

Socio-economic Impact of Watershed Development Project in Manipur

S.B. Singh¹ and N. Prakash²

1. Prog. Coordinator, KVK, Imphal West, ICAR Research Complex for NEH Region, Manipur Centre, Imphal.

2. Joint Director, ICAR Research Complex for NEH Region, Manipur Centre, Imphal,

Corresponding author email: basantasingshoibam@rediffmail.com

ABSTRACT

Soil erosion due to traditional mode of farming is considered a serious environment constraint to agricultural and rural development in Manipur state, north east India. This paper attempted to study the impact of Khamenlok watershed project on changes in land use pattern, cropping pattern, income, employment and equity of the households in the watershed. The study indicated that the watershed project altered the land use system favorably to horticultural crops mostly fruits with little attention to the development of field crops and livestock including fisheries. The project could increase the income and employment opportunities of the households in the watershed. However, the most crucial thing is that this increased income was not distributed uniformly to all sections of people in the area satisfactorily. It necessitates proper attention to the landless, marginal and small farmers while planning for watershed development projects. Self employment schemes such as village level small scale industries, post harvest technologies and value addition, livestock and poultry etc. need to be developed.

Key words: *Land use pattern; Cropping pattern; Income; Employment; Watershed;*

Manipur state in North Eastern hill region of India has a geographical area of 22,328 sq km in which 90% are of hills. Soil erosion is one of the outstanding ecological problems in the state and it offers a frightening prospect for the coming decades. The main cause of erosion are a number of land use practices mainly *jhuming* that attempt to cope with the rapidly increasing population density, which now stands at about 3.6 lakh hectares (*Govt. of India, 2002*). More than 80% of the population has no other choice but to depend solely on the land for their livelihood because of lack of employment opportunities in the other sector of the economy. But the area of land available to each farmer household is decreasing due to an increasing subdivision among heirs. Consequently agricultural activities have been extended into areas of unsuitable land and these activities have resulted in deforestation of step mountain land. The farmers cultivate land in the traditional way under most unsophisticated, low yielding condition. Therefore, land productivity and environmental damage are unavoidable with an increasing population. In view

of the above facts, Government of India resolves that ending neglect of vast rainfed and mountainous areas would be a major policy concern in the eight five year plan.

The National Watershed Development Project for Rainfed areas was restructured and expanded to the north-eastern hill states including the state of Manipur with the objective of creating more employment opportunities and provides additional income in an equitable and sustainable manner. There is hardly any scientific study on the impact of watershed project on socio-economic condition among stakeholders in Manipur. This research paper is an attempt to study the impact of Khamenlok watershed project on changes in land use pattern, cropping pattern, income, employment and equity of the households in the watershed.

METHODOLOGY

Khamenlok watershed in Senapati district of Manipur being one of the 8 watersheds under National

Agricultural Technology Project (NATP) was randomly selected for the study. The watershed project was implemented by the Department of Horticulture and Soil Conservation, Government of Manipur under the centrally sponsored National Watershed Development Project for Rainfed Areas (NWDPRRA). All the 5 villages falling under the project were purposively selected due to the significant differences in the socio-cultural status of the farm households. Finally, using proportionate random sampling technique, 65 farm households were selected as representative sample. Personal interview method using pre-tested questionnaire was applied for the collection of primary data. Secondary data were collected from various reports of the project and published and unpublished record of the Government of Manipur. Simple statistical tools such as averages, percentages and frequency distribution were used to arrive at the results related to the study objectives. Gini Concentration ratio and Lorenz Curve were used to examine the impact of the project on household income distribution. The quantitative measure of Gini Concentration Ratio (GCR) is given as follows:

$$L = 1 - \sum_{i=1}^n p_i (I_i + I_{i+1})$$

Where,

L = Gini Concentration Ratio

pi = Proportion of population of ith class

Ii= Cumulative proportion of total income at ith class

I = 1,2,3n

n= Number of classes in the distribution

RESULTS AND DISCUSSION

Size of holdings: The examination of size of holdings (Table 1) revealed that the distribution of land holdings in Khamenlok watershed was highly skewed. Majority of the farmers in the watershed were either landless or having holding less than 1 ha. About 3 per cent of the households occupied 25 per cent of total holdings which indicated unfair distributing of holdings among the households. There was no change in distribution of size of holdings before and after the watershed project. The average size of holding per household remained stagnant at 1.23 ha.

Table 1. Distribution of size of holdings of sample farms in Khamenlok watershed.

Particulars	No. of farms		Area owned (ha)	
	Before Project	After Project	Before Project	After Project
Landless	11	11	0	0
	17	17	0	0
<1	20	20	10.70	10.70
1-2	31	31	13.00	13.00
	20	20	26.00	26.00
2-5	12	12	23.50	23.50
	18	18	29.00	29.00
>5	2	2	20.00	20.00
	3	3	25.00	25.00
Total	65	65	80.20	80.20
Average size of holding	-	-	1.23	1.23

Figures in parentheses indicate percentage to total.

Table 2. Land use pattern of sample farms in Khamenlok watershed.

