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Dynamics and Revival of Fallow Land in Madhya Pradesh

Study sponsored by
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Jawaharlal Nehru Krishi Vishwa Vidyalaya,
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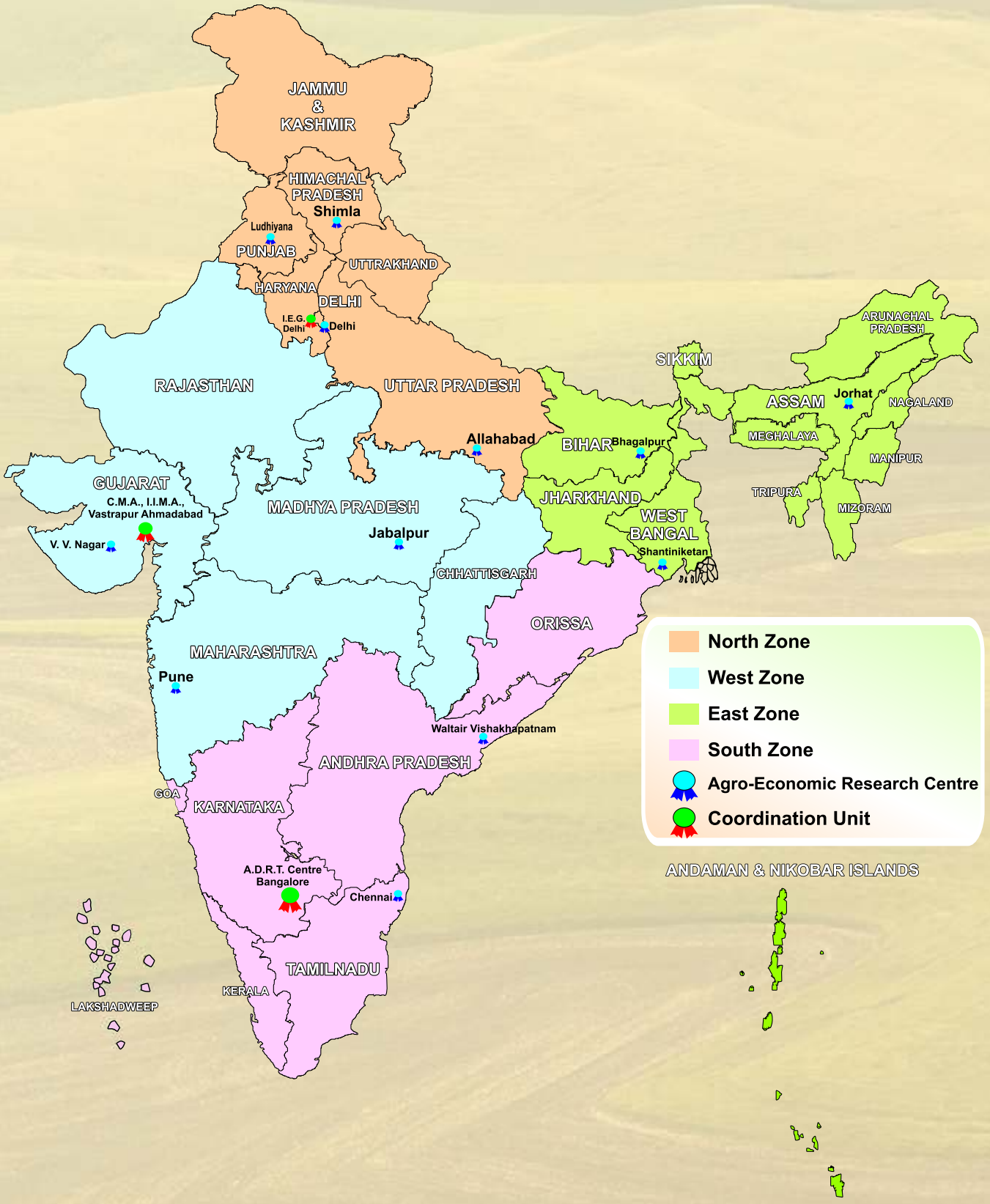

Agro Economic Research Centre for Madhya Pradesh

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) 482004

Phone & Fax : 0761-2680315, e-mail : aerc_jbp@yahoo.co.in, Web : aerc.jnkvv.org

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AGRO- ECONOMIC RESEARCH CENTRE
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PROJECT TEAM

Data Collection

Mr. C.K. Mishra
Mr. S. K. Upadhye
Mr. S. S. Thakur
Mr. Rajendra Singh Bareliya
Mr. H.S. Kurmi

Tabulation & Compilation of Data

Dr. Ravi Singh Chouhan
Dr. H. K. Niranjan
Mr. Rajendra Singh Bareliya

Interpretation and Report Writing

Dr. Hari Om Sharma
Dr. Deepak Rathi

Coordinator

Institute of Economic Growth (IEG),
University Enclave
University of Delhi (North Campus)
Delhi 110 007, India

AGRO-ECONOMIC RESEARCH CENTRE FOR
MADHYA PRADESH AND CHHATTISGARH
Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)

PREFACE

The present study entitled **"Dynamics and Revival of Fallow Land in Madhya Pradesh"** has been assigned by the Directorate of Economics and Statistics Ministry of Agriculture and Farmers' Welfare Government of India to this centre in the year 2016-17 under the close coordination of Institute of Economic Growth (IEG), Dehli.

The study comprises 120 fallow land farmers of Mandla & Bhopal districts of Madhya Pradesh. The study revealed that with the result of significant reduction of area under barren and uncultivated land permanent pasture (-12.61 thousand ha/year), cultivated waste land (-14.61 thousand ha/year), fallow land other than current fallow (-8.97 thousand ha/year) and current fallow (-27.55 thousand ha/year), resulted that the area under forest , non agricultural uses, net area sown was increased highly significant with the magnitude of 1.51, 21.16,45.34 thousand ha /year respectively.

The present study was conducted by Dr. H. O. Sharma and Dr. Deepak Rathi of this Centre. They performed field investigation, tabulation, analysis, interpretation and drafting of the report. I wish to express my deep sense of gratitude to team members namely; Dr. Ravi Singh Chouhan, Dr. H. K. Niranjan, Mr. S.K. Upadhye, Mr. C.K. Mishra, S.S. Thakur, Mr. Rajendra Singh Bareliya and Mr. H.S. Kurmi for their untiring efforts in bringing this innovative study to its perfect shape.

I extend heartfelt thanks to Dr. Brajesh Jha, (Professor), Dr. Nilabja Ghosh, (Professor) and Dr. Thiagu Ranganathan, (Assistant Professor), IEG, Delhi for Coordination and providing valuable guidelines and time to time suggestions for conducting the study successfully.

On behalf of the Centre, I express deep sense of gratitude to Prof. V.S. Tomar, Hon'ble Vice-Chancellor and Chairman Advisory Body of AERC, Jabalpur, Shri. P.C. Bodh, Adviser, AER Division, Ministry of Agriculture and Farmers' Welfare, Govt. of India, New Delhi, Dr. D. Khare, Director Research Services & Director Instruction, Dr. P.K. Mishra, Dean, Faculty of Agriculture, Dr. P. K. Bisen, Director Extension Services and Dr. N.K. Raghuwanshi, Prof. & Head (Dept. of Agril. Econ.&F.M.), Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur for providing the valuable guidance and all facilities during various stages in successful completion of this study.

I express sincere thanks to Shri A. K. Nema and Shri R.B. Sahu, Deputy Director of Agriculture, respectively Bhopal and Mandla district and their field staff for providing not only secondary data but also extending great assistance in collection of field data from the selected respondents.

I hope the findings and suggestions made in the study would be useful to policy makers of the State and Govt. of India.

Date : 24.11.2017
Place: Jabalpur

(Hari Om Sharma)
Prof. & Director

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EXECUTIVE SUMMARY

The land is the limited resource for agriculture. As a basic input for agriculture, land occupies a pre-element position among all the resources required for the development of agriculture sector. Like any other resource, the land has two dimensions, viz, quality and quantity and both of these crucial aspects are under serious threats due to the intensive and extensive use of land both for agriculture and non-agriculture purpose. The competition between agriculture and non-agriculture sector for land is intensifying due to increasing pressure on land for food production on one hand and housing, industrial expansion, a creation of infrastructural facilities etc. on the other hand.

The existing fallow lands could actually be used as an alternative for the development of farming and plantation activities. Lands without utilization for productive agriculture activity could be categorized as fallow lands. These are for example lands that were opened for agriculture or logging concession and then left within a period between 2 or 3 years. The vegetation of this land is bared and covered by unproductive vegetation such as grass, shrub, and bush (Karana and Abdurahman, 1994).

