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### IMPACT OF WATERSHED DEVELOPMENT PROGRAMME IN GIRD ZONE OF MADHYA PRADESH

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#### ABSTRACT

A study was conducted during 2010-11 in Budhara micro watershed in Ambah block of Morena district of Madhya Pradesh. To assess the impact of watershed development programme a benchmark survey was under taken on management practices. Positive effect of programme was noticed an increase in area of arhar and wheat while productivity of gram and arhar was increased with a change in arable area, agricultural area, irrigated area, cropping intensity, water resources and area of horticultural crops. Micro and macro soil nutrients and its availability were also increased. However, the cattle population was also increased due to sufficient water and fodder availability. Using modern inputs like high yielding varieties, chemical fertilizers, irrigation and plant protection measures, etc. productivity of crops can be increased. The co-ordination of farmers and government functionaries, land development activities were some of the measures for improving the Budhara Micro Watershed. Better co-ordination between development agencies and voluntary organizations is also essential for effective implementation of watershed programme.

**Keywords:** Watershed programme, area, Productivity, nutrients use.

#### INTRODUCTION

Soil, water, vegetation, nutrients and energy are the basic natural resources needed for agricultural production. Due to ever-increasing population pressure, these natural resources are shrinking very fast (Raju *et al.* 2004). Since agricultural development is not possible on deteriorating natural base, thus, there is a need to lay emphasis on conservation and judicious utilization of these resources through adoption of sustainable management practices. It is an established fact that conservation of natural resources and their management holds key to sustainable agriculture (Mishra, 1990). In India, the conservation of soil and rainwater, the two basic resources to mankind, have been practiced since ancient times. However, there has been renewed emphasis in the recent past on conservation of these basic resources and their efficient utilization (Gangadharappa *et al.*, 1998).

About two-thirds of the country's cultivated land currently depends exclusively on rainfall, which is often erratic and poorly distributed. Water, soil and vegetation are the most vital natural resources for the survival of people. Watershed forms an integral component of these basic, natural resources. Watershed conditions influence the productivity of food, fuel, fodder, fiber and fruits. Growing demand for these items has extensively depleted the protective vegetative cover and exposed surface soils, which has resulted in partial to complete loss of nutrients and thereby reducing productivity and endangering vital life, support system. Experiences of many have also indicated that it is not very difficult to organize people around a profitable activity for some time but sustaining of such interest for a long period has been difficult. Mobilization of people's participation would need much more intensive interaction while the communities would be needed to be involved in the process of planning, execution and management of the watershed to the extent possible. It is well known fact that after construction of watershed the water for

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irrigation was increased, which brings the changes in cropping pattern and increases the crop productivity in the respective watershed areas. The Budhara micro watershed developed under Rajiv Gandhi Watershed Mission (RGWM) during 2005-06 to 2010-11 at Ambah block of district morena comes under Gird Zone of Madhya Pradesh having 500 hectare treatment area. Watershed secures availability of water in particular area. After the availability of sufficient water in particular area, which impact may be found.

The impact of this micro-watershed on different aspect of agricultural production, structural, operational, and extent of technological adoption needs to be examined. Hence the present study was under taken to assess the impact of watershed development programme in Gird Zone of Madhya Pradesh.

#### METHODOLOGY

The Budhara micro watershed is situated at Ambah block of Morena district comes under Gird Zone of Madhya Pradesh. This area has semi-arid sub-tropical climate having maximum temperature up to 47°C and minimum up to 12°C. The most of the rainfall is received during mid-July to early October. The average annual rainfall is 702 mm. Alluvial soil is generally found in this area which is quite suitable for growing bajra, arhar, guar, mustard, wheat and gram etc. (Commissioner, MP land Record, 2011).

The Budhara Micro Watershed of Morena district was purposively selected for this study during 2010-11. Out of 250 farmers, 50 beneficiary farmers were selected randomly for the study. All the farmers, who were selected as respondents for the benchmark survey of

Table 1. Change in area of major crops in micro WS-Budhara after implementation of watershed programme.

