

Research Paper :

## Effect of soil and water conservation measures on cropping pattern and crop productivity

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### ABSTRACT

Evaluation of watershed development programme implemented in Attharwadi watershed was carried during 2007-08 to study effect of soil and water conservation measures on cropping pattern and crop productivity. Different soil and water conservation measures adopted in Attharwadi watershed were continuous contour trenches, loose boulder structures, earthen nala bund and farm pond etc. Socio-economic survey was conducted to study the effect of soil and water conservation measures on parameters such as cropping pattern, crop productivity, education level and farm mechanization.

**Key words :** Soil and water conservation measures, Crop productivity, Cropping pattern

Rainfed agriculture in Maharashtra is characterized namely by low productivity, degraded natural resources and wide spread poverty. The factors, which are responsible for the low level of productivity in the state, are obviously soil erosion and low irrigation coverage. Limited irrigation facilities, erratic behavior of monsoon, constant threat of drought to nearly half of the gross cropped area are the basic factors inhibiting progress of agriculture in the state. A review of Maharashtra's agricultural production for the last four decades reveals that there is large degree of fluctuations in the production of rainfed crops. It has been recognized that only through a holistic development like the watershed development programme, economic condition of people living in rainfed areas, can be improved. Watershed management is the integration of technologies within natural boundaries of a drainage area for optimum development of land, water and plant resources to meet the basic requirements of people and animals in a sustainable manner. Properly formulated watershed development programme based on a study of climate, soil, water and plant resources on the other hand, offers ample scope for evolving sustained livelihood support system in that land. In India, watershed management for rainfed area is an integrated area development approach to promote mixed farming systems under complex, diverse and risk prone environment by adopting suitable combination of crops, and forestry components in consonance with carrying capacities of soils. Reduction in runoff and soil loss and improvement

in production have been achieved through proper land use, selection of suitable crops and varieties, crop rotation and cultural practices. (Ranade *et al.*, 1995). The adoption of dryland conservation technologies can increase productivity and profitability of watershed area. Hence impact evaluation of dryland technologies is essential to know an overall effect of soil and water conservation measures on crop productivity and cropping pattern. Evaluation of watershed management programmes in 10 major agro-ecological regions of India indicated that the various interventions reduced soil loss by 10-80%, runoff by 2-42% and increased the productivity of arable lands by 4.2 to 15.4 q/ha (Ram babu *et al.*, 1997). Keeping in view, the importance of post project evaluation, a study was undertaken to evaluate the impact of soil and water conservation measures on crop productivity and cropping pattern in Attharwadi watershed area during 2007-08.

### METHODOLOGY

Attharwadi watershed is located in Hingoli district of Marathwada region, Maharashtra. It is located between 9<sup>0</sup>0' E longitude and 19<sup>0</sup>48' latitude. It is 30 km away from Hingoli city. The total geographical area of the watershed is 550 ha with undulating topography. The general slope of cultivable land in the watershed ranges from 1 to 5 per cent. However, at some locations maximum slope of 8 per cent is observed. In non-cultivated area at hilly and elevated degraded lands maximum slope of 15 - 20 per cent is observed. Attharwadi watershed receives

on an average 822 mm rainfall annually.

The survey was conducted for studying the effect of watershed development programme on cropping pattern and crop productivity. In watershed area main *Kharif* crops grown by farmers in pre-development period were soybean, sorghum, cotton and pigeonpea and in *Rabi* season wheat, sorghum and chickpea were major crops where as in summer season; very little area was under groundnut production. The existing cropping pattern was studied according to land use and discussions were made with farmers regarding improvement and adoptability of the new crops packages or technology (Lavrane, 2003 and Gawali, 2005).

The socio-economic study was carried out in Attharwadi watershed to assess the impact of watershed development programme on village peoples and farming system. The data pertaining to socio-economic condition of the farmers were collected. Information was collected from farmers by personal interview method on various aspects. At the time of interview, the major points covered were educational status, live stock population and farm mechanization. The data collected from farmers was compared with pre-development data provided by State Agriculture Department, Hingoli.

## RESULTS AND DISCUSSION

The area under various crops and their productivity in *Kharif* season in predevelopment and post development

period is presented in Table 1. It is seen that in *Kharif* season, area under pulses *i.e.* soybean, greengram, black gram, and pigeonpea was found to be increased by 16.09, 26.66, 9.09 and 180 per cent, respectively. In pre-development stage of the watershed, there was no paddy cultivation but in year 2007-08, near about 10 ha. area was under paddy cultivation and its productivity was 24.80 q/ha. The productivity of cotton and sorghum was found to be increased by 67.87 and 57.76 per cent, respectively during 2007-08.

The area under various crops and their productivity in *Rabi* season in predevelopment and post development period is presented in Table 2. It reveals that area under chickpea increased from 30 ha to 42 ha and area under safflower increased from 5 ha to 19 ha. Productivity of chickpea and safflower increased by 54.24 and 44.59 per cent, respectively.

In 2007-2008, a special project was implemented by State Agriculture Department in Attharwadi watershed for increasing the wheat production. About 95 ha. land was under the study of wheat production project. Productivity of the wheat was 32.17 q/ha, which shows the success of this project.