There is tendency for land shifts to the agricultural sector; there is also a positive growth trend in fallow lands which ultimately tend to move into cultivable wastes. There were also indications of a sharp increase in other fallows, where by waste land reclamation adds to the cultivated area on one hand, along with on the other, increase in fallow land depletes the cultivated area, thereby resulting in constant net sown area. This phenomenon, thus nullifies the wasteland reclamation and development efforts. There is also found a high degree of association of other fallows with surface irrigation. At the farm level, increase in farm size; non-agricultural income and labour shortage have a positive impact on fallow land. The technological factors led to the underutilisation of land due to the resource crunch faced by the farmers on account of the capital intensive nature of modem inputs. The climatic and institutional factors also affecting under-utilized lands viz., other fallows current fallows and cultivable wastes.

The area under Barren land, uncultivated land, permanent pastures, land under miscellaneous tree crops, grooves and cultivable waste recorded significant negative growth but there was a substantial growth in the current fallow, which was the consequence of year to year rainfall variations. There was an inverse relationship between rainfall and current fallow. It was also found that there is sharp increase in the land put into non-agricultural uses due to increasing rate of urbanization and industrialization. Availability of labour is an emerging factor in determining fallow land. . Knowledge to reclaim land is an important factor to reduce fallow land. Looking to the above facts in mind present study has been framed with following specific objectives:

Specific Objectives

1. To analysethe trend and growth of different parameters of land use pattern in Madhya Pradesh.
2. To determine the extent of fallow land in different districts of Madhya Pradesh.
3. To analyze determinants of the fallow land in selected districts of Madhya Pradesh.
4. To identify the socio-economic characteristics of sample respondents who leave their land fallow and reason for land leaving fallow thereof.
5. To explore suitable policy implication for revival of fallow land in the state.

Research Methodology

Both secondary and primary data were collected for the study. District wise time series secondary data for the period 1991-2016 were considered for the study. The secondary data were collected from the published records of the Department of Farmers' Welfare and Agriculture Development, Ministry of Agriculture Government of Madhya Pradesh, Bhopal, Department of Statistics, Office of the land record, and the websites viz; *DACNET, MP KRISHI* etc.

The primary data were collected from the respondents by personal contact, for the reference year 2015-16, through pretested interview schedule. Stratified Sampling Technique was used to draw the samples for the study. At the first stage districts were selected on the basis of percentage share of fallow land in the recent five years (2010-15) in the districts to total geographical area. 5 years average of total fallow land and geographical area of the district was considered to select the district with the precaution that total fallow land as a percentage of total land reported should be at least 2 per cent. One district with highest (Mandla) and one with lowest percentage of fallow land (Bhopal) were selected for the study. 2 blocks were further selected from each selected districts on the basis of highest fallow land in the reference year. Thus, Ghugari & Niwas and Berasia & Phanda were selected from Mandla and Bhopal districts respectively. Further, two villages from each selected blocks were selected in each selected village for the study. A list of all the farmers who left land fallow during the reference year was prepared and 15 farmers were selected for the study considering the total land left fallow by these farmers should at least become 15 hectares. Thus, study comprises of 120 samples HHs of 8 villages, 4 blocks and two districts of Madhya Pradesh.

Conclusions

The following conclusions are made from the finding of the study:

1. Barren land, uncultivated land, permanent pastures, land under miscellaneous tree crops, grooves and cultivable waste recorded significant negative growth but there was a substantial growth in the current fallow, which was the consequence of year to year rainfall variations. There was an inverse relationship between rainfall and current fallow. It was also found that

there is sharp increase in the land put into non-agricultural uses due to increasing rate of urbanization and industrialization. Availability of labour is an emerging factor in determining fallow land. The positive association between fallow land and proportion of main female cultivators, indicating gender biased labour markets. availability of tube well and well irrigation with electricity; higher monsoon and post-monsoonal rainfall; increased market frequency; availability of power supply for agriculture; density of community workers (proxy for technical assistance and incentives for agriculture); availability of communication facility (e.g., bus, trains; proxy for connectivity to markets); and availability of agricultural credit institutions, and higher average income per capita (both indicating access to capital and ability to invest). Knowledge to reclaim land is an important factor to reduce fallow land.

2. It is a matter of great achievement that area under fallow land other than current fallow and current fallow was not found to be increased in most of the districts of the State, With the result of this the net area sown and area under non agricultural uses was found to be increased significantly in at most all the district of Madhya Pradesh.

3. Most of the districts of Madhya Pradesh and Madhya Pradesh as a whole, due creation of irrigation facilities in the period under study, there was found remarkable decrease in the share of fallow land to net area sown in the state. The growth of net area sown less than the growth of area under non agricultural uses in all the district of Madhya Pradesh and State as a whole. This might be due to the fact that interference of real estate not only on net area sown but also as barren and uncultivated land, permanent pasture and other grazing, Land under misc Tree crops & Grove not included in net Area, net included in net area, area under cultivable west land, fallow land other than current fallow during the period under study.

4. In Madhya Pradesh 73.26 per cent irrigation potential was created by the Govt. of Madhya Pradesh during the last 10 year which was found more in Mandla (152.63%) as compared to Bhopal (33.75%) district. The 123.86 per cent irrigation potential was found to be utilized in the State.

5. As far as different locations of the study are concern, the Mandla district where proportionate area under fallow land was more as compared to Bhopal district differs with respect to average size of holding, annual income per HHs and caste composition, which shows that Mandla was dominated by ST (76.6%) while OBC (64.70%) in Bhopal. The average size of holding per household was found to be more in Mandla (10.49 acres) as compared to Bhopal (7.32 acres), while the income was found to be low in Mandla (Rs.66658/year) as compared to Bhopal (Rs.114095/year).

6. At the different locations of the study an average farmer earned more income where contribution of fallow land was found to be less in total land viz. Bhopal (Rs. 114095/Farm) as

compared to where contribution of fallow land was found to be more in total land viz. Mandla (Rs. 66658/Farm).

7. The total income per farm was found to be increased with the size of farms. Amongst all the components of farm income, farm business income followed by income from live stock, nonfarm enterprises and agricultural labour plays an important role as compared to other components of farm income in both the situations.

8. An average farmer was found to have Rs. 108217.00 per farm of outstanding loan in which share of institutional (81.91%) was found more as compared to non institutional (18.08%) sources. As the size of holding increase the total outstanding increases from Rs. 27500 (Marginal) to 263765 (Large) per farm. Out of the total 120 HHs only 35 (29.17%) were found to have outstanding loan and found more in Bhopal (30) as compared to Mandla (5) district.

9. The maximum numbers of farmers have their owned irrigation assets(> 60%). The tendency of hiring irrigation assets from outside was not found so common. It was found that providing irrigation to the crops using own assets is cheaper than on rental basis. None of the farmer was found to be use drip irrigation in the area under study.

10. As the size of farm increases the area under leased in, leased out, irrigation, fallow land, food grains, fruits and vegetables was found to be increased. However, the size of operational holding was found to be more in Mandla (7.22 acres) as compared to Bhopal (6.66 acres), while area under irrigation and food grains was found to be more in Bhopal as compared to Mandla.

11. The current fallow (2.33 acres) was found to be more as compared to permanent fallow (0.06 acres), as the size of holding increases the area under fallow land also increases caste not play only role ST (87.89%) possessed more fallow land as compared to OBC (43.95%) and General (37.19%) in Mandla district, while in Bhopal OBC (35.97%) followed by General (26.59%), ST (8.60%) and SC (7.04%) have maximum percentage of current fallow in total land.

12. At over all level kharif (43.93%) was found to be major season of cultivation of crops as compared to rabi (39.26%) and summer (16.82%) season. In kharif season soybean (39.05%) followed by paddy(18.87%) maize (15.84%), tur (13.02%) were found to be major kharif crops , while wheat (58.01%) followed gram (20.87%) and mustard (8.86%) in rabi season grown by an average HHs. In summer vegetables (55.56%) and urd/moong (47.66%) were found to be grown by the sample HHs. The cropping pattern of both the locations was found similar in overall level. However, paddy followed by maize, soybean, tur and bajra in Mandla & Soybean followed by maize, paddy and tur in Bhopal were found to be major kharif crops and wheat followed by gram/mustard in Mandla and wheat followed by gram in Bhopal were

found to be major rabi crops grown by sample HHs.

13. On the basis of ranking by the respondents and coefficient of variance the reason of land kept fallow was divided into most important, important and least important.

a) The most important reasons for leaving land fallow were found to be lack of assured irrigation and uncertainty in rainfall.

b) The important reasons were found to be left land for crop rotation, lack of expertise/experience in cultivation, low fertility of soil & lack of interest in cultivate in unfavourable season, to conserve moisture & prepared land for next crops, not able to recover costs in farming/ low profit, lack of plough/tractor/farm yard manure (FYM), high production cost/lack of resources, providing grazing lands for the cattle, weed infected, shocks in personal life (like accident or death of a member), lack of assured market for the produce, close mountain/forest high yield volatility in the previous years, land is not suitable for cultivation, high price volatility in the previous years, no access to credit, lack of watershed or similar efforts which could recharge ground water.

c) The least important reasons for leaving land fallow were found to be land set apart for conversion into non-agricultural purposes, issues related to land entitlement, moved into other occupations which are more profitable, lack of agricultural extension services, skilled labour is not available for cultivation, surface runoff and water logging.

