infestation	5 (3.97)	VII	3 (5.36)	V	8 (4.40)	VI
8.	Poor quality saplings	--		10 (17.86)	III	10 (5.49)	V
9.	Unknown cause	6 (4.76)	VI	--		6 (3.30)	VII
	Total	126 (100.00)		56 (100.00)		182 (100.00)	

NOTE : Figure in the parenthesis indicates percentage to respective column total

by them. And for Coochbehar district, the plant mortality rate was a bothering 43.53 per cent . Considering this phenomenon as to be an impeding factor, an attempt would now be made through table 5.16 to examine the causes of plant mortality over the districts of Coochbehar and Murshidabad in particular. Needs be mentioned here that as the rate of survival of saplings was 99.36 per cent in the district of Nadia, its name was not included in table 5.16 deliberately. The table is revealing the fact that among the perceived causes : grazing, water logging, lack of self management, water stress , destructive attitude of neighbouring people and poor quality saplings (in case of Murshidabad district only) are appearing to be the dominating ones as per their ranking.

Table 5.17 : Measures Undertaken by Farm Forester to Protect Saplings in Selected Districts

SL No	Measures	Farm Foresters (No.)			All districts combined
		Coochbehar	Murshidabad	Nadia	
1.	Application of manures & fertilizers, p.p. chemicals & irrigation	45 (47.87)	32 (37.65)	46 (88.46)	123 (153.25)
2.	Peripheral fencing	35 (37.23)	50 (58.82)	--	85 (36.80)
3.	Weeding	--	1 (1.18)	4 (7.69)	5 (2.16)
4.	Regular visit to watch plantation area	14 (14.90)	2 (2.35)	2 (3.85)	18 (7.79)
	Total	94 (100.00)	85 (100.00)	52 (100.00)	231 (100.00)

NOTE : Figure in the parenthesis indicates percentage to respective column total

For the purpose of managing the problem of plant mortality, the sample farm foresters even incurred some expenditure from their own sources in addition to subsidy they received from the implementing agencies of the project. As means of protective measure, they resorted to application of manures and fertilizers, plant protection chemicals (specially for controlling white ants), arrangement of some life saving irrigation, setting up of peripheral fencing etc. 14.9 per cent of the respondent in Coochbehar district, 2.35 per cent in Murshidabad district and 3.85 per cent in

Table 5.18 : Species-wise Distribution of Plantation in Different Region

Saplings planted (No.)				
Sl. No.	Species	Lower Gangetic Plains Region	Terai Region	Total
1	Sisoo	8196	24461	32657
2	Segun	4972	3895	8867
3	Gamar	1139	12568	13707
4	Ghoraneem	422	2883	3305
5	Akasmani	207	250	457
6	Kadam	558	3013	3571
7	Sirish	250	312	562
8	Babla	1422	-	1422
9	Eucalyptus	2019	-	2019
10	Simul	-	1848	1848
11	Mehogini	181	37	218
12	Chikrase	-	125	125
13	Rasuni	-	155	155
14	Khair	-	215	215
15	Subabul	1513	-	1513
16	Papaya	190	125	315
17	Coconut	50	73	123
18	Guava	121	70	191
19	Bahera	-	18	18
20	Mango	75	25	100
21	Anola	-	15	15
22	Lemon	50	27	77
23	Krishnachura	40	19	59
24	Jackfruit	-	89	89
25	Lambu	74	-	74
	Total	21479	50223	71702

Nadia district kept on regular visit and watch on their respective plantation areas. A little bit of weeding was also done by the farm foresters of Nadia and Murshidabad districts. Detail account in respect to the protective measures undertaken may be had from a perusal of table 5.17.

IV. Review of Farm Forestry Plantation Programme in the Light of Regional Agro-Ecological Diversities

Among the three selected districts of the present study, Murshidabad and Nadia are placed under lower Gangetic Plain Region while Coochbehar, the other district, is a constituent part of Terai Region of the state. The districts in reference of lower Gangetic plain Region are characterized by loamy soil which is mostly neutral in reaction, moderate to high in fertility status, deep in soil depth and where nitrogen is low to medium followed by medium P_2O_5 and medium to high K_2O . Average annual rainfall varies here from 1275 mm to 1800 mm. In contrast, the soils of Terai Region are sandy to sandy loam in texture, shallow in depth, strongly to moderately acidic in reaction, medium in available nitrogen, medium to poor in available P_2O_5 and K_2O , and poor in fertility status with low water holding capacity. Here average annual rainfall varies from 2000 mm to 3500 mm and due to this high rainfall as well as high water table, sub-surface drainage is a pervading problem in Terai Region. This indicates that the two regions are distinctively varying in terms of relief configuration, soils and climatic parameters.

The above-mentioned variations in physical and climatic features obviates that the nature of vegetation should vary to match the specific agro-ecological suitabilities of those macro-environments. While testifying the plantation programme in accordance with the given agro-climatic variation of the regions studied, altogether 20 different plant species could be identified to have been picked up by the farm foresters in Lower Gangetic Plain Region and its number were 21 in case of Terai Region (Table 5.18). This phenomenon suggests to infer that instead of maintaining an uni-polar trend, planters in both the regions were inclined in favour of picking up divergent species while planting. Another notable perception may be made through

Table 5.19: Species-wise Account of Plantation in Different Regions

Region	Timber species	Industrial species	Fruit species	Misc. species	All species
Lower Gangetic Plains	14738 (68.62)	4719 (21.97)	486 (2.26)	1536 (7.15)	21479 (100.00)
Terai	41273 (82.18)	6361 (12.67)	442 (0.88)	2147 (4.27)	50223 (100.00)
All Regions Combined	56011 (78.12)	11080 (15.45)	1835 (2.56)	2776 (3.87)	71702 (100.00)

- NOTE :** 1. Timber Species : Mehogini, Sisoo, Segun, Gamar, Siris
 2. Industrial Species : Akashmani, Kadam, Eucalyptus, Khair, Ghoraneem, Subabul
 3. Misc. Species : Krishnachura, Simul, Babla, Rasuni, chikrasse, Lambu
 4. Fruit Species : Papaya, Coconut, Guava, Bahera, Mango, Anola, Lemon, Jackfruit.
 5. Figure in the parenthesis indicates percentage to corresponding row total.

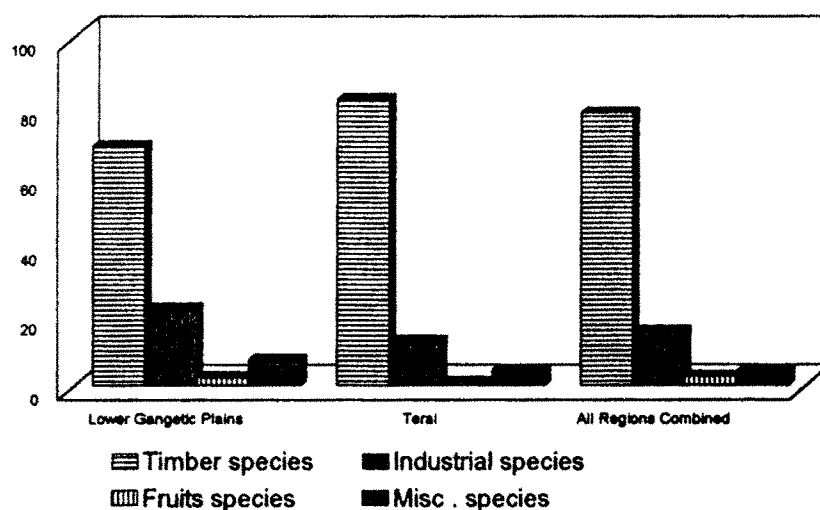
Fig.8 Species-wise Plantation in Different Region

