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Patterns of Agricultural Transition in Tribal Areas of Madhya Pradesh: A Macro and Micro analysis

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Abstract

The agricultural practices have been undergoing changes in all the parts of India in view of the advancements in technology through agricultural research, extension, credit, institutional and policy support extended in different ways. The primary objective of the present paper was to look into the transition taking place in agriculture in tribal areas with a focus on arriving at macro and micro level pictures. The issue of land alienation, forest rights act implementation status and the influence of non-tribals on the farming practices of tribals have also been discussed in this paper. The study is largely drawn both from the primary and secondary data sources. A total of 20 villages were selected in the Jhabua, Mandla and Sidhi districts of M.P. A total sample of 400 Households were selected for the study with twenty households in each village. Focused group discussions(FGDs) were also done with the tribal communities in Jhabua, Mandla and Sidhi districts of M.P. The empirical evidence indicates that agriculture in the tribal areas has shifted to a settled agriculture, excepting a few cases. Under settled agriculture, we could see that a majority have adopted both a combination of modern and traditional methods of farming techniques. We have observed that a small number of sample households continue with conventional agricultural practices which are sustainable in nature and ecologically sound. Access to Irrigation is a major problem in all the study villages. The cropping pattern has remained the same as compared to 10-15 years ago but the area under millets has reduced with Soybean being a new addition. Even today, millets and pulses are intact in their farming system. The majority of the tribal farmers are not keen on using pesticides so as to avoid poisoning of soils and food. The tribal regions of the study area present a great opportunity for organic cultivation due to a very less external input use and negligible pesticide use. A small support for investment on organic inputs can result in high yields in the tribal areas and can help make use of expanding organic markets at the global level.

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Author

1. Introduction

India's agriculture sector has undergone various changes since the introduction of five year plans. With the planners focusing on the development of irrigation projects, introduction of land reforms, promotion of scientific technologies, institutions and development of rural infrastructure an overall growth of the agricultural sector. The country also, apart from encouraging the adoption of high yielding varieties of seeds, adopted various measures as part of achieving the twin objective of raising food production and improving food availability to consumers. These included, among others, agricultural research and extension, minimum support price system, maintaining buffer stock, public distribution system, liberal agricultural credit etc. The resultant growth in agriculture during the green revolution period came to be considered a great success story of agriculture-led growth (Bhalla *et al*, 1992), although it generated various second generation problems later such as productivity decline, high level exploitation of water resources and degradation of land resources. In the recent times, government of India initiated several steps towards addressing the issue of sustainability of agriculture such as improving soil fertility through soil health card scheme; providing an improved access to irrigation and enhancing water use efficiency through Pradhanmantri Gram Sinchai Yojana and supporting organic farming through Paramparagat Krishi Vikas Yojana (GOI, 2016). The growth oriented changes in Indian agriculture were more visible in north western regions of India. While the farming systems of eastern, central and western regions, particularly the tribal areas remained subsistence-oriented besides being deprived of these major changes in Indian agriculture. Further the investment gone into these regions was relatively small in size during the green revolution period. Presently, we are in a situation where nobody seems accountable to the tribal development programmes(Nayak,2015). The recent measures aimed at improving rainfed farming with an increased focus on dryland farming also remain constrained by lack of water resources and other agricultural inputs. It seems there is a regional imbalance with respect to tribal areas when it comes to investments on agriculture. Therefore, it is important to understand the investment needs of the tribal region particularly from a sustainability perspective, since tribal farmers have an intuitive understanding of the natural farming techniques which are vital to their economic and social wellbeing.

India's population stands at 121.06 crores out of which the tribal population of the country (Census 2011) constitutes 8.6 percent(i.e, 10.43 crores). Out of this, 89.97% of them live in rural areas and 10.03% in urban areas (GOI, 2013). Despite special provisions, tribal communities continue to remain among the poorest and most marginalised sections of the society. During the year 2004-05, 37.7 percent of India's

population lived below the poverty line, whereas, during the same period, 60.0 percent of the tribal people were living below the poverty line, almost 22 percent more than the rest of the country. Similarly, the scenario was similar in education and health spheres. Census (2011) indicates that the literacy rate among tribals is 59 percent as against the national average of 74 percent. As per the national health survey 2005-06, the infant mortality rate is 62.1 per 1000 live births among tribes, and under five the mortality is as high as 95.7 per 1000 live births. However, the situation with respect to sex ratio is found encouraging- 990 females for 1000 males as against the national sex ratio of 943.

Tribal communities live, in various ecological and geo-climatic conditions ranging from plains and forest to hills to inaccessible areas with significant concentrations of tribes being found in the Himalayan stretches, Western Ghats, Andaman and Nicobar islands. Central Indian states are home to the country's largest tribes and taken as a whole, 72.80 percent (GOI, 2013) of the total tribal population lives in this region, although it accounts for around 10 percent of the region's total population. In addition, major concentrations of tribal population are found in Gujarat, Maharashtra, Odisha and West Bengal. Further, tribal groups are at different stages of social, economic and educational development. The tribal communities of the east, central and western regions of India are mainly dependent on forest resources and agriculture. Also, for their survival, they practise hunting, gathering, agriculture and labour works for their livelihoods. There are certain scheduled tribes (known as PVTGs) which remain characterized by a pre-agriculture level of technology, stagnant or declining population, extremely low literacy and subsistence level of economy (GOI, 2013).

Agricultural practices followed by tribal communities are rooted in shifting cultivation. They practise traditional methods which are integrated with animal husbandry. A recent study notes that primitive tribal communities like the Chuktia Bhunjias living in Maharashtra, Chhattisgarh and Odisha continue to practise shifting cultivation (Sabar, 2010). A rough estimate shows that 4.47 million hectares of land is still under shifting cultivation, a method involving clearing of a field by slash-and-burn, for cultivation for a number of seasons before leaving it fallow for a long period. This practice of shifting cultivation has brought about various changes in the local ecology in terms of soil erosion, loss of flora and fauna depending upon the cycle of cultivation. The practice of shifting cultivation is found unsustainable in the context of Odisha as it exerts a substantial pressure on the fragile ecosystems (Sahu and Sarangi, 2005). It is also observed that shifting cultivation has become unsustainable primarily due to an increase in the population and the resultant increased demand for food grains (Tripathi and Barik, 2010). However, the practice is found to be slowly changing towards settled agriculture in many tribal parts of India.

Secondly, certain tribal communities are practising settled agriculture, mostly in plains. For instance, the Bhil tribes of Gujarat and Madhya Pradesh are found to be more willing to adopt scientific methods of cultivation (Hiremath and Patel, 2004). It seems agriculture in tribal area is in a transition phase particularly in hilly areas and settled agriculture in plains due to various changes in markets, institutions technologies extension, and environmental conservation policies. It is a transition from a traditional subsistence based shifting cultivation to a more scientific settled agriculture with differential impacts on human wellbeing and ecosystem sustainability. Against this backdrop, a larger study was conducted in the state of Madhya Pradesh with an objective of understanding the agricultural practices being followed in the tribal areas, particularly in the context of a transition from a traditional subsistence-based shifting cultivation to a modern settled agriculture. The study also aimed at examining the role of market, institutions, environmental policies and gender in shaping this transition. From the institutional point of view, the study intended to analyse the spatial and temporal dimensions of traditional uses of land, territorial land rights, land ownership and power relations in the context of tribal agriculture. Factors and conditions underlying the displacement of tribes from agricultural land and reallocation of their de facto access and use rights were at the heart of the investigation. Finally, the economic viability and the contribution of agriculture to the overall wellbeing (or poverty eradication) and sustainability also were part of the analysis as part of designing policy options that promote appropriate agricultural investments in tribal areas. However, the primary objective of the present study was to look into the transition taking place in agriculture in tribal areas with a focus on arriving at macro and micro level pictures. At the macro level, Madhya Pradesh scenario was discussed vis-à-vis the study districts. At the micro level, an empirical analysis was carried out with regard to the scenario of study villages. A size class-wise analysis was done comparing the situation of villages located in the interior parts with those located near the plain areas being exposed to the influence of non-tribals. Similarly, the issue of land alienation, forest rights act implementation status and the influence of non-tribals on the farming practices of tribals have also been discussed in this paper.

2. Socio-Economic and Demographic profile of Madhya Pradesh

The state of Madhya Pradesh is home to a total population of 72.6 million (2011 Census) and a schedule tribe population of 15.3 million(highest in the country). Schedule tribes constitute 21.1% of the total population of M.P (India-8.6%). Madhya Pradesh ranks 20th in Human Development Index in India(2008-09) with a literacy rate of 70.6(as against India's 74.02%). Similarly, ST literacy rate in Madhya pradesh state constitutes 50.6 percent as against all India ST literacy rate of 58.96 percent. The total geographical area of the state works out to 307.56 lakh hectares with a recorded forest area is 95,221 Sq km, constituting 31% of the geographical area of the state and 12.44% of the forest

area of the country. Madhya Pradesh state consists of 50 districts out of which 21 are tribal districts. Jhabua, Dhar and Mandla districts account for more than 50% of tribal Population, while Kharghone, Seoni and Chindwara, Sidhi and Shadol districts for 30 to 50 percent population of tribal population. There are 46 tribal communities inhabiting Madhya Pradesh out of which six communities i.e, Bhils, Gonds, Kol, Korku, Sahariya and Baiga constitute 92.2% of the state ST population. There are twelve tribal communities with a population below 1000 out of which three are special primitive groups. Bhil is the most populous tribal group (2011 census) with a population of 4,618,068 (37.7%) followed by Gonds(35.6%). Over the last decade the tribal population has increased by 3.1 million. Major livelihood sources of tribals include farming, livestock rearing, casual labour, migration and collection of minor forest produce such as tendu leaves, fodder and fuel wood(see box 1).

Box 1 : Major Livelihood sources of the study districts of Madhya Pradesh

2015	1995
Farming (*Kheti*), MGNREGA, migration (*Palayan*), wage labour (*Majdhoori*), fuel wood selling, Timber selling, Tendu leaf collection(*tendu patta*), Mohua fruit and flower collection, Livestock rearing (*Maveshi Palan*), Gold smiths, employees (*Naukiri*), Baja Bajantri (*Doliyas*), Pig rearing.	Farming, *Maveshi Charana*, Wage labour, Tendu leave, Fuel wood collection, Mohua fruit and flower collection, timber selling and Pig rearing.

Source; Focused Group Discussions

3. Methodology, Data and Plan of Activities

The study is largely drawn both from the primary and secondary data sources besides making use of a number of Government documents and reports provided by the various departments. Along with secondary data, focused group discussions were also held with the tribal communities in Jhabua, Mandla and Sidhi districts of Madhya Pradesh. The first criterion adopted for the selection of a district was the notification as Scheduled area. The second important criterion adopted was the presence of the tribal groups which constitute/represent major tribal population of the state so that the study findings would be relevant to them. Hence, the districts/parts of districts coming under scheduled areas of Madhya Pradesh and inhabited by tribes such as Bhils, Gonds, Baigas, Kol were selected for the study. Jhabua (87% of STs and is dominated by Bhil tribe) Mandla (57.9% of STs and is dominated by Gonds) and Sidhi (29,89% of STs and Kusumi block of the district where Baigas and Gonds are predominant) were selected for the study.

In each block, four villages were selected, two villages located in the interior parts and geographically distant and the other two villages undergoing a transition in agriculture or located near the plain areas with the presence of a few non-tribal households engaged in modern agricultural practices. A total of 8 villages each were selected from Jhabua and Mandla districts and four villages from Sidhi district (as it is the only block in scheduled area). Thus, a total of 20 villages and twenty households from each village (i.e., a total of 400 sample households were selected for the study of Agriculture in Tribal areas of Madhya Pradesh (see table 1). Besides, focused group discussions were conducted with men and women from the study villages. A size class-wise analysis with respect to plain and interior villages was also carried out.

Table 1: Sample Villages selected from Madhya Pradesh state.

Name of the District	Block Name	Village Name
Jhabua	Jhabua	Hadmathia(Interior village)
		Bagore (village near to plain area)
		Jaida (village near to plain area)
		Koythariya(Interior village)
	Petlabad	Bada saloniya (Interior village)
		Barvet (village near to plain area)
		Bed dha(Interior village)
		Ramghad (village near to plain area)
Mandla	Gughri	Salwah (village near to plain area)
		Kusumi (Interior Village)
		Khamthara (Interior Village)
		Dobahat (village near to plain area)
	Beejahandi	Pindraimal (Interior Village)
		Beejahandi (village near to plain area)
		Chourai (Interior)
		Udaipur (village near to plain area)
Sidhi	Kusumi	Podi (Interior villages)
		Pankhaira (Interior villages)
		Thadipattar (Interior villages)
		Duhari (Interior villages)

3.1 Methods of Data collection

Information related to rainfall, net irrigated area and demographic features of the selected villages was collected from block development office and village panchayat records. A

thorough review of past and current trends in agricultural policies was conducted based on secondary sources. A structured questionnaire was used for collecting the relevant information from the selected sample households spread across the selected villages. The interview schedule, comprising variables for measurement was prepared in consultation with experts, keeping in view the objectives of the study. The interview schedule was pre-tested in one of the villages not coming under the present study. In the light of the experience gained from pre-testing, suitable modifications were made before finalizing the interview schedule. Enumerators were engaged for collecting the required information from households with the help of questionaire. In the beginning, enumerators were given a one-week training on how to canvas the questionnaire besides aiding them in understanding the general issues of agriculture related to tribal areas. Feild work was carried out during the year 2013-14.