Policy Implications

Looking to the above findings obtained from the study and reviews collected for the study the following policy implications may be taken into consideration.

1. Utmost care should be taken so that land suitable for cultivation viz. fallow land other than current fallow and current fallow land should not be converted for the purpose of non-agricultural uses and efforts should be made to divert barren & uncultivable land which fall under the land capabilities classes V to VIII for industrial, real estate etc. purposes (Box 1)

These calls for government attention to frame effective and feasible land use policy in the interest to protect cultivable land from its diversion to non agricultural purposes. The law must be enacted in such a way so that diversion can be checked effectively. The government policy, programme and self awareness are very much important for efficient land use management. Looking to teaming population which is increasing at a faster rate causing reduction in land man ratio. This warns that cultivated land should not be wasted at any cost and requires taking the corrective measures urgently in a planned manner.

2. As increase in net irrigated area significantly reduces the area under fallow land. Hence, emphasis should be given to bring more and more area under irrigation.

Box 1 Land Use According to their Capabilities
Classes that grow crops
♦ Class I- Perfect land for growing crops
♦ Class II-Have some limitations that reduce the choice of plants and require moderate conservation practices
♦ Class III-Same as II but require special and intensive conservation practices
♦ Class IV-very severe limitations that restrict plant choice and require careful management
Classes that do not grow crops
♦ Class V- cannot be tilled, therefore it's used for pasture, timber or wildlife.
♦ Class VI- Same as V
♦ Class VII- Woodland and wildlife use
♦ Class VIII- Recreation, wildlife, aesthetic uses only

Apart from this efficient method and system of irrigation should be popularized amongst the farmingcommunity such as in situ moisture conservation, water management technologies, location specific suitable crop varieties requires less water etc. to increase the water use efficiency in a significant manner in the years to come.

3. Efforts should be made not only to introduce an effective, efficient local specific integrated land use planning but also its effective implementation, should be ensured because it was found that land use pattern, cropping pattern, irrigation intensity, method and system of irrigation etc. differ remarkably and the most important, important and least important reasons of left land fallow are not same across the different districts.

4. The tolerant crop varieties could generate better returns and are economically feasible. Therefore, instead of investing more on reclamation programme, the small and marginal farmers could opt for low-cost technologies. The input delivery should be restructured and strengthened. All the inputs which are necessary for reclamation should be made available at one place at subsidized rates in order to promote the use of such inputs for land reclamation. There is a greater need for crop options that are tolerant to salts.

5. Finally, there is need for scientific, creative and orderly disposition of land resources, facility and services with a view to securing the physical, economical and social efficiency, health and well-being of communities. There is need for an effective, efficient and integrated land use planning which inter-alia includes agriculture, industry, commerce, forests, mining, housing infrastructure, and urban settlement, transportation facilities etc. to resolve claims/counter-claims of these sectors.

CHAPTER-I

INTRODUCTION

1.1 Background

Natural resources play vital role in the economic development of the country. Without minimum natural resources there is not much hope for economic development. Land, mineral, water, forest and climate etc. are the important natural resources. Out of them land is a free gift from nature and its quantity is also fixed by nature. It is the basic element of the life support system on our planet since the dawn of civilization. The best use of land is very important for our well being and survival. Land is a basic input for agriculture and it occupies an important position among all the resources required for the modern economy (Ramasamy *et al*, 2005). Country like India, where agriculture is the major source of food, employment and livelihood for the majority of the people, land is a very important natural resource and it should be put for right use according to its capacity and according to its type.

Land use pattern includes types of land and how much land is being utilized under different uses for example, the area actually cultivated, forest, fallow land, pasture land and area under settlement and so on. The land use pattern of the country at any particular time is determined by the physical, economic and institutional framework taken together. In other words, the existing land use pattern has evolved as a result of the action and interaction amongst various factors such as the physical characteristics of land, the institutional framework, the structure of other resources such as capital, labour etc. logically fertile land should be used for cultivation purposes and infertile land should be used for non agricultural purposes. The land use pattern in an area depends upon the physical, environmental, and pressure of population on land. Dynamics of land use is a complex phenomenon which is affected by several socio economic, agro-climatic, and ecological variables. Both climatic and institutional factors are crucial in determining land use pattern. The extent of land use is also influenced by technological changes over a period of time. The technological changes in agricultural ignite intensive cultivation resulting in conversion of marginal lands in to productive agricultural lands through capital intensive cultivation (Gaire, 2010).

At national scenario, a little more than half of total land mass of 328.73 million hectare used for agriculture, which includes 140.02 million hectare net sown area under cultivation and 26.17 million ha for non agricultural uses (GoI, 2013). Over the years there is gradual increase in area under non agricultural uses. The land is a scarce resource for agriculture. As a basic input for agriculture, land occupies a pre-element position among all the resources required for the development of agriculture sector. Like any other resource, the land has two dimensions, viz, quality and quantity and both

of these crucial aspects are under serious threats due to the intensive and extensive use of land both for agriculture and non-agriculture purpose. The competition between agriculture and non-agriculture sector for land is intensifying due to increasing pressure on land for food production on one hand and housing, industrial expansion, a creation of infrastructural facilities etc. on the other hand.

Land use is a highly dynamic process. Land resources constitute the fundamental base for all human activities. It is the most important natural resource of a country like India where agricultural sector is relatively more prominent than the manufacturing sector. The way and the extent to which the land is utilized set the pace of a country's economic development. The land is important not only for producing foodstuffs, cereals, pulses and other crops for consumption but also for generating surpluses to meet increasing demands created by rising population and developing industrial sector, for laying down the transport network, communication, construction of dwellings and public institution etc. Land use pattern is a process, which assigns each tract of land in an area to its proper class in a system of classes. The classes on the system are defined in terms of the qualities or characteristics with which the classification is concerned.

Agricultural Statistics set up in 1948 by the Ministry of Food and Agriculture, recommended the following twelve fold land use classification (Box 1.1)

Box 1.1 : Twelve Fold Land Use Classification

1	Area under forests	7	Current fallow
2	Barren and uncultivable lands	8	Old fallow
3	Land put to non-agricultural uses	9	Net area sown
4	Permanent pastures and other grazing lands	10	Gross cropped area
5	Cultivable wastes	11	Cropping intensity
6	Miscellaneous tree crops and groves	12	Net irrigated area

The present pattern of classification is considered as static harmony and adjustment with the other main characteristics of the economy of the region.

The existing fallow lands could actually be used as an alternative for the development of farming and plantation activities. Lands without utilization for productive agriculture activity could be categorized as fallow lands. These are for example lands that were opened for agriculture or logging concession and then left within a period between 2 or 3 years. The vegetation of this land is bared and covered by unproductive vegetation such as grass, shrub, and bush (Karana and Abdurahman, 1994).

Fallow land is defined as unused land that is left to its own natural growth and not planted with seeds. In Remote sensing term, such land can be categorized as shrub, bush, grass land or bare land. The term 'fallow' applies to the land,

which is not under crops at the time of reporting, though they were sown in the immediate past. The fallow lands are generally divided into two major categories viz. "old fallow" which comprises of those lands that have been left uncultivated for more than 5 years and the "current fallow" which include lands that were not sown at the time of crop reporting, but were sown one year or two years before or left fallow either in one season or for one complete year to replenish the soil fertility. The concept of the term "current fallow" greatly differs in many part of the country. In Punjab, land is classified as current fallow if it has been left uncultivated for less than two years. In Maharashtra, land continues to be classified as current fallow if it is continued uncultivated for less than ten years (Baleshwar Thakur *et.al,* 2007). In Madhya Pradesh, current fallow is applied to all such lands which were not under crops at the time of reporting but which had been sown in the recent past. Bihar and some other states also follow the criteria of Madhya Pradesh. Thus, "current fallow" is the part and parcel of the arable land.

1.2 Review of Literature

A review of past research helps in identifying the conceptual and methodological issues relevant to the present study. A brief review of the relevant research literature that has accumulated on the areas related to this study.

Prashant kumar (2003) studied the land use pattern in three dry zones of Northern Karnataka viz. 1. North Eastern Dry Zone, 2. North Eastern Transition Zone 3. Northern Dry Zone. The results showed that there was decline in the area under non-agricultural uses, cultivable waste and current fallow land in the case of zone-1 and in the area under non-agricultural uses, cultivated waste and net area sown in zone-2. There was a positive growth in barren and uncultivable land, current fallow and other fallow lands in zone-3. The share of area under cereals increased in the case of zone-2 and zone-3.