Table 5.20: Analysis of Variance Between Mean Values of All Explaining and Antecedent Variables Observed in Selected Districts

District	NTG	AFF	EDN	INC	SES	ALP	IRRI
Coochbehar	837.050	0.649	3.967	1945.833	23.483	2.050	62.367
Murshidabad	387.491	0.668	3.755	1772.170	25.868	2.057	62.000
Nadia	18.115	0.772	5.077	3797.288	27.000	2.231	87.769
SE (m)	63.70	0.05	0.13	146.27	0.49	0.06	2.85
Level of significance	Significant at 1% level	N.S.	Significant at 1% level	Significant at 1% level	Significant at 1% level	N.S.	Significant at 1% level

NOTE : NTG = No. of trees grown during farm forestry

AFF = Area allocated under farm forestry

EDN = Educational attainment

INC = Gross family income

SES = Socio-economic status

ALP = Area of Land under possession

IRRI = Irrigation status in the operated land

Explaining variables of performance of farm forestry

Antecedant socio-economic variables of the farm foresters

perusal of table 5.19 which indicates that in both the regions the farm forests had a clear bent towards growing timber species comprising of 'Mehogini', 'Sisoo', 'Segun', 'Gamar' and 'Siris'. While 68.82 percent of the planters in Lower Gangetic Plains opted for timber species, those were as high as 82.18 percent in case of Terai region. The next preference of the planters was in favour of different industrial species like 'Akashmani', 'Kadam', 'Eucalyptus', 'Khair', 'Ghoraneem' and 'Subabul'. 21.97 per cent in Lower Gangetic Plains favoured industrial species as against 12.67 percent in case of Terai region. Although there was a clear mandate that suitable fruit species would be induced under plantation programme of social forestry project, it has been appearing from a further perusal of table 5.19 that the proposition failed utterly in getting the same accepted by the farm foresters due perhaps to the fact that they assigned more weightage on better scope for future income through planting timber and industrial species rather than growing fruit plants. It is also being revealed from table 5.18 that among the 25 plant species, 14 were common for both the regions, 4 were exclusively grown in lower Gangetic Plains and 7 were unique of Terai Region. But, one can not straight way infer out of this variation that varietal heterogeneity was in existence in accordance with the regional diversities while selection of species was done. This is because 89.55 per cent of the plant species grown are appearing to be from the said common species as against 7 per cent by 4 exclusively species of Lower Gangetic Plains and a meagre 3.44 per cent by the exclusive grown species in Terai Region. There appears to be high degree of variation between the selected districts with respect to 5 of the 7 identified explaining as well as antecedent variables which covers both socio-economic factors as well as perceived determining factors of the performance of farm forestry programme (Table 5.20). But, in spite of having so much variation between the respondents not only in terms of socio-economic features but also in terms of number of trees grown, no mention worthy variation could be traced out among the respondents drawn from districts vis - a - vis regions when the question of planting species as per agro-ecological situations comes to the fore. The essence of the preceding discussion thus

suggests to infer that in spite of minor variations, the overall scenario of the two regions have been showing a gross homogeneity in terms of species planted. So, hypothesis - 4 that is “there exists variation in selection of species according to the location-specific suitabilities of different agro-ecological regions” stands rejected.

V. Institutional Support in People's Forestry

Section three of the present deliberation discussed on the subject of people's participations in West Bengal Social Forestry Project in an analytical manner and could come out with the that the project in reference could really turn out to be a people's forestry programme more importantly due to extremely encouraging rate of success in the farm forestry front which was depending entirely on people's sponsorship to become successful. While dealing with the subject of people's participation in social forestry project in general and of farm forestry programme in particular, indications were also given that in the entire process of execution of the project in reference, the panchayat and the newly created Social Forestry Division of the State Forest Department were to play very vital complementary roles in rendering support and supply services.

Panchayat is the grass-root level democratic local self government which has an extensive network throughout the state of West Bengal. As per the statutory provision, the three tier system of panchayat performs the functions of executing all developmental and regulatory assignments in rural West Bengal. The activity on Social forestry, hence, brought under the preview of Zilla Parishad at district level and of Panchayat Samity at block level with constituted committees to function in close co-ordination with the Gram Panchayats. The Social Forestry Division was conceived to formulate the overall strategy on implementation policies and to provide technical back-ups alongwith implementation of block plantation programmes associated with R.D.F. component in particular receiving assistance from the territorial division of their mother department. They were also to arrange for co-ordination with the panchayats in matters of setting up nurseries for raising seedlings

Table 5.21 : Who Motivates : Relative Ranking of Different Sources According to Opinion of Selected Farm Foresters

Sl. No.	Sources	Districts							
		Coochbehar		Murshidabad		Nadia		All districts combined	
		Frequency	Rank	Frequency	Rank	Frequency	Rank	Frequency	Rank
1.	Panchayat personnels	7 (10.00)	III	12 (17.41)	II	39 (42.86)	II	58 (25.10)	II
2.	Motivator	4 (5.71)	V	1 (1.42)	V	--		5 (2.16)	VI
3.	Neighbours	--		10 (14.28)	III	--		10 (4.33)	IV
4.	Forest officials	15 (21.43)	II	1 (1.42)	V	--		16 (6.93)	III
5.	Self	38 (54.29)	I	44 (62.85)	I	52 (57.14)	I	134 (58.00)	I
6.	Others	6 (8.57)	IV	2 (2.85)	IV	--		8 (3.46)	V
		70 (100.00)		70 (100.00)		91 (100.00)		231 (100.00)	

NOTE : Figure in the parenthesis indicates percentage to respective column total

Table 5.22 : Ranking of Sources Supplied Saplings to Selected Farm Foresters

Districts								
Sl. No.	Sources	Coochbehar		Murshidabad		Nadia		All districts combined
		Recipient no	Rank of source	Recipient no	Rank of source	Recipient no	Rank of source	Recipient no
1.	Forest departmental nursery	44 (73.33)	I	31 (58.49)	I	--	--	75 (45.45)
2.	Panchayat	5 (8.33)	IV	17 (32.08)	II	42 (80.77)	I	64 (38.79)
3.	Private nursery	4 (6.67)	III	4 (7.54)	III	10 (19.23)	II	18 (10.91)
4.	Self raised	1 (1.77)	V	--		--		1 (0.60)
5.	Others	6 (10.00)	II	1 (1.89)	IV	--		7 (4.24)
	Total	60 (100.00)		53 (100.00)		52 (100.00)		165 (100.00)

NOTE : Figure in the parenthesis indicates percentage to respective column total

and to render extension support through a new group of functionaries known as motivators created specially for the purpose of West Bengal Social Forestry Project. Keeping these in mind, an attempt was made by the present researcher, to develop insight during the micro-level study, as to how satisfactorily those institutions could discharge the said complementary functions as were delegated upon them.

The findings, as are getting presented in table 5.21, indicates that apart from the self motivation, which ranks first in all the selected districts, both panchayat personnels and forest officials did a good job in motivating the people towards farm forestry. In order of preferential ranking done by the farm foresters themselves, as motivators the panchayat personnels are being ranked as the second most important source followed next by the Forest Department personnels. Although the motivators were expected specially to look after the promotional functions of social forestry programmes, they have failed to motivate the clientele much. They have occupied the bottom rank for all districts combined and for Nadia district nobody received any motivational assistance from the motivators.