The questionnaire was divided into 24 blocks covering demographic Particulars, household characteristics, access to basic Amenities, migration details, land particulars, inputs used per acre, credit details of household holds, transition in Agriculture, issues on shifting cultivation, religious practices related to agriculture, marketing of crops/ forest products by households, livestock particulars, indebtedness, consumption expenditure, land acquisition and issues on Forest Rights Act 2006. Basic information related to villages was obtained using a questionnaire administered to the village panchayat secretaries of the selected villages and the Block revenue offices of the respective blocks.

3.2 Focused Group Discussions (FGDs)

FGDs were held with both men and women farmers of each study village. The objective of these discussions was to have a general idea on agriculture in tribal areas and related issues irrespective of farm size. FGDs helped us to understand the livelihood options along with ecological and economic dimensions associated with agriculture in tribal villages along with their advantages and disadvantages. This helped us bring out the perspectives of various categories of people with reference to issues in farming in interior as well as tribal villages located near the plain areas with the presence of non-tribals.

3.3 Methods used for data analysis

Both quantitative and qualitative information related to crop cultivation and its determinants was gathered. The analysis was basically carried out done in two ways: One was by comparing the interior and near-the-plain villages and the other was by comparing between the various size-classes. The results of the study are discussed at two levels one at the household level and the other is at the plot level. The data gathered was analysed using different statistical tools such as averages, frequency and percentages as part of understanding/exploring the various aspects related to agricultural practices in tribal villages.

4. Transition in Agriculture of Tribal areas :

A Macro picture of Madhya Pradesh Vis-à-vis Study districts

The agricultural practices have been undergoing changes in all the parts of India in view of the advancements in technology through agricultural research, extension, credit, institutional and policy support extended in different ways. More so in the case of Madhya Pradesh which shows a phenomenal growth in the agricultural sector over the last one decade. The present study has tried to look at the present scenario of agriculture at the state level in M.P vis-à-vis the study districts of Jhabua, Mandla and Sidhi. An attempt has been made to understand the agricultural scenario of tribal areas in Madhya Pradesh in general and the study districts in particular in the context of a transition from traditional subsistence based shifting cultivation to a modern settled agriculture. At the macro level, this analysis is based on the secondary data and at the micro level, on the primary survey data.

4.1 Key features of Agriculture in Madhya Pradesh

Madhya Pradesh (M.P) is a heavily agriculture-dependent state as more than 80% of the people of the state depend on this sector for their livelihood with cultivable area constituting 49%. The agricultural sector contributes around 46% to the state's economy. The average annual rainfall of the state amounts to 1370mm. Madhya Pradesh is endowed with a sub-tropical climate. Like most of north India, it experiences a hot dry summer(April-June), followed by monsoon rains(July-Sept) and a cool and relatively dry winter. M.P State is divided into 11 agro-climatic zones (see figure 1) with rich natural resources. Soil types include Black soils (predominantly in Malwa region), Red and Yellow soils (in Bundhle khand region), alluvial soils (northern Madhya Pradesh), laterite soil (in high land areas) and Mixed soils(in parts of Gwalior and Chambal region).

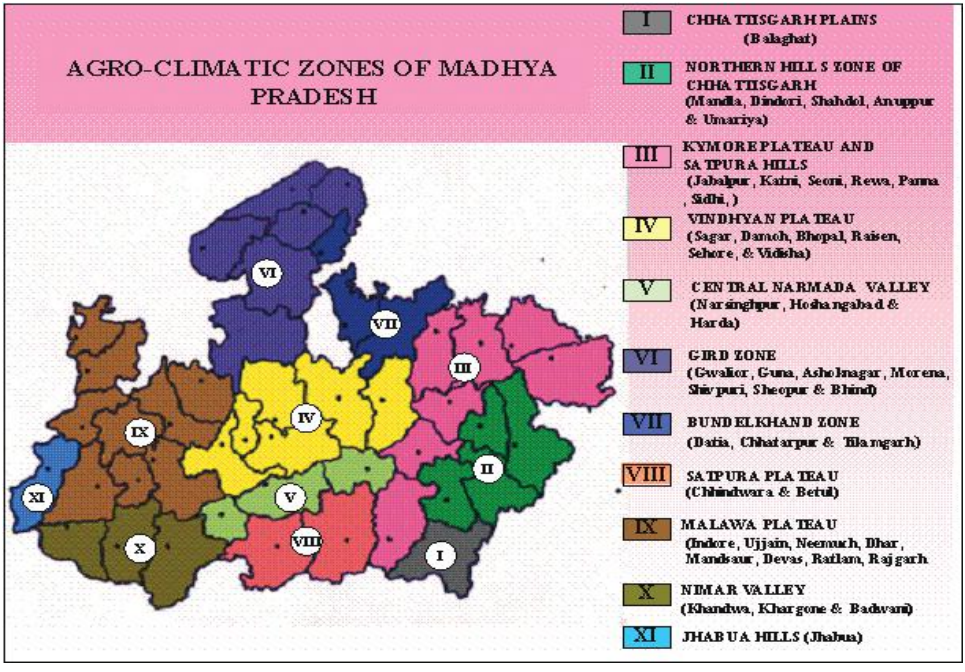
Black soils cover about 47.6% of the total area of the state, followed by red and yellow soils (about 36.5 percent). Similarly, table 2 indicates that in the study districts of Jhabua (54.64%) and Mandla (55.7%) there is a predominant presence of shallow soils while in Sidhi it is deep soils(46.2%).

Table 2 : Soil types of the Study districts in Madhya pradesh

S. No	Major Soils	Jhabua		Mandla		Sidhi	
		Area in '000 Hectares	Percent(%) of the total	Area in '000 Hectares	Percent(%) of the total	Area in '000 Hectares	Percent(%) of the total
1	Deep soils	124	18.32	**	22.9	486.2	46.2
2	Medium Deep soils	183	27.04	**	21.3	211.4	20.1
3	Shallow soils	370	54.64	**	55.7	353.6	33.6

Source: NBSS & LUP Nagpur

Fig 1. Agro-climatic Zones of Madhya pradesh State



The net sown area of Madhya Pradesh amounts to 151.30 lakh hectares (2014-15), while the gross cropped area is 202.16 lakh hectares out of which 27.7% (56.68 lakh hectares) is irrigated. The introduction of soybean in the 1980s replaced nutrient rich cereal/millet crops, there by indicating a decline in the area. M.P stood first in the country by achieving an agricultural growth rate of about 18% during 2011-12. It also won Krishi Karman award during 2011-12, 2012-13 and 2014-15. Today, M.P stands first in the country in the production of pulses, gram, oilseeds and soybean. Infact, the state contributes 22.54% of the total pulses production in the country. The total production of food grains for 2014-15 amounts to 320.43 lakh metric tones. The various crops grown in M.P include paddy, pulses, wheat, oil seeds, grams, soybean and maize. The state enjoys a good support infrastructure with 4500 Primary Agricultural Cooperatives (PACs), 240 Mandis, 2 SAUs, 11 Agricultural colleges. It also has a strong extension network.

Agriculture in Madhya pradesh is dominated by marginal farmers who account for 67.10% of the total farmers(see table 3) with 22.50% of the total land holdings while small farmers constitute 17.91% with 22.08% of the total land holdings. Medium and large farmers comprise 4.25% and 0.70% with 21.20 and 10.60 of the total land holdings respectively.

Table 3: Land Holding position in Madhya Pradesh State
(Area in 000' ha and Number in 000')

Sl.No	Operational Holdings	No.	%	Area	%
1	Marginal (0.5 to 1.0 ha.)	92826	67.10	35908	22.50
2	Small (1.0 to 2.0 ha.)	24779	17.91	35244	22.08
3	Semi Medium (2.0 to 4.0)	13896	10.04	37705	23.62
4	Medium (4.0 to 10.0)	5875	4.25	33828	21.20
5	Large (and over Hundred)	973	0.70	16907	10.60
	Total	**138348**	**100.00**	**159592**	**100.00**

Source: Madhya Pradesh at a Glance 2011.

The total geographical area of Madhya Pradesh spreads over 328726 thousand hectares and out of the total geographical area, forests constitute 21.30 per cent (see table 4).

Table 4: Land Use Pattern followed in Madhya Pradesh State in 2011 (000'ha.)

Particulars	Madhya Pradesh
1. Geographical area	328726 (100)
2. Forests 70035 (21.30)	
3. Land not available for cultivation	26309 (8.00)
4. Culturable fallow & Un-culturable land	17217 (5.24)
A. Permanent pastures & other grazing lands	10311 (3.14)
B. Land under misc. tree crops & groves Cultivable waste Land	3167 (0.96)
5. Land available for cultivation	26117 (7.94)
6. Fallow Land	26208 (7..97)
A. Current fallows	14515 (4.41)
B. Land other than current fallow	10664 (3.24)
7. Net area sown	140974 (42.88)
8. Area sown more than once	54658 (16.62)
9. Gross Cropped Area	195632 (59.51)
10.Cropping intensity %	138.8

Source: Madhya Pradesh at a glance 2011.

Table 5 gives us an idea of the land use pattern of the study districts in Madhya Pradesh. Mandla accounts for the highest percentage of forest area, followed by Sidhi and Jhabua, while Sidhi and Mandla account for higher share in the area under current fallows. Net sown area is highest in Jhabua (53.20%) followed by Sidhi(34.03%) and Mandla (22.19%).

Table 5: Land Use Classification of the study districts in Madhya Pradesh (in 000'Hectares)

S.No	Land use	Jhabua	Mandla	Sidhi
1	Geographical area	675.7	965.6	1039.2
2	Forest	131.7(19.5)	593.2(61.4)	434.8(41.8)
3	Land put to non-agricultural uses	57.3 (8.48)	42.4 (4.39)	83.1 (8)
4	Barren and Uncultivable land	83.4(12.34)	10.6 (1.09)	16.6(1.6)
5	Permanent pastures and other grazing land	8.7(1.3)	19.9 (2.06)	14.5 (1.4)
6	Land under Misc.Trees, crops and groves	0.0 (0)	0.1(0.01)	0.0 (0)
7	Cultivable waste land	25.8(3.8)	21.5(2.2)	65.7(6.3)
8	Current Fallows	4.7 (0.7)	31.4(3.25)	42.9 (4.13)
9	Permanent fallows	4.6 (0.68)	32.2 (3.33)	28.0 (2.69)
10	Net Sown Area	359.5 (53.20)	214.3(22.19)	353.6(34.03)
11	Cropping Intensity (%)	119	130	136

Source: Commissioner of Land records (2011), Gwalior, M.P.

Note: Figures in parentheses indicate the percentage share.

Table 6 : Agricultural Households by Major Source of Income in Madhya Pradesh: 2012-13 (%)

Source	Madhya Pradesh			All India		
	Scheduled Tribe Households	All Other Households	All Households	Scheduled Tribe Households	All Other Households	All Households
Cultivation	79.8	73.4	75.3	69.8	62.5	63.5
Livestock	0.1	3.5	2.5	1.8	4.0	3.7
Other Agriculture	0.1	0.1	0.1	0.8	1.1	1.1
Non-agriculture	0	0.8	0.6	1.7	5.1	4.7
Wages	19.8	20.7	20.4	24.3	21.7	22
Others	0.1	1.5	1.1	1.6	5.6	5.1
All	100.0	100.0	100.0	100.0	100.0	100.0

Source: NSS Report No.569: Some Characteristics of Agricultural Households in India, 2012-13

In Madhya Pradesh state (see table 6), for nearly 80% of the scheduled tribe households, the major source of income is cultivation, followed by wages (19.8 %), whereas, at the all India level, only 69.8% of the ST households receive income from agriculture. The income from livestock for ST households in Madhya Pradesh is negligible at 0.1% as against 3.5% for all the other households of the state. At the all India level, 1.8% of the ST households earn their income from livestock. Major crops grown in the state of Madhya Pradesh include paddy, wheat, maize, pulses, groundnut, rapeseed and soybean. Despite a recent good agricultural growth, as compared to the all India average, the productivity of all the major crops is less in Madhya Pradesh for 2013-14 (see table 7).

