Indian Journal of Economics and Development

Volume 13
No. 2a
April, 2017

Print ISSN 2277-5412
Online ISSN 2322-0430

Reprint

Society of Economics and Development
www.soed.in

Indian Journal of Economics and Development
Volume 13 No. (2a): 591-595
April, 2017
DOI: 10.5958/2322-0430.2017.00136.6

www.soed.in

Impact of IWMP on Land Use and Cropping Pattern in Central India

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Received: December 23, 2016 *Accepted: March 15, 2017*

ABSTRACT

The present study has been undertaken to analyze changes occurred in irrigation potential and determine the impact of Integrated Watershed Management Programm (IWMP-Watershed Development) on land use and cropping pattern in Madhya Pradesh. All the 33 watershed development areas 32 districts under the project have been selected in the State. 10 per cent or minimum 10 beneficiaries (1285) were selected randomly under these watershed development areas for the study. It was observed from the study that irrigation by all the sources was found to be increased by 17.36 per cent in the current year (0.47 ha) as compared to base year (0.40 ha) in an average farmer's field with the implementation of the project in the State. The size of holding, net cultivated area of an average farmer was also found to be increased by 2.14 per cent and 4.88 per cent respectively during the period under study. The area under uncultivated waste land, non-agriculture and grazing land, current fallow and old fallow was found to be decreased by 28.57, 14.71, 14.29 and 14.06 per cent respectively. The cropping intensity of an average farm was found to be increased by 11 per cent from 151 (Base year) to 162 per cent (current year). The area under rabi crops (7.51 per cent) increased more compared to kharif crops (7.34 per cent). The result of increased in area and productivity of the crops the production of crops were also found to be increased from 3.47 (Mustard) to 118.98 (Lentil) per cent in the current year as compared to the base year.

Keywords
Cropping pattern, irrigation, IWMP, land use, productivity

JEL Codes
O32, Q01, Q15, Q24, Q25, R14

INTRODUCTION

The watershed programme endeavour to improve, optimize and sustain production and productivity of all categories of land. The specific object of the programme include, promotion of in situ soil and water conservation, optimum use of land to minimize risk in rainfed farming, increase productivity of land and provide higher returns to the farmers on a sustainable basis through adoption of better technology, cropping pattern and diversification of sources of income, proper management to non-arable land, improvement of ground water recharge and production on food, fodder, fuel, fiber, fruits and timber to maintain the ecological balance (Ramanna, 1991). Most of the watershed projects in India are implemented with the twin objectives of soil and water conservation and enhancing the livelihood of rural poor (Sharma & Scott, 2005).

The Watershed Development Programmes (WDPs) have been accorded high priority in India's development plans (Singh *et al*., 1991). These programmes have been initiated in India to improve and sustain productivity and the production potential of the dry and semi arid regions of the country through the adoption of appropriate production and conservation techniques (Ninan and Lakshmikanthamma, 2001). Ministry of Rural Development, Government of India had started watershed management programme in the year 1994 under Drought Prone Area Programme (DPAP) and Integrated Wasteland Development Programme (IWDP). Considering its importance, Government of Madhya Pradesh, Panchayat and Rural Development Department had also constituted Rajiv Gandhi Mission for Watershed Management (RGMWM) in August, 1994 to plan and implement the watershed projects in mission mode with the aim of reducing the vulnerability to droughts, improving the incomes and livelihood of people and also providing short-term employment opportunities. Rainfed agriculture added about 44 per cent of total food production and 75 per cent of oilseeds and pulses production in India (Rambabu, 1987).

The main objectives of the IWMP (Watershed Development) is to enhance agricultural productivity by increasing in situ moisture conservation and protective irrigation for socio economic development of rural people (Joshi *et al.,* 2004). Taking this in view the country wide watershed development projects sectioned by the government of India during 1995–1998, and had been taken up by ministry of rural development. The benefits have been seen in the forms of, enhanced quality of the water harvesting structures, reduction in the soil erosion, increase in the ground water level, change in the land use land cover pattern, cropping intensification. Although these benefits are seems to be valuable for the society it may not necessarily virtuous for the environment. Keeping these views in mind the present study has been undertaken in all the watershed areas (33) to analyze change in irrigation potential and determine the impact of watershed mission on land use and cropping pattern in Madhya Pradesh.

