



# Agrarian Transformation through Technical and Institutional Reforms: A Case Study of Madhya Pradesh

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The state of Madhya Pradesh is the only state of the Union of India where Agricultural growth has consistently been between 15-20 % in the last quinquennial (2010-15). Year 2010 can be marked as structural break for agrarian development, which coincides with high priority given to agriculture by the current regime. As a result, the state of Madhya Pradesh has become the only state in the country where agricultural growth has been consistently higher than GSDP growth for last few years (very rare to be found) especially when GSDP growth is also at a moderate level. Agricultural development is more remarkable given the fact that the state is comparatively less naturally bestowed from the point of view of agriculture than all other agriculturally forward states of the country. Despite natural constraints, better management in the implementation centrally sponsored schemes and newly initiated state schemes, along with transparency and equity were the key factors to take agriculture forward. These are the policy lessons, other states can learn from the state. The paper studies how Madhya Pradesh implemented game-changing policies in agriculture within a short span of time. In doing so, the state has bagged Krishi Karman Award for Agriculture for four consecutive years.

**Key words:** *Madhya Pradesh, agriculture, growth, irrigation, development*



## Introduction

The reputation of the state of Madhya Pradesh is generally marked with its BIMARU<sup>1</sup> status, which is derived from the fact that state had high poverty, low agricultural productivity and poor performance in most other development indicators. Being a second largest state in terms of geographical area (constituting 9% of total geographical area of the country), and 6<sup>th</sup> largest populous state in Union of India, has large importance in terms of providing food security to the country. Due to vast agricultural land, and varying land use, soil types, rainfall and water resources distributed across 51 districts of the state, the state is divided into 11 agro-climatic zones and five crop zones.

Though agriculture has become comparatively less sensitive to rainfall variations in the state compared to early eighties, but in the rain-fed areas monsoon still continues to create large fluctuations in the agricultural production. Continuous drought situation due to less than normal monsoon especially for last many years has added to the vulnerability of the agriculture in the state. The farmers with access to irrigation facilities are less vulnerable to rainfall fluctuation, but poor monsoon reduces the recharge of groundwater and surface water, which further affects the irrigated areas with increasing cost of extracting water as well as less supply of surface water.

Section – A focuses on Inter-state comparison of agrarian scenario. Section – B compares the natural advantageous and disadvantageous situation for agriculture in MP. Section – C describes determinants of agricultural productivity and efforts by Government of MP to improve them. The last section discusses about the Tasks ahead and Conclusion.

### **Agrarian scenario in Madhya Pradesh: Inter-state comparison**

The share of Agriculture and Allied sectors have been around  $\frac{1}{4}$  of state GSDP<sup>2</sup> since independence, reflecting the comparatively higher importance of Agriculture and Allied sector in the state's economy in general and rural economy in particular. Figure-1 shows comparison between GSDP and Agricultural growth (three years moving average have been taken to capture the trend due to volatile nature of agricultural production) in the state of Madhya Pradesh for last 11 years.

One can clearly notice that moving averages of annual growth shows a significant improvement for GSDP growth as well as Agriculture growth. Contrary to forward agricultural states and growing Indian states wherein GSDP growth has generally been found to be higher than the

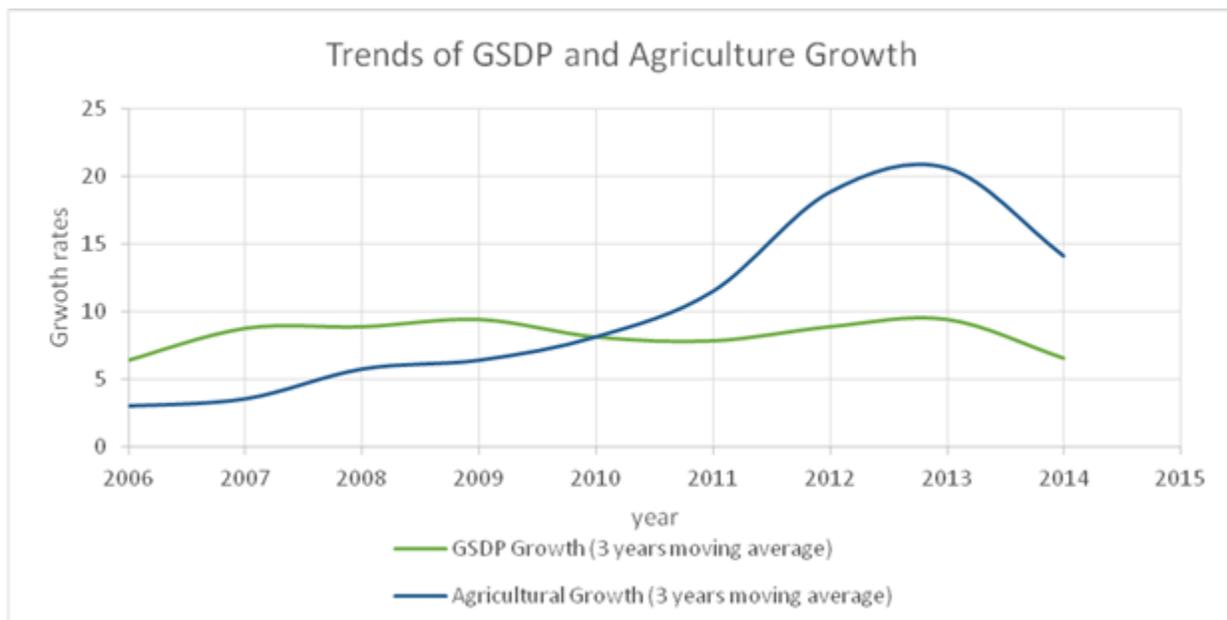
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<sup>1</sup>BIMARU is a term coined by Ashish Bose for most poor states Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh.

<sup>2</sup> GSDP is Gross Domestic State Product

agricultural growth, the agricultural growth in Madhya Pradesh is not only consistently higher than GSDP growth but the difference between the two started widening from 2011 onwards. The performance of agriculture sector has been commendable despite the severe implications of natural calamities in terms of drought in recent past years. This is clearly visible from the Figure-1.

Figure 1: Trends of GSDP and Agriculture growth in Madhya Pradesh (based on 2004-05 series)



If we compare GSDP growth with Agricultural growth of forward agricultural states of the country i.e. Andhra Pradesh<sup>3</sup>, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal, we find that Agricultural growth is lower than GSDP growth. However, a plausible question may be raised since these state are agriculturally forward, they must have reached their saturation point.

On the basis of theory suggested by Sollow (1956)<sup>4</sup> one may believe that high agricultural growth of a state could be due to poor initial agricultural status of the state. A comparison with other BIMARU states i.e. Bihar and Rajasthan and Uttar Pradesh, show that Agricultural growth is lower than GSDP growth. Compared to all forward agricultural and large states of India in last quinquennial (2010-15), Madhya Pradesh is the only state which has recorded highest average growth rate of agriculture.

<sup>3</sup> AP is Undivided Andhra Pradesh. Combined AP is being referred throughout this report since segregated data for important indicators is not available for the divided Andhra Pradesh and Telangana.

<sup>4</sup>Sollow model predicts that, other things equal, "poor" countries (with lower Y/L and K/L) should grow faster than "rich" ones.

**Interstate comparison of yields of main crops:** The cropping pattern in MP is mostly in favour of oilseeds and pulses. Soya bean (26.5%)<sup>5</sup>, wheat (22.8%), gram (14.2%) and paddy (7.8%) are the major crops of Madhya Pradesh. Approximately ¾ of gross cropped area is under these four major crops. Other important crops are maize and cotton whose gross cropped area is less than 4 percent.