Particulars	Before Project	After Project
Sample Size	65	65
<i>Total operated area</i>	153.60	252.13
		(64.15)
a. Private land	69.17	71.70
		(2.87)
b. Community Land	83.90	180.43
		(115.05)
<i>Arable land</i>		
a. Wet land cultivation	69.70	71.70
		(2.87)
b. Jhum cultivation	27.32	33.15
		(21.24)
c. Orchard	25.10	56.90
		(126.7)
d. Afforested area	7.10	71.26
	(903.7)	
e. Aquaculture	0.01	0.50
	(903.7)	
<i>Sub total</i>	129.23	233.51
	(80.69)	
Current fallow/	24.38	18.62
Natural forest		(-23.63)
Irrigated area	70.00	71.00
	(1.43)	

Figures in parentheses indicate percentage change

Land use pattern : Table 2 showed that the total operational area under Khamenlok watershed increased significantly. It is due to utilization of more community lands for fruit and forest tree plantations. The utilization of community lands in Khamenlok watershed increased by 115 per cent after the project. Creating Irrigation facilities in the watershed through construction of check dams and water harvesting structures was mandatory. However, no or little attention had been given for the creation of irrigation infrastructures that resulted into increased in irrigated area a marginal 1.43 per cent and area under wetland paddy cultivation 2.87 per cent. Finally, the area under *jhum* cultivation increased a significant 21.34 per cent after the project which was against the objective of the project.

The area under orchard, aquaculture, and afforestation increased substantially. Ultimately, the current fallow land declined significantly in this watershed. The ponds dug under the watershed project were used for aquaculture purpose only.

Cropping pattern: Table 3 revealed that paddy was the only crop in irrigated land during Kharif season. However, in Rabi season a negligible amount of land was under cultivation for Rabi crops.

There was moderate increase in area under Rabi crops after the watershed project. The homestead lands were used for growing vegetables and cash crops in both Kharif and Rabi seasons. The area under vegetables and cash crops in homestead land also increased marginally after the watershed project. The overall cropping intensity increases negligibly from 103.64 per cent to 104.29 per cent.

Livestock population and milk production: Table 4 depicts the performance of livestock improvement programme in the selected watershed. Livestock being an integral part of hill farming system, livestock improvement programme was introduced during the watershed project. Artificial insemination with exotic breeds of cattle, distribution of improved breeds of pig and poultry were major components of the program.

The table shows that the project had brought moderate change in livestock composition. There was no change in milk production. The reason being negligence on the part of implementing agency in

development of livestock as one of the activities of the watershed project

Table 3. Cropping pattern of sample farms in Khamenlok watershed.

Particulars	Before Project	After Project
<i>A. Irrigated area</i>		
i. Kharif		
Wetland paddy	69.70	71.70 (2.87)
i. Rabi		
Mustard	1.88	2.47 (31.38)
Potato	0.19	0.30 (57.89)
Others	0.24	0.31 (29.17)
Gross cropped area	72.01	74.78
Cropping intensity	103.00	104.00
<i>B. Rainfed area</i>		
i. Kharif		
Wetland paddy	-	-
Jhum	27.32	33.15 (21.34)
Ginger	0.46	0.65 (41.3)
Chilies	0.16	0.16 (-)
Beans	0.66	0.70 (6.06)
i. Rabi		
Potato	0.54	0.71 (31.48)
Mustard	0.33	0.45 (36.36)
Others	0.67	0.63 (-5.97)
Gross cropped area	30.14	36.44
Cropping intensity	104.38	104.60
Total grossed cropped area	102.15	111.22
<i>Overall cropping intensity</i>	103.64	104.29

Figures in parentheses indicate percentage change

Table 4. Livestock population and milk production in Khamenlok watershed.

Particulars	BP		AP	
	Imp	Local	Imp	Local
Cow	1	19	2 (100)	29 (53)
Bullock	7	21	16 (129)	24 (14)
Buffalo	18	27	26 (44)	31 (15)
Pig	20	31	27 (35)	62 (100)
Goat	-	-	--	--
Total livestock	36	98	71 (97)	146 (49)
Milk production lt/lactation				
i. Cow	450	300	450	300

Figures in parentheses indicate percentage change

Table 5. Family income (Rs/family) under Khamenlok watershed, Manipur

Components	BP	AP	% change
A. Farm Income			
i. Agriculture	25,855	27,890	7.87
ii. fruits	353	2589	633.43
iii. Livestock including fisheries	878	1083	23.34
Sub total	27084 (77.50)	31562 (78.46)	16.53
B. Off Farm Income			
i. Service including business	4655	4766	2.38
ii. Labour within watershed	2760	3325	20.47
iii. Selling of forest products	389	412	5.91
iv. Small scale industries	58	61	5.17
Sub total	7862 (22.50)	8564 (21.54)	8.92
Total	34946	40226	15.11