Table 7 : A Productivity comparison of important crops in Madhya pradesh for 2013-14.

CROP	Madhya Pradesh (Kg/Ha)	All India (Kg/Ha)
Paddy	2228	2424
Wheat	2946	3075
Maize	2361	2583
Pulses	662	764
Groundnut	1274	1750
Rapeseed	851	1188
Soyabean	836	983

Source: Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India.

Table 8 clearly indicates a transition in the cropping pattern followed in Madhya pradesh state. As the table shows the area under millets has gradually declined during the period between 1990-91 to 2011-12, while gram and soybean area has increased. Infact, Soybean crop has replaced the area of jowar, as it is not only economically fetching but also allows for the cultivation of a second crop during rabi due to its shorter growth period.

Table 8: Crop Diversification pattern in Madhya Pradesh (Area in Lakh hectares)

Crop	90-91	2007-08	2008-09	2009-10	2010-11	2011-12
Jowar	16.24	5.46	4.98	4.67	4.28	3.91
Kodo-kutki	7.61	2.86	2.78	2.53	2.48	2.26
Gram	22.61	26.62	28.75	30.14	28.88	30.44
Total Pulses	39.23	43.98	46.37	47.95	52.07	51.85
Soybean	21.47	52.02	52.95	54.54	55.52	56.69
Total Oilseeds	36.73	65.63	67.13	69.61	70.33	72.01

Source: Directorate of Economics and statistics, department of agriculture and cooperation, government of India, 2013.

Madhya Pradesh state accounts for 43.3 per cent of the irrigated area and 56.7 percent of the rainfed area (see table 9). But the study districts present a different scenario with respect to access to irrigation. Table 9 clearly indicates that all the three districts of Jhabua, Mandla and Sidhi predominantly account for around 82 per cent of the rainfed area and a lesser percent of irrigated area as compared to the state average of 43.3%, thereby indicating at a significant implication for the agricultural productivity in these regions. The data calls for more investments in the scheduled areas of Madhya Pradesh.

Table 9 : Irrigation details of the study districts in M.P for 2012-13.

S.No	Irrigation	Jhabua		Mandla		Sidhi		M.P
		Area in '000 Hectares	Percent (%) of the total	Area in '000 Hectares	Percent (%) of the total	Area in '000 Hectares	Percent (%) of the total	Percentage
1	Net Irrigated area	63.639	17.70	20.4	8.69	64.8	18.33	43.3
2	Gross irrigated area	67.757	16.36	20.4	8.69	71.9	20.33	-
3	Rainfed area	295.83	82.30	193.9	82.62	288.8	81.67	56.7

Source: Department of Agriculture and Cooperation, Ministry of Agriculture, GOI 2013.

An analysis of the sources of irrigation across the study districts reveal that in Jhabua and Sidhi, open wells happen to be the major source of irrigation, while in Mandla it is Canals. As can be noticed (from table 10), irrigation through borewells(tubewells) in terms of area is neglible in Jhabua and Mandla, while relatively high in Sidhi. Even, according to the reports of M.P state ground water departments/board, the ground water utilization is at a safe level i.e below < 70% usage. Other than Kusumi tehsil, the remaining part of Sidhi district is under non-scheduled areas which inturn could be the reason for the presence of a high number of borewells and the area irrigated under that particular source.

Table 10 : Details of Sources of Irrigation in the study districts of M.P during 2012-13.

S.No	Irrigation Source	Jhabua			Mandla			Sidhi		
		Number	Area in '000 Hectares	Percent (%) of the total	Number	Area in '000 Hectares	Percent (%) of the total	Number	Area in '000 Hectares	Percent (%) of the total
1	Canals	339	9.773	2.36	67	15.9	77.9	185	18.3	18.4
2	Tanks	614	10.682	2.58	3	0.18	00	80	0.8	1.1
3	Open wells	22882	22.132	5.34	3180	2.9	14.2	12143	30.9	42.9
4	Borewells	-	1.721	0.42	00	00	00	2096	15.3	21.2
5	Lift irrigation	-	-	-	NA	NA	NA	NA	-	-
6	Micro irrigation	-	-	-	NA	NA	NA	NA	-	-
7	Other sources	-	23.449	5.66	539	1.6	7.8	161	11.6	16.1
	Total	25,799	44.308	16.36	-	20.04	-	-	71.9	-

Source: Department of Agriculture and Cooperation, Ministry of Agriculture, GOI 2013.

4.2 Area, Production and Productivity:

An analysis of the latest data based on secondary sources was carried out as part of assessing the area, production and productivity of major kharif crops grown in Jhabua, Mandla and Sidhi districts. As can be seen from table 11, Paddy is the main Kharif crop grown in Mandla and Sidhi districts, while Maize is the predominant crop grown in Jhabua. Millet and pulse based cropping systems could be seen in the sample districts

hosting a huge agro-biodiversity. In respect of Jowar and Soyabean, Madhya Pradesh has achieved a higher yield than the study districts' average, while in the case of Niger, small millets, Kodo-Kutki and Urad, the study districts are found to have fared better than the state average yield for 2011-12.

Table 11 : Area, production and yield of major kharif crops with respect to the study districts of Madhya Pradesh (2011-12)

Crop	Mandla			Jhabua			Sidhi			M.P
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Yield
Paddy	114.0	78.1	685	22.7	12.2	537	123.6	98.0	793	887
Jowar	0.2	0.2	1000	17.5	15.2	869	15.4	13.8	896	1080
Maize	18.1	23.8	1315	112.7	129.7	1151	36.0	42.9	1192	1767
Bajra	0.0	0.0	0.0	17.2	10.2	593	0.0	0.0	0.0	1397
Small Millets	0.6	0.2	333	3.4	0.8	235	12.2	5.2	426	365
Kodo-Kutki	41.5	9.7	234	0.3	0.1	333	44.5	13.8	310	269
Tur	3.7	3.0	811	5.3	2.7	509	32.2	14.6	453	733
Urad	2.3	0.5	217	68.0	29.6	435	9.9	4.1	414	352
Moong	0.0	0.0	0.0	2.0	0.7	350	1.1	0.4	364	318
Soy bean	1.0	0.7	700	32.0	22.4	700	0.1	0.1	1000	1005
Ground nut	0.0	0.0	0.0	18.1	16.7	923	0.0	0.0	0.0	1058
Sesame	1.6	0.5	313	0.3	0.1	333	19.8	6.1	308	376
Niger	8.1	1.7	210	0.0	0.0	0.0	2.5	1.1	440	227
Cotton	0.0	0.0	0.0	35.1	27.2	395	0.0	0.0	0.0	624

Source: Commissioner of Land records, Gwalior, M.P.

Note : Area in 000' Hects, Production in 000' tones, Yield in Kgs/Hect.

4.3 Livestock

Livestock and agriculture are inseparable. Madhya Pradesh has a rich and diverse livestock resource. Among large ruminants, the population of bullocks is highest in all the three study districts followed by cows, while goat population is observed significant in Jhabua and Sidhi districts. On the contrary, the presence of sheep is very less in Jhabua and Sidhi and negligible in Mandla. As can be observed from Table 12, a small area is under the cultivation of fodder crops such as Lucern, Sorghum chari, Bajra chari and Berseem. Access to grazing land is an important factor when it comes to rearing the livestock by the villagers. In Sidhi and Mandla, a small number of pig population could be seen in view of the tribal households in interior villages following the tradition of back yard piggery. Interestingly, in Bade saloniya village of Jhabua, goat population has increased resulting in farmers doing a business. Besides, they were of the opinion that goat comes very handy during difficult situations such as ill health, as they can immediately sell a couple of goats for treatment at hospital.

Table 12:Major Livestock details of the Study districts of M.P (in 000'Nos) for 2011-12

District	Bull Bullocks	Cows	He Buffaloes	Buffaloes	Sheep	Goats	Pigs	Total Livestock	Fodder Crop Area ('000 hectares)	Grazing Land ('000 hectares)
Jhabua	310.2	145.8	2.8	62.4	13.5	469.9	1.0	1227.8	12.503	8.659
Mandla	159.5	106.6	22.3	25.7	0.5	92.3	21.7	572.4	8.659	19.9
Sidhi	329.2	215.3	7.1	84.9	23.4	340.6	11.0	1335.3	-	-
M.P	6553.4	5178.7	306.1	3463.8	593.2	7418	561.3	32880.7	700	454

Source: Commissioner of Land records, Gwalior, M.P.

4.4 Drivers of Agricultural Growth In Madhya Pradesh

Agricultural growth in any region can occur, because of sustained growth in crop output, diversification of agriculture and live stock products and with a resultant increase in the value of the total output. An examination of agricultural growth, agricultural production and productivity of the entire range of major crops in Madhya Pradesh throwsup an impressive scenario at the macro level. The implementation of National Food Security Mission and National Horticulture Mission has also emerged as a path of intervention which has helped the diversification of agriculture towards cash crops in the state. The area and production of cereals, pulses, total food grains and total oilseeds, vegetables, fruits, spices, medicinal and aromatic plants have shown a significant increase, thanks to an effective implementation of the National Horticultural Mission. The growth of livestock sector is also evident in Madhya Pradesh due to the implementation of Backyard Poultry Scheme, Subsidy for Quails, Progressive animal owner / trained Gau Sewak being given subsidy for bulls as part of improving Intensive Cattle Breeding Programme, Sufficient fodder development for productive livestock and Piggery development with a cent percent Central Government assistance (a new piggery farm has been established in Jabalpur) for farmers. However, as far as an increase in the value of agricultural output is concerned, in the recent times, the farmers have been observed unable to get a scientific price for their product.

The growth of agriculture also depends on the infrastructure base created in the state viz. roads, power, agro-based and other industries. The construction of roads in the state is supervised by Madhya Pradesh Road Development Corporation Limited which implements projects taken up under public-private partnership and those funded by Asian Development Bank. The state shows an impressive progress in the road development since 2000. These initiatives have improved the state of road connectivity to a great extent in the study districts of Madhya Pradesh. The progress of agro-based and other industries is also quite impressive due to various policy incentives undertaken by the

state government. Madhya Pradesh has been one of the leading soybean, pulses, oilseeds, cotton, spices etc. producing states of India.

Our field observations clearly reveal that the progress achieved at the state level is not visible in the scheduled areas(study sites of Jhabua, Mandla and Sidhi) of the state, mainly inhabited by major tribal communities such as Bhils, Gonds, and Baighas. The major agricultural investments made by the state have not reached to these tribal belts to the desired extent. A case in point is the provision of irrigation infrastructure. In addition to the general agricultural challenges, specific challenges facing the tribal areas of the state include lack of a better price for agricultural produce; lack of minimum wages; migration; lack of access to irrigation, institutional credit and improved technology; exploitation by money lenders and lack of effective policies and institutions.

5. Patterns of Agricultural Transition in Tribal Areas of Madhya Pradesh :
A Micro picture of the study villages

5.1 Agricultural Transition
The scenario of farming is changing not only at the macro level, but also at the micro level in the villages. The agricultural practices are undergoing changes due to interventions by both the government and private sector agencies. The study villages of Jhabua, Mandla and Sidhi districts are no exception to this. The main objective of this section is to understand the agricultural scenario of tribal areas of both plain and interior villages, particularly in the context of a transition from a traditional subsistence based shifting cultivation to a modern settled agriculture. An attempt has been made here to understand these changes across various size classes of the sample households.

The study tried to get a glimpse of the overall scenario of the existing methods of agriculture being followed by interior villages as well as villages located in the plain areas of the study districts. For this purpose, inputs such as seeds, fertilizers, pesticides, labour (includes manual and mechanical) and ploughing methods were considered in order to understand whether a farmer was cultivating land by adopting entirely traditional/modern methods or a mix of both these methods. Unless and until a farmer is found adopting completely traditional practise with respect to each and every variable mentioned above, he is not considered a traditional agriculture practitioner. Similarly, if a farmer is found practising modern methods of cultivation with respect to all the above mentioned variables, he is considered a modern agriculture practitioner. Those farmers who are found adopting even one modern practice/traditional practice with respect to any one of the variable are placed under the category of mixed method (both modern and traditional) of cultivation. The empirical evidence based on the study carried out in three districts of Jhabua, Mandla and Sidhi reveals that only 2 percent of the sample

households living in the villages near to plain areas have adopted only traditional methods as against 9.5 percent of the sample HHs in the interior villages (see table 13).

Table 13:Distribution of Sample households according to the type of agricultural practice adopted in respect of all the crops during Kharif (2013-14).