A comparison (2009 and 2014) of the yields of major crops (soya bean, rice, wheat, maize and cotton) of Madhya Pradesh, although not highest (except for soya bean) in any of the comparison years, reflects drastic improvement. Also the yields of these major crops of Madhya Pradesh are higher than the national averages. Though gram is a major crop, its yield fell marginally in 2014 compared to 2009 and gram's yield is in line with high yielding states. Within a span of just 5 years, especially when the state took agriculture very seriously as a source to provide food security and contributor to GSDP, the improvement in the yield of major crops (rice, wheat, maize and cotton) of the state is highest among all major agricultural states. For instance during this period the yield of rice increased by 93 % while the same for wheat, maize, cotton and soya bean was 29.7%, 42.5%, and 117.8% respectively. This places Madhya Pradesh among one of the quickly growing states in terms of agriculture. It is worth mentioning here that the yield of Soya Bean did not witness any significant change for both the comparison years.

**Table 1:** Comparison of productivity (kg/ha) of major crops in MP with other major agricultural states (2014-15)

Crop and year	A.P.	Bihar	Gujarat	Haryana	Karnataka	M. P.	Maharashtra	Punjab	T.N.	U.P.	W.B.
<b>Soya Bean</b>											
2009-10	796.4	NA	NA	NA	448.6	1180.0	727.7	NA	NA	1055.0	602.5
2014-15	1082.0	NA	759.0	NA	886.3	1138.9	655.2	NA	NA	730.8	706.9
% Change	35.9	NA	NA	NA	97.6	-3.5	-10.0	NA	NA	-30.7	17.3
<b>Rice</b>											
2009-10	3062.5	1120.0	1902.8	3008.3	2482.2	872.0	1485.0	4010.0	3069.7	2083.6	2547.2
2014-15	3036.3	1951.4	2085.4	3112.7	2826.9	1683.9	1891.4	3837.9	3190.7	2082.4	2731.4
% Change	-0.9	74.2	9.6	3.5	13.9	93.1	27.4	-4.3	3.9	-0.1	7.2
<b>Wheat</b>											
2009-10	1000.0	2084.0	2678.8	4213.5	886.9	1966.8	1609.6	4306.9	NA	2846.3	2680.1
2014-15	1000.0	1850.6	2809.8	4574.1	1091.4	2550.7	1381.0	4491.6	NA	2561.4	2835.8
% Change	0.0	-11.2	4.9	8.6	23.1	29.7	-14.2	4.3	NA	-10.0	5.8
<b>Maize</b>											
2009-10	3527.5	2340.8	1072.4	2250.0	2429.8	1255.8	2302.3	3417.3	4685.3	1465.4	3942.3
2014-15	4257.3	3049.1	1588.7	2250.0	2921.5	1790.0	2080.3	3650.8	5359.9	1790.7	4335.2
% Change	20.7	30.3	48.1	0.0	20.2	42.5	-9.6	6.8	14.4	22.2	10.0
<b>Gram</b>											
2009-10	1307.6	1014.4	947.0	738.1	590.5	1070.8	862.9	1133.3	613.5	823.6	1107.8
2014-15	1149.6	969.1	1129.4	656.7	813.8	1038.9	615.0	1500.0	646.6	683.2	1185.2
% Change	-12.1	-4.5	19.3	-11.0	37.8	-3.0	-28.7	32.4	5.4	-17.0	7.0
<b>Cotton</b>											
2009-10	374.0	NA	551.0	645.8	323.0	238.0	285.0	667.4	367.6	170.0	430.3

<sup>5</sup>Figures in parentheses are as percentage of gross cropped area (GCA)



2014-15	444.5	NA	626.3	604.3	430.4	518.3	284.6	647.6	718.4		
% Change	18.9	NA	13.7	-6.4	33.3	117.8	-0.1	-3.0	95.4	-100.0	-100.0

Source: Ministry of Farmer Welfare and Agriculture, MP

However, it will not be fair to compare agricultural productivity of Madhya Pradesh as a whole to that of Punjab, Haryana and other highly irrigated and rich states. Districts falling under Central Narmada agro climatic zone<sup>6</sup> of Madhya Pradesh have better irrigation facilities and plain land than the rest of MP but certainly less irrigated and less plain compared to that of Punjab and Haryana. Compared to these highly irrigated states of the country, interestingly, we find that these districts collectively have almost equal yield (4300 kg for wheat) or even higher for some crops (1543 kg for soya bean), which is really a big achievement. Similarly, the districts under Grid Region agro-climatic zone<sup>7</sup> which also have comparatively better irrigation facilities compared to rest of the other agro-climatic zones other than Central Narmada, also shows better yield (rice - 2194, soya bean - 1389, wheat - 3400 and gram - 1093). The agriculture performance of the state was recognised by both UPA and NDA<sup>8</sup> governments and the state was selected for Krishi Karman Award for four consecutive years.

**Interstate comparison of fall in fallow land<sup>9</sup>:** Among all these major agricultural states (Table 2), Madhya Pradesh has been successful in reducing its current fallow land substantially. From 2004-05 to 2013-14, Haryana has been able to reduce 49.7 % of its current fallow land while Madhya Pradesh has been able to reduce the same by 37 %. The results are not surprising for Haryana, a state with good irrigation facilities but the results a sure surprise for MP and Gujarat which is relatively having poor irrigation facilities. For the same period, West Bengal is able to reduce fallow land other than current fallow by 51.8% while Madhya Pradesh has been able to reduce the same by 21.5%. Again, the results are not surprising for West Bengal as it has perennial river and the soil is highly fertile but the results are once again a sure surprise for MP. Due to excess use of water in some parts of Haryana and Punjab, lot of land turned unusable for cultivation for a long time (1067% increase in fallow land other than from 2004-05 to 2013-14). But on the other hand MP is witnessing a contrasting scenario wherein fallow land is being reduced at a great pace. In Indian scenario, leaving land fallow is mostly out of compulsion when the farmers do not have adequate resources to improve the fertility of land which requires rejuvenation, and in the case of less irrigated states, lack of irrigation facilities is one of the major reason to take single crop and leave the land fallow for other season.

<sup>6</sup> This agro- climatic zone is consisting of Hoshangabad and Narsinghpur districts, and irrigated by canal system supported by Narmada river

<sup>7</sup> This agro- climatic zone is consisting of Bhind, Gwalior, Morena, Sheopur, Shivpuri districts

<sup>8</sup> NDA is led by Bharatiya Janata Party which is in power in MP for last 12 years. UPA is led by Congress, the principal opposition in MP

<sup>9</sup> Fallow land is of 2 types. Current fallow and Fallow other than current. Current fallow land is defined as cropland that is not seeded for a season; it may or may not be ploughed. The land may be cultivated or chemically treated for control of weeds and other. Fallow land other than current fallow is defined as : This includes all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than 5 years

**Table 2:** % change in fallow land between 2004-05 and 2013-14

State	Fallow lands other than current fallow	Current fallows	% change in Total Fallow land
Andhra Pradesh	-8.6	-27.4	-20.6
Bihar	-9.4	41.0	32.4
Gujarat	31.7	-43.5	-42.1
Haryana	90.6	-49.7	-42.2
Karnataka	18.6	36.4	31.7
Madhya Pradesh	-21.5	-41.3	-31.4
Maharashtra	-1.0	6.5	2.9
Punjab	1067.1	66.1	80.9
Tamil Nadu	0.8	61.2	18.2
Uttar Pradesh	-6.1	-6.7	-6.5
West Bengal	-51.8	11.2	6.5

Source: [http://eands.dacnet.nic.in/LUS\\_1999\\_2004.htm](http://eands.dacnet.nic.in/LUS_1999_2004.htm)

## B) Madhya Pradesh's comparative disadvantage for agriculture

There are various factors related to development of agriculture in a state that depends on nature i.e. area useful for agriculture, canal irrigation, rainfall etc. This section concentrates on comparing these 11 states for 2004-05<sup>10</sup> in terms of these factors bestowed by nature. The question why we have included canal irrigation among naturally bestowed factor is limit to its expansion put by availability of the surface water resources.

