

Wastelands afforestation in northern India by cooperatives: a socio-economic evaluation

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Abstract

India has an estimated area of 129 million ha of wasteland, which can be used for providing sustainable livelihood for millions of rural unemployed. An evaluation of enhancing income and employment generation and environmental externalities due to plantations on wastelands through cooperatives and self-help groups was done. The development process was set up in leased degraded lands in three north Indian states of Madhya Pradesh, Uttar Pradesh and Rajasthan. The capacity building processes like savings and micro-enterprise skills empowered resource-poor farmers. An internal rate of return of 11.5 to 17.0 % in the phase I of the project imply tangible economic benefits at the end of 17 years, which improved to 13.9 to 20.4 % by including environmental benefits like carbon sequestration, soil conservation, soil salinity reclamation, etc. By extrapolating the trend till the end of 30 years, the estimated IRR increased further. The incremental net return due to afforestation of wastelands ranged between Rs. 2283 and 9514 (US \$51 -211) ha⁻¹ yr⁻¹ over the pre-developed status. The organization of stakeholders through cooperative societies for developing plantations on degraded lands and managing them for deriving benefits has demonstrated the viability of these models. The model can be replicated by dovetailing the same with the government schemes like food-for work programme and the recently enacted national rural employment guarantee programme.

Key Words: Common pool resources, environmental evaluation, farmers, micro enterprises, self-help groups

Introduction

India with 1.06 billion people has over two-thirds of its population living in rural areas and an estimated 73.7 million of them are land less. The rural poverty as measured by percentage of people below poverty line in 1999-2000 was 27.09 percent in the country as a whole as compared to 13.74 percent in Rajasthan, 31.22 in Uttar Pradesh and 37.06 percent in Madhya Pradesh (Planning Commission, 2003). Open access natural resources in India are afflicted by the “tragedy of commons”, resulting in degradation and loss of productivity (GOI, 2000). About 129 million hectare (ha) out of total geographical area of the country is wasted (ICFRE, 2000). Such lands usually belong to communities, religious organizations, *Panchayats* (Village elected bodies), revenue, forest and other government departments. These common pool resources (CPRs), majority of which are wastelands, play a key role in people’s coping strategies especially in drought years (DFID, 2001). Conventionally CPR management followed three patterns viz. access for all and limited access to powerful landowners and democratic village level institutions ensuring equitable sharing (Gadgil and Guha, 1992). Attempts were made to empower the rural poor based on the afforestation of community lands and promoting supplementary activities. Examples include projects undertaken by Indian Farmers Fertilizers Cooperative (IFFCO) and the National Dairy Development Board (NDDB) sponsored village level cooperatives for re-vegetating wastelands in 1980s and 1990s (Balooni and Ballabh, 2000). Successful projects

generally involved local communities, responding to local needs and preferences besides offering a broad basket of choices (Current *et al.*, 1995).

The present paper evaluates the overall performance of tree plantations on wastelands promoted by IFFCO in three states of northern India from the viewpoint of opportunities created for the communities, with specific economic evaluation for the phase-I.

Methodology

Study sites

The IFFCO community plantation project was implemented on lands leased for 30 years from private and *panchayat* in seven districts of Uttar Pradesh, revenue department in three districts of Madhya Pradesh and *Panchayats* in three districts of Rajasthan. The members of the cooperative societies developed plantations on the wastelands like sodic soils and ravine lands in Uttar Pradesh and Rajasthan, and in bouldery and gravely lands in Madhya Pradesh. Multipurpose species were grown on these lands as per local preference.

Methods and data

The study adopted the Institutional Analysis and Development Framework method used by Balooni and Ballabh (2000). This method recognises that there are three sets of variables, which affect the performance of any local body of self-governance viz. physical factors, institutional arrangements and economic viability. Data were collected through visits to the primary societies on their performance besides that of

self help groups (SHGs) promoted by them. Secondary data were also obtained from the state offices of Indian Farm Fertilizer Development Cooperatives (IFFDC), the subsidiary of IFFCO. Four primary farm forestry cooperative societies (PFFCS) from pilot group (phase-I) from each of these states were selected for data collection. For primary interactions three PFFCS members and another three SHG members were selected from each PFFCS.

The physical performance of the project was evaluated using parameters viz. budget, total membership, area under plantation, average membership, proportion of women members and average investment per ha. A comparative analysis of the two phases of the project was done. The institutional performance was measured by the regularity of statutory meetings and the frequency of capacity building programmes. The equity and impact on society were gauged by the representation of membership of the society by different social and resource groups.