Goswami and Challa (2004) studied the land use pattern in India for the period 1950-51 to 1997-98. The results indicated that forest area had increased from 40.08 million ha in 1950-51 to 68.65 million ha in 1997-98. There was significant increase in area under non-agricultural uses showing increase from 9.36 million ha in 1950-51 to 12.3 million ha in 1997-98. It also revealed that the net area sown increased during the study period.

Sreeja (2004) studied dynamics of land use pattern in Kollam district of Kerala. The results indicated that there was a substantial growth in the current fallow, which was the consequence of year to year rainfall variations. Thus there was an inverse relationship between rainfall and current fallow. Barren land, uncultivated land, permanent pastures, land under miscellaneous tree crops, grooves and cultivable waste recorded significant negative growth.

Ramaswamy *et al.* (2005) noticed that area under cultivable waste; uncultivable waste and barren land were declined significantly while there was a sharp increase in the land put into non agricultural uses. They also observed that there was significant reduction in the area under common lands mainly because of diversion of these lands for non agricultural purposes. Disturbing trend of land

use pattern was noted in Tamil Nadu and sharp increase in other fallows took place during the last two decades probably due to instability of the area under total fallow lands surpassed 20 lakh ha during the last two decades. Thus, accounting for more than 15% of the total geographical area of the state and more than one third of the net sown area.

Harish (2006) studied land use dynamics in Madhya Pradesh during the period 1980-2001. The study revealed that area under fallow, current fallow, cultivable waste and land under miscellaneous tree crops showed positive growth rate. The land under non-agricultural uses showed a marginal increase in area. This was mainly because of less infrastructural development. According to the results of dynamics of land use pattern, the majority of the category of the land use showed stability in period l (1980-81).

Sharma *et al.* (2007) conducted a study on changes in land use pattern in Chabri micro watershed for year 1970-71 & 2004-05. They noticed that entire area under forests was under watershed and managed by the government. Forest contributed about 50% of the total geographical area.

Ramappa and Naidu (2009) studied the land utilization pattern in Andhra Pradesh. The study noticed that the possibility for extensive agriculture was very limited since the area under agricultural uses had already reached the maximum level. The area under non agricultural uses had increased from time to time. This certainly reduces the size of cultivable land. Change in cropping pattern was also necessary to make the most efficient use of land.

Bardhan and Tewari (2010) investigated into land use dynamics in India and land under-utilisation. They found out using linear multiple regression model that there is high degree of concentration of major land use classes in a few states. The area under the forests is mostly concentrated in the hilly states and also in states having a large number of tribal districts. They also found that there is an increasing trend in land under non-agricultural use which is due to the industrialisation and urbanization. Cultivable wastes increased with an increase in the area under large land holdings and decreased with increase in the proportion of leased-in land. The findings underline the need for the deepening and widening of insurance cover to farming in high risk areas for reducing other fallows.

Singh and Singh (2011) studied the land use pattern analysis using remote sensing in Mau district of India. The present study revealed that remote sensing and GIS techniques can be effectively used for development of land use/land cover plan map. The present study also found that remote sensing coupled with GIS can be effectively used for real time and long term monitoring of the environment. The baseline information generated on land use/land cover pattern of the area would be of immense help in formulation of policies and programmes required for developmental planning of the area. Land use/land cover mapping and changes are depending on the physical conditions, which are mainly driven by socio-economic factors. They can be mainly characterized by the changes of cultivated land and construction land, which are

strongly inter-related with human construction behavior.

Basavaraja et al. (2011) reported the analysis of the impact of urban sprawl in altering the land use, land-cover pattern of Raichur city in India using geospatial technologies. They found out that the present agrarian land-use of Raichur city is under imminent threat from the rapid and burgeoning urbanization. Considering the present trend, by 2021, nearly 27% of the agricultural land would be converted to settlements. Moreover, agriculture in this region depends on both the surface and ground water resources. Hence they concluded that the increasing urbanization would increase the demand of ground water which in turn would further impact the agriculture. Thus, it is imperative to formulate appropriate measures to check the haphazard growth of urbanization.

Karwariya and Goyal (2011) studied the land use and land cover mapping using digital classification technique in Tikamgarh district, Madhya Pradesh, India using remote sensing. The land use and land cover map clearly shows that area of cropland is higher than others. Open Land/Waste land has 154885 hectare area which occupies second place in this district, Forest blank getting third place has 23423 hectare areas. They found out that contribution of fallow land, dense forest and forest blank were 5.35 %, 3.22 % and 4.65 % respectively.

Mondal (2012) found that the level of agricultural development in the Mednipur district (West Bengal) is not satisfactory. On the other hand, population pressure on land in increasing in a slow but steady rate. As a result of which their already impoverished socio – economic status deteriorates day by day and noticed high diversification of cropping pattern of the study area. The major part of agricultural land of the district has been transformed into piscicultural which is environmental unsustainable. Apart from agriculture, poor development of non-agricultural activates is another problem which needs to be addressed seriously. He concludes that there are limitations to land use modification, constraints to exploitation of land potentiality and agricultural extension. An assured supply of water through irrigation can ensure agricultural development by increasing of cropping and it also reduces its dependence on variable and unreliable monsoonal rainfall. Proper attention should be given on the storage of rainwater during seasons.

Tokula (2013) studied land use/ land cover chage and its effect on agriculture land in Anyiyba. The study concluded that the establishment of Kogi state university in the town influenced the rate of urbanization and urban expansion which led to drastic reduction in the agriculture land use of the study area. This consequently have negative impact on peasant farmers and food security.

Nanda *et al.* (2014) reported the changes in land-use/land-cover dynamics using geospatial techniques: A case study of Vishav drainage basin. The main objectives were to analyse the nature and extent of land-use/land-cover changes in Vishav watershed since last two decades (1990 to 2010) and also to identify the main forces behind them. The study reveals that the land use pattern and its spatial distribution are the major

rudiments for the foundation of a successful land-use strategy required for the appropriate development of any area. They concluded that during the last two decades the area under horticulture land has been increased from 15.65% (166.38 Sq. Km) in 1990 to 18.49% (196.55 Sq. Km) in 2010 while the area under dense forest cover has reduced from 16.66% in 1990 to 12.14% in 2010. The agricultural land has also decreased by -3.67% (-39 Sq. Km).

Adhikari and Sekhon (2014) made a study on an economic analysis of land use dynamics in Punjab. The compound growth rate analysis of land use pattern exhibited that area under forest has significantly increased over a period of time, which may be due to governmental policies for the plantation of trees, and shifting of barren land to forest land. Barren and uncultivable land and cultural waste showed significant declining pattern. The share of other uncultivated land excluding fallow land is likely to increase its share in future while that of net area sown is likely to lose its share in future. About 0.49 per cent area in the state is under the barren and uncultivated which may be used for afforestation programme. They suggested implementing afforestation program and protecting available forest land from deforestation. They also suggested for proper management of land resource and to ensure sustainable agricultural growth in country, there is need for a land use policy.

Sharma (2015) studied on dynamics of land use competition in India: perceptions and realities. The study showed that loss of prime agricultural land to non-agricultural uses is intensifying in the country but varied across different states. The area under non-agricultural uses increased by about 23 per cent (21.3 million ha to 26.3 million ha) during the last two decades. Another pattern that was consistent across majority of states is the loss of net sown area and total arable land. From TE1991-92 to TE2011-12, about 1.8 million hectares of net area sown and over 3 million ha of total arable land were lost to other sectors. Multiple regression analysis results showed that urbanization, industrialisation and rapid increase in road development in the country are the main factors influencing conversion of prime agricultural land. Therefore, proper planning and management of land resources and appropriate policy framework is required to check conversion of agricultural land. Managing urbanization process and industrial expansion in a desired way that protects productive agricultural land and uses barren and uncultivable wastelands (about 17.2 million ha) is very critical to country's prosperity and sustainability.

Azharuddin (2015) analyzed the land use pattern in Western Uttar Pradesh and found out that there is an increasing trend in land under non-agricultural uses. The land use system is highly dynamic which undergoes significant changes according to the socio-economic changes and natural environment. Transformation lands from different land use to agriculture to fulfil the demand of food, fuel, wood, fodder and timber and on the other hand increasing the non-agricultural land use means to development of urbanization and industrialization. It can be concluded that the processes and associated

problems observed have regional, national, and international implications through the management of land use.