In 2004-05, the area under cultivation as percentage of total geographical land in Madhya Pradesh is just 51% which was 3<sup>rd</sup> lowest among all these states after Andhra Pradesh and Tamil Nadu while Punjab and Haryana uses approximately 84 percent of their geographical area for agriculture. Out of total cultivated area, the percentage of net irrigated area using canals is lowest in Madhya Pradesh (6.5%) after Maharashtra (5.8%) while the same in Haryana and Punjab is 38.2% and 26.0 % respectively. Net area irrigated by canal as percentage of total geographical area is just 3.3% in Madhya Pradesh and this is lowest among all these states.

Out of the net irrigated area, the percentage of net area irrigated by canal was only 16.6% in Madhya Pradesh and this number is lowest among all states while the same in Haryana is 48.3%. Though average normal rainfall of Punjab, Haryana, Andhra Pradesh, Bihar and Uttar Pradesh is lower compared to Madhya Pradesh, better canal irrigation system not only compensated the same but also checks the problems associated with volatility of rainfall.

In this way we notice that if we compare the area for cultivation as percentage of total geographical land, net area irrigated by canal as percentage of total geographical area, net area

<sup>10</sup> 2004-05 is taken as the base year for comparison as we witnessed a stable government under the leadership of current CM of MP

irrigated by canal as percentage of total cultivated land, net area irrigated by canal as percentage of net irrigated area and average normal rainfall, Madhya Pradesh stands 3rd, 1st, 2nd, 1st and 6th respectively from the bottom among the comparative states. The state is mostly in the bottom in most indicators while in rainfall Madhya Pradesh is positioned in the middle among the comparative states. This clearly reflects how less bestowed the state of Madhya Pradesh is in terms of natural factors or agriculture. In Punjab and Haryana, % of irrigated area of all cultivable land is very high and canal system is highly developed due to the initiatives of central government especially huge influx of country's resources in beginning years of planning period. Madhya Pradesh did not receive the same from central government initially.

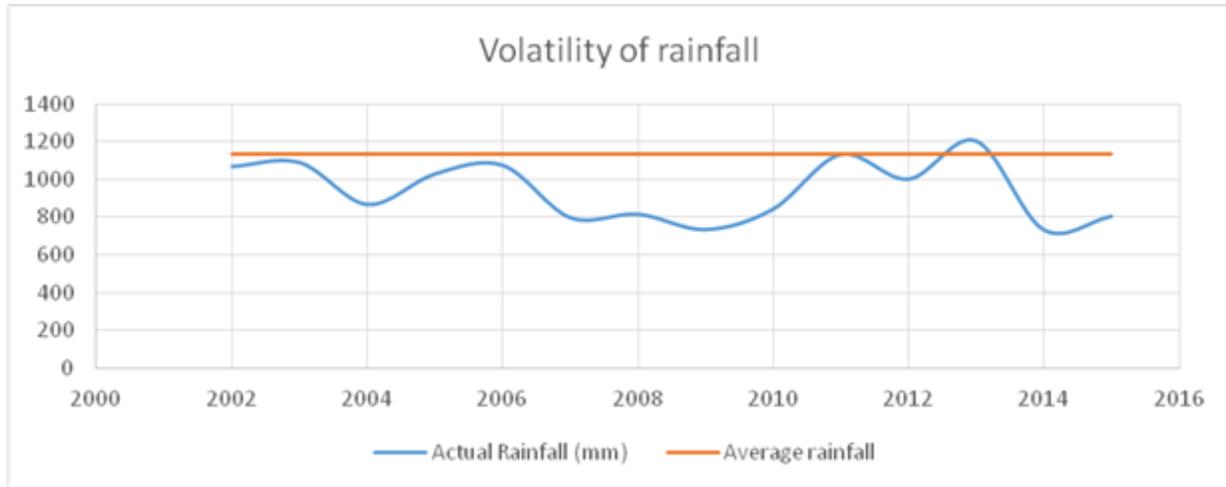
**Table 3:** Inter-state comparison of naturally bestowed situation for agriculture (2004-05)

States	Area under cultivation as % of total geographical land	Net irrigated area by canal as % of total geographical area	Net irrigated area by canal as % of total cultivated land	Net irrigated area by canal as % net irrigated area	Normal average rainfall (mm) (1951 – 2000)
Andhra Pradesh	48	4.9	10.2	34.7	890.4
Bihar	66	8.5	12.8	26.3	1205.6
Gujarat	53	3.4	6.5	19.2	694.8
Haryana	84	32.3	38.2	48.3	554.7
Karnataka	61	4.9	8.1	33.6	1147.2
Madhya Pradesh	51	3.3	6.5	16.6	1048.4
Maharashtra	61	3.5	5.8	33.3	1151.1
Punjab	84	21.8	26.0	27.3	635.9
Tamil Nadu	45	5.8	13.0	28.6	912.4
Uttar Pradesh	74	11.2	15.0	20.5	1439
West Bengal	64	0.0	0.0	0.0	1795.8

Source: [http://eands.dacnet.nic.in/LUS\\_1999\\_2004.htm](http://eands.dacnet.nic.in/LUS_1999_2004.htm)

Figure – 2 below indicates high volatility of rainfall in MP except for 2 years (2011 & 2013). The state witnessed rainfall deficiency in the last 14 years. How public investment was used to overcome the bottleneck of sporadic rainfall, less irrigated area and other natural disadvantageous situation, through adoption of new technology, institutional reforms and incentives have been discussed in detail in the next sections. We will also explain how Madhya Pradesh government infused investment in agriculture at a time which was considered to be worst for agriculture as the state was reeling under severe drought situation (especially between 2006 and 2010) and carrying the burden of partition (e.g.: shortage of electricity). The investment during the tough phase was turning point in terms of agricultural overturn.

Figure 2: Volatility of rainfall in Madhya Pradesh



### **C) Determinants of agricultural growth and productivity & initiatives taken by Government of MP**

Most literature on the agricultural growth and cropping pattern mainly focuses on three factors which mainly affect the agricultural production and cropping pattern in the agrarian economy: agrarian structure, technological change and price policy to improve agrarian production. Most of the studies mainly focus on these three aspects, while considering the importance of one factor over other. It depends on the inclination of the scholars, which determines and which factor is more important than the other. But there is no controversy as all these factors have high influence on the agrarian economy in general and on agricultural production and productivity in particular.

In view of these three determinants of agricultural productivity we are going to analyse the initiatives taken by Madhya Pradesh government in last 10 years in the direction to affect these determinants of agricultural productivity to obtain required results.

#### **1. Technological constraint**

Ricardo (1817), in his growth model emphasized the limits to growth imposed by land. Ricardo was of the view that land diminishes in quality up to the point where it does not pay to work it at the margin. It implies that there are diminishing returns to land. He further says that the limit to growth can be postponed if more land can be discovered or through cheap import of the agricultural commodities. Malthus also argued that the production of the agricultural commodities increase in natural progression but the population increases in the geometric progression. This also imposes the scarcity of food grain production.

Both the classical economists (Ricardo and Malthus) over looked the technological progress in agriculture. Hicks (1932) acknowledges the importance of the technological progress and gives the concept of ‘induced technological progress’, which is the search for new methods of production which will use more of the now cheaper factors and less of expensive ones. It indicates that new methods of production should be searched to overcome Ricardo’s limit to growth and these methods of production should use less quantity of limiting factors (according to Ricardo this limiting factor is land). Investment in research and education can be helpful in searching such methods and new agricultural inputs (fertilizers and high yielding crops). The rapid rise of agricultural productivity in Japan and Taiwan in the late nineteenth and early twentieth century was due to ‘technological progress’ but the rise could also be made possible by the application of fertilizers and the selection and cultivation of high-yield crops (Shultz, 1961).