Major Crops(ha)	Pre-project status(ha)	Post-project status(ha)	Absolute change (ha)	Relative change (%)
<b>Kharif crops</b>				
Bajra,	200	230	+30	15.00
Arhar	35	100	+65	185.71
<b>Rabi crops</b>				
Wheat	125	175	+50	40.00
Mustard	195	195	0	0.00
Gram	75	55	-20	-26.67

**Change in productivity:** The impact of watershed development programme is also studied in terms of crop productivity from the post project status. It can be evident from the table-2. That the highest increment in productivity was observed in Gram (30%) followed by

this project in year 2005-06, were used for this study. For the study, pre tested interview schedules were used for obtaining data and were compared with the data collected for the benchmark survey and from Patwari records. The secondary data for year 2010-11 were collected from the own survey and project records from Govt. offices. Simple percentage distribution statistical methods were used for analysis of data. The impact of watershed development programme was studied in terms of change in area under different crops, productivity, land use pattern, land resources use, Change in water resources, Change in micro and macro Soil nutrients availability and livestock status.

#### RESULT AND DISCUSSION

**Change in area:** The data presented in Table-1 revealed that total area under crops increased after implementation of watershed programme in the Budhara watershed area. The positive changes were observed in the area of Arhar (185.71%) in *Kharif* and wheat (40.00%) in Rabi season over the period of implementation. Whereas, no change was seen in mustard area. However, reduction was observed in the area of gram (-26.67%). The figures implies that due to Insufficient availability of irrigation water, timely availability of agricultural Inputs and training imparted by extension agents, after implementation of watershed programme.

Area of crops like wheat, which need timely irrigation, has significantly increased. Thus, the positive change clearly indicates the healthy impacts in the study area due to watershed development programme. These findings are similar to those of Shrivastava *et al.* (1996).

Arhar (25%) and similarly both in Bajra and Mustard (16.67%). The productivity of Wheat also increased by (9.38%) after the project implementation period. Due to watershed development programme farmers used modern inputs like high yielding varieties, chemical

fertilizers, timely irrigation and use of plant protection measures etc. may increase the productivity of crops. Similar findings were also reported by Jat *et al.* (2008).

**Change in land use pattern:** The impact of watershed development programme in terms of change in land use pattern is presented in table-3. Availability of arable and non-arable land was affected as a decrement in non-arable land (-7.41%) and increment in arable land (7.59%). The study showed that the average cropping intensity was observed 185 percent as compare to 125

percent in bench mark of survey during the year 2005-6 in Budhara watershed area. An increase in agricultural and irrigated area about 7.59% and 90% respectively in watershed area in the year 2010-11 as compared to starting of the programme 2005-06. Thus, it could be inferred that due to the participation in the watershed management activities farmers were able to gear up their adoption on soil and water conservation practices. Similar findings were also reported by Desai *et al.* (1997).

Table2. Change in productivity of major crops in micro WS-Budhara after implementation of watershed programme.

Crops	Pre-project status (qt /ha.)	Post-project status (qt /ha.)	Absolute change	Relative change (%)
<b>Kharif crops</b>				
Bajra	18	21	+3	16.67
Arhar	12	15	+3	25.00
<b>Rabi crops</b>				
Wheat	32	35	+3	9.38
Mustard	12	14	+2	16.67
Gram	10	13	+3	30.00

Table3. Change in land use pattern in micro WS-Budhara after implementation of watershed programme.

Change in land use pattern	Pre-project status	Post-project status	Absolute change	Relative change (%)
Arable land (ha)	395	425	+30	7.59
Non-arable land (ha)	405	375	-30	-7.41
Change in cropping intensity (%)	125%	185%	+60	48.00
Increase in Agricultural land (ha)	395	425	+30	7.59
Change in area under irrigation(ha)	50	95	+45	90.00

**Change in land resources:** Highly positive change was noticed in area of pasture land (125%), area under horticultural crops (350%) and vegetation of the watershed area (100%), due to wasteland development. Which was nil at the time of benchmark survey in the year 2005-06. Thus, the positive change clearly indicates healthy impacts by the adoption on horticultural and

forestry practices. Forestry programme was observed only on wasteland, panchayat and government land, very few farmers planted forest plants, bushes and grasses in the study area. This might be due to marginal and small land holdings, where they preferred to grow food grain crops rather than the tree plantation. These results in conformity with Desai *et al.* (1997).