Alongside motivating people in favour of farm forestry, panchayats and Forest Department are also performing the job of supplying saplings to the interested planters in a formidable manner. Among the 165 sample respondents, 45.45 per cent received saplings from Forest Department nurseries while 38.79 per cent of them collected the said saplings from panchayats. Private nurseries also did act as a source but they are holding only the third position. 10.91 percent of the respondent planters utilized that source for receipt of saplings (Table 5.22). Interestingly, in Nadia district none of the respondent farmers received any sapling from the forest departmental nurseries and 80.77 per cent of them occurred the benefit of panchayats as the source of collection of saplings. The nurseries of Forest Department acted as the source to 73.33 per cent of the intending planters of Coochbehar district and to 58.49 percent of the intending planters in Murshidabad district. The panchayats were also found to be discharging the jobs of raising strip plantation through ensured supply of required volume of saplings from the nurseries set up and managed by them. Undertaking the

Table 5.23: Percentage Distribution of Activities Performed by Panchayat Institution in the Selected Area**(N=36)**

Sl. No.	Activities	Percentage distribution of response
1	Strip plantation	100.00
2	Distribution of saplings to villagers	69.44
3	Plantation under village wood lot	52.77
4	Providing concessional rate to perchase seedling from F.D. Nursery to the SC, ST & OBC	61.11
5	Raising seedling in nursery	72.22
6	Recommendation for selection of nurseryman under kissan/Janata Nursery	36.33
7	Organising discussion seminar, workshops etc.	22.22

NOTE: N = Panchayat Functionaries interviewed**Table 5.24: Selection of Workers in Social Forestry Related Jobs in The Selected Area**

Sl. No.	Procedure of Selection	Frequency of response (No.)
1	In consultation with relevant G.P. members	22 (61.11)
2	Consultation with local people in the area (S) of execution	14 (38.88)
	Total	36 (100.00)

NOTE: Figure in the parenthesis indicates percentage to total.

job of developing plantation under village woodlot programme, recommending the names of S.C., S.T. and O.B.C. people to receive seedlings from forest department nurseries in concessional rates, raising seedlings in own nurseries for distribution, organising mass awareness programme on social forestry through discussion, seminars, workshops and recommending the names to the forest department as a facilitating agency for selection of nurserymen under Kisan / Janata nursery programmes were the other important activities performed by the panchayat institution as are being highlighted in table 5.23.

Panchayats not only provided the required institutional back-up in matters of developing motives and plantation curriculum but, as per information gathered, the said institution also did a lot in creating employment opportunities centring around the West Bengal Social Forestry Project and also rural employment schemes like NREP and RLEGP where at one time there was the rider that 25 per cent of those scheme funds had to be spent for social forestry programmes. While selecting the job workers under social forestry programmes, the spirit of decentralized decision making was followed by the panchayat bodies as are being perceived from a glance at table 5.24. The table indicates that both the gram panchayat members and the local people of the area of execution were taken into confidence by the panchayats while exercising the selection process of the job workers.

It was conceived that as the G.P. members and the local people were betterly poised to easily and perfectly identify the persons for doing the required specialised jobs, human resource utilization in connection with social forestry programme would be accomplished in a better fashion.

VI. Weaknesses, Constraints and Some Emerging Issues

It was highlighted earlier that alongside achieving some exciting physical performance, few symptoms of weaknesses/constraints were also noticed sporadically. Some social issues also reported to be emerged out centring around the project. In reference to this happenings, the present section will now put endeavour to

Table 5.25 Performance of Mixed Cropping under Farm Forestry Programme

Sl. No.	Particulars	Frequency of Response (No.)			All District Combined
		Coochbehar	Murshidabad	Nadia	
1	No mixed cropping practiced	35 (58.33)	47 (88.68)	52 (100.00)	134 (81.21)
2	Mixed cropping practiced	25 (41.67)	6 (11.32)	-	31 (18.79)
Total		60 (100.00)	53 (100.00)	52 (100.00)	165 (100.00)

Crop grown in mixed cropping

i	Blackgram	5 (20.00)	2 (33.33)	-	7 (22.58)
ii	Turmeric	11 (44.00)	3 (50.00)	-	14 (45.16)
iii	Fodder Crop	6 (24.00)	-	-	6 (19.36)
iv	Vegetables	3 (12.00)	1 (16.67)	-	4 (12.90)
Total		25 (100.00)	6 (100.00)	-	31 (100.00)

NOTE: Figure in the parenthesis indicates percentage to respective column total

throw some light on the dull sides that affected the quality of few project under reference.

6.1 Agro-forestry : A neglected propositions

For the purpose of efficient execution of farm forestry component, it was conceived that alongside other categories of lands, culturable farm lands would also be appropriately utilized by way of introducing suitable mixed farming models. Agro-forestry was also thought of to be given due weightage in the farm forestry operations through required technical support. But the findings made in Table 5.25 reveals that the proposition of mixed farming vis-a-vis agro-forestry did not find much ground. No mixed cropping was practiced by the respondent farm foresters in Nadia district and a large majority (88.68%) of those group of people were found to be non-practitioner of mixed-cropping in the district of Murshidabad. The position of Coochbehar in this regard is, however, somehow better in the sense that 41.67 per cent of the selected farm foresters in that district practised mixed farming with the crops like blackgram, turmeric, fodder crops and vegetables. Among those crops, turmeric appears to be the choicest one as 44 percent of the practitioner of mixed farming picked up this crop. This was followed in descending order by fodder crops (24.00%), black gram (20.00%) and vegetable (12.00%). Among the respondent farm foresters who adopted mixed cropping in their forest area at Murshidabad district, 50 percent picked up turmeric as the crop followed in descending order by black gram and vegetables. The farm foresters who didn't practice of agro-forestry in the form of mixed farming were found to have identified three causes behind the same. The most important cause was that the non-practicing farmers were not at all aware regarding possibility of doing mixed farming within the plantation area. While 100 per cent of the farm foresters in Nadia district Viewed this, 83.02 per cent in Murshidabad district and 43.33 per cent in Coochbehar district conformed with the same submission. 40 per cent of the Coochbehar farm foresters, who didn't follow any sort of agro-forestry, opined that this was a 'hazardous proposition'. And 5.66 per cent of such section of people in Murshidabad district conformed with it. The remaining

Table 5.26: Causes of Non-Practicing Agro-forestry by the Farm Foresters

Sl. No.	Cause	Coochbehar	Murshidabad	Nadia	All Districts Combined
1	Not aware	15 (43.33)	39 (83.02)	52 (100)	106 (79.10)
2	Cultivation should not be done under tree	6 (16.67)	5 (11.32)	-	11 (8.21)
3	It is a hazardous proposition	14 (40.00)	3 (5.66)	-	17 (12.69)
	Total	35 (100.00)	47 (100.00)	52 (100.00)	134 (100.00)

NOTE: Figure in the parenthesis, indicates percentage to column total

Table 5.27: Knowledge/Practice of Scientific Agro-Forestry and Source-Wise Suggestion Received by Farm Foresters

Sl. No.	Particulars	Coochbehar Frequency N = 60	Murshidabad Frequency N = 53	Nadia Frequency N = 52	All Districts Combined Frequency N = 165
I	Knowledge/Practice of Scientific Agro-forestry				
I	a) Having knowledge but no practice	27 (45.00)	16 (30.19)	2 (3.85)	45 (27.27)
	b) Having knowledge and practicing	3 (5.00)	1 (1.89)	-	4 (2.43)
II	a) No knowledge no practice	8 (13.33)	31 (58.49)	50 (96.15)	89 (53.94)
	b) No knowledge but practicing	22 (36.67)	5 (9.43)	-	27 (16.36)
	Total	60 (100.00)	53 (100.00)	52 (100.00)	165 (100.00)
2	Suggestion Received on Scientific Agroforestry				
	i. No suggestion	33 (55.00)	37 (69.81)	50 (96.15)	120 (72.73)
	ii. Source of suggestion				
	a. Staff of forest Deptt	2 (7.41)	1 (6.25)	-	3 (6.67)
	b. A.D.O.. Office	2 (7.41)	3 (18.75)	1 (50.00)	6 (13.33)
	c. Agril. University	8 (29.63)	-	1 (50.00)	9 (20.00)
	d. Friends & Relatives	15 (55.56)	12 (75.00)	-	27 (60.00)
	Total 2 (ii)	27 (100.00)	16 (100.00)	2 (100.00)	45 (100.00)
	Grand Total 2 (i+ii)	60 (100.00)	53 (100.00)	52 (100.00)	165 (100.00)

NOTE: 1. Figure in the parenthesis indicates percentage to respective total

2. N = No. of sample respondents.

cause behind non-practice of agro-forestry associated more with some sort of ethics and taboo. 16.67 per cent in Coochbehar and 11.32 per cent in Murshidabad were expressive of the belief that cultivation should not be done under tree (Table 5.26).