An economic and environmental analysis of the pilot phase of the IFFDC project, which has completed 17 years, was carried out. This was performed using the pre and post development scenario method (Gittinger, 1982). Internal rate of return (IRR) was estimated for the three project states on a unit area (ha) basis (Reddy *et al.*, 1999). Economic analysis of the development was done (at 2002 price level) by taking into account the pre-development returns as the benchmark returns, average investment per unit area and the economic and environmental costs and benefits. The analysis was done for four scenarios. In scenario-I revenue flows from fodder and fuel wood collection up to 17 years since 1986-87, along actual revenue from tree sales and standing tree stock worth at local prices were considered. In scenario-

II, the tree worth at the end of the land lease period of 30 years besides the regular revenues from plantations were accounted by the actual data and extrapolation. All the costs in both these scenarios like plantation and other associated works were taken into account. For the environmental benefits, net of costs, on account of soil conservation, carbon sequestration value, salinity reclamation, and biodiversity were arrived for the 17 years and 30 years periods. These were added to the scenario I and II for obtaining values for scenario III and IV. The IRR was estimated for the three states separately. The soil conservation impact was estimated adopting cost or input saving approach (Ashok and Kombairaju, 2002). This was done for Madhya Pradesh and Rajasthan only as in the case of Uttar Pradesh the lands are of tabletop type. Whereas for the carbon sequestration the pricing adopted by the World Bank (@US \$ 4.4 for 2 t of carbon sequestered) was used (World Bank, 2003). For this purpose the biomass accumulated at the two points of time i.e. 17 and 30 years were taken into account and the value thus obtained was averaged per year. In the case of soil salinity benefit, applicable in case of Uttar Pradesh, the opportunity yield loss in the crop was taken into account. The other environmental benefit on account of biodiversity value was considered notionally at Rs.100 ha⁻¹ uniformly in all the states. The social costs for preventing the availability of these lands for recreation and other purposes were accounted again on a notional basis at Rs.200 ha⁻¹ in all the three states.

Results

The community forestry project of IFFCO

The aims of the IFFCO community forestry were enhancing the livelihood security of resource-poor farmers through sustainable institutions besides biomass and environmental services.

The first (pilot) phase of IFFCO project of plantations commenced in 1986-87 was promoted in three states jointly by grants from IFFCO (36 %), respective state governments (31%), National Wasteland Development Board (23%) and Department of Non- Renewable Energy Resources (10%) on 4609 hectares (ha). The pilot phase was followed by a second phase in 1995-96 with plantations on 21,451 ha of wastelands and was supported by the India Canada Environment Facility (ICEF) besides IFFCO. A two-tier voluntary and democratic entity of cooperatives at villages and state level was created and registered with the concerned State Registrars of Cooperatives. The village level institutions were named as PFFCS. The state level institutions, which guide and coordinate the progress of PFFCS, are the state project offices of IFFDC, a subsidiary of IFFCO. These constitutional bodies leased in wastelands for about 30 years and raised plantations on the same with the investments of social and financial capital. Any willing person belonging to villages in the jurisdiction of the lands procured for development irrespective of gender, caste and economic status was entitled to be a member of PFFCS by paying a membership fee of Rs. 25/-. The society members decided the species to be planted and executed the plantation work.

Landowner and PFFCS shared the proceeds of fuel wood and timber in the ratio of 1: 1 while the fodder was harvested by villagers or landlords for free or token payment. The PFFCS shared 25 per cent of its share with IFFDC, 25 per cent with

shareholders (members) and retained the remaining 50 per cent for further investments. The IFFDC used its earnings for development of the primary societies.

Pre-development returns

The managed lands consisted of extremely degraded hillocks, ravines, *usar* (sodic soils) and in some cases water logged lands both with community and private ownership. These were otherwise used for community grazing, collection of fuel wood and other produce. The annual productivity of these lands was estimated based on the survey data of National Sample Survey Organization (NSSO, 1999), specifically for the agro climatic locations of the project sites in the three states (Table-1). The highest annual contribution was by the lands in Uttar Pradesh at Rs.1106 per ha, followed by Rs.855 in Madhya Pradesh and Rs.50 in Rajasthan. Higher contribution in respect of the first two states is due to higher productivity of these lands as compared to poor productivity and subsequent collection in Rajasthan. In the case of Uttar Pradesh, the pre-project returns for the private farmers' lands were taken on par with that of community lands, as in the absence of cultivation due to problems of salinity, they serve the similar purposes as that of community lands.