Reviews related to determinates and revival of fallow land were also collected for the study and are presented as follows:

Shiferaw *et al.* (2003) reported watershed management and farmer conservation investments in the semi-arid tropics of India: Analysis of determinants of resource use decisions and land productivity benefits. They found that cropping decision determines the farmer's choice on whether to crop or to leave the plot idle during a given production period. In the vertisol areas, difficult working conditions compel fallowing during the rainy season. In an intertemporal perspective, land taken out of production is proportional to the level of rainfall (Reddy 1991). Low rainfall years result in extensive fallowing of lands. In a cross-sectional context analyzed here, land may be left idle because of constraints related to labor, water for irrigation, credit, migration, or due to its low productivity. The plots that may have low fertility and which have not been cultivated for some time are most likely to remain fallow and also that plots more distant from the homestead are likely to remain idle. This could be due to supervision problems and high transaction cost.

Chinnappa (2005) Studied the economic feasibility of land reclamation technologies adopted by the farmers of Tungbhadra Command Area in Karnatka for amelioraion of irrigation-induced soil degradation has been studied. The data have been analysed using tabular method and partial budgeting method. It has been found that the available technologies are not being spread effectively among the affected farm households. Amongst different technologies followed by the farmers, adoption of leaching has been found least costly and could result in an incremental output of 14 quintals per hectare on saline soils of both head- and mid-regions. Green manuring has been observed to be another effective technology and could enhance crop yields on saline as well as waterlogged soils. Partial budgeting analysis has suggested that the technologies are viable irrespective of the farm size. Biological measures such as adoption of salt-resistant crop varieties can be profitable for small and marginal farmers. Instead of leaving their lands fallow due to their inability to adopt capital-intensive technologies, they should adopt them for land reclamation and higher returns.

Sauer *et al.* (2009) studied determinants of the fallowing decision in Kosovo. They found that the main factors for leaving land fallow indicated by the models is the lack of input and equipment on farms in Kosovo. This problem is recurrent in transition countries, in particular due to a limited access to credit. Another important finding of the econometric analysis is that larger arable areas decrease the probability for fallow land. Smaller non-arable land areas, and in particular when skilled labor input and specialized equipment are necessary, for example fruit and vegetables, are more likely to bring fallow plots. One of the main stated factors for the decision to leave land fallow was the low

profitability of farming. The increase in incentives to farmers by improving market institutions up- and downstream is one measure which can improve profitability and decrease the impediments to land use.

Wani et al. (2009) reported the determinants of productive and unproductive land utilization in Jammu Kashmir. Study had chosen cropping intensity as endogenous variable in productive land utilization and current fallow as variable in unproductive land utilization. The estimates of exponential function for productive land use revealed that the net irrigated area, literacy level and area not available for cultivation were positive and significant determinants of the variation in cropping intensity. Increase in rural population in relation with cultivated area had significantly contributed to the increase of area under current fallow. The area under rice was found to be significant and positive determinant of area under current fallow.

Meiyappan *et al.* (2016) analysed the dynamics and determinants of land change in India: integrating satellite data with village socioeconomics. Regression analysis at national scale indicates higher monsoon and post-monsoon precipitation is negatively associated and larger farm size is positively associated with conversion from cropland to fallow land. The results also imply that availability of labor is an emerging factor in determining fallow land. They also find positive association between fallow land and proportion of main female cultivators, indicating gender biased labour markets. At national scale, the following factors show prominent positive association with reducing fallow land (in decreasing order of importance): availability of tube well and well irrigation with electricity; higher monsoon and post-monsoonal rainfall; increased market frequency; availability of power supply for agriculture; density of community workers (proxy for technical assistance and incentives for agriculture); availability of communication facility (e.g., bus, trains; proxy for connectivity to markets); and availability of agricultural credit institutions, and higher average income per capita (both indicating access to capital and ability to invest). Knowledge to reclaim land is an important factor to reduce fallow land (proportion of literate population, access to information such as magazine and newspapers.

In nutshell these studies reported that there is tendency for land shifts to the agricultural sector, there is also a positive growth trend in fallow lands which ultimately tend to move into cultivable wastes (Pandey and Tewari, 1996). State level studies reported a diversion of common land to non-agricultural uses in Tamil Nadu. There were also indications of a sharp increase in other fallows (Ramasamy *ct al,* 2005). Pandey and Tewari (1987) reported the operation of the *vicious cycle* i *n Uttar* Pradesh, whereby waste land reclamation adds to the cultivated area on one hand, and on the other, increase in fallow land depletes the cultivated area, thereby resulting in constant net sown area. This phenomenon thus nullifies the wasteland reclamation and development efforts. Ramasamy *et at.* (2005) reported a high degree of association of other fallows with surface irrigation. At the farm level, the study revealed that increase in farm size; non-agricultural income and labour shortage have a

positive impact on fallow land. Reddy (1991) in a study on Andhra Pradesh, focused on technological factors affecting land use. He reported that technological factors led to the underutilization of land due to the resource crunch faced by the farmers on account of the capital intensive nature of modem inputs. Nadkarni and Deshpande (1979) in a study in Karnataka and Maharashtra highlighted the climatic and institutional factors affecting under-utilized lands, viz., other fallows, current fallows and cultivable wastes.

Thus, it can be concluded from these reviews that area under Barren land, uncultivated land, permanent pastures, land under miscellaneous tree crops, grooves and cultivable waste recorded significant negative growth but there was a substantial growth in the current fallow, which was the consequence of year to year rainfall variations. There was an inverse relationship between rainfall and current fallow. It was also found that there is sharp increase in the land put into non-agricultural uses due to increasing rate of urbanization and industrialization. Availability of labour is an emerging factor in determining fallow land. The positive association between fallow land and proportion of main female cultivators, indicating gender biased labour markets. At national scale, the following factors showed prominent positive association with reducing fallow land (in decreasing order of importance): availability of tube well and well irrigation with electricity; higher monsoon and post-monsoonal rainfall; increased market frequency; availability of power supply for agriculture; density of community workers (proxy for technical assistance and incentives for agriculture); availability of communication facility (e.g., bus, trains; proxy for connectivity to markets); and availability of agricultural credit institutions, and higher average income per capita (both indicating access to capital and ability to invest). Knowledge to reclaim land is an important factor to reduce fallow land. (Meiyappan *et.al*, 2016)

The important measures came out from above reviews for efficient uses of fallow land management are as follows :

a) The site of industrial estate should be assigned to those areas which are barren and uncultivable.

b) Cultivable wastes can be decreased with increase in the proportion of leased-in land.

c) Proper irrigation practices and change in cropping pattern is also necessary to make the most efficient use of land.

d) Implement aforestation program and protect available forest land from deforestation.

e) Deepening and widening of insurance cover to farming in high risk areas for reducing other fallows.

f) The governmental policy and programme and self-awareness are very much important for land use management.

Looking to all these facts the present study is conducted in Madhya Pradesh with following specific objectives

1.3 Specific Objectives

1. To Study the trend and growth of different parameters of land use pattern in Madhya Pradesh.

2. To determine the extent of fallow land in different district of Madhya Pradesh.
3. To analyze determinants of the fallow land and selected district of Madhya Pradesh.
4. To identify the socio-economic characteristics of sample respondents who leave their land fallow and reason for land leaving fallow thereof.
5. To explore suitable policy implication for revival of fallow land in the state.

1.4 Relevance of the Study

The information on the land-use pattern including fallow land is necessary to develop future strategies on land use planning and land use policies for any regions. The study is important for the resource base of different districts of the State under evaluation rational use, conservation and management of the land resource. The study plays a crucial role in the development of agriculture economy in the State. The will help to suggest the scope for planned shifts in the pattern and important for the formulation of agriculture development policies for agricultural and rural development.

1.5 Limitation of the Study

Year wise data related to total population, live stock population, number of tractors and area under above 10 hectare holdings are not available. Hence, these variables have been dropped under the results of multiple regression analysis i.e. factor affecting share of total fallow land to total cultivable land. The primary data relating to the objectives of the study were collected from the selected respondents by survey method. The information provided by them is based on the face to face interview and they do not keep any record of their farming practices. Therefore, the information provided by them is entirely based on their memory thus; there is possibility of certain biasness to enter in the present study.

1.6 Chapter Scheme

The study is organized into 5 chapters. Chapter 1 covers the introductory part of the study followed by Research Methodology (Chapter II). Trend and growth of different parameter of land use pattern along with extent & determinants of fallow land covered under chapter 3. Chapter 4, purely based on the primary data and deals with socio economics characteristics of sample farmers, extent of fallow land, and reason for land leaved fallow by the farmers and conclusions and policy suggestions are given in chapter 5.

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CHAPTER-II

RESEARCH METHODOLOGY

This chapter deals with the data followed by sample technique, sources of data, analysis of data, period of the study, analytical tools and concept used in the study for clear cut understanding of the problem in the light of stated objectives.

2.1 The Data

Both secondary and primary data were collected for the study.

2.1.1 Secondary Data

District wise time series secondary data related to different parameters of land use pattern (area under forest, area under non agricultural uses, net area sown, permanent pasture & other grazing land, land under misc. tree crops & grove not included in net area sown, cultivated waste land, fallow land other than current fallow and current fallow) along with mansoon rain fall, and net area irrigated in different districts of Madhya Pradesh for the period 1991-2016 were considered for the study to perform analysis and draw meaningful conclusions for the study.