Table 5.25 already revealed that only 18.79 per cent of the sample farm foresters did practice some form of agro-forestry in their respective plantation areas. But, it is indeed interesting to note from the leanings made through table 5.27 that in reality only 2.43 per cent of the respondents were practicing agro-forestry with having scientific knowledge behind them and 16.36 per cent of them who although practicing the said agro-forestry had no real scientific knowledge on that subject behind them. They went for some casual crop cultivation in their respective plantation areas. Another part of the story revealed from the appraisal of table 5.27 is that 27.27 per cent of the 165 numbers of so called farm foresters although knew about what scientific agro-forestry meant for, they preferred not to opt for the practice might be due to the causes 2 & 3 being narrated earlier drawing experiences from table 5.26. The findings thus provokes the present researcher to infer that even within the very small quantum of so called agro-foresters, there were a sizeable proportion who exercised mixed farming vis-a-vis agro-forestry with no knowledge and understanding as to 'what should be done actually and how' while performing agro-forestry. Another unfortunate revelation is being made from table 5.27 wherein it became evidently clear that the two chief agencies meant for rendering support and supply services in connection with social forestry project (i.e. the panchayat and the Forest Department) performed in extremely weak manner to advice and educate the farm foresters in technical matters of scientific agro-forestry. As a matter of fact nobody among the practicing agro-foresters could be found to have received any kind of advice/suggestion in this respect. And only a meagre 6.67 per cent of them appeared to be received suggestion advice from the staff of Forest Department. It was actually the personal localite source like friends and relatives who were found to be playing most important roles in this regard followed by the Agril. University and the local A.D.O. offices.

Table 5.28 : Weakness of the Project as Envisaged by the Panchayat Functionaries

Sl. No.	Weakness	Frequency of response	Rank
1.	Paucity of fund for protection of plantation	25 (33.78)	I
2.	Lack of training provision for the persons engaged in project implementation	22 (29.73)	II
3.	Extreme dearth of extension infrastructure at panchayat level to under take awareness and scientific motivational jobs.	15 (20.27)	III
4.	Inadequate knowledge regarding agro-forestry by the functionaries	12 (16.22)	IV

NOTE : Figure in the parenthesis indicates percentage to total

Table 5.29 : Weakness in the Project as Experienced by the F.D. Functionaries (N=13)

Sl. No	Weakness	Frequency of agreement	Rank
1.	Soil climatic suitabilities not properly considered during raising of saplings.	30.77	VI
2.	Inadequate fund provision for protection of trees under strip plantations	84.62	I
3.	Rural and absentee Urban elites taking maximum benefit from the project	23.08	VI
4.	Lack of knowledge in scientific agro-forestry	38.46	V
5.	Extremely poor functional relationship between Social Forestry & Territorial divisions of F.D.	69.23	II
6.	Lack of mobility of field level staff due to non-availability of vehicle in time	46.15	IV
7.	Poor inter-institutional linkages with Panchayat and Agriculture Department	61.53	III

6.2 Perceived constraints and weaknesses

Information collected during the course of field investigation and subsequent analyses of those data could trace out some constraints emerged out mainly due to few genuine structural and functional impairfections. Delineation of those weaknesses and constraints are hereby being made through tables 5.28 & 5.29 where documentation have been made of the weaknesses of West Bengal Social Forestry Project envisagedly by the panchayat functionaries and the Forest Department personnels respectively. Table 5.28 indicates rank order of four important weaknesses perceived by the 36 numbers of panchayat functionaries who were interviewed during the field investigation. According to the table, 'paucity of fund for protection of plantation' was the most important weakness of the project at the execution point in panchayat level. The remaining three causes enumerated by them in order of importance were : a) Lack of training provision for the persons engaged in project implementation, b) Extreme dearth of extension infrastructure at panchayat level to undertake awareness and scientific motivational jobs, and c) Inadequate knowledge regarding agro-forestry by the functionaries. While interacting on the structural imperfection and functional weaknesses of the project, the interviewee of the Forest Department highlighted seven such constraints. As per the ranking, those perceived constraints were : a) Inadequate fund provision for protection of trees under strip plantations; b) Extremely poor functional relationship between social forestry and territorial divisions of Forest Department; c) Poor inter-institutional linkages with panchayat and Agriculture Department; d) Lack of mobility of field level staff due to non-availability of vehicles in time; e) Lack of knowledge in scientific agro-forestry; f) Rural and absentee urban elites taking maximum benefits from the project and ; g) Soil-climatic suitabilities not properly considered during raising of saplings.

The aforesaid perceived constraints are giving birth to the realisation that there is a major dysfunctional effect arising out of little or no knowledge on the parts of both panchayat personnels as well as Forest Department functionaries about scientific agro-forestry which in one hand leaving them with a big chunk of

Table 5.30: Density of Plant Population in Different Categories of Land under Farm Forestry Programme

Category of land	Density of plants (Plants per acre)
Home-stead	928
Orchard	249
Pond-side	245
Agriculture	1121
Fallow	619

complacency by way of physical achievement in farm forestry plantation programme and on the other hand extending opportunity for high density tree culture on agricultural land in the camouflaged manner by a section of landed gentry. Dearth of training and extension back up system are the two other broad areas of weaknesses where intervention seems to be imperative. So, hypothesis-5 i.e. "Sustainable social forestry programme requires appropriate technological and extension back-up" may be accepted.

6.3 Emerging Social Issues :

Table 5.4 came out with the revelation that number of trees grown during farm forestry operation was significantly related with the area allocated under farm forestry in cases of three selected districts separately as well as for all districts combined. Moreover, size of holding of individual farm foresters established its larger influence over the area allocated under farm forestry in table 5.5. Although, subsequent analysis of the available research information could not assertively establish the fact that land rich farmers were accruing larger benefits from the project due to their comparative advantage to allocate more land under long gestation plant mono-culture compared to their land poor counterpart, yet it was the middle class landed gentry that were appearing to be investing more of their land resource for favour of growing overwhelmed concentration of timber and industrial plant species under the banner of farm forestry programme keeping eyes more on future income and perhaps with subtle notion to shrug off the pressures of wage rationalization movements as well as to harvest the advantage of tree culture as against conventional agriculture in the sense that trees require little care and hence less labour intensive, so less hazardous for them who, by all indications in the state, are gradually getting inclined to continue their agriculture by employing more hired labourers and are increasingly involving themselves in various agro-business. The linear correlation indices of the sample farm foresters indicated highly significant association between socio-economic status of the selected farm foresters with that of the area under farm forestry. Another significant revelation has been made from tables 5.15 & 5.30

Table 5.31: Annual Rate of Growth of Production of Foodgrains Between 1980-83 and 1989-92 (Triennia Ended)