The technological barriers to agricultural growth can be of two kinds, barrier on account of lack of existence of technology and barriers to the adoption of given technology. The first kind of technological barriers can be overcome through research and required investment in research. On the other hand adoption of a technology can be limited by poor access to capital and credit, low risk bearing capacity, technological indivisibilities and inadequate agricultural extension.

The first kind of technological barrier includes the biological and chemical inputs compatible to the different climates, water availability and different kinds of soil. The chemical fertilizers and most high yielding varieties which were developed, in the sixties in India, have assumed the availability of adequate irrigation facilities. The high yielding varieties of seeds and chemical fertilizers compatible to dry region of India is still a technological constraint. Resistance to pests and diseases can be overcome through either biological innovation or chemical innovation.

A look at the incentives provided by Madhya Pradesh government to overcome these technological barriers indicates that it has emphasised mainly on overcoming the second kind of technological barrier to increase agricultural production and productivity. This section focuses on the same. Some of the most important initiatives are expansion of irrigation facilities, expansion of electricity on affordable prices, distribution of soil health cards and seed replacement rate.

### **1.1 Expansion of irrigation**

Despite deficiency of rainfall in the last 10-15 years, the net sown area and cultivated land increased by 3 and 1.3% respectively. It is worth mentioning here that MP along with two other states (see Table 4) are the only ones which have witnessed positive growth in net sown area and cultivated land whereas all other states including Punjab and Haryana have witnessed negative

growth. Gross cropped area, change in net irrigated area by canal, net irrigated area and gross irrigated area witnessed a positive growth and is the highest among all the comparative states.

**Table 4:** Inter-state comparison of irrigation and cultivation related indicators (in %) between 2004-05 and 2013-14

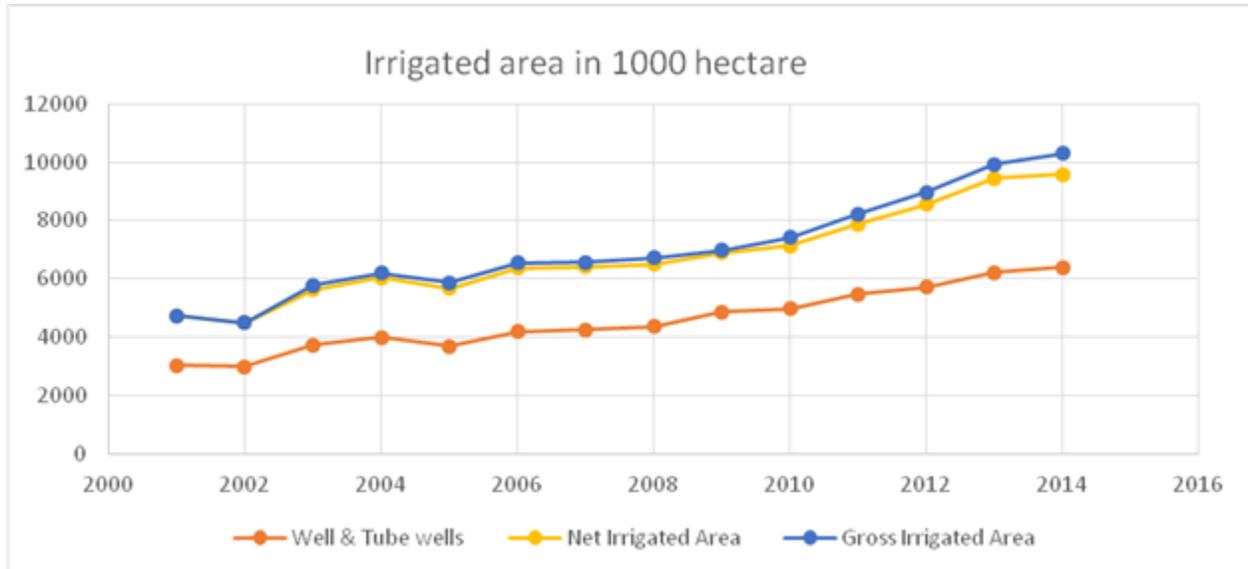
State	Net Sown area	Gross Cropped Area	Cultivated land	Change in net irrigated area by canal	Net Irrigated Area	Gross Irrigated Area
Andhra Pradesh	10.5	15.2	2.4	28	-14.9	45.6
Bihar	-5.7	2.4	-0.9	14	-3.3	22.6
Gujarat	5.7	10.9	2.5	14	20.0	38.9
Haryana	-0.9	0.7	-3.5	-15	-0.8	5.0
Karnataka	-5.5	-4.2	-1.0	32	26.1	23.6
Madhya Pradesh	3.0	19.0	1.3	62	56.5	60.2
Maharashtra	-0.7	4.3	-0.2	-1	-0.7	14.2
Punjab	-1.3	-1.0	-0.8	2	2.9	0.4
Tamil Nadu	-7.5	0.1	0.7	-13	1.6	7.2
Uttar Pradesh	-0.8	1.5	-1.2	-5	6.9	7.7
West Bengal	-2.6	1.0	-1.8	NA	-2.6	6.0

Source: [http://eands.dacnet.nic.in/LUS\\_1999\\_2004.htm](http://eands.dacnet.nic.in/LUS_1999_2004.htm)

If we look at Figure 3, we notice expansion of irrigation facilities, whether it is expansion of ground water irrigation or surface irrigation through canal, since 2008 and more extensively since 2010. Expansion in the area under canal irrigation is much more important than under the ground water irrigation as canal irrigation yields high productivity and is low cost input for farmers.

But the increase in well and tube well does not necessarily increase the area under irrigation since Expansion of irrigation through well or tube-well is supplementary to the expansion in canal irrigation. In the emergency situations when canal water doesn't reach the farm sufficiently, the tube-well is used to fill the deficiency by the farmers.

Figure 3: Expansion in irrigated areas in Madhya Pradesh



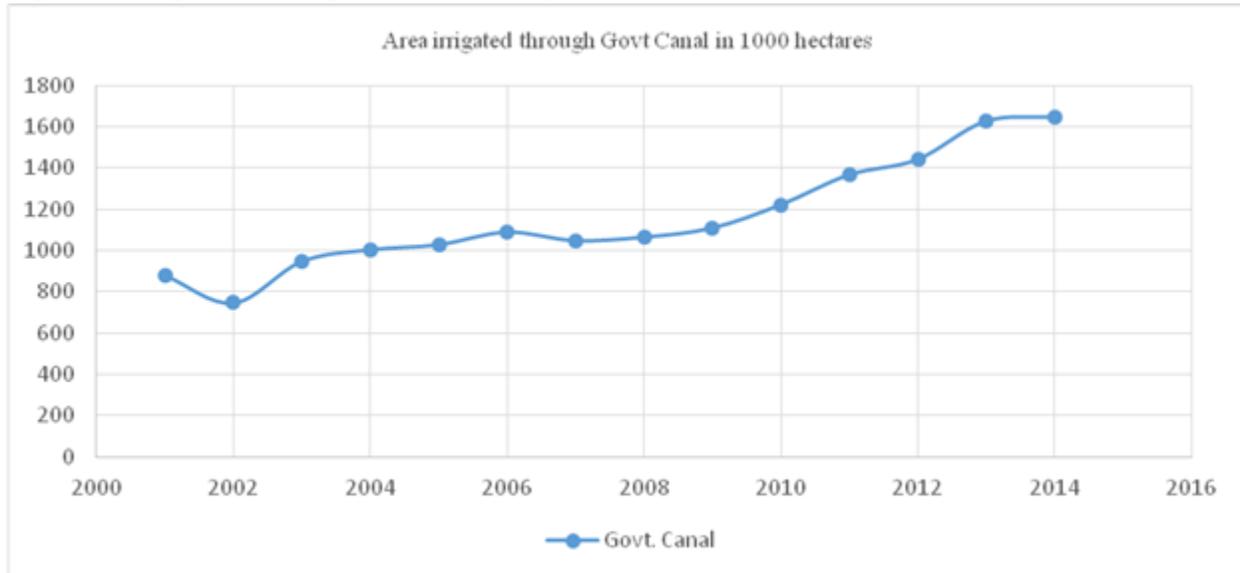
The limit on expansion of irrigation using canal due to paucity of water was realised by the Government of Madhya Pradesh. Rather than increasing the length of canals having water shortage, the government prioritised the lining of existing canals which not only ensured the check on wastage of water due to seepage but also increased the culturable command area under existing canals. The importance given to irrigation can be understood by the 330% increase in the budget towards irrigation within a span of 7 years (2009-10 to 2016-17).