2.1.2 Primary Data

The primary data were collected from the respondents for the reference year 2015-16, through interview schedule provided by the Coordinator, Institution of Economic Growth (IEG), Delhi. This interview schedule was translated into local language (Hindi) and pre-tested in the area under study.

2.2 Sample Technique

Stratified Sampling Technique was used to draw the samples for the study. At the first stage districts were selected on the basis of percentage share of fallow land in the recent five years (2011-16) in the districts to total geographical area. The 5 year average total fallow land and geographical area of the district was considered with the precaution that total fallow land as a percentage of total land reported should be at least 2 per cent. One district with highest (Mandla) and one with lowest percentage of fallow land (Bhopal) were selected for the study. (Fig. 2.1) Two blocks were further selected from each selected districts on the basis of highest fallow land in the reference year (2015-16). Thus, Ghugari & Niwas and Berasia & Phanda were selected from Mandla and Bhopal districts respectively. Further, two villages from each selected blocks were selected for the study on the basis of same criteria.

A list of all the farmers, who left land fallow during the reference year 2015-16 was prepared with the help of the Rural Agriculture Extension Officer of selected villages. and 15 farmers were selected in each selected village randomly for the study, considering the total land left fallow by these farmers should at least become 15 hectares. Thus, study comprises of 120 samples Households (HHs) of 8 villages, 4 blocks and two districts of Madhya Pradesh. (Table 2.2)

Table 2.1: Area under Fallow Land in Madhya Pradesh (ha.)

S. No.	District	Total Geographical Area	Current Fallow	Total Fallow	Percent Share to Total Geographical area
1	Dindori	358935	32635	61447	17.12
2	Mandla*	965559	26179	53888	5.58
3	Rewa	628745	27281	53353	8.49
4	Chhattarpur	863036	24606	53265	6.17
5	Shahdol	561006	24831	51614	9.20
6	Chhindwara	1184923	24109	50319	4.25
7	Anuppur	374671	24739	49432	13.19
8	Katani	493092	22920	45902	9.31
9	Seoni	875401	19497	41342	4.72
10	Betul	1007800	7864	40464	4.02
11	Satna	742432	17684	35214	4.74
12	Umaria	450329	16692	34013	7.55
13	Shivpuri	995392	12936	32280	3.24
14	Tikamgarh	504002	12532	31766	6.30
15	Sidhi	471921	17259	31238	6.62
16	Jabalpur	519757	13555	28554	5.49
17	Balaghat	924500	12134	27996	3.03
18	Signrauli	567486	15663	26826	4.73
19	Alirajpur	382659	12314	20663	5.40
20	Sagar	1022759	7237	17877	1.75
21	Gwalior	456449	5369	17083	3.74
22	Panna	702924	6908	15526	2.21
23	East Nimar (Khandwa)	775616	4426	14888	1.92
24	West Nimar(Khargaon)	818657	2601	10789	1.32
25	Datia	295874	4889	10773	3.64
26	Bhind	445204	4351	10629	2.39
27	Hoshangabad	668689	3749	10532	1.57
28	Morena	501686	3995	9484	1.89
29	Damoh	728583	3429	8031	1.10
30	Indore	383097	2610	7992	2.09
31	Sheopur	666650	3427	7251	1.09
32	Narsinghpur	513651	2961	7143	1.39
33	Bhopal*	277880	1524	5872	2.11
34	Badwani	529846	2028	5712	1.08
35	Rajgarh	616300	1239	4717	0.77
36	Dhar	819541	1818	4627	0.56
37	Vidisha	730197	1430	4414	0.60
38	Guna	630766	1295	4323	0.69
39	Ashok Nagar	467394	1247	3724	0.80
40	Jhabua	293057	1593	3205	1.09
41	Ujjain	609874	982	2798	0.46
41	Ujjain	609874	982	2798	0.46
42	Raisen	848746	839	2786	0.33
43	Burhanpur	342741	808	2650	0.77
44	Sehore	656368	193	2326	0.35
45	Mandsaur	551806	1010	2016	0.37
46	Ratlam	486007	741	1923	0.40
47	Shajapur + Agar	618618	346	1517	0.25
48	Neemuch	393555	718	1411	0.36
49	Harda	330579	207	1358	0.41
50	Dewas	701307	286	1089	0.16
	M.P. State	**30756067**	**439684**	**974043**	**3.17**

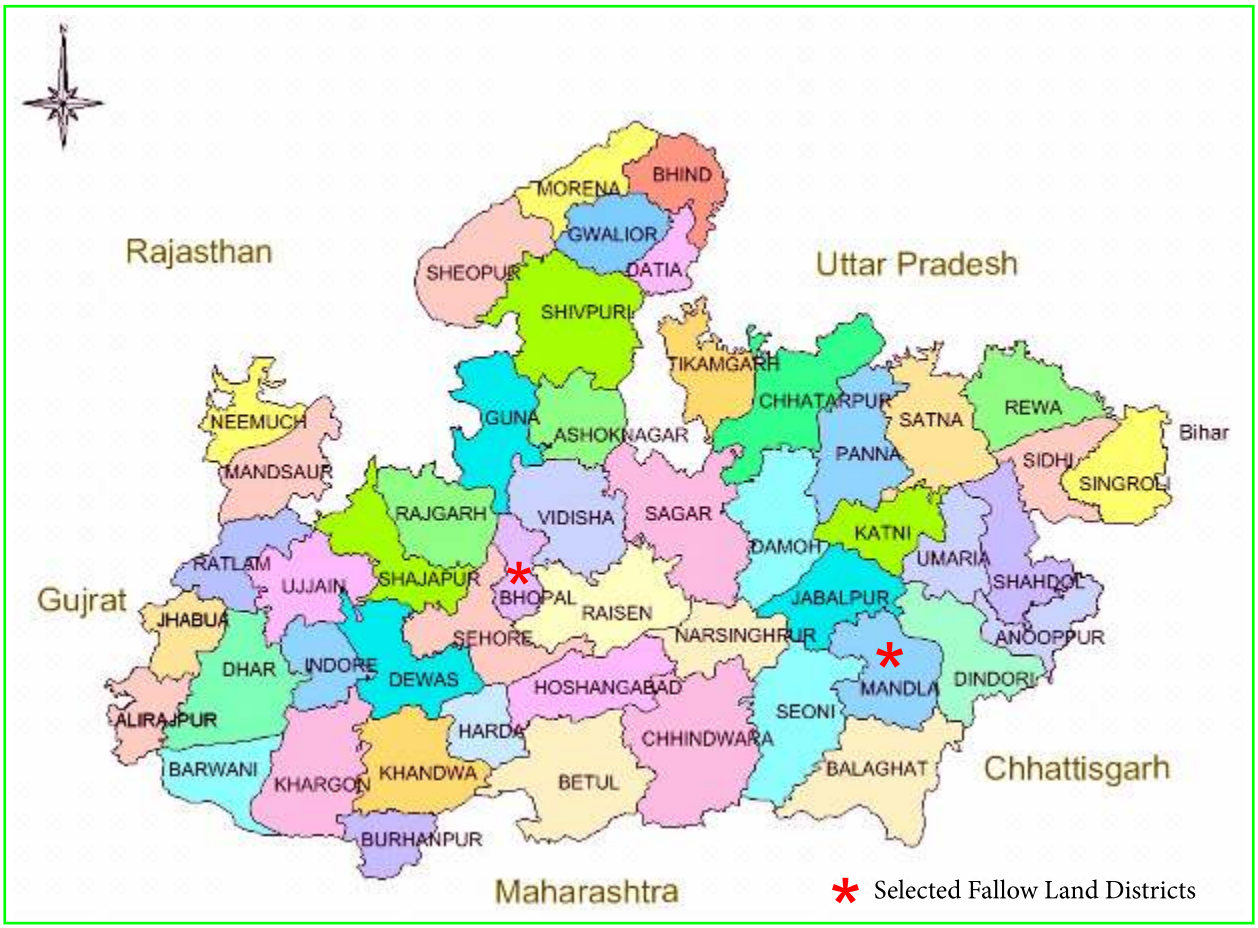

Fig.2.1: Selected Fallow Land Districts in Madhya Pradesh

Table 2.2: Number of Sample HHs in Selected Districts of Madhya Pradesh

S. No.	District	Blocks	Villages	Number of Farmers Sampled
1	Mandla	Ghugari-I	Chauva, Bhainswahi	30
		Niwas-II	Garhvisauda, , Amganv	30
Sub Total				60
2	Bhopal	Barasia-III	Jammu Sarkala, Semri Kalan	30
		Bhopal-IV	Tara savaniya, Purachhindwara	30
Sub Total				60
ToTal	**2**	**4**	**8**	**120**

2.3 Sources of Data

The primary data were collected from the respondents by personal contact through survey method, while secondary data were collected from the published records of the Department of Farmers' Welfare and Agriculture Development, Ministry of Agriculture Government of Madhya Pradesh, Bhopal, Department of Statistics, Office of the Land record, and the websites viz; DACNET, MP KRISHI etc.