States	Annual growth rate 1980-83 to 1989-92(%)	RANK
Andhra Pradesh	1.44	XII
Assam	2.40	IX
Bihar	3.38	V
Gujarat	(-) 0.77	XVI
Haryana	2.28	X
Himachal Pradesh	2.91	VII
Jammu and Kashmir	0.48	XV
Karnataka	1.22	XIII
Kerala	(-) 2.06	XVII
Madhya Pradesh	.70	XIV
Maharashtra	1.52	XI
Orissa	4.32	III
Punjab	4.37	II
Rajasthan	2.48	VIII
Tamil Nadu	2.99	VI
Uttar Pradesh	3.69	IV
West Bengal	6.28	I
India	3.06	

Source : Basic Statistics Relating to the Indian Economy, States, September, 1993,
CMIE, Bombay

Table 5.32 : Rice Production in Major States of India

State	Rice Production		Compound Annual Rate of Increase in Production 1983-84 to 1993-94	RANK
	1983- 84 (Thousand M.T.)	1993-94		
West Bengal	7940.0	11444.4	6.4	I
Uttar Pradesh	6776.0	10115.3	4.8	III
Andhra Pradesh	8790.7	9487.0	1.2	XIII
Punjab	4536.0	7624.0	5.6	II
Orissa	5121.0	6616.3	4.5	IV
Tamil Nadu	4466.0	6601.9	4.0	VI
Bihar	4966.5	6063.3	1.4	XII
Madhya Pradesh	4799.0	5822.2	3.4	VII
Assam	2515.0	3361.1	3.0	VIII
Karnataka	2292.0	3135.6	2.9	IX
Maharashtra	2461.0	2484.4	0.2	XIV
Haryana	1325.0	2057.0	4.1	V
Kerala	1208.0	961.0	(-) 2.1	XVIII
Gujarat	754.3	838.6	1.8	X
Jammu & Kashmir	593.0	508.8	(-) 0.9	XVI
Tripura	379.0	438.1	1.6	XI
Rajasthan	218.0	143.0	(-) 0.2	XV
Himachal Pradesh	111.5	101.9	(-) 1.2	XVII

Source: India's Agricultural Sector; Centre for Monitoring Indian Economy, Bombay, September, 1995.

wherefrom it is being found that 31.04 per cent of the total area under farm forestry was done in agricultural land with highest degree of plant density over there. Whereas the density of plant population in agricultural land was 1.12 thousand per acre this was only 0.245 thousand in pond side land, 0.25 thousand in orchard, 0.62 thousand in fallow land and 0.93 thousand in homestead land. This suggests that the agricultural lands, converted to farm forestry, are experiencing high density tree culture with the constituent species overwhelmingly being either industrial ones or of having timber values. And because neither of them are of short rotations, there exists little possibility of having those lands converted to agriculture again within next two decades or so. Again, in view of very little interest on the part of the farm foresters to practice mixed farming and / or agri-silviculture, the scope of employment for the wage labourers would continue to be under cessation in those lands for many more years to come. If this be any indication and if this phenomenon be continued to persist or increase then, it is being apprehended quite justifiably, disharmony in social structure of agrarian nexus might be the resultant effect. The impact of pumping a fresh blood into the otherwise sickly rural economy of the state by way of attaining remarkable agricultural growth during eighties (Tables 5.31 & 5.32) might again be waned out if the trend of shifting culturable land for doing so called farm forestry remain to be continued by the aforesaid sections of neo-middle class with the alibi of either 'marginality of the land' or, in many cases, with the coined term of 'fallow land' or 'land unsuitable for agriculture'. West Bengal is such a state where the density of population was recorded to be 766 per km² against 266 per km² to be the national average. Decennial percentage variation of population during the periods between 1981 and 1991 was recorded to be 24.55 as against 23.56 to be the national picture. (Table 1.7). So, with the passage of time the high density of population would be even higher in the state with the burgeoning population. Obviously, that will snatch out more quantum of arable land for purposes other than agriculture during the coming years. And this apparently excellent performer, farm forestry, would by that time definitely add our miseries if the present kind of high density tree planting

programmes under the banner of 'Social Forestry', with the full -scale technical and financial support of the government, continue to happen in the countryside of West Bengal. Things are looking better but may gradually turn out to be more than worse if the revelations of the present sample survey become true for the entire state. Assured supply of wood fuel seems to be the mask of many a farm foresters whose faces are internalizing the catchy slogans mooted by the formal bodies itself like 'forest for ecology, ecology for posterity', forest for future income', 'Grow your own fuel wood' so on and so forth and just trying to capitalize from a really noble venture of Social Forestry.

VII. Status of Functional Linkage

As discussed earlier, West Bengal Social Forestry Project came into being with the pre-conceived notion that people's participation would be the key for its success. Hence, to make it a people's programme, the roles of the panchayat bodies and the Forest Department were thought of to be as the collaborators. Motivators were inducted into the extension efforts associated with the project for the purpose of discharging required awareness-cum-transfer of ideas for which they were to maintain functional linkage with the clientele. Also it was conceived that the Forest Department and the panchayat would keep a sustained linkage not only in the matters of policy implementation activities but for maintaining effective feed-back also.

Table 5.33 : Motivator - Farm Forester Linkage

Sl. No	Items of assessment for motivators	Frequencies of response			All districts combined
		Coochbehar	Murshidabad	Nadia	
1.	Known	22 (84.62)	4 (15.38)	--	26 (100.00)
2.	Unknown	38 (27.34)	49 (35.25)	52 (37.41)	139 (100.00)
3.	Suggestion for plantation	3 (75.00)	--	--	3 (60.00)
4.	Supplied seed	1 (25.00)	1 (100.00)	--	2 (40.00)
	Total (3 + 4)	4 (100.00)	1 (100.00)	--	5 (100.00)

NOTE : Figure in the parenthesis indicates percentage to respective total

Table 5.33 presents that the motivators summarily failed to perform the responsibility of linkmen as they were reported to be not even known by 84.24 per cent of the respondents. The very few (15.76%), to whom motivators were known, came out with the opinion that 60.00 per cent received suggestion from them while rest 40.00 per cent received seed supply from the motivators. One may be completely misled if he tries to understand the performance of motivators in terms of those just mentioned percentage distribution figures. In fact, only 3.03 per cent of the selected farm foresters actually did receive assistance from motivators. In absolute number, only 5 farm foresters among a total of 25 (to whom motivators were known) actually received the professional service of motivators. This is altogether lamentable. Among the two collaborative agencies, panchayat bodies were appearing to be well ahead of Forest Department in terms of assistance and / or co-operation rendered by them to the farm foresters. A brief account of the perception of the farm foresters on quality

Table 5.34 : Assistance and Co-operation Received from Implementing Agencies

Sl. No	Particulars	Percentage Distribution			All districts combined
		Coochbehar	Murshidabad	Nadia	
A	Assistance / Co-operation received				
	1. Forest Department	33 (90.48)	4 (9.52)	—	37 (100.00)
	2. Panchayat Institution	8 (12.07)	14 (20.69)	45 (67.24)	67 (100.00)
B	Quality Assistance and Co-operation				
	1. Forest Department				
	i. Very good	36.48	—	—	33.33
	ii. Good	15.79	50.00	—	19.04
	iii Not as expected	47.37	50.00	—	47.63
	2. Panchayat Institution				
	i. Very good	57.14	50.00	66.67	62.07
	ii. Good	28.57	33.33	17.95	22.41
	iii Not as expected	14.29	16.67	15.38	15.52