Since the improvement in the irrigation facility require concerted efforts from the part of the government machinery, the appointment of new Irrigation Secretary in 2010 turned out to be a wise decision for Madhya Pradesh government. He not only ensured timely completion of target fixed for lining work of canals, but digitalised the information related to water availability/supply of the canals according to the requirement i.e. hourly basis, twice in a day, daily, monthly etc.

This was one of the biggest reforms of Irrigation in Madhya Pradesh and no other state can match in this regard. Since, government employees are the back bone of executive, this officer ensured transparency in the appointment and transfers of officers in irrigation department. Online application were being invited for any transfer or posting. However, in some cases the transfers were linked to the performance also. The transparency in the transfers not only boosted the morale of the government officers but brought back their faith in the system, which is directly linked to the performance and enthusiasm of the employees of irrigation department. However, appointing such dynamic officer at the right place is not an easy task given any political economy, the credit also goes to the chief minister of Madhya Pradesh for providing free hand to

such dynamic officer by not allowing any kind of political interference in the working of irrigation department.

Figure 4: Irrigation through canal in Madhya Pradesh



A study conducted by RBI mentions that due to ‘deficiencies in planning, implementation and management’, the area under canal irrigation has decreased during 1991-2007 (Balakrishnan et al 2008). Shah et al (2016) in their pioneer study of canal system in Madhya Pradesh showed how better management and implementation of a government policy reaches the common farmers and brings equity in the access to government resources. While comparing the implementation of Pradhan Mantri Krishi Sichai Yojana (PMKSY), in UPA ruled states-- Maharashtra and Andhra Pradesh, and NDA ruled state –Madhya Pradesh (by 2015), they made following observations:

Post 2000, the United Progressive Alliance (UPA) and Bharatiya Janata Party (BJP) chief ministers have pursued sharply different irrigation strategies. UPA governments in Maharashtra and Andhra Pradesh (AP) have used massive irrigation investments to create rent-seeking opportunities and left the anarchy on rural electricity network totally untouched. Soon after he became Chief Minister in 2004, Y S Rajasekhara Reddy announced free power to farmers until 2017 and launched Jala Yagnam, a massive scheme to provide irrigation to over 1.2 crore acres at a cost of Rs 1.86 lakh crores. Between 2003–04 and 2011–12, the state government invested Rs 74,200 crores on this programme. However, a 2012 Comptroller and Auditor General audit concluded that its benefits are illusory. In Maharashtra, similarly, the Congress–Nationalist Congress Party government got mired in an irrigation scam in drought prone Vidarbha region that cost the exchequer over Rs 70,000 crores but resulted in

hardly any increase in irrigated area leading to accusations that half the funds spent were swindled by politicians. In both the states, farm power supply remained free but with progressive deterioration in quality and availability.

Between 2000–01 and 2012–13, when massive irrigation investments were made in AP and Maharashtra, their index of area irrigated by government projects, as well as by all sources, was flat or declining. The major beneficiaries of these investments arguably were politicians and contractors. In contrast, irrigation scene in BJP-ruled Gujarat and Madhya Pradesh has been different. Vaidyanathan (2007) had shown that all agricultural growth in India during 1970–2000 could be attributed to irrigation-induced productivity growth. As if on cue, Narendra Modi and Shivraj Singh Chouhan as chief ministers pursued agricultural growth through irrigation development as a political strategy for capturing agrarian vote-banks rather than rent-seeking. Since 2000, these states rapidly expanded areas under canal irrigation and improved farm-power supply. Neither Modi nor Chouhan nor their colleagues got accused of irrigation scams.

It is noteworthy to mention here that all expansion in area irrigated was mainly due to improvement in already constructed canal rather than building new canal or increasing length of already constructed canals. This achievement was not just limited to improving irrigation facilities through better management, but this government also brought equity in the access to water between the crop land in the head of canal and tail of the canal. Shah et al (2015) explains how government ensured equity in the access of canal water:

Four rules of effective canal system operation—rationalized irrigation schedules, tail-to-head irrigation, *osarabandi* (operating canals by strict rotation) and operating canals at full-supply level (FSL)—have eroded in all Indian systems. MP restored their primacy and insisted on full enforcement of all these principles. Obsolete irrigation schedules were revised; water allowances were adjusted to reflect new cropping patterns; areas served by lift irrigation from surface and groundwater in command areas began to get counted as canal irrigated areas. Irrigating “tail-end first” removed the head–tail inequity endemic to canal irrigation; FSL canal operation meant that water reached tail-ends and could be distributed in an orderly manner; enforcing *osarabandi* ensured that distributaries could be operated at FSL during their rotations. The most difficult of all in the early years was enforcing the tail-end first rule because it challenged the long-entrenched power relations. In some projects, tail-end farmers were asked to complete land preparation a week or so in advance so that water could be released in advance when head-end farmers were not ready. Restoring the primacy of tail-end first required a massive thrust first; but once it got accepted,

things began to fall in place; farmers adjusted planting schedules; water demand in head began lagging that in the tail. Earlier, when canals ran non-stop at low-supply, it was a winner take all game for head-end farmers who had no pressure to time planting or save water. Now, osarabandi delivers full-supply for specific predetermined time slots that drives farmers to manage water better. Over time, there is greater appreciation among farmers for the discipline of tail-end first irrigation and osarabandi since with greater discharge of water, the fields are irrigated faster saving the farmer time and labour.

The views of Shah et al (2016) were reiterated by many residents of villages situated in the tail end area of Harsi canal of Gwalior district, during our field visit. For instance, the interviewed farmers of Sullaiya, Masoodpur village and Kari Kacha of panchayat Badi Akbai, accepted to have received sufficient water from the canal for last three years, despite having complaints about leakages of water from canal due to the damage caused by some villagers.

## **1.2 Improvements in Electricity infrastructure for Agriculture**

Irrigation, a key determinant of agriculture production, cannot be efficiently used without affordable electricity since cost of extracting water with diesel pumps will be very high. Madhya Pradesh government's effort to provide access to permanent electric pump connections for farmers over last few years can be clearly noticed Figure 5.

This figure shows that permanent electric pumps were increasing at snail's pace until 2007 but it started increasing at a moderate rate from 2007 until 2012. But it was since 2012, when government took it on priority, that the number of electric pumps started accelerating. There are various highly subsidised schemes to provide electric pumps/connection to the farmers along with other equipments for irrigation at highly subsidised rates.

As a result of increase in number of permanent electric pumps, electricity consumption towards agriculture also increased. Accelerated increase in number of electric pump connections since 2012 was reflected in the accelerated increase in the corresponding electricity consumption since 2013 (see Figure 6). It is worth mentioning here that electricity consumption for agricultural sector depends more on supply side factors rather than demand side factors. This is due to the fact that getting a permanent electricity connection is not a trivial task and electricity is not available 24/7 so as to consume at their will.