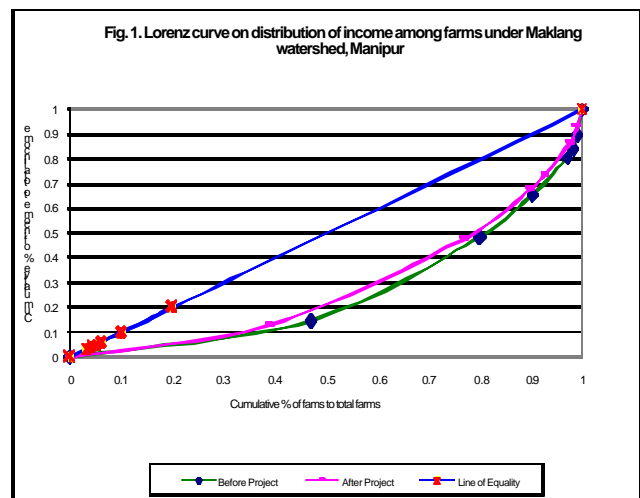
BP=Before project: AP=After Project

Changes in share of farm and off-farm income to the total income : To assess the impact of the project on farm income, income from various sources was calculated in terms of percentage change in income before and after the project. A perusal of Table 5 indicated that annual average income per household increased to Rs.40226 (15 per cent increase) in Khamenlok watershed. Farm income from agriculture, fruits and livestock including fisheries increased about 4478 and 16.53 per cent after the implementation of the

watershed project which indicates that income from fruits contributed a major share in increasing income of the watershed households.

The relative share of farm income in the total household income also increased marginally from 77.5 per cent to 78.46 per cent. The off-farm income particularly from labour within the watershed increased by 20.47 per cent. This shows that watershed project is somewhat successful in increasing farm income and employment opportunities. Further it can be concluded that watershed project had little impact in improving income from agricultural crops, livestock including fisheries and off-farm income particularly from village based small scale industries which need more attention for identifying underlying factors.

Pattern of income distribution: It was found that the share of the poorest 69 per cent of the households in Khamenlok watershed before the project was 56 per cent of the total income, which increased to about 62 per cent after the project. On the other hand, the share of the upper 5 per cent in the total income was 18 percent before the project, which decreased to about 14 per cent after the project. This increase in the share of the poorest group and decline in the share of the richest group after the project indicated an improvement in the farm income distribution after the project.



The Lorenz curve for farm household in Khamenlok watershed before and after the project was drawn and is shown in Fig. I. The Lorenz curve of the households after the project lie above that of before the project and the average farm income after the project was higher than that of before the project.

The Gini Concentration Ratio (GCR) was lower (0.36173) after the project as compared to before the project (0.38654), indicating that the income was more evenly distributed after the implementation of the project. It shows that the income disparity among the sample households have become better-off from before, i.e. the gap between the rich and poor has brought down. However, the impact of the project on the income distribution cannot be marked significant as shown by the Gini Concentration Ratio and Lorenz curve. It was in confirmation with the findings of *Lobo (1990)*, *Despande and Reddy (1993)*, *Singh et al (1993)* and *Kumar and Singh (2002)*. Therefore, more attention would be given to small, marginal and landless farmers for upcoming watershed projects in Manipur.

Changes in Employment level of the Sample Households: Employment level of sample households in man-days for the two study period was analyzed and found that the per hectare employment level had been marginally reduced. In other words, the per hectare employment which was 311.5 man-days has been declined to 306.8 man-days after the project i.e. a percentage change of (-) 1.5. The reason may be due to the increase in crop area which in turn led to the decrease in per hectare utilization of labour. On the other hand, the per family employment pattern showed that the level of employment had been increasing from 369.53

Indian Res. J. Ext. Edu. 10 (1), January, 2010 man-days to 457.94 man-days with a percentage increase of 24 only during the two period of study. It is mainly contributed by the horticulture components of the Watershed Programme. In short, employment opportunities have been created but it is not drastically changed.

CONCLUSION

The above facts clearly indicate that the watershed project altered the land use system favourably to horticultural crops mostly fruits with little attention to the development of field crops and livestock including fisheries. Therefore, the project could not reduce the area under shifting cultivation which was against the objective of the project. Since food security and livestock are the essential components of hill farmers, proper emphasis should be given in this direction. The project could increase the income and employment opportunities of the households in the watershed. However, the most crucial thing is that this increased income was not distributed uniformly to all sections of people in the area satisfactorily. It necessitates proper attention to the landless, marginal and small farmers while planning for watershed development projects. Self employment schemes such as village level small scale industries, post harvest technologies and value addition and livestock and poultry etc. need to be developed.

REFERENCES

1. Despande, R.S. and V.R. Reddy (1993). Watershed development approach in fragile resource region: an analytical study of Maharashtra. *Agricultural Situation in India*, **48**(3):163-67.
2. Kumar, N.R. and P. Singh (2002). Socio-economic impact of Aril watershed development programme in Bareilly district of Uttar Pradesh. *Journal of Agril. Development and Policy*, **14**(1):20-32.
3. Lobo, C. (1990). Watershed development: some implications for agrarian economic relations and rural employment. *Social Action*, **40**(2):146-62.
4. Basic Statistics of NER, NEC Secretariat, Govt. of India, 2002.
5. Singh, Karam, H.S. Sandhu, N. Singh and B. Kumar (1993). Kandi watershed development project: a critical evaluation. *Economic and Political Weekly*, **28** (52):A122-A128.