NOTE: Figure in the parenthesis indicate percentage to row total

of assistance co-operation they received has been getting furnished through table 5.34. The table again suggests that like performing the job of motivating people in favour of farm forestry, panchayat bodies were also trying to provide some meaningful service to the people in matters of farm forestry programme the recognition of which has been made through table 5.34 by the practicing planters themselves. It would be improper if the present researcher fails to place on record here the notable efforts provided by some sincere and duteous forest department personnels like ranger of Coochbehar Social Forestry Division. Owing perhaps to the presence of such type of officials and field extension workers, the forest department also won appreciation and recognition of its services from the farm foresters of

Table 5.35 : Inter-Institutional Linkage and Training Need as Indicated by Panchayat Personnel. (N = 36)

Sl.No.	Particulars	Frequency (No.)			
		Very Good	Good	Weak	Nil
1	Linkage with F.D.				
	1. Before and during plantation	12 (33.33)	15 (41.66)	5 (13.88)	4 (11.11)
	2. After Plantation	3 (8.33)	9 (25.00)	18 (50.00)	6 (16.66)
2	Provision for arrangement of training for panchayat personnel in the project	-	-	-	36 (100.00)

NOTE : Figure in the parenthesis indicate percentage to total

Coochbehar district in particular. So far as inter-institutional linkage between the said two collaborative agencies were concerned, table 5.35 is expressive of the fact that 33.33 per cent of the panchayat functionaries perceived the existence of very good linkage with Forest Department, 41.66 per cent as good linkage, 13.88 per cent as weak linkage and 11.11 per cent as no linkage before and during the plantation programme. But regarding post-plantation linkage, 8.33 per cent of the respondent panchayat functionaries indicated of the existence of very good linkage, 25 per cent as good and 50.00 per cent as weak. It is further being evident from table 5.35 that

regarding provision for arrangement of training for the panchayat personnels about project activities and related technical matters by the Forest Department, no body among the responding panchayat functionaries perceived of the existence of any linkage between the two agencies. In case of social forestry functionaries of the Forest Department, all were found to be underwent some form of training as compared to only 8.33 in case of panchayat people. While 36.36 per cent of the Forest Department staff indicated necessity of further training, 69.44 per cent of the interviewed panchayat personnels endorsed the same view (Table 5.36). Needed areas of training as were identified by the Forest Department staff in order of

Table 5.36 : Training of Social Forestry Functionaries

Sl No.	Item	Percentage	
		Forest Department Personnel (N = 13)	Panchayat Personnel (N = 36)
A	Status of Training		
	i Received Training	100.00	8.33
	ii Necessity of Training	36.36	69.44
B	Area of Training		
	i. In nursery management	-	52.77
	ii. Application of Fertiliser PPC	36.36	13.88
	iii. Utility of tree plantation	-	58.33
	iv. Mixed farming	46.15	61.11
	v. Propagation techniques	69.23	-
	vi. Soil Testing	15.38	-

preference were : i) propagation techniques, ii) mixed farming, iii) application of fertilizer and plant protection chemicals, and iv) soil testing. In contrast, panchayat people indicated 'Utility of tree plantation' to be the most needed area of training followed in order of preference by the subjects like 'mixed farming' 'nursery management' and 'application of fertilizers and plant protection chemicals'. As the

final comment, in this regard, it may be mentioned that ample scope is still left open to improve the present standard of linkage and co-ordination.

By way of taking stock of the preceding discussion made in this section, hypothesis-6 i.e. "Functionaries of social forestry project has maintained desired inter-institutional functional linkage and co-ordination" may now be rejected.

Table 5.37 : Recommendation for Improvement by Functionaries of Implementing Agencies

Sl No.	Recommendation	Forest Department Functionaries(N = 13)	Panchayat Functionaries (N = 36)
1.	More campaign and extension work to be done to create awareness regarding utility to the Social Forestry	53.84	83.33
2.	Provision for loan to the farm foresters for the main-tenance protection etc. on the basis of their plantation	38.46	61.11
3.	Supply of seedlings in time and in adequate quantity	-	41.66
4.	Arrangement of special fund for guarding and protection of strip plantations	61.53	52.78
5	Supply of saplings to be done on the basis of choice of the people	-	55.55
6.	Need frequent training to update the persons involved in the project	23.07	16.66
7	Strong linkage is essential for effective implementation of the project	61.53	63.88
8	Panchayats must be made aware and thorough regarding the concepts and modus operandi of various constituent models of such type of projects	-	69.44

VIII. Suggestions for Future

In this section, an attempt has been made to document the tip-offs made by the interviewees of the two collaborative agencies keeping in view the improvement in the quality of such type of project activities in future course of time. The recommendations have been getting presented in this section through table 5.37. While Forest Department functionaries enumerated five recommendations, those were eight in case of panchayat personnels. All the recommendations and their corresponding importance as were indicated by the selected rank and file of both the implementing agencies are hereunder being presented through the said table 5.37 in a self-explanatory manner.

CHAPTER - VI

SUMMARY AND CONCLUSION

SUMMARY

In chapter one, attempt has been made to introduce the purpose of undertaking the present research study on a broad basis. Highlighting the importance of forests on life and living of the mankind, the chapter has furnished an analytical preview of the forest depletion process, how it has affected the environment and ecology, genesis of West Bengal Social Forestry Project and a brief resume of physical performance of the project in West Bengal. Finally, manifesting some important issues that have emerged during the post implementation phase centring around the project, the chapter has focussed on the need for undertaking a study to understand the impact of West Bengal Social Forestry Project from various dimensions. With this, the chapter ends with the enumeration of objectives of the present study.

In chapter two, the researcher has attempted to review the existing literature relevant for the present work. During the course of reviewing available literature, the investigator has put forth endeavour to perceive various cause and effect relationships associated with the subject of social forestry and its implementation mechanism. By way of studying such trends through review, endeavour has been made to relate those with the objectives with a view to focus on the direction and guideline of the present research. In fine, this chapter provides the theoretical framework of the study and, thus, has set the stage for analyses and interpretations of the findings in the light of the revelations made by many a contemporary researchers who conducted valuable studies to understand the issues and implications associated with both the dull and bright sides of social forestry.

Chapter three of the present thesis has dealt with the methodologies adopted during preparatory as well as actual field study and desk work phases. The chapter has started with the presentation of research design which includes derivation of hypotheses, pilot study, development of tools and techniques of data collection, selection of respondents, pre-testing of interview schedule, selection of area for field

investigation, collection of data and statistical methods utilized for analyses and interpretations of field data. Farm foresters, functionaries associated with the implementation of the project at gram panchayat and panchayat samity levels, and various categories of Forest Department staff like motivators, field extension workers, beat officers, range officers and DFOs have been identified as the respondents of the present study. Both primary as well as secondary information have been utilized and discussed for the purpose of doing analyses and interpretations. Statistical techniques as have been employed and utilized are :

1. Analysis of variance
2. Linear correlation analysis
3. Multiple regression analysis
4. 't' test and 'F' test
5. Percentage and other qualitative analysis

In chapter four, efforts have been made to describe the research setting of the present study. The study was carried out in three selected districts of West Bengal viz. Coochbehar of Terai Region, Murshidabad and Nadia of lower Gangetic plain Region. From each of the selected districts two blocks viz. Tufanganj-I & Dinhata-I from Coochbehar, Domkal & Kandi from Murshidabad and Chakdaha & Haringhata from Nadia are firstly being selected through area sampling technique. Finally, sixteen gram panchayats have been randomly selected from those blocks. Needs be mentioned here that number of selected gram panchayats have been three from each of all the blocks excepting Haringhata and Kandi where two gram panchayats have been selected from each of them. Socio-agro-economic profile of the state, selected districts and selected blocks are all getting presented in this chapter.