Table4. Change in land resources use activities in micro WS- Budhara after implementation of watershed programme.

Change in land resources use activities (ha)	Pre-project status	Post-project status	Absolute change	Relative change (%)
Increase area under pasture	20	45	+25	125.00
Increase in area under horticulture crops	2	9	+7	350.00
Increase in vegetation area.	0	30	+30	100.00
Status of waste land development.	0	30	+30	100.00

**Change in water resources:** The data presented in Table-5 revealed that no soil and water conservation structures were constructed before implementation of

watershed development programme. Whereas, 18 numbers of structures have been constructed after watershed development programme. Due to increase in

ground water status some new wells and hand pumps also constructed. Water run-off reduced by small structures resulted in increased agriculture area. Wells and hand pumps, which used to dry up during the summers have been converted into perennial sources of

water, the conservation of soil in the farms has resulted in the better productivity of crops in the watershed development programme. Similar results were found by Verma (2008).

Table5. Change in water resources in Micro WS Budhara after implementation of watershed programme.

Change in water resources	Pre-project status	Post-project status	Relative change (%)
Number of soil and water conservation structure	0	18	1800
Number of Wells	4	6	50
Number of Hand pump	7	12	72

**Change in nutrients:** The data presented in table-5 revealed that nutrients availability to major crops increased after implementation of watershed programme in the Budhara watershed area.

The positive changes were observed in the availability of Nitrogen (14.28%), Phosphorus (62.22 %), Potash (12.32 %), Sulphur (58.33 %), Zink (253.06 %) and Organic carbon (50%) after the period of implementation. Thus, the positive change is clearly evident by the soil testing and recommended use of

fertilizers in the study area (Yadav and Sharma, 2003).

**Change in livestock status:** The data in table-6 revealed that before project implementation, livestock population was less as compared to after project implementation. The positive change in livestock population was found due to improvement of fodder availability, balanced feeding of animals and vaccination in animals has also increased in the area. Watershed management was showed positive impact on farming community. Similar findings were also reported by Shrivastava *et al.* (1996).

Table6. Change in Major and Micro nutrients availability to major crops in Micro WS-Budhara after implementation of watershed programme.

Availability under major crops in Nutrient (Kg/ha.)	Pre-project status	Post-project status	Absolute change	Relative change (%)
Nitrogen	203.00	232.00	+29	14.28
Phosphorus	11.7	18.35	+7.28	62.22
Potash	293.00	429.11	+36.11	12.32
Sulphur	14.4	22.8	+8.4	58.33
Zink	0.49	1.73	+1.24	253.06
Organic carbon	0.30	0.45	+0.15	50.00

Table7. Change in livestock status in Micro WS-Budhara after implementation of watershed programme.

Live stock	Pre-project status (No.)	Post-project status (No.)	Absolute change (No.)	Relative change (%)
Cow	132	184	+52	39.39
Bullock	70	93	+23	32.86
Buffalos	209	324	+115	55.02
Sheeps	30	38	+8	26.67
Goats	160	202	+42	26.25
birds	200	265	+65	32.50
fodder availability (qt.)	250	450	+200	80.00

## CONCLUSION

It could be concluded that the overall watershed management practices in the study area have positive and effective changes on agricultural area, crop productivity, land use, use of land resources, water

resources, availability of nutrients and livestock due to increase in availability of water in the watershed area. It was also found positive change in Arable land (7.59%), Agricultural land (7.59%), irrigated area (90%), Cropping intensity (48%), area under horticultural and

vegetables crops. Similarly cattle population was also increased due to sufficient availability of water and fodder in watershed area.

The results of the study suggested that appropriate steps needed to be taken by the farmers for rational use of cultivated land, wasteland, forests and other common property resources. Using modern inputs like high yielding varieties, chemical fertilizers, irrigation and plant protection measures, *etc.*, increased the productivity of crops. The co-ordination of farmers and government functionaries, land development activities were some of the measures for improving the Budhara Micro Watershed. Better co-ordination between development agencies and voluntary organizations is also essential for effective implementation of watershed programme. The lack of effective coordination among project officials, agriculture extension department, agriculture research station and farmers near the study area is a constraint in the adoption of watershed technique.

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