Physical performance

The two phases of the IFFDC project were implemented with a budget of US \$ 9.6 million. In all 145 primary societies were established in the two phases of the project with 32 in phase-I and 112 in phase-II. The concentration of primary societies was higher in Uttar Pradesh (57 %) in the pilot phase as compared to more or less even spread across the three states in phase-II. On a sample basis, it was

learnt that the representation of village households in the society membership worked out to 11.6 per cent in six of the PFFCS in the three states. The surviving tree stock in the plantations was 0.92 and 10.53 million in the two phases, respectively. The tree density was higher at 491 ha⁻¹ in phase-II, as compared to a meagre 200 ha⁻¹ in phase-I. Employment generation for women, resource-poor and socially disadvantaged sects were scaled up from about 35 to 45 percent in phase-II mainly due to avenues in micro-enterprises. Almost 75 per cent of the pilot societies had harvested some trees by 2002, while the phase-II societies were yet to commence the tree harvesting. On an average the pilot societies earned Rs. 25851 per annum through sale of harvested trees (IFFDC, 2002).

Micro-enterprises like marketing of fertilizers, cattle feed and tea leaves, dairy, goat rearing, grocery store, poultry, leaf cup/ plate making and other non-farm enterprises for supplementing the revenue of the societies were taken up in the phase-II of the project. The position at the end of phase-II of the project i.e. as on March 2002, was that about 54 PFFCS had been engaged in micro-enterprises at the society level. The net annual income earned on account of such activities worked out to Rs.3627 per society per year. Besides this the growth of 22 different kinds of micro-enterprises among the members of SHGs like dairy, goat rearing, camel-cart, tailoring, grocery shops, flourmill on a small level indicated the path of rural development through self-managed or family run enterprises. The members earned returns in the range of Rs.250-2000 per month from these micro-enterprises. About 138 members of the SHGs of three sample societies had borrowed Rs. 0.93 million from the revolving fund of IFFDC at an average of Rs. 6739 per member. Each of

these micro-enterprises has given livelihood opportunity to at least one person per family, besides improving the family economic status and complementing the income and employment opportunities of others in the village.

The major physical performance indicators of pilot societies like survival of societies and trees harvested are better in the case of Uttar Pradesh with higher survival and more harvests (Table-2). In respect of survival of trees and tree density, the position was better in Madhya Pradesh.

Institutional and capacity building

The phase-II societies, for which data was available, have had on an average one board meeting once in two months during the period 1996 to 2002. While the frequency of annual general meeting of the members was one in 30 months per society. The capacity building programmes at the rate of five per month were organized in the project area during 1995-1998 both for the members and officials of the societies. Some of the capacity building programmes was aimed at inculcating savings habit and for initiating micro enterprise.

Gender and social equity

PFFCS membership matrix of Table - 3 suggests that the women membership was quite low at less than 10 per cent in all the three states during phase-I which, increased in the second phase of the project to almost 38 percent. The landless people of the rural areas constituted 39.5 per cent of the society membership in Madhya Pradesh as against 8.7 and 17.2 per cent in Rajasthan and Uttar Pradesh, respectively. The participation of the backward and scheduled communities was almost two- thirds in the society membership in the pilot phase.

The motivating factors for membership of PFFCS as obtained through personal interviews from the sample members indicate that initial employment avenues in the plantation programme was the major driving factor (41-67 %) in all the three states, followed by the expectation of tree produce and fodder from the plantations. Overall development of the community and the villages on account of tree plantation was one of the significant motivating factors for at least 17 per cent in Madhya Pradesh and 33 per cent in Rajasthan societies.

Income and employment generation

The average annual gross income generation per society during the project period (1986-96) was Rs 9,397 (Table-4). This is quite low by any standards, as the annual expenditure on account of pay and incidental charges work out approximately to Rs 60,000. In the post project period the average gross income per society was Rs. 53,683 with highest of Rs 96,317 in Rajasthan and the lowest of Rs 45761 in Madhya Pradesh. The overall employment generation in phase-I project worked out to about 481 person days ha^{-1} at an average of 28 person days per $\text{ha}^{-1} \text{yr}^{-1}$. On a sample basis data from two societies of Uttar Pradesh at the end of 17 years, indicated that almost 75 percent of the employment generation was generated in the first six years i.e. from 1988-1993.

Economic and Environmental analysis

Considering only direct benefits from the community forestry plantations, the IRR at the end of 17 years was the highest (17 %) in Uttar Pradesh followed by 11.7 and 11.5 per cent in Madhya Pradesh and Rajasthan (Table-5). This trend was similar even at the extrapolated period of 30 years. On including the environmental benefits, the IRR increased considerable by 2-5 percent (Table-6).