2.4 Period of the Study

The secondary data of the study related to the year 1991-2016, while primary data were collected for the year 2015-16.

2.5 Analysis of Data

The collected data were classified and tabulated in light of stated objectives. The different analytical tools which were used to draw conclusions are as follows:

1. Absolute Change

Absolute change explains the overall change occurred in current year over the base year.

Absolute Change = Yn–Yo

Where,

Yn = Current year (Triennium average upto2016)

Yo = Base year (Triennium average up to 1993)

2. Relative Change

The absolute change explains percentage change in current year over base year.

$$\text{Relative Change} = \frac{\text{Yn (Current year)} - \text{Yo (Base year)}}{\text{Yo (Base year)}} \times 100$$

3. Mean

The average of the variables used for the study.

$$\text{Mean } X = \frac{\Sigma x}{n}$$

Where,

X = Mean of the variables

Σx = Sum of scores (observation) of variables

n = Total number of years

4. Compound Annual Growth Rate

It is an average value for annual rate of change over a period of time allowing for the compound effect of growth.

C.A.G.R. = (Antilog of b – 1) x 100

Where,

b = Regression Coefficient

5. Multiple Regression Linear Model

The percentage of total fallow land in total cultivable land is regressed with the following variables in the linear form

Y = a + b1X1+b2X2

Where,

Y= Share of total fallow land to total cultivable land

a = Intercept

b1- b2 = Regression Coefficients of X1 & X2

X1 = Monsoon rainfall

X2 = Percentage of net area irrigated

6. Standard Deviation (SD)

Standard deviation is a measure of the dispersion of a set of data from its mean. It is the ratio of mean to variance.

Standard deviation was calculated by using following formula:

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{N - 1}}$$

Where,

S.D. = Standard deviation

x = Deviation obtained from mean

N = Number of observations

x = Mean

7. Coefficient of variation (CV)

It's a statistical measure of the dispersion of data points in a data series around the mean. The coefficients of variation computed as follows:

$$\text{Coefficient of variation} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

2.6 The Concept Used

The following concepts were used for the study:

A. Geographical Area

The latest figures of geographical area of the State/Union Territories are as provided by the Office of the Surveyor General of India.

B. Forest Area

This includes all land classified either as forest under any legal enactment, or administered as forest, whether State-owned or private, and whether wooded or maintained as potential forest land. The area of crop raised in the forest and grazing lands or areas open for grazing within the forests remain included under the "forest area".

C. Area under Non-agricultural Uses

This includes all land occupied by buildings, roads and railways or under water, e.g. rivers and canals, and other land put to uses other than agriculture.

D. Barren and Un-cultivable Land

This includes all land covered by mountains, deserts, etc. Land which cannot be brought under cultivation except at an exorbitant cost is classified as uncultivable whether such land is in isolated blocks or within cultivated holdings.

E. Permanent Pasture and other Grazing Land

This includes all grazing land whether it is permanent pasture/meadows or not. Village common grazing land is included under this category.

F. Land under Miscellaneous Tree Crops, etc.

This includes all cultivable land which is not included in 'Net area sown' but is put to some agricultural use. Land under casuring trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under 'Orchards' are classified under this category.

G. Cultivable Waste Land

This includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings.

H. Fallow Lands other than Current Fallows

This includes all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years.

I. Current Fallow Land

Cropped area, which are kept fallow

during the current year but was cultivated in the previous year. For example with any seeding area is not cropped in the same year, it may be treated as current fallow.

J. Permanent Fallow

The land which are not use more than five for agricultural purposes, considered as permanent fallow land.

K. Gross Cropped Area

This represents the total area sown once and/or more than once in a particular year, i.e. the area is counted as many times as there are sowings in a year. This total area is also known as total cropped area or total area sown.

L. Area Sown More than Once

This represents the areas on which crops are cultivated more than once during the agricultural year. This is obtained by deducting Net Area Sown from Gross Cropped Area.

M. Net area Sown

Total area sown with crops and orchards counting area sown more than once in the same year only once.

N. Cropping Intensity

It is the ratio of net area sown to the total cropped area or the number of crops cultivated in a piece of land per annum, considered as cropping intensity.

$$\text{Cropping intensity} = \frac{\text{Gross Cropped Area}}{\text{Net Area Sown}} \text{ x100}$$

O. Irrigation Intensity

It is the ratio of net irrigated area to the total irrigated area in a piece of land per annum, considered as irrigation intensity.

$$\text{Irrigation intensity} = \frac{\text{Gross Irrigated Area}}{\text{Net Irrigated Area}} \text{ x100}$$

P. Net Irrigated Area

It is the area irrigated through any source once ina year for a particular crop.

Q. Land used Pattern

The arrangements, activities, and input people undertake in a certain land cover type to produce, change and maintain it.

R. Cropping pattern

Cropping pattern means the proportion of area under various crops at a point of time.

S. Kharif Crops

The crops which are grown in the kharif season known as the kharif crops for example; Paddy, Soyben, Bajra, Maize etc.

T. Rabi Crops

The crops which are grown in the rabi season know as the rabi crops for example; Wheat, Gram, Lentil, Mustard ect.

U. Marginal Farmer

The farmer has less than 1 hectare land (< 2.5 Acre).

V. Small Farmer

The Farmer has one to two hectare land (2.5 – 5 Acre).

W. Medium Farmer

The Farmer who have 2-4 hectare land (5-10 Acre).

X. Large Farmer

The farmer has above the 4 hectare land (> 10 Acre).

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CHAPTER-III

EXTENT OF FALLOW LAND IN MADHYA PRADESH: MARCO LEVEL ANALYSIS

This Chapter deals with profile of Madhya Pradesh, the share of fallow land to total geographical area in the base and current year of the study and districts-wise growth of different parameters of land use pattern viz. area under forest, area under non agricultural uses, net area sown, permanent pasture & other grazing land, land under misc. tree crops & grove not included in net area sown, cultivated waste land, fallow land other than current fallow and current fallow were also carried out considering time series data from 1991-2016. Finally, Chapter also includes the determinants of fallow land in the selected districts as well as in the state.

3.1 Profile of Madhya Pradesh

The **Gross State Value Added** (GSVA) of primary secondary and tertiary sectors of Madhya Pradesh in the year 2016-17 at constant price of 2011-12 was found to be 43941770 lakh. The tertiary sector was found to be the major contributor with 41.2 per cent share followed by primary (36.34%) and secondary (22.46%) sectors. Crops (73.75%) and live stock (13.15%) were found to be the major contributors in primary sector. The manufacturing (46.40%) followed by construction (40.14%) and utility services (13.46%) were found to be major sources in secondary sector. (Table 3.1) In case of tertiary sector trade, repair, hotels and restaurants were found to be the major contributor with 27.83 per cent followed by Real estate, ownership of dwelling & professional services (14.25%), other services (13.93%), financial services (13.41%), public administration (13.20%), transport by other means and storage (8.45%), communication & services related to broadcasting (6.18%) and railways (2.75%). The Gross State Domestic Product (GSDP) of Madhya Pradesh in the year 2016-17 (at constant price of 2011-12) was found to be 46521170 lakh with per capita GSDP of ₹ 59052 (Table 3.1).

The **Net State Value Added (NSVA)** of primary secondary and tertiary sector of Madhya Pradesh in the year 2016-17 at constant price of 2011-12 was found to be ₹38269882 lakh. The tertiary sector was found to be the major contributor with 40.73 per cent share followed by primary (39.25%) and secondary (20.02%) sector. Crops with 74.03 per cent and live stock (13.70%) were found to be the major contributors in primary sector. The construction (48.21%) followed by manufacturing (43.86%) and utility services (7.93%) were contributed to secondary sector. (Table 3.2) In case of tertiary sector trade, repair, hotels and restaurants were found to be the major contributor with 29.83 per cent followed by financial services (15.30%), other services (14.99%), Real estate, ownership of dwelling & professional services (12.57%), public administration (12.07%), transport by other means and storage (8.83%), communication & services related to broadcasting (3.73%) and railways (2.66%).