METHODOLOGY

The study based on the primary data. The data were collected through pre-tested interview schedule from the respondents.

These primary data have been classified into two parts i.e. before and after inception of irrigation potential and productivity component in the watershed approach in the area under study.

All the 33 watershed development areas from 32 districts have been selected in the State. 10 per cent or minimum 10 beneficiaries from each category were selected randomly under the watershed development area. Thus, 1285 beneficiaries have been selected for the study covers 18.18 per cent of beneficiaries and more than 30 per cent of total Watershed Command Area of Madhya Pradesh (Table 1). To analyze the impact of the study year 2009–10 and 2014–15 were taken as the base and the current year for the study.

RESULTS AND DISCUSSION

The change occurred potential of irrigated water from different sources and its impact on Land Use and Cropping Pattern have been analyzed for the study.

Irrigated Area

The changes occurred in irrigated area, depth of water table and number of irrigations was observed and presented in Table 2.

An overall area under irrigation by all the sources was found to be increased by 17.36 per cent in the current year (0.47 ha) as compared to base year (0.40 ha) with the implementation of IWMP in the State. The maximum increase in area under irrigation was from wells (17.86 per cent) followed by tube-wells (17.54 per cent) and ponds (12.90 per cent).

The depth of water table was found to be decreased remarkably in the State after implementation of the project. Amongst different sources of irrigation, the maximum decrease of 22.73 per cent from (1.10 to 0.85

Table 1: Number of selected beneficiaries in different size of farms

Agro-Climatic Zone	Selected No of IWMP	Marginal	Small	Medium	Large	Total
Vindhya Plateau	6	85	57	48	21	211
Central Narmada Valley	1	10	10	10	9	39
Jhabua Hills	2	22	23	18	3	66
Kymore Plateau	6	90	64	55	46	255
Nimar Plains	2	20	20	20	1	61
Northern Hill of Chhattisgarh	1	10	10	10	10	40
Satpura Hills	2	20	20	20	14	74
Bundelkhand region	3	42	45	33	20	140
Gird Region	3	43	33	24	20	120
Malwa Plateau	7	89	80	71	39	279
Madhya Pradesh	**33**	**431**	**362**	**309**	**183**	**1285**

Table 2: Changes occurred in irrigated area in Madhya Pradesh

Sources	Irrigated area (ha)			Depth of water table (M)			Number of irrigations		
	Base year	Current year	Per cent change	Base year	Current year	Per cent change	Base year	Current year	Per cent change
Ponds	0.08	0.09	12.50	1.10	0.85	–22.73/29.41	0.7	0.8	14.29
Tube-wells	0.57	0.67	17.54	30.73	28.48	–7.32/7.90	2.3	3.3	43.48
Wells	0.56	0.66	17.86	11.98	9.43	–21.29/27.04	2.8	3.8	35.71
Overall	0.40	0.47	17.36	14.6	12.9	–11.53/13.18	1.9	2.6	36.21

meter) in depth of water table was found in case of ponds followed by wells (21.29 per cent) from 11.98 to 9.43 meter and tube-wells (7.32 per cent) from 30.73 to 28.48 meter in current year as compared to base year. The maximum increase in number of irrigations were found in case of tube wells (43.48 per cent) from 2.3 to 3.3 followed by wells (35.71 per cent) from 2.8 to 3.8 and ponds (14.29 per cent) from 0.7 to 0.8 in current year as compared to the base year.

Land Utilization

The size of holding of an average farmer was also found to be increased by 2.14 per cent in the current year as compared to the base year. The increase in size of holding might be due to extra land could have been purchased by the farmers or inclusion of leased in land in the current year (Table 3). The cultivated area was also found to be increased by 4.88 per cent, that is, from 2.31 (Base year) to 2.42 ha (current year). The area under uncultivated waste land, non-agriculture and grazing land, current fallow and old fallow was found to be decreased by 28.57, 14.71, 14.29 and 14.06 per cent respectively due to implementation of the project in the State.