Type of Agriculture	Village Type				Total	
	Plain Villages		Interior Villages			
	No of Households	Percentage	No of Households	Percentage	No of Households	Percentage
Completely Traditional Agriculture inputs and practices	4	2.0	19	9.5	23	5.75
Completely Modern Agriculture	0	0.0	0	0.0	0	0.0
Mix of Traditional and Modern practices	196	98.0	181	90.5	377	94.25
Total	200	100.0	200	100.0	400	100.0

Source: Primary Survey

The villages in the plain areas are found more exposed to the non-tribal farmers' agricultural practices, who are also residing in and around these villages. Moreover they are nearer to district headquarters to which the agricultural department and other line department officers are likely to make more visits impacting their practice in the process. A few of the sample households (9.5 percent) belonging interior villages are rooted in traditional cultivation practices, which are based on local resources and less expensive and ecologically beneficial. It is interesting to note that out of the total sample households of the study districts, 94.25 percent have adopted a combination of both traditional and modern methods with respect to inputs such as seeds, fertilizers, pesticides, labour and ploughing. On the other side, nearly 6 percent of total sample households have adopted only traditional cultivation methods. Notably, the table 13 indicates, none of the sample households of the present study villages has adopted solely modern farming methods with respect to all the variables considered for our analysis.

A further analysis was done to see what kind of practices were adopted in the cultivation of major crops. Table 14 reveals that traditional food crops such as dry sown paddy and local maize are being cultivated using not only traditional methods but also, a combination of traditional, mixed and modern methods. However, commercial crops such as cotton and soybean are grown using mixed methods and no sample farmer of the study area is found cultivating them using solely traditional methods. Along with major crops grown in the study area, an analysis was also done with regard to other cereals, pulses and

millets apart from major crops grown in the study villages. It can be observed from table 15 that little millet/kodo millet and redgram are grown using both the mixed and traditional agricultural practices, whereas, jute, wheat. black gram are cultivated using both the mixed and traditional practices. Only fox tail millet is grown using exclusively traditional methods.

Table 14:Distribution of Sampled households according to the type of agricultural practices adopted in respect of major crops during Kharif(2013-14).

Crop name	Type of agriculture**	Village Type				Total	
		Plain Villages		Interior Villages			
		No of Households	Percentage	No of Households	Percentage	No of Households	Percentage
Paddy	Traditional	2	3.5	14	14.6	16	10.5
	Mixed	55	96.5	82	85.4	137	89.5
	Total	57	100.0	96	100.0	153	100.0
Maize	Traditional	1	1.9	6	10.7	7	6.4
	Mixed	52	98.1	50	89.3	102	93.6
	Total	53	100.0	56	100.0	109	100.0
Cotton	Mixed	7	100.0	17	100.0	24	100.0
	Total	7	100.0	17	100.0	24	100.0
Soybean	Mixed	32	100.0	34	100.0	66	100.0
	Total	32	100.0	34	100.0	66	100.0

Source: Primary Survey

** for this purpose, inputs such as seeds, fertilizers, pesticides, labour and ploughing methods were considered.

Note: In respect of paddy and Maize, none is found following completely modern practices with regards to the above considered variables. Even if one of the variables was not a modern practice, the household was placed under the mixed category. Similary, in respect of cotton and Soybean, there are no farmers following either all the traditional practices or modern practices in relation to the variables considered.

Table 15: Distribution of Sample households according to the type of agricultural practices adopted in respect of other cereals, pulses and millets during 2013-14.

Crop name	Type of Agriculture practice**	Village Type				Total	
		Plain Villages		Interior Villages			
		No. of Households	Percentage	No. of Households	Percentage	No. of Households (N)	Percentage
Jowar	Mixed	1	100.0	0	0.0	1	100.0
	Total	1	100.0	0	0.0	1	100.0
Fox tail millet	Traditional	0	0.0	1	100.0	1	100.0
	Total	0	0.0	1	100.0	1	100.0
Little millet/	Traditional	1	25.0	3	33.3	4	30.8
Kodo millet	Mixed	3	75.0	6	66.7	9	69.2
	Total	4	100.0	9	100.0	13	100.0
Red gram	Traditional	0	.0	2	9.5	2	9.1
	Mixed	1	100.0	19	90.5	20	90.9
	Total	1	100.0	21	100.0	22	100.0
Black gram	Mixed	2	100.0	6	100.0	8	100.0
	Total	2	100.0	6	100.0	8	100.0
Jute/Mesta	Mixed	1	100.0	0	0.0	1	100.0
	Total	1	100.0	0	0.0	1	100.0
Wheat	Mixed	6	100.0	0	0.0	6	100.0
	Total	6	100.0	0	0.0	6	100.0

Source: Primary Survey

** for this purpose, inputs such as seeds, fertilizers, pesticides, labour and ploughing methods were considered.

Continuing the analysis further, an attempt was made to look into the size-class-wise adoption of traditional/modern agricultural technologies in villages near to plains and interior villages with respect to each input such as seed, fertilizer, pesticide, ploughing, marketing of crop produce, labour market and land tenure related to major crops such as paddy, maize, cotton and Soybean. Table 16 indicates that in interior villages and villages near to plains across all size classes sample households predominantly use a combination of both improved/hybrid seeds in respect of major crops such as paddy, maize, cotton and Soybean. In plain area villages, in the case of paddy crop, medium and large farmers (40 percent) use exclusively local seeds. Similarly, in the case of maize crop, 7.5 per cent of the farmers use traditional seeds. When it comes to interior villages,

traditional seeds are used in respect of only paddy crop. Fertiliser, an important input in crop production, determines the yield level. The type of fertiliser used also has an influence on the soil health. Empirical evidence (from table 16) indicates that in the case of paddy and maize crops, in interior and villages near to plains, a small number of sampled households across different size-classes use exclusively organic manure i.e farm yard manure. However, a large number of farmers use a combination of chemical and organic fertilizers. For commercial crops such as cotton and soybean, both chemical fertilizers and organic fertilizers are being used (see table 16). Noticebly, not a single sample household is observed using only organic manures for the cultivation of cotton and soybean. This could be due to the development and cultivation of mainly fertilser-responsive varieties of the two major crops of the state. The use of tank silt for improving soil fertility is a recent practice observed.

Table 17 Indicates that except in the case of marginal farmers (1.3 percent) in both the interior and plain villages of the study districts, no pesticide is used for food crop paddy across all size-classes. Even in the case of Maize a majority of the farmers do not use pesticides. FGDs with farmers reveal that they are not keen on spraying pesticides on the two major food crops (paddy and maize) of their region. Empirical evidence reveals that in the case of two prominent cash crops-cotton and soybean-the usage of pesticide has been very high among all the sampled households. The reason for this could be the cultivation of these commercial crops as continuous monocrops, leading to a high pest prevalence with a resultant economic damage. To protect these crops from pest infestation, farmers across all size classes are found using pesticides.

In the case of 'variable' ploughing, across all size classes, farmers in the plain areas use a combination of bullocks and tractors (see table 17). In the case of food crops paddy and maize, a substantial number of households are using only bullocks for ploughing the land. In interior villages, in respect of paddy crop across all size classes, predominantly bullocks are used for ploughing the land, while in the case of cotton and soybean cultivation, both bullocks and tractor are used. An analysis was done with reference to marketing of agricultural produce as well to understand what was happening to crops, produced by farmers. Table 3.17 indicates that in the plain area villages, in the case of food crops paddy and maize, across all size classes a substantial number of sampled households retain the harvested produce for self consumption. Contrary to this, the produce of cotton and soybean crops is either sold to market or to middle men. A similar trend is observed in interior villages with a slightly higher percentage of sample households retaining food crops for self consumption.

Table 16: Size-class wise distribution of Sample households according to adoption of seed and fertilizer type in respect of Paddy, maize, cotton and soybean crops during the Kharif season(2013-14)

S.No	Inputs	Paddy			Maize			Cotton			Soya bean		
		MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF
		Plain Areas											
SEED	Local	0.0 (0)	0.0(0)	40.0 (2)	7.5(3)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)
	Improved/Hybrid	37.1(13)	11.1(1)	0.0 (0)	27.5(11)	33.3(4)	20.0(1)	0.0(0)	0.0(0)	0.0(0)	6.7(1)	28.6(4)	0.0(0)
	Both	62.9(22)	88.9(8)	60.0 (3)	65.0(26)	66.7(8)	80.0(4)	100.0(3)	100.0 (2)	100.0 (1)	93.3(14)	71.4(10)	100.0(7)
		Interior Areas											
	Local	10.4(8)	9.1(1)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0 (0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)
	Improved/Hybrid	28.6(22)	36.4(4)	33.3(1)	28.2(11)	12.5(2)	50.0(2)	0.0(0)	25.0(1)	0.0(0)	6.7(1)	11.1(1)	16.66(1)
	Both	61.0(47)	54.5(6)	66.7(2)	71.8(28)	87.5(14)	50.0(2)	100.0(6)	75.0(3)	100.0(7)	93.3(14)	88.9(8)	83.33(5)
FERTILIZER		Plain Areas											
	Organic Manure (OM)	34.3(!2)	33.3(3)	60.0(3)	22.5(9)	8.3(1)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)
	Chemical Fertiliser (CF)	14.3(5)	33.3(3)	0.0(0)	12.5(5)	0.0(0)	0.0(0)	33.3(1)	0.0(0)	100.0(1)	6.7(1)	0.0(0)	14.29(1)
	Both CF and OM	51.4(18)	33.3(3)	40.0(2)	65.0(26)	91.7(11)	100.0(5)	66.7(1)	100.0 (2)	0.0(0)	93.3(14)	100.0(14)	85.71(6)
		Interior Areas											
	Organic Manure(OM)	34.3(12)	33.3(3)	60.0(3)	22.5(9)	8.3(1)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)
	Chemical Fertiliser (CF)	14.3(5)	33.3(3)	0.0(0)	12.5(5)	0.0(0)	0.0(0)	33.3(1)	0.0(0)	100.0(1)	6.7(1)	0.0(0)	14.29(1)
	Both CF and OM	51.4(18)	33.3(3)	40.0(2)	65.0(26)	91.7(11)	100.0 (5)	66.7(2)	100.0(2)	0.0(0)	93.3(14)	100.0(14)	85.71(6)

Source: Primary survey; Note: MF=Marginal Farmers ; SF= Small Farmers ; MDF & LF= Medium and Large Farmers

Table 17: Size-class wise distribution of Sample households according to the adoption of Pest Management and ploughing type in respect of Paddy, maize, cotton and soybean crops during the Kharif season (2013-14)

S.No	Inputs	Paddy			Maize			Cotton			Soya bean		
		MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF
		Plain Areas											
Pest Management	Chemical pesticides	0.0 (0)	0.0 (0)	0.0 (0)	30.0 (12)	41.7 (5)	40.0 (2)	66.7 (2)	100.0 (2)	0.0 (0)	80.0 (12)	92.9 (13)	14.29 (1)
	Bio-pesticides	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
	No pesticide Usage	100.0 (35)	100.0 (9)	100.0 (5)	70.0 (28)	58.3 (7)	60.0 (3)	33.3 (1)	0.0 (0)	100.0 (1)	20.0 (3)	7.1 (1)	85.71 (6)
		Interior Areas											
	Chemical pesticides	1.3(1)	0.0(0)	0.0(0)	25.6(10)	81.2(13)	25.0 (1)	100.0(6)	100.0(4)	100.0(7)	80.0(12)	88.9(8)	83.33(5)
	Bio-pesticides	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
	No pesticide Usage	98.7 (76)	100.0 (11)	100.0 (3)	74.4 (29)	18.8 (3)	75.0 (30	0.0 (0)	0.0 (0)	0.0 (0)	20.0 (3)	11.1 (1)	16.66 (1)
		Plain Areas											
ploughing	With Bullocks	40.0 (14)	44.4 (4)	80.0 (4)	32.5(13)	8.3(1)	0.0 (0)	0.0 (0)	50.0 (1)	0.0 (0)	0.0 (0)	7.1(1)	14.29 (1)
	With Tractor	8.6 (3)	0.0 (0)	0.0 (0)	2.5 (1)	8.3(1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	6.7(1)	0.0(0)	0.0 (0)
	Mixed (both)	51.4 (18)	55.6 (5)	20.0(1)	65.0 (26)	83.3(10)	100.0 (5)	100.0(3)	50.0 (1)	100.0(2)	93.3(14)	92.9{13)	85.71(6)
		Interior Areas											
	With Bullocks	58.4 (45)	54.6 (6)	66.7 (2)	41.0 (16)	18.8 (3)	50.0 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.0(0)	0.0(0)	33.33(2)
	With Tractor	2.6 (2)	9.1(1)	0.0 (0)	5.1 (2)	6.2 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0(0)	0.0(0)	0.0 (0)
	Mixed (both)	39.0 (30)	36.4 (4)	33.3 (1)	53.8 (21)	75.0 (12)	50.0 (2)	100.0 (6)	100.0 (4)	100.0 (7)	100.0 (15)	100.0 (9)	66.66 (4)