In chapter five of the present study, the results have been presented and discussed through following broad sections and sub-sections :

1. Physical performance

2. Inter-relationship between socio-economic characteristics of the selected farm foresters and perceived determinants of farm forestry.
3. Social impact of social forestry
 - a) Mechanism of peoples participation
 - b) Why farm forestry
 - c) Land use pattern in farm forestry.
 - d) Plant mortality and follow up care.
4. Regional agro-ecological diversities and Farm forestry plantation programme.
5. Institutional support in people's in people's forestry
6. Weaknesses, constraints and emerging issues
 - a) Agro-forestry : a neglected issue
 - b) perceived constraints and weaknesses
 - c) Emerging social issues
7. Status of functional linkage
8. Suggestions for future

The findings reveal that among the four components of Social Forestry Project, physical achievements are extremely encouraging in case of Farm Forestry while the weakest performer happens to be Village Wood-lot Programme. In terms of coverage of area, the district of Coohbehar comes out to be occupying the topmost position among the selected districts followed by Nadia and Murshidabad. Some socio-economic characteristics of the respondent farm foresters like socio-economic status, gross annual income of the family and area of possessed land have been found to be significantly related with one of the perceived determining variables like 'area under farm forestry'. And among the seven selected dependent and independent variables, variation in mean values have been noticed between the selected districts in cases of five such and those were: 1) Number of trees grown during farm forestry,

2) Educational attainment 3) Gross family income, 4) Socio-economic status, and 5) Irrigation status in the operated lands. Although, the study has been able to explore good deal of participation by the small, marginal and middle class farmers particularly in the farm forestry programme, there is, however, some distinct signs of diversion of agricultural lands in favour of high density plantation programmes giving birth to the apprehension that this phenomenon, if continues, may give rise to some dysfunctional effects on the overall harmony of agrarian social structure in future. The study has failed to establish any noticeable variation in selection of plant species between the two agro-ecological regions which have been considered for the purpose of present study. Having learnt about the weaknesses and / or constraints relating to agro-forestry, paucity of fund for protection of strip plantations, lack of training provision for project functionaries, extreme dearth of extension infrastructure, inadequate knowledge regarding scientific agro-forestry by the project functionaries, poor functional linkage between the implementing agencies, lack of mobility of field level staff etc., the chapter ends with some recommendations made by the concerned functionaries of Forest Department and the Panchayat Bodies.

CONCLUSION

In the face of alarmingly decaying forest wealth on a national scale and understanding its growing adverse effects on the overall ecology, the National Commission on Agriculture came out with the recommendation to launch Social / Extension Forestry in nook and corner of the country. The purpose was to extend the facilities of forest even beyond the surroundings of traditional forest areas where initiation of 'protection' as well as 'production' forestry were suggested of by the Commission. While suggesting further on the framework of activities under social forestry programme, planting of such species were advocated which might cater to the needs of fuel, fodder and small timber of the rural populace. In conformity with the recommendations and ideas promulgated by the said Commission, Social Forestry projects were initiated in the country with the financial assistance received from foreign agencies. And in case of West Bengal it was launched in 1980-81 as IDA-

World Bank aided programme. While the physical performance of the project drew appreciation from various corners in and outside the country, some issues, however, were raised from knowledgeable quarters centring around mechanism of implementation vis-a-vis land use pattern under the project in question. It was in this backdrop that a study was undertaken to widen our understanding on the impact of social forestry with special reference to Lower Gangetic Plains and Terai Region of West Bengal. The findings thus accumulated have now been presented in this concluding section as follows :

- Impressive physical achievement is being made in Social Forestry Project of the selected districts and the district of Coochber appears to be far ahead in terms of physical coverage compared to the districts of Nadia and Murshidabad.

- Among the various components, the rate of success in physical term is highest in case of farm forestry while village wood lot is the poorest performer.

- Farm forestry programme evokes good deal of people's participation. Marginal and Small farmers as well as middle class agriculturists have been found to be particularly keen on farm forestry.

- Overwhelming majority of the farm foresters are appearing to be planted timber and industrial species perhaps with their long term objective to augment future family income although at present substantial amount of annual wood fuel requirement of their respective families is being met up from the available lops and tops.

- There is a perceivable trend of allocating higher degrees of agricultural lands under high density plant mono-culture pervaded by high value timber and industrial species having longer maturity time to leave least scope for agricultural labourers to be employed in those lands for fairly longer span of time.

- Mixed farming vis-a-vis agro-froestry in scientific lines is a highly neglected proposition.

– Panchayats and Forest Department have done some good work in motivating people in favour of growing trees unlike to the motivators who were specially functionalised for the purpose.

– A good proportion of the saplings planted by the farm foresters of Coochbehar and Murshidabad districts indicate lack of appropriate post-planting cares in those places.

– Paucity of available fund for protection of plants raised under strip plantation programme before the panchayat bodies.

– Lack of HRD curricula for project functionaries to train them up in matters of nursery management, mixed farming, propagation and agro-techniques of plant culture etc.

– Least inclusion of fruit plants under plantation programmes done both by individuals as well as by the formal bodies like panchayats and Forest Department.

– Existence of poor functional linkage between panchayats and Forest Department in matters of post-plantation activities and arrangement of training for the earlier agency by the latter one.

– Consistent failure on the part of the motivators to play the roles of linkmen with the farm foresters giving rise to poor feed-back and poor quality of advisory service and thus manifesting existence of inadequate extension support system in the project.

– Raising of plants befitting divergent agro-ecological situations of the areas of investigation are appearing to be a non-existent phenomenon.

– Achievement of West Bengal Social Forestry Project was good but there are some grey areas viz, research-extension back-up, inter-institutional linkage, training, agro-forestry and selection of species on the basis of socio-economic and agro-ecological diversities etc. which may be more professionally attended to for bettering the future performance.

CHAPTER - VII

FUTURE SCOPE OF RESEARCH

West Bengal Social Forestry Project has been terminated since 1990-91. But expiry of this tenure does not essentially mean that the very concept of social forestry has lost its relevance and, hence, developing more understanding in this regard would be unpragmatic. This is because the state of West Bengal is now passing through a new breed of people's forestry programme entitled 'West Bengal Forestry Project'. So, in view of the fact that the concept and philosophy of social vis-a-vis people's forestry is very much alive even now, continued effort in matters of accumulating more insights on the functional as well as institutional aspects in the domain of this important subject seems imperative. Continuity of this kind of endeavour may definitely help understanding the existing weaknesses more comprehensively from where further refinements and / or adjustments may be made possible more efficiently. The following are some of the fields where, as perceived by the present researcher, more studies are still due to be conducted.

- Time series socio-economic studies to explore cause and effect relationships of the diversion of culturable lands for high density plant mono-culture with long duration timber / industrial species.
- Farmers' Participatory Research on development of regional agri-silvicultural and silvi-pastoral models keeping farmers perspectives in view.
- Modelling of plant combinations suitable for block plantations under different socio-ecological settings.
- Assessment of the impact of forest protection committees.
- Social impact of social forestry for all the differing social, cultural and economic contexture exist in the state.

CHAPTER-VII

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APPENDIX

PERSONAL INTERVIEW SCHEDULE

- A. Schedule for Collection of Information for the Selected Farm Foresters of Social Forestry Project.