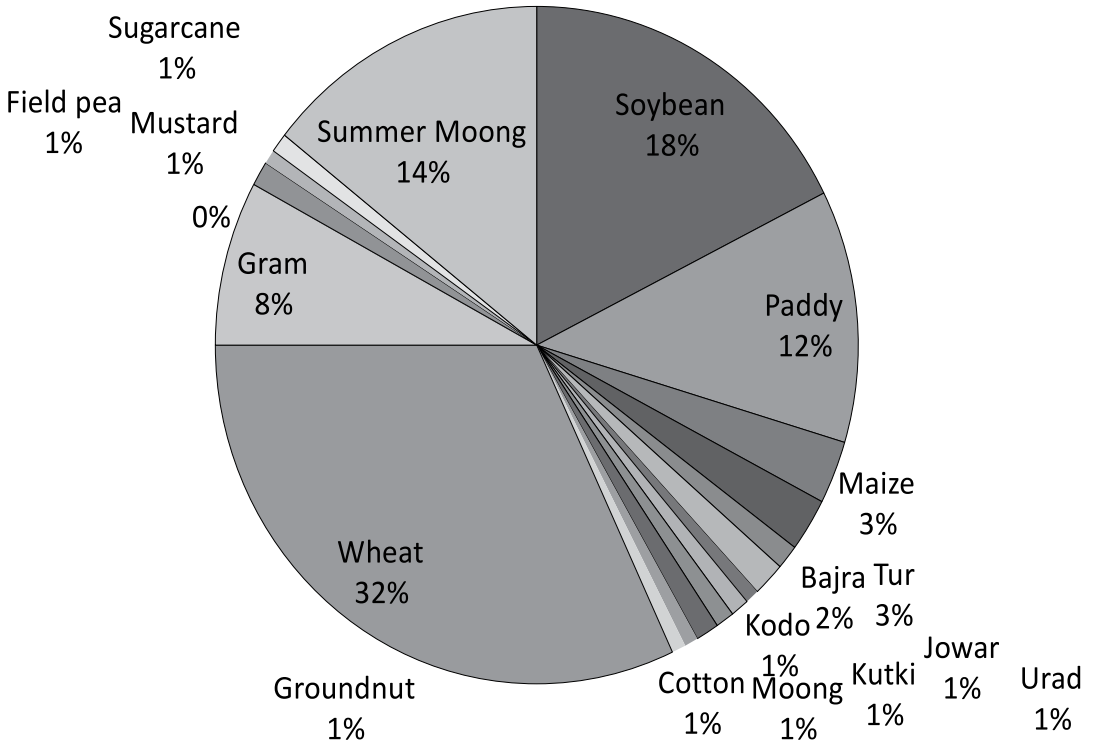
Cropping Pattern

The changes occurred in cropping pattern as well as cropping intensity has also been observed for various size of farm and presented in the Table 3. It is observed from the data that an average farmer was found to be devoted in 3.86 ha of land in cultivation of crops in the year 2014-15. Wheat (32 per cent) followed by soybean (18 per cent), summer moong (14 per cent), paddy (12 per cent), gram (8 per cent), maize (3 per cent) and tur (3 per cent) were found to be major crops of th Madhya Pradesh. Jwar (1 per cent), bajra (1 per cent), kodo (1 per cent), kutki (1 per cent), moong (1 per cent), field pea (1 per cent), cotton (1 per cent), urd (1 per cent), mustard (1 per cent), groundnut (1 per cent), and sugarcane (1 per cent) were also been found to be growth by the farmers (Figure 1). Cropping intensity of an average farm was found to be increased by 11 per cent from 151 (Base year) to 162 per cent (current year) during the period under study. The net and gross

Table 3: Changes occurred in land utilization pattern in Madhya Pradesh

(Ha)

Particular	Base year	Current year	Per cent change
Size of holding	2.69	2.74	2.14
Cultivated land	2.31	2.42	4.88
Non-agri and grazing land	0.09	0.07	-14.71
Graging and other	0.07	0.05	-28.57
Current fallow	0.07	0.06	-14.29
Old fallow	0.16	0.14	-14.06