Figure 5: Expansion of permanent agricultural pumps

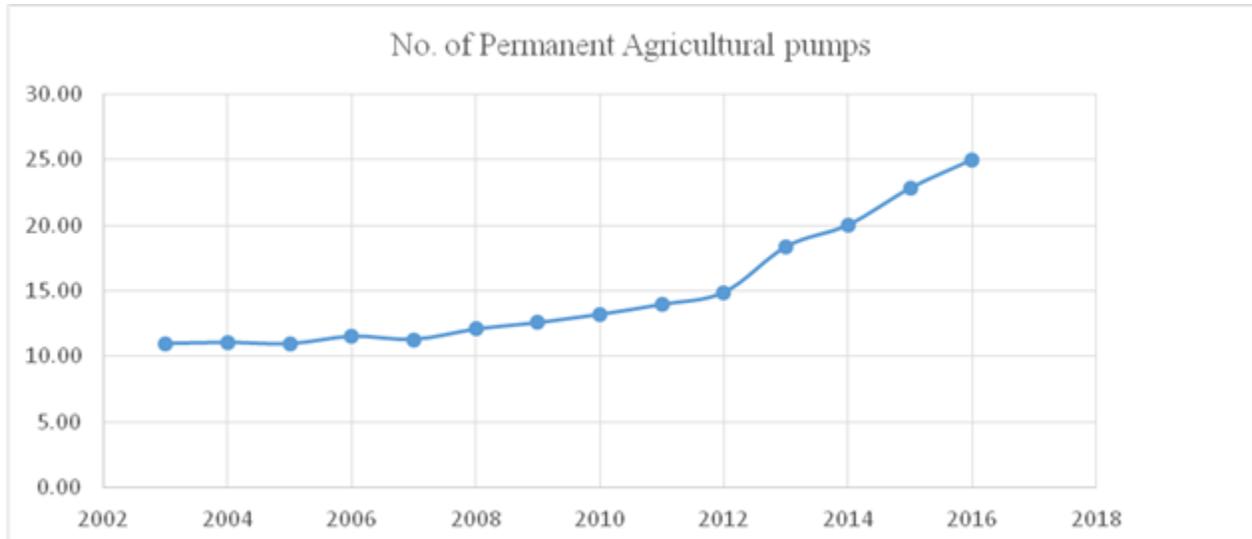


Figure 6: Agricultural consumption of electricity in Madhya Pradesh from 2002 to 2016

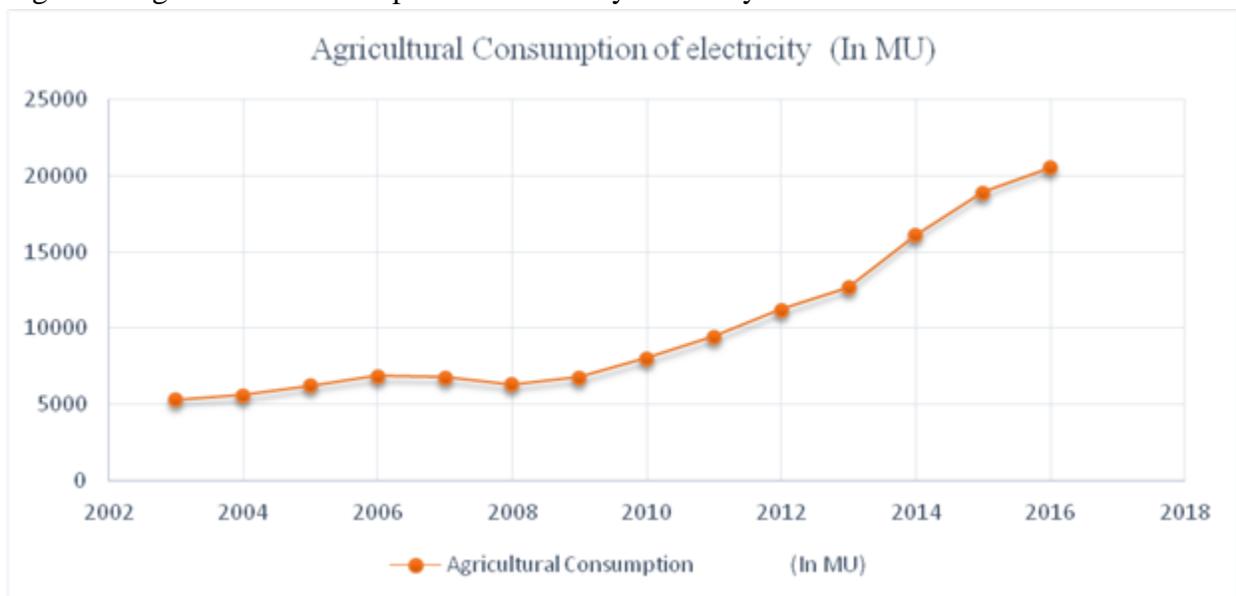
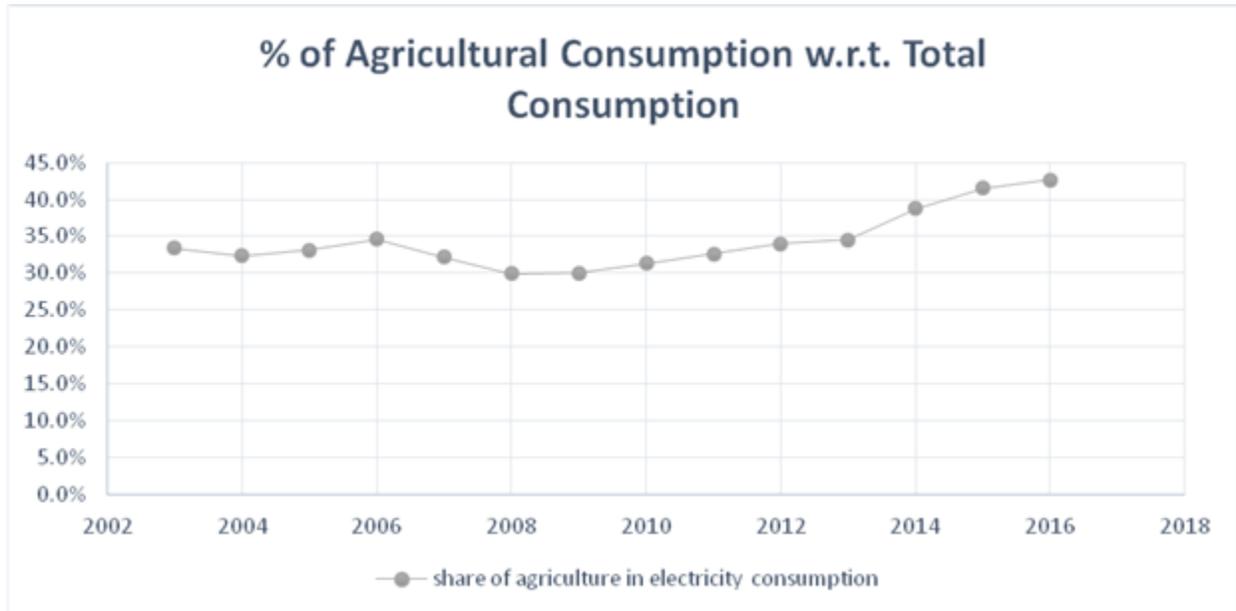


Figure 7: Agricultural consumption of electricity in Madhya Pradesh



There is always a trade-off between quality of electricity supply and tariff especially in states wherein it is difficult to subsidise the electricity tariff due to limited production of electricity along with poor finances. Rather than resorting to populist policy of providing free electricity to farmers, as was the policy adopted by governments of Maharashtra and AP in early 2010s and thus resulted in gradual deterioration of availability and quality of electricity, M.P. government's main focus has been on uninterrupted supply of electricity at least for minimum fixed duration. The experiences shared by some villagers from Gwalior and Anuppur districts, confirm the government's order of supplying 10 hours of quality electricity daily to agriculture. However, some of them had complained of electricity supply to their farms during odd hours.