Source: Primary survey; Note: MF=Marginal Farmers ; SF= Small Farmers ; MDF & LF= Medium and Large Farmers

An analysis of 'variable' labour (see table 19) points out that both in plain and interior villages, a combination of family and hired labour is used. The percentage of sample households using family labour is a bit higher in interior villages as compared to those located in the plain areas. The average wage rate (both agriculture and non agriculture) is quite low in the study areas of Jhabua, Mandla and Sidhi(see table18)

Table 18 : Wage Scenario in the study villages of Madhya Pradesh during the year 2013-14

District	Block	Village	Agricultural Labour	Non-agricultural labour	Other Casual labour
Sidhi	Kusumi	Duhari	100	150	100
		Pondi	100	100	-
		Pankhaira	120	140	140
		Thadipattar	100	200	-
Mandla	Bheejahandi	Pindraimall	100	140	-
		Chourai	50	50	-
		Udaipur	100	150	130-230
	Gughri	Kamtara	150	150	140
Jhabua	Jhabua	Jaida	200	-	-
	Petlabad	Bagore	150	-	-
		Barvet	150	-	-
		Badesaloniya	100-150	-	-

Source: Primary Survey

5.2 Cropping System

Despite the constant encouragement being provided for monocropping by the agricultural extension agencies, private seed and pesticide and fertiliser companies since past three decades, farmers of the study area continue to follow inter-cropping and mixed cropping, realizing their merit. Focused group discussions reveal that millets are still part of their cropping system. However, the area under millets has declined as compared to the area 20-30 years ago. Farmers, have gone for a huge crop diversity on their farms. Table 20 gives us a glimpse of the huge crop diversity observed in the study villages during kharif and Rabi seasons. Mixed and intercropping are predominant across the drylands. Farmers value such crop diversity since it provides them with a greater sense of protection against the risk of crop failures (Scoones, 2001; Gautam and Venkateswarlu, 2007). The reasons given by farmers for practising crop diversity are as follows:

- Provides nutritive and diverse food to the family members through out the year.

Table 19: Size-class wise distribution of Sample households according to adoption of marketing of agricultural produce and labour market in respect of Paddy, maize, cotton and soybean crops during the Kharif season(2013-14)

S.No	Inputs	Paddy			Maize			Cotton			Soya bean		
		MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF	MF	SF	MDF & LF
		Plain Areas											
MARKETING Of Agril. Produce	Own Consumption	51.4 (18)	22.2 (2)	80.0 (4)	45.0 (18)	41.7 (5)	60.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	7.1 (1)	0.0 (0)
	Sale in Market	37.1 (13)	77.8 (7)	20.0 (1)	50.0 (20)	41.7 (5)	40.0 (2)	100.0 (3)	50.0 (1)	0.0 (0)	80.0 (12)	85.7 (12)	57.14 (4)
	ale to Middle men	11.4 (4)	0.0 (0)	0.0 (0)	5.0 (2)	16.7 (2)	0.0 (0)	0.0 (0)	50.0 (1)	100 (1)	20.0 (3)	7.1 (1)	42.85 (3)
		Interior Areas											
	Own Consumption	72.7 (56)	27.3 (3)	66.7 (2)	56.4 (22)	43.8 (7)	75.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)	6.7 (1)	11.1 (1)	33.33 (2)
	Sale in Market	14.3 (11)	27.3 (3)	33.3 (1)	33.3 (13)	56.2 (9)	0.0 (0)	100.0 (6)	100.0 (4)	57.14 (4)	86.7 (13)	77.8 (7)	33.33 (2)
	Sale to Middle men	13.0 (10)	45.5 (5)	0.0 (0)	10.3 (4)	0.0 (0)	25.0 (1)	0.0 (0)	0.0 (0)	42.86 (3)	6.7 (1)	11.1 (1)	33.33 (2)
		Plain Areas											
LABOUR Market	Family Labour	18.6(8)	22.2(2)	60.0(3)	52.9(18)	33.3(5)	75.0(3)	33.3(1)	0.0(0)	0.0(0)	28.6(4)	25.0(3)	50.0(3)
	Hired Labour	2.3(1)	0.0(0)	20.0(1)	11.8(4)	13.3(2)	25.0(1)	0.0(0)	100.0(2)	50.0(1)	21.4(3)	8.3(1)	33.3(2)
	Both	79.1(34)	77.8(7)	20.0(1)	35.3(12)	53.3(8)	0.0(0)	66.7(3)	0.0(0)	50.0(1)	50.0(7)	66.7(8)	16.7(1)
		Interior Areas											
	Family Labour	41.2 (33)	46.2 (6)	33.3 (1)	56.4 (22)	73.3 (11)	50.0 (1)	28.6 (2)	75.0 (3)	16.7 (1)	33.3 (5)	20.0 (2)	22.2 (2)
	Hired Labour	2.5 (2)	0.0 (0)	2.1 (2)	5.1 (2)	13.3 (2)	0.0 (0)	14.3 (1)	0.0 (0)	0.0 (0)	6.7 (1)	20.0 (2)	33.3 (3)
	Both	56.2 (45)	53.8 (7)	56.2 (54)	38.5 (15)	13.3 (2)	50.0 (1)	57.1 (4)	25.0 (1)	83.3 (5)	60.0 (9)	60.0 (6)	44.4 (4)

Note: MF=Marginal Farmers ; SF= Small Farmers ; MDF & LF= Medium and Large Farmers

- Provides a variety of fodder and feed to the livestock
- Improves soil health
- Results in an effective utilization of farmland
- Ensures that there is no crop loss under unfavorable climatic conditions.

Table 20 : Agrobiodiversity during the kharif and Rabi seasons in the study villages of Sidhi and Mandla districts of Madhya Pradesh (2013-14)

Village	Kharif crops	Rabi crops
	Sidhi district-Kusumi block	
Duhari	Maize (*Meccai*), Dry sown Paddy (*Dhan*), Kodo millet(*Kodho*), Redgram (*Arhar*), Til (*Tili*), Black gram(*Urad*), Peas (*Batra*)	Chick pea (*Chana*) and wheat (*Ghehoo*)
Podi	Dry sown Paddy (*Dhaan*), Kodo millet (*Kodho*), Kutki, Redgram (*Arhar*), Black gram (*Urad*), Linseed (*Alsi*), Mejri, Little millet (*Sama*), Maize (*Meccai*) and Til (*Tili*), Jowar	Chick pea (*Chana*), Paddy (*Dhaan*) and wheat (*Ghehoo*)
Thadipattar	Dry sown Paddy, Redgram, Kodo millet, Sesame, Jowar, Rayi, Sama	Wheat, Chick pea, peas (*mutter*), Linseed (*alsi*)
	Mandla district – Beejahandi block	
Pindraimall	Maize, dry sown Paddy, Kodo, Kutki, Vegetables.	Peas, wheat, Chick pea, Lentils (*masoor*),
Chourai	Green gram, Kodo, Kutki, Jowar, Paddy	Wheat, Chick pea, Linseed
	Jhabua district – Jhabua block	
Jaida	Maize, Cotton, Soya bean, paddy, Black gram, Ground nut, redgram (both white and red seeded), sesame and green gram	Bengal gram, wheat, Maize, Peas, Onion, Bhendi, Chillies, tomato and Balor (Big beans-*pedda chikkudu*)
Bagore	Maize, Soya bean, Black gram, paddy,Cotton, Ground nut, redgram, paddy, sesame, pearl millet, sorghum, green gram and hibiscus.	Wheat, Bengal gram, peas, maize(only few farmers), vegetables like Potato, garlic and onion

Source: Fouced group discussions.

In the study districts, a high crop diversity is observed with the cultivation of pulses and millets characterizing the farming system (see table 20). While practising inter/mixed cropping, the farmers combine crops with varying lengths of root depth so as to avoid

competition for space, moisture and nutrients. Under mixed cropping, root diversity at different levels below the ground stabilises physically the soil structure against erosion and soil movement on steep slopes, and in tropical systems, the contribution of roots to soil organic matter is proportionately larger than from inputs above the ground. The effects of root systems on the biophysical properties of the soil are particularly critical to farming systems where crop residues are at a premium for fuel and fodder. Earthworms, other soil fauna and micro-organisms, together with roots of plants and trees, ensure nutrient cycling; pests and diseases are kept in check by predators and disease control organisms, as well as by genetic resistances in crop plants themselves; and insect pollinators contribute to the cross-fertilisation of out-crossing crop plants.

The natural process of biological nitrogen fixation by roots constitutes an important source of nitrogen for crop growth (Venkateshwarlu, 2001). It, therefore, provides a major alternative to the use of commercial nitrogen fertiliser in agriculture. Inter/mixed cropping safeguards against the total failure of crops during unfavorable climatic conditions and can thus increase production and income from drylands (Singh, 1979). Under monocropping system, the incidence of pest or spread of disease is easy, as there is a single crop, whereas, the inter/mixed cropping system by itself acts like a barrier to the spread of pests, thereby reducing the potential damage. Moreover, it becomes difficult for pests to locate their food under the mixed cropping system. Interestingly, some of the crops under the mixed cropping system are a source of food for natural enemies of crop pests. So, more the variety of crops in a field, higher is the population of beneficial organisms which takes care of pest menace. This helps avoide the use of pesticides.

In the sample villages of the study districts, Kodomillet cultivation is predominant as compared to other crops. This is evident from the highest mean area of these crops, especially in the interior areas of Mandla and Jhabua(see table 21). Crops such as Redgram and Black gram(Urad) also share a good mean area while crops such as Foxtail millet are seen in Sidhi district. Although the area under millets has come down as compared to hitherto, these crops still occupy a prominent place in the farming systems of tribals. This is done to secure themselves against the vagaries of nature and incidence of pests and diseases. Creating incentives for the conservation of agrobiodiversity, especially on-farm diversity of underutilized crops such as minor millets, is essential to combating climate change (Arvindakshan and Sherief, 2010)

In some of the study villages, the sowing of Kodho(*kodo millet*), Kutki(*little millet*), Alsi(*linseed*), Jagni(*niger*) has now been stopped. In the case of paddy, Maize and redgram(*arhar*) new seed varieties supplied through Agriculture Department are being used. Mostly for broadcasting of seeds, excepting in study villages, for crops such as Chick pea(*Chana*), wheat(*Ghehoo*), Lentils (*Masoor*) and peas (*Batri*), seed drill is used.

Women are mainly involved in agricultural activities such as *Nindayi*(weeding), Katayi(*Harvesting*) and Gudahi(Threshing), whereas, men are involved in land preparation(*Jhuthayi*), weeding (*Nindayi*) and Threshing (*Gudahi*). Traditionally the practice of Halma, which is community weeding used to exist in the study villages(see table 25).

The FGDs with women farmers of the study villages reveal that agriculture department is not involving women in their programmes, excepting that 10 years ago in 2003-04, 5-6 women from Kamtara Village of Mandla, were taken by Krishi Vibagh to Dindori where they were trained in agriculture and watershed concepts considered necessary for the village.

Even today, fertilizer is being used in very small quantities in the study villages, while pesticide is being used by a negligible number of farmers. Unlike other parts of India, these tribal areas present an interesting scenario for encouraging the ecologically sustainable and viable organic farming so as to tap the expanding niche markets of organic farming at the international level. Similarly, the millet based traditional nutritional foods can be encouraged and supported in a big way in these tribal belts.

Table 21: Average Crop area(in acres) under different crops during 2013 Kharif season in the study districts of M.P

Crop name	Jhabua		Mandla		Sidhi
	Plain areas	Interior areas	Plain areas	Interior areas	Interior areas
Paddy	1.99	1.98	1.7	1.57	1.82
Maize	2.03	1	1.64	2.21	1.38
Kodo millet	2.5	7.25	2.5	8.25	3.33
Redgram	6.5	4.42	3.99	5.6	-
Blackgram	4.38	5	2.5	6	2
Cotton	1.88	4	2	2	2.96
Soybean	3	2.45	2.73	3.22	3.72
Jowar	-	1	-	-	-
Fox tail millet	-	-	-	-	6
Hibiscus/Jute	-	-	3	-	-

Source: Primary survey.

Table 22 presents the yield levels for major crops for some of the study villages. Our focused group discussions conducted during 2013-14 and 2014-15, reveal that in a large number of cases, farmers used to get better crop yields 10-15 years back. They attribute this to timely rains, use of farm yard manure, mixed cropping system and use

of good quality traditional seed hitherto. According to farmers in the tribal areas, high yielding varieties do not perform well in less rainy days and light soils unless fertilizer is applied. Despite the penetration of latest technology, yield levels have gone down in certain cases. This clearly indicated that these technologies are not supportive of the cultural, social, economic and ecological conditions of the tribal areas.