Figures 1: Cropping pattern of an average farmer

Table 4: Changes occurred in area, production and productivity in Madhya Pradesh

Crops	Area (ha)			Production(q)			Productivity kg/ha		
	Base year	Current year	Per cent change	Base year	Current year	Per cent change	Base year	Current year	Per cent change
Soybean	0.71	0.76	7.04	5.28	6.00	13.66	7.44	7.90	6.14
Paddy	0.48	0.52	8.33	9.51	11.39	19.76	19.82	21.91	10.56
Maize	0.11	0.13	18.18	1.59	2.01	26.35	14.46	15.46	6.90
Tur	0.10	0.11	10.00	0.71	0.86	21.05	7.07	7.78	10.01
Jowar	0.05	0.05	0.00	0.66	0.69	5.64	13.13	13.87	5.61
Bajra	0.09	0.07	-22.22	0.90	0.75	-15.82	9.96	10.78	8.19
Urad	0.03	0.03	0.00	0.09	0.09	8.07	2.85	3.08	8.15
Kodo	0.03	0.04	33.33	0.14	0.20	41.65	4.81	5.11	6.27
Kutki	0.05	0.04	-20.00	0.28	0.24	-15.86	5.60	5.89	5.30
Moong	0.03	0.05	66.67	0.11	0.22	102.80	3.69	4.49	21.60
Groundnut	0.02	0.03	50.00	0.37	0.59	61.51	18.37	19.78	7.68
Cotton	0.02	0.03	50.00	0.26	0.40	55.09	12.96	13.40	3.36
Total Kharif	**1.77**	**1.90**	**7.34**						
Wheat	1.21	1.38	14.05	28.64	35.34	23.40	23.67	25.61	8.19
Gram	0.41	0.34	-17.07	3.76	3.36	-10.46	9.16	9.89	7.94
Lentil	0.01	0.02	100.00	0.05	0.12	118.98	5.48	6.00	9.57
Field pea	0.04	0.05	25.00	0.24	0.31	28.76	5.99	6.17	3.10
Mustard	0.03	0.03	0.00	0.21	0.21	3.47	6.92	7.16	3.37
Sugarcane	0.03	0.04	33.33	0.97	1.39	43.28	32.29	34.70	7.49
Total Rabi	**1.73**	**1.86**	**7.51**						
Summer Moong	0.37	0.62	67.57	0.16	0.25	57.56	3.97	4.17	5.04
GCA	3.48	3.86	11.15						
NCA	2.31	2.42	4.88						
CI (per cent)	151	162	11.00						

cropped area was also found to be increased by 4.88 and 11.15 per cent respectively.

The area under rabi crops (7.51 per cent) showed more percentage increase as compared to kharif krops (7.34 per cent) in current year compared to base year. Amongst different kharif crops the area of all the crops found to be increased except till (-20.00 per cent), bajra (-22.22 per cent) and kutki (-20.00 per cent). Amongst rabi crops the area of all the crops found to be increased from 14.05 per cent (Wheat) to 100 per cent (Lentil) except gram (-17.07per cent).

The area of summer moong was also found to be increased by 67.67 per cent in the current year as compared to the base year during the period under study. The result of increased in area and productivity of the crops the production was also found to be increased from 3.47 (Mustard) to 118.98 (Lentil) per cent at overall level in the current year as compared to the base year. At overall level the change in production of lentil was found to be maximum (118.98 per cent) followed by moong (102.80 per cent), cotton (61.51 per cent), Zaid Moong (57.56per cent), cotton (55.09 per cent), sugarcane (43.28 per cent), kodo (41.65 per cent), field pea (28.76 per cent), maize (26.35 per cent), wheat (23.40 per cent), arhar (21.05 per cent), paddy (19.76 per cent), soybean (13.666 per cent), urad (8.07 per cent), jowar (5.64 per cent) and mustard (3.47 per cent), while the production of kutki, bajra, gram, and seasame was found to be decreased by 15.86, 15.82, 10,46 and 10.32 per cent respectively in the current year over the base year. The maximum increase in productivity of moong, sesamum, paddy and arhar was found to be 1.60, 12.06, 10.56 and 10.01 per cent respectively while, amongst the remaining crops grown in the region the change in productivity ranged between 3.10 (Field Pea) to 9.57 (Lentil) per cent at overall level of different size of holding (Table 4).

CONCLUSIONS

It is clear from the above findings that not only area under irrigation through all the sources of irrigation was found to be increased due to remarkable decrease in depth of water table almost in all the sources, but the number of irrigations by all the resources and area under irrigation were also increased across different size of holdings. Although, the yield of crop were found to be increased except jawar and maize with the successful implementation of watershed approach in the area under study but still there is found yield gap in the actual farmer yield and potential yield of crop as per the recommended package of practices (Kumar *et al*., 2016). Hence affords should be made to find out the constraints which came

across increase potential yield of the crops in the area under study.

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