Area under groundnut and its production in summer season is presented in Table 3. It reveals that area under groundnut increased from 5 ha to 12.19 ha and its productivity increased from 22.75 q/ha to 27.60 q/ha. Increase in productivity of the summer groundnut was

**Table 1 : Area under various crops and their productivity in *Kharif* season**

Crops	Predevelopment (2002-03)		Post development (2007-08)		Per cent increase	
	Area (ha)	Productivity (q/ha)	Area (ha)	Productivity (q/ha)	Area	Productivity
Paddy	---	---	10	24.80	---	---
Soybean	205	13.07	238	24.04	16.09	83.93
Greengram	30	5.63	38	9.42	26.66	67.31
Blackgram	55	5.43	60	10.06	9.09	88.95
Cotton	15	8.53	25	14.32	66.66	67.87
Pigeonpea	10	8.34	28	17.64	180	111.51
Sorghum	30	13.07	42	20.64	40	57.76

**Table 2 : Area under various crops and their productivity in *Rabi* season**

Crops	Predevelopment (2002-03)		Post development (2007-08)		Per cent increase	
	Area (ha)	Productivity (q/ha)	Area (ha)	Productivity (q/ha)	Area	Productivity
Wheat	15	15.12	95	32.17	533.33	112.76
Chickpea	30	6.69	42	10.32	40.00	54.26
Safflower	5	3.61	19	5.22	280	44.59

**Table 3 : Area under groundnut and its production in summer season**

Crop	Predevelopment (2002-03)		Post development (2007-08)		Per cent increase	
	Area (ha)	Productivity (q/ha)	Area (ha)	Productivity (q/ha)	Area	Productivity
Groundnut	5	22.75	12.19	27.60	143.8	21.31

**Table 4 : Area under horticulture crops and vegetable during pre-development and post development of the watershed**

Crops	Predevelopment (2002-03)		Post development (2007-08)		Per cent increase	
	Area (ha)	Crop productivity (q/ha)	Area (ha)	Crop productivity (q/ha)	Area	Crop productivity
Mandarin orange	7	25	33	45	371.42	80
Sweet orange	3	22	10	41	233.33	86.36
Capsicum green	5	20	9	35	80	75
Onion	4	30	12	50	200	66.66

**Table 5 : Live stock population in pre and post development of watershed**

Sr. No.	Particulars	Population of livestock		Per cent increase in livestock
		Before development (2002-2003)	After development (2007-08)	
1.	Goat	22	49	122.72
2.	Cows	32	59	84.37
3.	Hens	250	310	24.00
4.	Bullock	100	120	20.00
5.	Buffaloes	20	31	55.00

because of the availability monsoon water stored in farm pond.

Area under horticulture crops and vegetable and their productivity during pre-development and post development of the watershed is presented in Table 4. It is seen that area under mandarin orange was found to be increased from 7 ha to 33 ha and area under sweet orange increased from 3 ha to 10 ha. Watershed activities coupled with National Horticulture Scheme is the reason for increased area under fruit crops. Due to availability of the irrigation water, productivity of capsicum green and onion increased by 75 and 66.66 per cent, respectively. Bangar and Sthool (2004) also reported that, after implementation of National Horticultural Scheme, there was tremendous change in production and productivity of fruit crop at village Ajnale of Solapur district. Hazara (1993), Ranade (1995) and Rao (1997) also reported the increase in agricultural productivity due to watershed activities.

#### Socio-economic status:

The livestock survey in the area indicated increasing trend in livestock over pre-development period (Table 5). The increased in number of goat, cows, bullocks and buffaloes was 122.72, 84.37, 20 and 55%, respectively over pre-development period. It may be due to increased in availability of feed and fodder. Mandal *et al.* (2006) reported increased in livestock population over pre-development period at CSWCRTI, Bellary.

In Attharwadi watershed area, before development of watershed, farmers were using traditional bullock drawn implements like seed drill, harrow and hoes and hand operated tools. But in post-project period, there was

**Table 6 : Machinery inventory in watershed**

Sr. No.	Name of equipments	Before	After
		development (2002-2003)	development (2007-08)
1.	Tractor	---	2
2.	Jeep	---	2
3.	Electric pumps	12	27
4.	Oil engines	4	10
5.	Tractor drawn seed drill	---	1
6.	Drip set	---	2
7.	Sprinkler set	---	5
8.	Thresher	1	4
9.	Bullock drawn implements	25	41

increase in farm mechanization due to better economic condition of farmers. Various farm machineries used in Attharwadi watershed are presented in Table 6. It reveals that number of tractor increased by two, tractor drawn seed drill by one from none, electric pumps from 12 to 27 and oils engines from 4 to 10 on post development stage of watershed. Similarly, drip sets and sprinkler sets increased by 2 and 5 from none, respectively during 2007-08.

#### Conclusion:

From above results it is concluded that different soil and water conservation measures *viz.*, continuous contour trenches, loose boulder structures, earthen nala bund and farm pond showed their positive effect on cropping pattern

and crop productivity. Availability of irrigation water stored during monsoon season increased the area under *Rabi* and summer season as well as the observation wells under influence of farm pond showed increase in groundwater table. Increase in crop productivity and livestock population resulted better economic condition off farmers, which led to improvement in lifestyle of watershed community.

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