Table 22 : Per acre Crop yields of the Study Villages of Jhabua, Mandla and Sidhi Districts(in Quintals) during 2013-14

Crops	Mandla district								Sidhi District		Jhabua	
	Kamtara		Bijahandi		Udaipur		Pindaramahi		Tadipatar		Bade Saloniya	
	Now	Earlier	Now	Earlier	Now	Earlier	Now	Earlier	Now	Earlier	Now	Earlier
Paddy	10-15	4-5	10-12	20-25	4-6	14-16	4-5	*	10	1-2	5	2-3
Kodomillet	2-3	4-5	-	-	6-7	6-7	5	*	10	1-2	-	-
Maize	-	-	1-2	6-7	8	8	6-7	*	-	-	1-2	4-5
Wheat	-	-	4-5	20-25	-	-	-	-	-	-	-	-
Arhar Own use	-	-	-	-	-	-	2-3	*	10-15	1	0.25	-0.30
Soya bean											4-5	NC

Source: Primary Survey and FGDs

Note : * indicates the non-availability of data ; NC= Not cultivated

The study tried to understand the transitional changes occurring in crop productivity. For this purpose, the data obtained from the primary survey and FGDs was compared with the latest secondary data provided by the commissioner of land records, Gwalior, Madhya Pradesh. Table 22 does not give a consistent picture of the yield levels of major crops for different villages. It can be seen that in Kamtara village of Mandla, the yields are much better now besides being far above the district average of 6.85 quintals per acre (see table 23). On the other hand, the yield levels of Bijahandi and Udaipur villages were much better erlier (see table 22). However, the yield levels of Udaipur are observed much below the district average yield levels. In the case of paddy crop, the yield levels of Tadipatar(sidhi district) and Bade saloniya(Jhabua district) are much better now as compared those to 10-15 years ago. But the reported yield levels are lesser than the district average yield levels(see table 23). Despite the use of mostly traditional inputs,the yields of Kodo-Kutiki have improved drastically for Sidhi district in comparison to Mandla. Moreover, Kodo-kutki yield levels of the study villages are found much better than the average district yield levels. The use of good quality traditional seed, crop rotation, application of mostly FYM and adoption of mixed cropping system could be the reason for higher yields. In the case of Maize crop the yield levels have for different villages of Mandla, but they show a decline in one of the villages of Jhabua district. However, the yield levels for all the three study districts show a declining trend vis-a-vis

the district average yield levels (see table 23). Soybean has made a recent entry into their cropping system replacing the jowar cultivated area. Yeild levels for Bade saloniya villages indicate a declining trend vis-a-vis the district average yield levels of Jhabua at 7 quintals per acre (see table 23).

In the case of paddy, Maize and redgram, new seed varieties supplied through Agriculture Department are being used by farmers of the study villages. *"Jab jyadhathar ghar ka bheej isthemal karthe the"*, said, Delan Maravi, a farmer from Kusumi village. Seed drill is used for sowing of crops such as Chick pea (*Chana*), wheat (*Ghehoo*), Lentils (*Masoor*) and Batri (*Peas*). For other crops, mostly broadcasting of seeds is done. The above analysis based on tables 22 and 23 indicates that the use of modern agricultural inputs such as improved seeds and fertilizer has not led to consistent and intended yields in these areas. Access to Irrigation is a major problem observed in all the study villages. *"Yaha ka kheti hai, Bhagvan Barosa"* (here agriculture is mainly dependent on God) said a farmer. Our FGDs clearly indicated that a majority of the tribal farmers are reluctant to use pesticides, especially for food crops. As farmer Sanju marku said, *"Bhagvan ke Barose par Chodthe, jithna pakna uthna paktha"* (we don't use pesticide and leave it to god, whatever yields we take).

Our FGDs also reveal that Agriculture Department does not provide inputs to farmers on time. Only those people who are intelligent and have access to these officers manage to get them on time. According to a majority of the farmers seeds distributed by Agriculture Department do not perform well. *"Milgahi to vo bheej Galath nikalthe"* (even if it is available on time, it turns out to be a duplicate seed). Moreover, the Department supplies paddy seeds of 100-110 days duration. As soils are light in these tribal villages, they don't yield well. They need 80-90 days duration paddy varieties. *"Abhika bheenj pani jyadha mangtha"* said a farmer from Jhabua district (the newly developed seeds ask for more water).

Table 23: Productivity of major crops in the study districts of Madhya Pradesh during Kharif 2011-12 and 2013-14 (quintals/per acre).

Crops	Jhabua*	Mandla*	Sidhi**
Paddy	5.37	6.85	12.4
Maize	12.97	13.15	6.06
KodoKutki	3.3	2.34	3.84
Redgram	5.09	8.11	3.64
Soybean	7.0	7.0	15.40

Source: Commissioner of Land records, M.P, Gwalior.

Note: * Data available for 2011-12; ** data available for 2013-14 year.

5.3 Crop rotation

Focused group discussions have clearly brought out the importance of rotation of crops every year. Crop rotation is a tried and tested practice of the tribals from the study villages of Madhya pradesh. The growing of different crops on a piece of land in a pre-planned succession is called crop rotation. The rotating of crops has a huge bearing on soil fertility management and hence, adopted by farmers across all size classes. According to farmers, if we grow the same crop continuously on the same patch of land, we do not get good yields. They have been advised by their elders that crops have to be rotated in order to preserve soil fertility. Thus, farmers not only grow crops, but also take care of soil and its fertility. Compared to monoculture cropping practices, multicrop rotations with two or three crops in a year can result in increased soil organic carbon content (Purakayastha *et al*., 2008). This is because of the addition of a large amount of biomass from above the ground as well as underground. Such crop planning is practised in dryland regions. Crop rotation also controls weeds and diseases and helps a good variety of natural predators survive on the farm. The complexity and diversity of such micro-environments created by farmers are often undervalued (Chambers, 1995).

5.4 Fertiliser Consumption

According to the main stream agricultural scientists, the use of recommended doses of chemical fertilisers is considered as one of the important and good signs of technology adoption by farmers with respect to nutrient management. However, farmers use fertilisers keeping in view their social, economic and soil conditions. The analysis of data based on secondary sources points out that except in the case of Nitrogen nutrient (N2) in Jhabua district, fertiliser intake is quite low in the study districts as compared to Madhya Pradesh state average and all India average(see table 24). The presence of a large number of livestock in the study districts could be one of the reasons for a reduced use of chemical fertiliser.

Table 24 : Fertiliser Consumption in the study districts of M.P (in Kgs/Hect.)

District	Nitrogen	Phosphorus	Potassium	Total
Jhabua	50.16	11.21	1.40	62.78
Mandla	14.13	2.92	0.27	17.32
Sidhi	12.16	5.97	0.19	18.32
M.P	49.1	32.5	3.2	84.8
India	84.5	33.4	10.4	128.3

Source: Commissioner of Land records, M.P, Gwalior

As observed by farmers (during FGDs) the use of chemical fertilisers in rainfed conditions can result in the scorching of crops. In Jhabua, in view of a large area under Maize,

Cotton, Soya and black gram, fertiliser consumption has gone up(see table 26). These crops are mostly grown for markets. The influence of market forces in promoting cash crop cultivation in tribal areas has seriously constrained food production and food availability (Singh, 2008). These areas of Jhabua are also influenced by close-to-Jhabua district Patidar community of Gujarat, who are engaged in input-intensive agriculture.

Table 25: Agricultural Implements used in Jhabua district of Madhya pradesh

Now	Earlier
Tractor	Plough(Hal)
Plough (Hal)	Dora
Dora (Removes weeds)	Naayi (Seed Drill)
Seed Drill (Naayi)	Karpi
KARPI(weeding)	Darotha
Daratha (sickle for cutting grass)	-

Note: The practice of community weeding called Halma existed 20 years ago in the tribal villages of Jhabua district. No cash was paid for this work, but food was provided during lunch time for men and women involved in weeding. Generally, Meccai ki bath was served along with red chilli paste. This practice of community weeding had helped increase the affection and bond between people. In this way, earlier each one would help other households in activities such as ploughing, harvesting and house construction.
Source: Focused Group Discussion.

6. Land Alienation : *Scenario in the Study Villages*

6.1 Land Alienation:

Land alienation is a very serious issue as far as the tribal areas are concerned. When it comes to tribal areas, 1.58 lakh acres (As per MoRD) of tribal land continues to be alienated. The Land Committee Report, while noting the grave situation with regard to dispossession of tribal lands, observes that non-tribal population holds as much as 48 percent of tribal lands and that every year more and more of land is passed on to the hands of non-tribals and that if not checked, tribals may not have lands at all' (Land Committee Report, 2006). There are many landless households in the study villages (see table 27) with their life being very miserable even now. Landlessness, nominal and unproductive land holdings and the inability to invest in farming are the major issues facing the tribal areas (Deshingkar and Akter, 2009). The study tried to understand the transactions leading to the tribal land alienation. Foused group discussions reveal that in some study villages, non-tribals have purchased road side lands from tribals for constructing houses. However, the registration is not done for these lands or is done in some other tribal's name with who the purchaser shares some intimacy. This kind of buying land for housing purpose seems to be predominant in road side villages. For

example, a person called Choudhary purchased land in Kamatara village five years back from a tribal @Rs5000/acre. Since he did not pay the full amount land registration was not done. However, he constructed a kutchha house on that land.

Table 26 : Crop wise Average usage of fertilizers in the study area (per acre)

Quantity in kilograms/acre

Village Type	Name of the District	Crop name	Farm Yard Manure	Urea	DAP	Potash	Complex
Plain	Jhabua	Paddy	300	100	17	15	0.00
		Maize	747	88	73	43	27
		Cotton	656	93	83	50	45
		Soya been	921	87	87	59	100
Interior	Jhabua	Maize	503	87	72	78	50
		Cotton	530	88	99	78	16
		Soybean	1033	89	70	56	100
Plain	Mandla	Paddy	460	94	32	24	40
		Jowar	110	100	0.00	0.00	0.00
		Maize	266	88	21	41	0.00
		Red gram	300	110	10	0.00	0.00
		Blackgram	191	100	0.00	0.00	0.00
Interior	Mandla	Paddy	477	90	41	40	0.00
		Maize	197	96	2	5	0.00
		Fox tail millet	165	100	0.00	0.00	0.00
		Little millets	317	97	0.00	0.00	0.00
		Red gram	990	87	3	1	0.00
		Blackgram	297	87	6.75	0.00	0.00
		Cotton	700	75	100	50	0.00
Interior	Seedhi	Paddy	759	92	4	3	0.00
		Maize	448	94	19	18	0.00
		Little millets	783	75	15	15	0.00
		Red gram	436	93	5	0.00	0.00
		Blackgram	388	100	0.00	0.00	0.00
		Soyabeen	1083	91	83	66	0.00

Source: Field Survey

Table 27: Details of landless Households in the study villages of Sidhi and Mandla districts in Madhya Pradesh during the year 2013-14.

District	Block	Village	Total	Landless
Sidhi	Kusumi	Duhari	210	20
		Podi	600	200
		Pankhaira	46	25
		Thadipattar	230	0
Mandla	Bheejahandi	**Pindrahimall	89	4
		Chourai	106	4
	Gughri	Kamtara	96	3

** Shifting cultivation is seen in this village and is being practiced by 6 families that grow Paddy and Black gram.

In Kusumi village of Mandla district, a decade back, 10-15 acres of land belonging to tribals was purchased by O.B.C families at the rate of Rs10,000/acre. However, interestingly, the registration was done in the name of some other Adivasi. Similarly, in Bheejahandi Village of Mandla, 2-3 Gond Farmers have sold 4-5 acres of land to non-tribals such as Pandits, Sahus(OBCs) and Muslims. The land was purchased for construction of houses in 2013. This land was near to Road and hence people bought it for the construction of houses. Tribal indebtedness is another important reason for lands being handed over to moneylenders (See UNDP, 2008). Hira singh, a resident of Kusumi village, says, *"Acche sambandh hai so Aadivason ko registry karthe hai"* (These non tribals register the land they purchase in the name of other tribals with who they have a good relation). This is to avoid complications in future. Many a time, these households are not aware of the fact that so and so land is registered in their name. Land registration cannot be done in the name of non-tribals and hence, they adopt this method. Until now, no such lands have been restored to tribals.