Madhya Pradesh government adopted a viable policy to make electricity accessible to even poor farmers. Instead of providing subsidy on variable cost of electricity consumption i.e. tariff subsidy, they gave subsidy on fixed cost i.e. electricity connection and agricultural pumps. This policy not only expanded the reach of electricity to all types of farmers by subsidising the installation cost but has also been successful in averting overconsumption through positive tariff for electricity. This policy of the state is reflected in the following Table 5.

Table 5: Share (in %) of revenue from agriculture sector in total electricity sales from 2009-10 to 2013-14

Categories	States	2009-10 (Actual)	2010-11 (Actual)	2011-12 (Prov.)	2012-13 (RE)	2013-14 (AP)
SPUs	Andhra Pradesh	1.05	0.92	1.01	1.48	2.19
SPUs	Bihar	2.76	3.66	1.98	4.8	4.86
SPUs	Gujarat	14.04	11.52	12.47	11.99	11.61
SPUs	Haryana	4.08	3.44	4.27	3.06	2.61
SPUs	Karnataka	14.56	24.76	24.25	24.48	23.83
SPUs	Madhya Pradesh	25	25.35	26.02	29.19	27.89
SPUs	Maharashtra	10.17	10.03	11.73	10.79	11.99
SPUs	Punjab	0	5.32	0.02	0.03	0
SPUs	Tamil Nadu	0	0	0	0	0
SPUs	Uttar Pradesh	9.52	9.75	9.53	9.66	7.18
SPUs	West Bengal	2.39	2.69	2.87	3.8	4.62

Source: <https://data.gov.in/catalog/share-revenue-agriculture-sector-total-electricity-sales-revenue>

The table clearly shows that the percentage share of sales revenue obtained by sale of electricity to agriculture sector in total electricity sales revenue, was highest in Madhya Pradesh compared to all other agricultural forward states of the country. However, one may question the statistics since it is affected by the relative price of electricity being charged by M.P. government from agriculture sector. But it would be noteworthy to mention that the electricity tariff in Madhya Pradesh is almost comparable other states for all sectors. Given the fact that electricity is more a problem of supply side in most of the states of the country than a demand side (That is why, 24X7 electricity finds place in election manifesto of all political parties time and again), if highest share in sales revenue is coming from agriculture in Madhya Pradesh, it indicates high supply of electricity to agriculture (Figure 6). Based on the fact that electricity tariff for agriculture is far lower than household and commercial consumption as well as approximately 28% of electricity revenue is derived from agriculture, we can conclude that the share of electricity consumption of agriculture sector in total volume of supply will certainly be higher than 28%.

### 1.3 Seeds

The benefits of seed replacement to improve productivity cannot be ignored. Various schemes/programmes introduced by the state government attempts to make high quality seeds available for the farming community. The following are the schemes from the government to procure seeds at subsidized rates for SC/ST farmers: Annapurna for Cereals and Surajdhara for Oilseeds and Pulses. General category farmers can procure seeds for farming from RKVY, GoI at subsidised rates. Seed Production Villages and Campaign – 2400 Seed Growers cooperatives formed for augmenting availability of certified seeds.

Table 6: Distribution of better quality seeds

Year	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Distribution of Quality Seeds (lakh quintal)	11.6	14.7	18.4	23.6	30.1	34.1	38.7

In the light of low productivity of major crops in the state, government is taking initiatives for promoting the use of high yielding varieties (drought, disease and pest resistant) for increasing the production levels. As on 2013-14, 65.8 lakh ha (approx. 44% of net sown area) is under high yielding varieties distributed under different crops and is showing steady increase from 2007-08 onwards.

Seed Replacement Rate in all major crops increased from 2007-08 to 2013-14. Wheat (14.03% to 27.2%), Paddy (8.85% to 22.61%), Maize (10.94% to 73.91%) and Gram (2.90% to 15.78%). Replacement of traditional broadcasting system of sowing by Line sowing in 11 lakh ha (approx. 7.3% of net sown area) in Bundelkhand and Baghelkhand region by vigorous extension efforts. This has considerably cut down the quantity of seed requirement per acre and helped in being cost effective. Under the seed quality improvement program, 40,000 villages were provided with Spiral graders and Seed treating drums free of cost for farmers use.

#### 1.4 Yantradoot yojana

There are some technical indivisibilities, which a small or marginal farmer can never overcome, wherein only the state's step in required. Yantradoot scheme was launched in 2009-10 to give access to variety of farm implements i.e. rotavators, seed graders, double box seed cum fertilizer drills, ridge furrow & raised bed planters and broad weeders and insect controllers, at a very nominal rate. However, due to high demand of deep ploughing and other farm operations, government have restricted farmers to a specified amount of land to be deep ploughed at a subsidised rate i.e. 1 acre. In this way this scheme ensures equity, otherwise medium and large farmers wouldn't have given any chance to small and marginal farmers due to their influence. A NITI Aayog report (2016) has included Yantradoot scheme as best practices from the state of Madhya Pradesh, and the report also claim that this scheme has helped farmer enhance crop production which resulted in significant increase in farmers' income without any major increase in input cost. It also helped farmers improve their knowledge base. By providing up to 50% subsidy, the government has encouraged the young educated people in setting up custom hiring centres (CHCs) wherein all the equipment are available for rent at a very nominal price compared to market price. Till now approximately 1300 CHCs have been established in the state. Though the area covered under Yantradoot scheme is miniscule compared to area under cultivation, the farmers witnessed huge upsurge in the yields due to the usage of these new farm implements.



## **1.5 Mukhyamantri khet tirath yojana**

The scheme has been formulated to provide exposure to farmers about ongoing modern techniques used by farmers of other districts, states and country, in some designated farms. Undoubtedly a mere visit to others' farm will not bring a revolution, but such schemes keep farmers connected with the system. This is important especially for those farmers who never went out of their respective districts, since most of the farming communities' activities are confined to nearby villages. Such travels benefit farmers a lot in changing their outlook towards life and rejuvenate them.

## **2. Agrarian structure**

Agrarian structure plays a very important role in determining agricultural output and productivity. The main components of agrarian structure are tenancy contracts, size of land holding, money lenders, caste system and terms of labour hiring. Agrarian system has a significant influence on the motivation and innovation in the agriculture. In Indian context farmers belonging to SC and ST require special assistance due to their historical backwardness and high poverty level. The concerns of tenant farmers required extra attention due to lack of clarity in the property rights, which resulted in not only the exploitation of tenant farmers but also denying access to all benefits provided by government to the farm community (Gupta et al, 2016). We have made an attempt to put light on how Madhya Pradesh government has handled these problems related to agrarian structure.

### **2.1 Loans to Tenants farmers**

Gupta et al. (2016) in their study showed that tenant farmers are neither beneficiary of any type of concessional farm loans nor are they compensated in the case of crop failure. They cannot avail the benefit of PMFBY since they do not possess legal paper of the agreement of tenancy. Due to this reason, many tenant farmers commit suicide and these suicides are the dominant share in the farmer suicides. At all India level, tenancy farming is approximately 20% of landholding but agricultural census of India shows these figures less than 2 % of total land holding. This gap is due to unaccounted tenancy as legal accounting of tenancy involves risk to landowners. This generally leads to exploitation of tenant farmers. Madhya Pradesh is the first state in Union of India, which has introduced a bill in the assembly to protect the rights of landowners as well as tenants i.e. Madhya Pradesh Bhumiswami aur Bataidar ke Hitonka Sanrakshan Vidheyak, 2016 (Madhya Pradesh landowner and tenant farmer's interest protection act, 2016). The provision of act allows both landowners and tenant farmers to enter into a legally binding agreement for a period of five years for sharing income from agricultural activities. The new legislation requires that the agreement between the two parties has to be submitted to the



tehsildars, who in the eventuality of dispute has right to adjudicate the matter. The provisions of Bill also ensure sharing of relief amount in the eventuality of damage to agricultural crop due to natural calamity. The relief amount given by the state government and amount of claim by insurance company would be shared as per agreement between tenant farmers and landowners. However, following the culmination of the contract or breach of contract by tenant farmers, land would be automatically reverted to landowners (Financial Express; October 25, 2016). This could be one of the biggest reforms especially in a country where property rights are not very clear and thus resulting into high rent. The legislation will not only provide relief to tenant farmers but also to landowners who are afraid to rent out their land. This legislation will lower the rents for tenant farmers and increase the availability of land for agriculture.