Discussions

Development agencies have refocused their attention on poverty and have realised that CPRs provide an entry point to understanding poor people's perceptions and for building on their capacities (Beck, 2001). Collective action is the key for managing CPRs. Several problems of collective action exist that have relevance for natural resources management. These 145 cooperative societies formed for tree plantations are legal entities with democratic management, as an elected executive board runs them. The focus of the local societies appears to have been demonstrating institutionalization of natural resource management. The same has been achieved in all the three states. There is a need to infuse confidence and commitment among the members for better results. Supplementing the tree plantations with micro-enterprises has certainly encouraged the local communities. Increased representation of women and weaker sections of the society as the project progressed indicates that they are given just representation and adequate opportunity for growth and development. Increase in the income of the societies over the years certainly indicates that there is a commitment for progress in these institutions. The lucrative IRR of the project indicates its financial viability. Promotion of tree plantations on the country's total wastelands of 129 million ha can generate employment of 3612 million mandays yr⁻¹ or provide a regular employment to almost 10 million people.

Conclusions

There is a great potential for managing degraded lands through community forestry and micro enterprises by organizing stakeholders for collective action. The cooperatives appear to keep the participation of the rural resource poor to build their livelihoods through plantations on degraded lands. Promotion of micro-enterprises

on a greater scale with emphasis on animal husbandry could be more remunerative. The institutional arrangements for distribution of the income and the qualitative changes in the land could elevate the status of the project and the replicability of the model. More such projects could be promoted with or without an intermediary development agency in the developing countries for providing sustainable income and employment to the resource-poor rural people.

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Table-1: Annual contribution of village/community lands in three states of India under natural conditions (per ha)*

Particulars	Madhya Pradesh	Rajasthan	Uttar Pradesh
Quantity (q)			
Fuel wood	5.53	0.31	5.60
Fodder	1.38	0.13	2.98
Other material (leaves, gums, honey etc.)	IM	IM	IM
Value (Rs.)			
Fuel wood	503	25	452
Fodder	100	9	161
Other material (leaves, gums, honey etc.)	352	16	493
Total value (Rs.)	855	50	1106

* Estimates based on Data of National Sample Survey Organisation (1999)

IM : Immeasurable due to varied products ; Indian Rs. (INR) 45 = 1 US \$

Table -2: Some indicators of physical performance of pilot societies in the three north Indian states

Indicator	Madhya Pradesh	Rajasthan	Uttar Pradesh
Primary societies initiated	5	10	17
Percentage of surviving societies at the end of 17 years	60	90	100
Plantation area (ha/society)	53	187	165
Tree survival (%)	48	31	17
Surviving tree density (no./ha)	371	347	272
Average tree harvests per society	173	5778	8669
Average tree harvests per ha	3	31	52.5

Table- 3: Membership profile in pilot phase societies of IFFCO project

Particulars	Madhya Pradesh	Rajasthan	Uttar Pradesh
Membership	62	164	203
Proportion of women members (%)	7.0	6.5	8.9
Share of Land less (%)	39.5	8.7	17.2
Share of scheduled castes/ tribe members (%)	50	32.5	28
Share of backward class members (%)	19.2	39.2	36.5
Share of Other caste members (%)	30.8	28.3	35.5

Table-4: Annual average gross income by source for pilot societies (in %)

Activity	Project period * (1986-1996)	Post project period	
		Rajasthan	Uttar Pradesh
Nursery	69	6	48
Fertiliser sales	0	65	9
Fodder	15	0	0
Fisheries	7	0	0
Timber/fuel wood	4	14	34
Others	5	15	9
Total	100 (9397)	100 (96317)	100 (67252)

Note:* = average for all the pilot societies across the states; Figures in parentheses are amount in Rs.

Table-5: Economic evaluation of plantations of pilot phase of IFFCO's community forestry

State	Net returns (Rs./ha/yr)	Incremental net returns (Rs./ha/yr)	IRR (%)
At current age of plantations (at 17 years)			
Rajasthan	2785	2735	11.51
Uttar Pradesh	5139	4033	17.01
Madhya Pradesh	2931	2076	11.67
At the end of contract with land lords (at 30 years)			
Rajasthan	5168	5118	28.92
Uttar Pradesh	9822	8716	33.43
Madhya Pradesh	5216	4361	26.96

Table-6: Environmental cum economic evaluation of pilot phase of IFFCO's community forestry

State	Net environmental benefits (Rs./ha/yr)	Net returns (Rs./ha/yr)	Incremental net returns (Rs./ha.yr)	IRR (%)
At current age of plantations (at 17 years)				
Rajasthan	211	2996	2946	13.96
Uttar Pradesh	332	5471	4365	20.39
Madhya Pradesh	207	3138	2283	13.94
At the end of contract with land lords (at 30 years)				
Rajasthan	252	9564	9514	32.73
Uttar Pradesh	447	10269	9163	38.88
Madhya Pradesh	247	5463	4608	30.09