In Tadipatar village of Sidhi district, nearly 25 people possess *"Ahvaid patta"* (illegal registration) amounting to 200 acres of land. More importantly, none of these people resides in the village. *"Yahan Bahar ke log patta karliye"* (the outsiders got the lands registered here) said a farmer. As farmers observe (during the FGDs) the lands which are being cultivated by them and where there houses stand are not in the name of respective farmers, instead in some one else's name as an official document. As a result of this, many farmers remain deprived of Kisan Credit Card for which having land registered in their name is mandatory. According to the tribal farmers, during the tenure of D.Panika as Tehsildar of Kusumi, a lot of illegal land registration infavour of non-tribals had

taken place. Farmers feel that this land has to be taken back and should be distributed among the landless in this village. Even in Duhari, another study village of Sidhi district, Bhaigas have developed certain patches of land adjoining the village and a few "upper caste" people have got the same registered in their name, depriving them of their land. Whenever Biaghas resisted, they were beaten up, threatening to even kill them. In the same Duhari village, there are 3-4 cases reported of the land already in the possession of Baighas was transferred in the name of gonds. Taking advantage of this, one of the Gond farmers is trying to take possession of the baigha land. In such a scenarios the particularly vulnerable Tribal group of Baighas is helpless.

Similarly, in Podi village of Kusumi block of sidhi district, according to Gorelal Baigha, aged 65, since three generations, many government lands have been under the possession of Baighas (both agricultural and residential). But they do not possess patta (ownership) for these lands. However, nobody from the government asks them to leave. But for record sake, they do not enjoy ownership over these lands. On the other hand, Rajbari Singh baigha of Podi narrates that, in the village, there are nearly 20-30% of non tribals living like pundits and Yadavs. He says that from kings period, a large number of non-tribals (who are said to progeny of non-local kings) have own land in this village with atleast 10-20 acres shared by each household. It is surprising that these things are happening in the schedule areas where non-tribals are not supposed to possess land in their names. But on paper, these lands could be in the name of other tribes of the region whose names the villagers perhaps are not aware of. Most of these lands are being cultivated by Baighas on share cropping basis.

Table 28 : Distribution of respondents according to sale of their Agricultural land in the Study districts of M.P during the last 5-10.

Village Type	Type of Farmer	Land sold to Tribals (%)	Land sold to non-Tribals (%)	Area of land sold (in acres)
Plain Areas	Marginal	25.0(1)	75.0(3)	7 (4)
(Jhabua)	Medium	50.0(1)	50.0(1)	3 (2)
	Total	33.30(2)	66.70(4)	10 (6)
Interior Areas	Marginal	0.0(0)	100.00(2)	2(2)
(Jhabua)	Small	0.0(0)	100.00(1)	2(1)
	Medium	0.0(0)	100.00(1)	2(1)
	Total	0.0(0)	100.00(4)	6(4)
Plain Area	Marginal	0.0(0)	100.00(1)	1(1)
(Mandla)	Total	0.0(0)	100.00(1)	1(1)

Note: Figures in brackets are the actual number of households

An analysis was carried out to see whether sample households had sold any of their lands during the last 5-10 years prior to the study period. The results showed that they had sold land to both tribals and non-tribals. Table 28 indicates that a large proportion of their land had been sold to non-tribals by the sample households. In plain area villages of Jhabua district, 66.70 percent of the land had been sold to non-tribals and 33.30 percent to tribals. Similarly, in the interior villages of Jhabua and plain areas of Mandla, a 100 pecent land had been sold to non-tribals. As per law, the registration can be done in the name of non-tribals and hence it is transferred to STs name whom non-tribals completely trust in view of their shared relations. This is done to avoid any revolt or complications in the future. Even today such transactions continue to happen with innocent tribals being lured into selling their lands. Officials of the revenue department, including the cadre of Tehsildars, remain blindfolded to such transactions. Many a times, they take side with non-tribals, thereby encouraging such sale of land from tribals to non-tribals. Instead of protecting the rights of innocent tribals, they are working against the longterm interests of the tribal communities. The presence of small landholdings and exploitation by "outsiders" create problems in the tribal areas (sarkar 2010). The experience of Andhra Pradesh state shows that the implementation of Land Transfer Regulation Act (LTR) has neither been effective in arresting the land transactions between tribes and non-tribes nor has it resulted in the restoration of lands to tribal communities (Rao *et al*, 1998).

7. The Status of Forest Right Act (2006) in Madhya Pradesh

The tribal people's struggle for rights over forest lands had begun right from the colonial regime, because during the pre-British or pre-modern forest administration, the forests had been under the domain of kings and their kingdoms with the local people inhabiting, cultivating, grazing their cattle as part of earning their livelihoods without facing any restrictions or impositions (Guha, 1983). However, with the advent of the British, the tribals began to be looked upon as 'encroachers' of their own land, though not in accordance with any formal law of land, but their historical custom. The implementation of Forest Rights Act (FRA) is not satisfactory in the tribal areas with many tribals still not utilizing the act for securing the land ownership titles which they have been cultivating sinces ages in the forested areas. They have become illegal occupants (see box 2) in the eyes of those who, in actuality, claim control over the forests illegitimately, using force and power. A macro scenario of FRA implementation (until Feb 2017) has been discussed below in table 29. Regarding the distribution of land ownership titles, the data shows that Madhya Pradesh has distributed 2,38,842 claims (2,11,420 individual and 27,422 community). .

Table 29 :Statement of claims and distribution of title deeds under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (29.02.2017)

States	No. of Claims received	No. of Titles Distributed	No. of Claims Rejected	Total No. of Claims Disposed of (of the % claims received)
Madhya Pradesh	6,14,718 (5,74,902 individual and 39,816 community)	2,38,842 distributed (2,11,420 individual, 27,422 Community)	3,64,600 (59.31%)	6,03,442 (98.17%)
All India Total	41,65,395 (40,26,970 individual and 1,38,425 community)	17,90,624 (17,27,655 individual and 62,969 community)	18,47,071 (46.2)	36,37,695 (87.33%)

Source: Ministry of Tribal Welfare, Government of India. http:*//www.forestrights.gov.in/*

Table 30: Status of community claims over forest lands and their distribution across Indian States (as on 29.02.2017)

State	Claims Over Community Rights	Community Rights Titles distributed
Andhra Pradesh	4,711	1,415
Assam	6,046	1,477
Chhattisgarh	25,977	12,714
Gujarat	7,187	3,484
K arnataka	5,741	628
Kerala	1,395	NA
Madhya Pradesh	39,816	27,422
Maharashtra	11,408	5,748
Odisha	13,433	5,891
Rajasthan	688	72
Tripura	277	16
Uttar Pradesh	1,124	843
West Bengal	10,119	805
All India	1,38,425	62,969

Source: Ministry of Tribal Welfare, Government of India. http://www.forestrights.gov.in/

Table 30 indicates that in Madhya Pradesh state, the number of claims received for community rights were only 6.47 of the total claims received. UNDP and Samarthan (2011), in a study conducted in Madhya Pradesh, pointed out that the number of

applications filed for community rights had fallen far short of the potential in claiming such rights in Madhya Pradesh and all India. The main reasons being that the community as well as the administration were more focused on claiming individual user rights rather than community rights. And the people were also unaware of the long-term implications of not claiming such rights. Similarly, table 31 gives us an idea of what is happening to FRA at the field level in the sample villages. The awareness level of tribals regarding FRA is fairly low with a few people being able to make use of it in a couple of study villages (see Box 2).

Table 31: FRA Implementation status in Study villages in Mandla and Sidhi District

Kusumi	3-4 years back, 8-10 people had sent their applications to the village secretariat. This year 5 people have sent their applications to the village secretariat. *"Abhibi thaili me hai, ooper nahi gaya"*(even now applications are lying in a bag with the village secretariat to be sent to a higher level for processing).
Chaurahi	In this village, 32 people got land under FRA in 2012. This was Katni wala Jameen. Others also had sent their applications. Everybody had applied at the same time. The others had applied second time. It is almost one year. *"Panchayat me poochetho Meewas me bolthe, vaha poochetho Narayan Ganj bolthe"(When we check at the panchayat, they say you have to check in Meevas(Thehesil) and they, inturn, tell you have to check in Mandla".* "Harijan and O.B.C valonki nahi mili"(Harijans and O.B.Cs did not get these Pattas).
Duhari	Dalbir Baigha gave a petition for title of 7 acres of land in the year 2014 in Gram panchayat.

Source: Focused Group Discussions

Box 2: Forest Right Act: State of Awareness among Tribals

Gopal resides in Pindarihi village of Bheejahandi block, Mandla district, Madhya pradesh. Some 20 years back, along with him nine, other farmers were cultivating land in the forest area. These 9 people together cultivated around 20-25 acres of forest land. The Forest Department filed a case against all these nine farmers in 1994. The trial of the case lasted for three years. Every three months, they would attend the court spending a lot of money for every court hearing of the case which the forest dept had filed against them. Initially, the hearing was conducted for every 15 days. Gopal informs that they had to go through a lot of hardship while attending these hearings. Farmers would walk bare footed(in both rain and scorching sun) to Niwas, nearly 90kms from their village Pindarihi. As there was no transport facility in those days, these nine farmers would start 2-3 days early from their village so as to reach the court on time on the day of hearing. *"At the end of the trial, we were fined Rs 57 in 1997 and those paid receipts are still with us"*, says, Gopal. This was court fine. Finally, they were freed from this case after three years in 1997. Despite this proof, Gopal and others did not claim their right under FRA untill 2014.

In another case, the same Mandla district tribal farmers benefitted from FRA. Chuaurahi village (panchayat khapmal) of Bheejahandi block is located at 109 kms away from the district headquarters Mandla. In this village, 32 people got land titles under FRA in the year 2012. This was for Katniwala Jameen(shifting cultivation land). Some other villagers had also sent their applications at the same time. However, they did not receive any title. A few others applied later on second time. It is almost one year now since they applied in 2013. Kamal singh says, "Panchayat me poochetho Meewas me bolthe, vaha poochetho Narayan Ganj bolthe"(When we ask about the status of our application at the panchayat, they say you have to check in Meevas (Thehsil) and they, inturn, tell you have to check in Mandla". He also said *"Harijan and O.B.C valonki nahi mili"* (Harijans and O.B.Cs did not get these Pattas).

Source: Focused Group Discussions

Table 32: Details of the households and NTFPs collected by them in the study villages of Madhya Pradesh during the year 2013-14.

Village	Number of households collecting Fodder/ Fuel wood/NTFPs	Name of NTFPs	Available period	Distance of Forest from the village (in Kms).
Sidhi District-Kusumi Block				
Duhari	200	Fuel wood Amla Honey Leaves Mohua flowers Mohua Fruit	Year round Nov-Dec June-July March-April Feb-March June	1Km
Podi	All HHs	Fuel wood Mohua flower Amla Leaves Tendu leaves	Year round March Oct-Nov April June-July.	0.5Kms
Pankhaira	All HHs	Fuel wood Mahua Tendu leaf Grass	Year round March June-July. July-Febb	0.5Kms
Thadipattar	All HHs	Leaves Mohua flowers Mohua Fruit	March-May Feb-March June-July	2Kms
Mandla district – Beejahandi block				
Pindraimall	All HHs	Mohua flowers and Mohua fruit	Feb-March June-July	0.5Kms

Source: FGDs and Village Survey.

Collection of non-timber forest produce has been an important livelihood option for the large number of households in the study villages. Fuel wood is an important NTFP collected year round. Other NTFPs such as amla, honey, tendu leaves, mohua flowers and fruits are collected during periods/seasons of the year (see table 32). Due to a poor status of agriculture in the tribal areas, poor households depend on other sources of income to meet their food security and survival needs (CMS, 2009). However, in some of the study villages, households are deprived of access to Tendu, Mohua, fuel wood etc. in view of forests being declared as national parks (for eg Sanjay National Park).

Many tribal households are still unaware of the Forest Rights Act and hence, unable to make the full use of it. There are several lacunae in the implementation of this FRA by the governments across states. However, several positive developments of FRA could also be seen in the field with many tribals applying for their right and with some of them obtaining land titles through FRA. In several instances, it was local political leaders(MLAs/M.Ps) who encouraged tribals to apply for their rights under FRA. Still a lot of effort is needed on the part of state machinery to implement the FRA in letter and spirit so as to benefit large sections of the tribal community. There is a considerable scope for filing claims under the Forest Right Act(FRA) for user rights over forest resources already under use such as land for collection of NTFPs, markets, pasture land etc (SAMARTHAN, 2011).

8. Transition in Agriculture in Tribal areas: Who has contributed to the Change and How?

Based on the primary and secondary data, we have clearly seen in the previous sections how the agricultural scenario has been changing in the tribal areas with respect to technology adoption regarding various inputs use, cropping systems, crop choices, production and productivity. Continuing the analysis further, the study also tried to identify the actors causing these changes. These include state, NGOs, input dealers, population growth (food security concerns), non tribals, demonstration effect(from migration) and connectivity. The study tried to look at how these actors were causing a transition in agriculture in the tribal areas of the study districts,driving it in the direction of main stream agriculture. The study looked at changes happening with respect to cropping, practices, land transaction,yields, nutrition, labour use and credit use and how all these have led to a transition in agriculture in the study districts. Another important aspect to be understood was whether the transition taking place in these areas was growth oriented, viable, sustainable, inclusive besides taking care of enhancement of wellbeing of the tribal people, how the space was taking shape with respect to men versus women(a political economy issue). Similary, the study also tried to understand how different patterns of transitions, co-existed under the tribal agriculture (such as podu, traditional agriculture and modern agriculture).