## **2.2 Special attention to socially backward farmers**

Social backwardness is another institutional reason comes in the way of agricultural development since social backwardness is related to low size of land owning, poverty, less information, less education, etc. Each and every scheme gives not only priority/reservation to farmers belonging to SC/ST/female, but also additional benefit to them. The primary information collected about most backward part of the state - Annupur district, provides some interesting findings.

**Tribal beneficiary – Hanra Tola, Amarkantak, Annupur**

Bhanwar is a gond tribal who is also a retired school teacher belonging to a village which has approx. 80% tribal population. Though he could not recall the year and the amount of benefits availed from the government schemes but he could share the names of those implements/machines which have been bought under the subsidy scheme.

- Tractor subsidy (2007)
- Sprinklers
- Rotavator
- Seed driller
- Plough
- Reaper
- Fodder Cutter
- Balram talab
- Diesel pump
- Deep ploughing

**Backward caste beneficiary – Hanra Tola, Amarkantak, Annupur**

Yogendra Singh, a backward caste farmer, who seems to be more systematic and had somehow better memory to recall the benefits along with year.

- Gobar gas plant in 2007 (Rs 17000)
- Spray pump in 2008 (Rs 1100)
- Under SRI hybrid paddy seeds (1.5 kg seeds worth Rs 300, zinc Rs. 150, culture Rs 70)
- Mangla Gram Beez Yojna (30 kg rice seeds in just Rs 300)
- Balram talab yojana in 2008-09 (subsidy of Rs. 80000)
- Cono weeder and marker in 2012-13
- Electric pump in 2013 (Rs. 8000)
- Rain gun(Rs. 9000)
- Digging well in 2015 (Rs. 40000)
- Traditional farming and organic farming scheme
- Repair for gobar gas plant

However, there was an unhappy villager too, who have got the benefit of demonstration of package of seeds, pesticide, fertilizer etc, subsidy for diesel pump under kapil dhara yojna, sprinklers etc. But the only cause of his unhappiness was the delay in the payment of deep ploughing he had carried out in his farm land. However, he was unsure about completion of paper work for the same.

There are few schemes which have been implemented at the village level i.e. spiral grader which is used to separate quality grain from poor quality, shed for animal, levelling and waling for animal shed, weekly market in the rural areas.

### **3. Transparency in the access of all schemes**

Most governments in the country have been accused of displaying partisan as they favour people loyal to the political party belonging to ruling dispensation. Such accusations have been noticed mostly in the access of many government schemes or benefits. It is difficult for any government to avoid the people who have supported it and who have been ignored by previous governments due to political rivalry. This political economy of benefits of most schemes compels each successive governments to help their cadre when came into power. Though it is very difficult



decision for any government to bring transparency in its system in availing benefits, this government has shown courage by making online applications mandatory for almost all schemes whose beneficiaries are limited in number. Not only applications are invited online but the priority is set according to the date of application *ceteris paribus*. This is applicable in most schemes of the state wherein technology is being used to improve transparency and abolish discretionary powers of the state machinery.

#### **D) Tasks ahead**

Duplicity of schemes is one of the biggest problems a government official face. There are a lot of schemes running with the same purpose but variations in the benefits. For instance, sprinklers can be bought under following schemes:

- Rashtriya Khadya Surksha Mission
- Rashtriya Vikas Mission
- Pradhan Mantri Krishi Sichai Yojana
- Rashtriya Krishi Vikas Yojana

Interestingly, benefits are mostly different under all these different schemes. This often led to tiff between farmers and government officials and thus made the task of government officials difficult since they are blamed of partisan.

Similarly under the subsidy scheme related to digging well, there is a rule that under 200 meter radius there shouldn't be any other tube well. This leads to conflict among farmers. Outsourcing of PMFBY to private players is being seen as scepticism among farming community since the methodologies adopted by these private companies are not very transparent.

Another issue is related to irrigation. Since the lining work of all the canals is still in progress, the bigger challenge for the government will be in stopping the villagers from breaking of canals. Since breaking of canals to get more water is still rampant, it would require political will and skill of the government to control, which is simply not possible by vigilantism as it increases enmity among neighbouring villages.

One of the biggest issues is related to protection of interests of tenant farmers whose interests cannot be protected by a mere introduction of a new legislation. The government on its part should encourage landowners and tenant farmers to sign a contract before leasing in or out.



## **Conclusion**

All the state governments in Union of India have been implementing various initiatives to enhance farm productivity but Madhya Pradesh has left an indelible mark in enhancing farm productivity through sensitive and empathetic attitude towards farmers. Instead of adopting piece wise approach towards agricultural development, this government has adopted comprehensive approach which is reflected in their simultaneous efforts towards access of irrigation, electricity and modified seeds to farmers belonging to all classes. While recognising the problems of tenant farmers, Madhya Pradesh has brought in institutional reforms by introducing legislation to protect the rights of tenants as well as landowners. It also recognised the poor socio-economic condition of SC/ST/Women farmers and thus provided an extra concession in all agricultural schemes. Though the state has achieved unparalleled growth, it has to go a long way to irrigate all farms and thus ensuring higher productivity levels matching that of Punjab and Haryana. To achieve the previously mentioned, this high performance momentum has to be maintained and further investment is required in the sector. Also, making legislation to protect the rights of tenant farmers will not be sufficient as its implementation is required for the intended impact.



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## REFERENCES

- Balakrishnan, Pulapre, Ramesh Golait and Pankaj Kumar (2008): “Agricultural Growth in India since 1991,” Reserve Bank of India, Mumbai, Development Research Group Study No 27, <https://rbidocs.rbi.org.in/rdocs/content/>
- Bhaduri, A. (1973). A Study in Agricultural Backwardness under Semi-Feudalism. *The Economic Journal*, 83(329): 120-137
- Gupta, Anish and Giri, Aaleya (2016). Suicides despite compensation. *EPW* Vol. 51, Issue No. 18, 30 Apr, 2016
- Hicks, J.R. (1932a). *The Theory of Wages*. London: Palgrave Macmillan
- Malthus, Thomas (1836). *An Essay on the Principle of Population*
- Ricardo, David (1817). *On the Principles of Political Economy and Taxation*
- Schultz, T. W. (1961). Investment in Human Capital. *The American Economic Review*, Vol. 51, No. 1 (Mar., 1961), pp. 1-17
- Schultz, T. W.(1962). ed. Investment in Human Beings, *Journal of Political Economy*, 70 (5, part 2), 1962
- Solow, Robert M. (1956). "A contribution to the theory of economic growth". *Quarterly Journal of Economics*. Oxford Journals. 70 (1): 65–94
- Shah, T, G Mishra, P Kela and P Chinnasamy (2016): “Har Khet Ko Pani? Madhya Pradesh’s Irrigation Reform as a Model,” *Economic & Political Weekly*, 6 February
- Best practices from states: State forward. A report published by NITI AAYOG (2016). Available on following link.  
[http://www.niti.gov.in/writereaddata/files/document\\_publication/State%20Foward%20Book.pdf](http://www.niti.gov.in/writereaddata/files/document_publication/State%20Foward%20Book.pdf)
- Land reforms: Madhya Pradesh does a first, proposes new law to protect tenant farmers, landowners. *Financial Express*; October 25, 2016. Available on following link.  
<http://www.financialexpress.com/economy/land-reforms-madhya-pradesh-does-a-first-proposes-new-law-to-protect-tenant-farmers-landowners/428870/>