PART - I

1. Name of the Respondent :
2. Age :
3. Name of Village :
4. Name of Block :
5. District :
6. Date of Survey :

Sl. No.	Age	Sex	Educational attainment	Occupation		Av. monthly income (Rs.)
				Primary	Secondary	

Note : Sl. No. 1 will denote head of the Family

7. i. Caste :

Schedule caste (1) / Lower caste (2) / Artisen caste (3) / Agricultural caste (4) / Prestige caste (5) / Dominant caste (6).

ii. Occupation :

Labour (1) / Caste occupation (2) / Business (3) / Independent profession (4) / Cultivation (5) / Service (6).

iii. Education :

Illiterate (0) / Can read only (1) / Can read and write (2) / Primary (3) / Secondary (4) / higher Secondary (5) / Craduate (6)

iv. Size of holding :

No. land (0) / Less than 1 acre (1) / 1-5 acres (2) / 5-10 acres (3) / 10-15 acres (4) / 15-20 acres (5) / more than 20 acres (6).

v. Housing :

No. home (0) / hut (1) / Kutcha house (2) / Mixed house (3) / Pucca house (4)

vi. Farm Power :

No. draught animal (0) / 1-2 draught animal (2) / 3-4 draught animals or prestige animal(s) or one or more sprayer or thresher (4) / 5-6 draught animal(s) or power water and pumpset or tractor (6).

vii. Material possession :

Bullock Cart (1) / Cycle & radio or chair (1) improved agricultural implements (2)

viii. Social Participation :

Member of one organisation (1) / member of more than one organisation (2) / Office holder (3) / Wider public leader (6).

ix. Family :

Type	Size
Single (1)	Upto five (1)
Joint (2)	Above five (2)

x. Irrigation status : Area (acre)

- a) Irrigated
- b) Rainfed

PART - II

SL No.	Category	Year	Species	No. Planted	Area of land (acre)
i)	Homestead				
ii)	Orchard				
iii)	Pondside				
iv)	Bund of field				
v)	Agril. land				
vi)	Permanent/ Current fallow				

i) Yearwise Account of Survival :

Year of planting	Species	Number survived
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ii) Perceived causes of Mortality :

- a)
- b)
- c)

iii) Measures taken for Protection of Saplings

- a)
- b)
- c)

3 : Planting Details

i) Source of collection of Saplings

Year	Species	Source	Number
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ii) Who advised you to plant trees :

- a) Panchayat
- b) Motivator
- c) Neighbour
- d) Forest officials
- e) Own decision
- f) Others, if any

iii) Causes behind Tree Planting :

- a) For assured supply of fuelwood
- b) For future Income
- c) For increased supply of green fodder
- d) For checking soil erosion
- e) For more rainfall
- f) For personal hobby or self satisfaction
- g) To maintain natural balance
- h) To check air pollution
- i) To increase availability of oxygen
- j) To receive good quality timber
- k) To increase soil fertility
- l) To get rid of natural calamity

iv. Agril. practice(s) followed previously in lands where trees are planted at present

- a) Pre-kharif
- b) Kharif
- c) Rabi

x) Did you plant bamboo saplings ? Yes / No

If the answer is 'Yes' then pl. give the following information :

Year of Planting	No. of saplings planted	Nature of land where planted	Area of land

If the answer is 'No' then please specify the reason (s)

- a)
- b)
- c)

8. i How you get co-operation from Forest Department Personnels / Panchayat members in matters of planting saplings?

ii. Did you cut any tree produce for selling : Yes / No.

If you sold any tree produce then pl. answer the following :

Species	Age of tree	No. of tree sold	Year of selling	Where sold selling	Selling price (Rs.)

iii. Did you face any difficulty while selling trees ? Yes / No.

If the answer is 'Yes' then pl. mention the nature of difficulties

- a)
- b)
- c)

iv. Did you receive required assistance from the Forest Department Personnel before planting of trees ? Yes / No.

v. Do you know any Motivator ? Yes / No

If the answer is 'Yes' then pl. mention what kind of help did you receive from him?

- a)
- b)
- c)

vi. How the decision to harvest trees are taken ?

To fulfill own need / As per recommendation of forest department.

- v) Was your Panchayat aware before hand about the actual number of trees to be planted ? Yes / No.
- vi) How the proprietorship of the plantation were determined ?

3. : Wage, Employment and Revenue

- i) Were the payments to daily workers made with rates other than the governemnt fixed ones ? Yes / No.
- ii) Was there any practice of paying differential wage rates according to sex ?Yes/ No
If the answer is 'Yes' then pl. specify the rates.
- iii) What is the practice of distributing revenue earned by selling the trees ?
- iv) Do you feel that Social Forestry Project has really increased the employment opportunities in the village . Yes / No.

4. : Linkage and Training

- i) What kind of formal linkage did forest department maintain with your institution at the time of project implementation ?

Very good /Good / Weak/ Nil

- ii) Is there any provision in the project for your training ?

Very good / Good / Weak / Nil

If the answer is 'Yes' then pl. mention whether you underwent any such training.
Yes / No.

If you underwent training then pl. mention the following

Sl. No	Year of training	Venue	Subject of training	Duration	Organisor of training
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If you did not undergo any training then what are those areas where you feel training is required ?

5. : Perceived Weakness and Remedial Plan

- i) Has the porject suffered from any weakness ? Yes / No

If the answer is 'Yes' pl. let me know what are those :

- a)

- b)
- c)
- ii) Have you any plan regarding how better the under-story of plantations may be utilized ? Yes / No.
If the answer is 'Yes' then please help knowing the plan.
- iii) What is your suggestion to further improve the performance of the projects of similar nature in future ?
Suggestion No. 1
Suggestion No. 2
Suggestion No. 3

Signature with Seal

C. Questionnaire for Collecting Data on Social Forestry Project from Officials and Other Functionaries of Forest Department

Date of interview :

1. Name of Interviewee :
2. Designation/ Form of Attachment :
3. Working place :
4. Year of initiation of project
activities in your area :
5. Account of plantation activities
during last five years :

No. of trees planted					
		Strip plantation	R.D.F.	Village Woodlot	Remarks
Year	Species	No. Area (acre)	No. Area (acre)	No. Area (acre)	
1					
2					
3					
4					
5					
1					
2					
3					
4					
5					
1					
2					
3					
4					
5					

6. Criteria for selecting species under plantation programme

- 1.
- 2.
- 3.

7. Farmers' inclination regarding species, if any

- 1.
- 2.
- 3.

8. Trees grow well in this area

- 1.
- 2.
- 3.
- 4.

9. Causes of failure to raise seedlings as per people's demand / liking

- 1.
- 2.
- 3.

10. Source (s) of seed availability

- 1.
- 2.
- 3.

11. Training underwent : Attended / No training

Year	Who organised	Subject	Duration	No. attended
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12. Subject areas where more trainings are needed

- 1.
- 2.
- 3.

13. How the values of different tree species are determined from five years are onward ?**14. Future planning on re-plantation, if any after felling of present trees**

- 1.
- 2.
- 3.

15. a) Kind of under - vegetation developed so far
 b) Are tree farming and crop cultivation different ? Yes / No.
 c) Status of formal training on :
 i) Agro-forestry Yes / No
 ii) Agriculture Yes / No
 d) If answer to (c) is 'No' then is there any functional co-ordination in existence with A.D. Os. or K.P.Ss. of Agriculture Department ? Yes / No.
16. Why people are indifferent in planting bamboo ?
 1.
 2.
 3.
17. Are bamboo cuttings are getting planted under your departmental programmes ?
 Yes / No
 If 'No' why ?
 1.
 2.
 3.
 If 'Yes' please mention the source of receipt
 1.
 2.
 3.
18. What was the ratio of fruit plants in the plantation programmes ?
19. Ratio of raising saplings of fruit plants at departmental / Kissan / Janata nurseries.
 1. **Departmental**
 2. **Janata**
 3. **Kissan**
20. Perceived impact of the project
 i) **Social**
 a)
 b)
 c)
 ii) **Economic**
 a)
 b)
 c)

iii) **Environmental**

- a)
- b)
- c)

21. **Inconvenience / Difficulties**

- a)
- b)
- c)
- d)

22 **Future suggestions for bettering performance of Social Forestry**

- a)
- b)
- c)
- d)
- e)

Signature with Seal