Since long back, in tribal areas, people have been used to practicing slash and burn/ podu/shifting cultivation and this practice was prevalent until 15-20 years ago in a majority of the study villages. It was referred to with different vernacular names such as "Khuter", "Katni" and "Dahiya Dokha"in different study villages. Earlier, those households with little or no land were engaged in shifting cultivation in forested areas. FGDs reveal that shifting cultivation is prevalent even now among Baigha (who are PVTGs) community of Duhari and podi villages of Kusumi block in Sidhi district. A study conducted by Sabar (2010) on the tribal agricultural practices of a primitive tribal group (Chuktya Bhunjia) points out that this community still practices the shifting cultivation and traditional- agriculture using bio-cultural resources, but continues to remain poor despite these economical and soil-protecting practices.

Earlier, not many people used to be there in each household with even very people to do farming operations like weeding etc. Tribals possessed lands with a low fertility with resultant low yields. FGDs reveal clearly, how the population growth has led to an undue pressure on land, leading to food security concerns. This, inturn, has led to agricultural growth by way of yield enhancement and area expansion. However, the population is growing at a higer rate while the carrying capacity of agriculture is declining (Singh and Singh, 2007).

Increasing cost of cultivation and non-remunerative prices for agricultural output resulting in lower incomes and indebtedness has been witnessed in respect of the mainstream agriculture. The same is happening in respect of tribal agriculture but on a small scale. The reason being that the quantum of input use is much less in the tribal areas. However, the lessons of mainstream agriculture do not seem to have been kept in view by the government, agricultural universities and extension departments of the state government in the promotion of technologies suitable to tribal regions and conditions. In tribal areas, extensive agricultural practices have led to the depletion of forests and grazing lands in addition to accentuating the environmental and natural ecological unsustainability of agricultural practices (Singh and Singh, 2009). In Bagore village of Jhabua district, during FGDs, farmers indicated that crop yields were good due to the use of inputs such as irrigation and fertilizer. Despite this, there are no profits observed accruing to farmers from farming. The farmers have not been able to recover expenditure incurred on the purchase of seeds and fertilizers. Crops such as Chillies tend to get affected by virus and hence the cultivation of this crop has been stopped. These days even soyabean market price has come down.This shows the disconnect between agricultural growth and farmers' income. The negative contribution of modern green revolution technologies has affected adversely the natural resource base. This, inturn, has led to the unsustainability of agriculture. Such symptoms could be seen even in

study districts, though to a lesser extent. Earlier, for Kodo Kutki crops, ploughing would be done 3-4 times because of the presence of small stones across the fields. These days stones are removed easily through a tractor or plough. This results in erosion of top soil, leading to an unsustainable resource management. Now in view of a sustained use of fertilizers the soil has become hard, demanding more water. Access to FYM has become less due to a reduction in the livestock population. As regards the availability of manure, one farmer said *"Purane Jamane me Gobar Khad, Ab Shasan ka Khad milra, vo Jaladethe"* (Hitherto, we used to apply FYM, now it is chemical fertilizer which causes scorching of crops). In Villages of Mandla and Sidhi, tribal households seem very cautious in using modern inputs, especially pesticides. In Duhari village of Sidhi district, farmers use powder made of crushed dried neem leaves mixed in water for spraying on paddy crop for jassids. Noticeably, there are no many agencies (including NGOs) engaged in promoting sustainable agricultural technologies in these regions.

In the study villages, agricultural incomes have come down. These days, young people with minimal education do not get any job. As a consequence of this, people migrate from tribal areas to other parts of the country. Now due to migration, some households don't keep livestock as there won't be anyone to maintain these animals. This has implications for livestock maintenance and, in turn, soil fertility management. Our FGDs reveal that those households migrating for labour work to agricultural fields are bringing back some knowledge which is also used in their farming practices.

Irrigation has been a big constraint in the study districts(see table 9). Even in the study villages irrigation facilities are very very poor. Some of the study villages with the presence of non-tribals have a better access to irrigation facilties. The best example for this is the Podi village of Sidhi district where nearly 150 acres of land possessed by Yadav community receives irrigation from the near by dam, whereas, Baighas in the same village own just 4-5 wells with each well irrigating only 0.5 to 1 acre of land. On the other hand, there are positive signs of development for tribal households who very recently accessed assured irrigation. In Villages like Bade saloniya of Petlabad block in Jhabua district, access to irrigation through canal water (for 25HHs) has reduced migration in the village by 50 percent. Hitherto in this village, people had to go out for work inorder to earn their livelihood. Having moved away from such a pathetic situation, they now are able produce their own crops due to irrigation.

The empirical evidence and the discussions with farmers during the FGDs do not give any indication to the effect that whatever transition has happened in agriculture is not breeding inequalities among the tribals and between categories of various size class farmers. However, there is no concrete evidence emerging from the study that the agricultural growth is inclusive in the study districts and villages of Madhya Pradesh

state. One can observe that with the entry of commercial crops such as cotton and soybean and dependence of some households on market seeds in the case of paddy, soybean and cotton etc, the role of women in seed keeping is decreasing. The use of weedicide(karpathwar) for soybean crop in Jhabua district has reduced the role of women in the cultivation of certain crops. Similarly, no women participation is seen in the Gram sabhas, excepting ward members.

In all the study districts, it could be seen that during the period between 2005-2010 a lot of improvement in the construction of roads has taken place, leading to a better connectivity between villages and people. Earlier, mainly mud roads were there, now we can see roads upto all the villages and also within the villages upto house front. This has improved connectivity of the tribal villages with the outside world. Due to improved roads, the movement of vehicles has improved, reducing the time drastically by one third. Moreover, the number of vehicles flying on the roads has also increased considerably. Earlier Dalals(middle men) used to procure farmers'crop produce from the villages. But now due to better roads and awareness, many a time, they are able to sell their produce directly in the nearby market. Most importantly, the distance between the market and village has reduced considerably in all the study villages. Now people use readily vehicles and developed roads to reach the market quickly.

Access to credit has been a big problem in the study area. Empirical evidence reveals that there is a negligible amount of institutional credit available to farmers. Those households using Kisan Credit card face peculiar problems. Each time, they are forced to go to Patwari and spend some money before getting the signed documents with land ownership details. In some study villages, a majority of the land is in the name of mostly elders or *Mukhiya* of the household. Despite separating from joint families and having own houses engaged in separate cultivation, many farmers do not have land registered in their names. Hence, many tribal households are unable to access loans through Kisan Credit cards wherein they are entitled to get Rs50,000/hectare. FGDs reveal that they are forced to bribe the Patwari to get loans sanctioned from banks as they have to submit papers stating that land is in their names.

9. Impact of Non-Tribals on Agricultural practices of Tribals

The present study made an attempt to find out whether the non-tribals living in and around the sampled villages/households influenced the agricultural practices of tribals. For this purpose, in each district and block, villages located near to the plain areas under the possible influence of non-tribals were selected. In different villages, tribals have been learning different agricultural practices from non-tribals. Since last 5-6 years(i.e from 2007-08), tribals have started learning from OBCs and other communities in plain

areas as well. In village Salwah of Mandla district, there are 60 percent of tribals and 40 percent of non-tribals. Non-tribals started improving their land by levelling and increasing fertility. This practice was not adopted by tribals. The Paddy yields of tribals amount to 10 Quintals/acre, whereas it is 15 quintals/acre in the case of non-tribals. The reasons for good yields in the case of non-tribals include 1) Use of more chemical fertilizers; 2) timely agricultural operations; and 3) application of mind to cultivation. As one tribal farmer observed, "from non-tribals, we have learnt the importance of timely agricultural operations in improving the yields and hence started adopting the same from last 5-6 years".

Observing the non-tribals, some tribal farmers have started manually levelling the land and improving the farm. Earlier, in these undulating lands, kodo kutki was grown. Now due to land levelling, paddy can be grown. Now, due to land leveling, two crops can be grown. During rabi in the same land, wheat, peas (*mutter*) and chick pea(*chana*) crops are grown. The practice of putting a small cement bag(filled with sand) across the water flow for diverting the flowing water to crops has been learnt from non-tribals. This also helps reduce the widening of water channels. Construction of wells, reservoirs and other small scale water harvesting technologies could offer better options (Edmons and etal, 2006)

In Jhabua, the agricultural practices of tribals are influenced by the non-tribal community of Nayaks. Their influence can be seen in the area of inputs such as seeds (especially for crops like Cotton, Paddy and Soya bean), cultivation methods of tomoto crop, ploughing practices (three times by nayaks). The Nayak community used to keep more buffaloes which gave more farm yard manure. Seeing this, even tribal households started keeping buffaloes which in turn helped access more farmyard manure. The use of harvesting machine and thresher, tractor and weedicide (*karpathwar* in only soybean crop) is also influenced by non-tribals.

Similarly, by observing the Nayaks drill borewells for irrigation purpose, tribal farmers also followed their path. However, the Nayaks are comparatively wealthy and can invest more in farming getting good yields, whereas, tribal farmers(except very few HHs) do not have such kind of money and hence, are forced to borrow, on interest, to drill borewells. In the event of failure to get water by drilling borewells, they get indebted and are caught in a poverty trap. Hence, the majority of tribal households do not dare to go for borewell drilling. Public investments in infrastructure and development of credit, input and output market reduces the risk of chronic poverty for a larger section of the tribal society (Sah and *et al*, 2008).

10. Conclusion

There are multiple agricultural challenges facing the tribal areas with a low crop productivity being one of these major problems. There is a lot of gap between the all India productivity and the productivity of Madhya Pradesh with respect to the yields of major crops. More or less, the cropping pattern has remained the same as compared to 10-15 years ago but the area under millets has reduced with Soybean being a new addition. Due to reduced rains, crops don't reach the maturity stage and hence, farmers tend to sow lesser area and prefer labour work/migration. Access to Irrigation is a major problem in all the study villages. In most of the villages, farmers feel that the yields have come down in respect of major crops, but in a few cases they have also improved. The reasons for low yeilds are reduced and untimely rains, declining soil fertility, failure of high yielding seeds in a low-input system of agriculture. The cost of cultivation has also increased. Accessing Credit through Kisan Credit card is a problem due to lack of title deeds in the name of progeny cultivating the land. Inspite of favourable resource conditions, tribal regions performance is not satisfactory in terms of infrastructure, returns from agriculture and almost all human development indicators(CMS, 2009).

Despite stringent laws, land alienation is still happening in the tribal areas, due to innocence of tribal people, who are deceived by some corrupt officials to favour land lords, non STs and wealthy people. Majority of tribal households are still unaware of the Forest Right Act and hence could not make full use of it. There are several lacunae in the implementation of this FRA by the governments at the state level. However, several positive developments of FRA could also be seen in the field with many tribals applying for their right and with some of them obtaining land titles through FRA. Still, lot of effort is needed on the state machinery to implement the FRA in the letter and spirit so as to benefit large sections of tribal community. There has been certain influence of non-tribals, on the agricultural practices of tribals. In different study illages, tribals have been learning different agricultural practices from non-tribals. Since the year 2007-08, tribals have started learning from OBCs and other communities in plain areas. .

The empirical evidence indicates that agriculture in the tribal areas has shifted to a settled agriculture, excepting a few cases. Under settled agriculture, we could see that a majority have adopted both a combination of modern and traditional methods of farming techniques. However, the quantum of external inputs used is in smaller quantities. We have observed that a small number of sample households continue with conventional agricultural practices which are sustainable in nature and ecologically sound. These practices are being continued keeping in view the health of family members, livestock and mother earth. Millets and pulses are intact in their farming system. The majority of the tribal farmers are not keen on using reluctant pesticides so as to avoid poisoning of

soils and food. In tribal regions, an integrated resource use policy for an efficient utilization of resources and a planned diversified cropping pattern with agro-forestry and horticulture is required to be promoted and interlinked to the agro-processing activities and market linkages(Singh, 2008). The tribal regions of the study area present a great opportunity for organic cultivation due to a very less external input use and negligible pesticide use. Vast areas of these tribal regions can easily go totally organic, as farmers have started adopting ecologically safe agricultural practices. A small support for investment on organic inputs can result in high yields in the tribal areas and can help make use of expanding organic markets at the global level. Organic farming is viable, but demands a strong support for livestock development for better results (Reddy, 2016).

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