Table 3.1: Gross State Value Added by Economic Activity at Constant Prices (2011-12) (Rs. in lakh)

S. No.	Item	2016-17
1	Crops	11775666 (73.75)
2	Livestock	2099697 (13.15)
3	Forestry and logging	773752 (4.85)
4	Fishing and aquaculture	111854 (0.7)
5	Mining and quarrying	1206902 (7.56)
	Primary	**15967871 (36.34)**
6	Manufacturing	4579278 (46.4)
7	Electricity, gas, water supply & other utility services	1328653 (13.46)
8	Construction	3961512 (40.14)
	Secondary	**9869443 (22.46)**
9	Trade, repair, hotels and restaurants	5038691 (27.83)
10	Transport by other means and Storage	1529484 (8.45)
11	Railways	497852 (2.75)
12	Communication & services related to broadcasting	1119324 (6.18)
13	Financial services	2427595 (13.41)
14	Real estate, ownership of dwelling & professional services	2579810 (14.25)
15	Public administration	2389072 (13.2)
16	Other services	2522628 (13.93)
	Tertiary	**18104456 (41.2)**
	Total GSVA at basic prices	43941770
	Gross State Domestic Product	46521170
	Population ('00)	787800
	Per Capita GSDP (Rs.)	59052

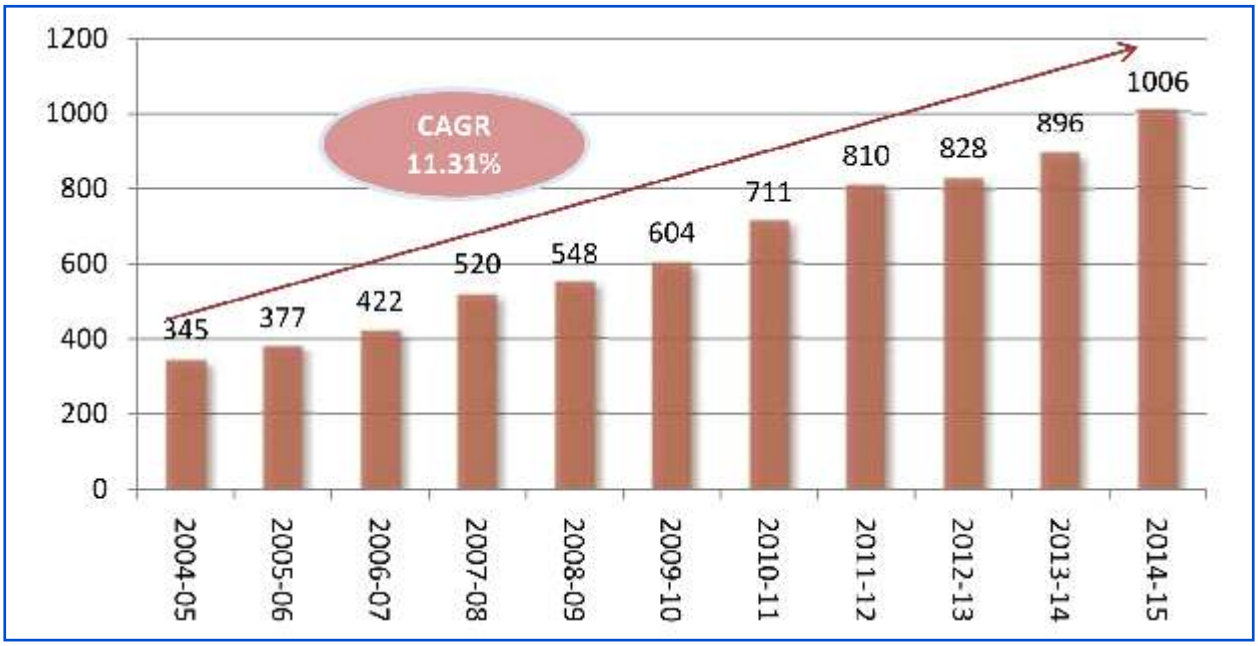
Source : Department of Planning, Economics and Statistics, Directorate of Economics and Statistics, Madhya Pradesh
Figures in parenthesis shows percentage to respective total of the sector and figures in parenthesis with blod show percentage to total NSVA.

The Net State Domestic Product (NSDP) of Madhya Pradesh in the year 2016-17 at constant price of 2011-12 was found to be ₹40849282 lakh with per capita GSDP of ₹51852.

Table 3.2: Net State Value Added by Economic Activity at Constant Prices (2011-12) (Rs. in lakh)

S. No.	Item	2016-17
1	Crops	11120099 (74.03)
2	Livestock	2058123 (13.7)
3	Forestry and logging	761348 (5.07)
4	Fishing and aquaculture	98652 (0.66)
5	Mining and quarrying	982158 (6.54)
	Primary	**15020380 (39.25)**
6	Manufacturing	3360101 (43.86)
7	Electricity, gas, water supply & other utility services	607802 (7.93)
8	Construction	3693555 (48.21)
	Secondary	**7661458 (20.02)**
9	Trade, repair, hotels and restaurants	4649854 (29.83)
10	Transport by other means and Storage	1376952 (8.83)
11	Railways	415014 (2.66)
12	Communication & services related to broadcasting	581531 (3.73)
13	Financial services	2385555 (15.3)
14	Real estate, ownership of dwelling & professional services	1959695 (12.57)
15	Public administration	1882097 (12.07)
16	Other services	2337346 (14.99)
	Tertiary	**15588044 (40.73)**
	Total NSVA at basic prices	38269882
	Gross State Domestic Product	40849282
	Population ('00)	787800
	Per Capita NSDP (Rs.)	51852

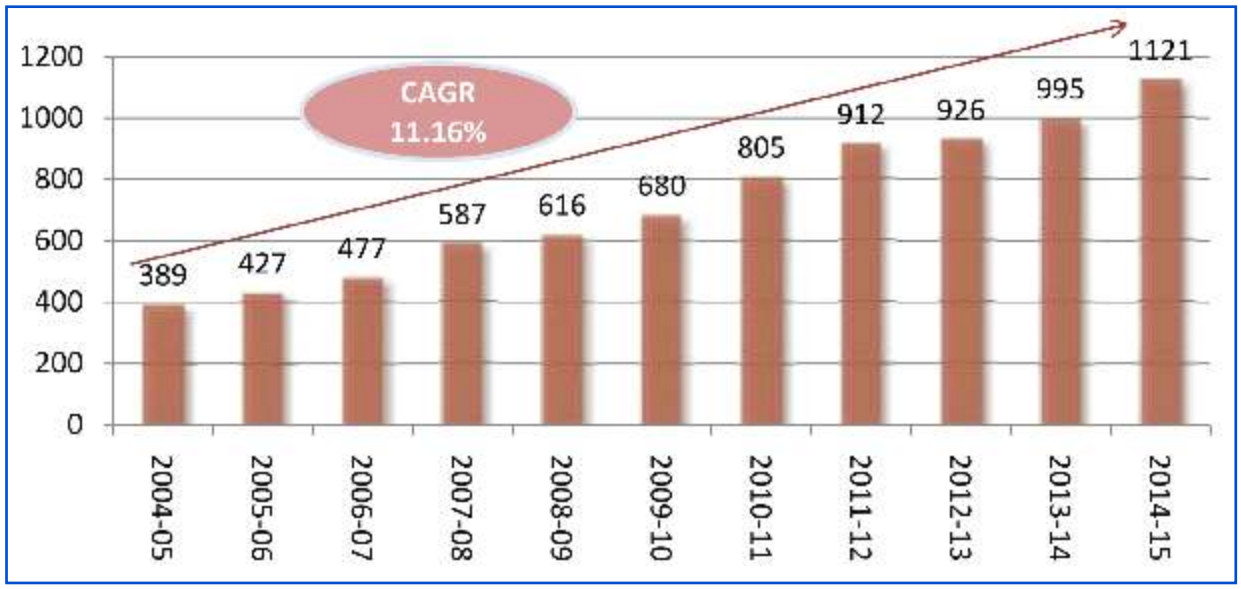
Source : Department of Planning, Economics and Statistics, Directorate of Economics and Statistics, Madhya Pradesh
Figures in parenthesis shows percentage to respective total of the sector and figures in parenthesis with bold show percentage to total NSVA



Sources : www.ibef.org (2015)

Fig. 3.1 : Per Capita NSDP at Current Prices (in US$)

The State's Per Capita NSDP in 2014-15 was US$ 1,006 compared with US$ 345 in 2004-05. The per capita NSDP increased at a CAGR of 11.31 per cent during the period of 2004-05 - 2014-15. (Fig. 3.1)



Sources: www.ibef.org (2015)

Fig. 3.2: Per Capita GSDP at Current Prices (in US$)

The State's Per Capita GSDP in 2014-15 was US$ 1,121 compared with US$ 389.4 in 2004-05. The Per capita GSDP increased at a CAGR of 11.16 per cent during the period of 2004-05 - 2014-15. (Fig. 3.2)

The State NSDP at current prices in the year 2014-15 was US$ 75.64 compared with US$ 22.30 in 2004-05 which was found to be increase at CAGR of 12.99 per cent during the period of 2004-05-2014-15. (Fig. 3.3)

Sources : www.ibef.org (2015)

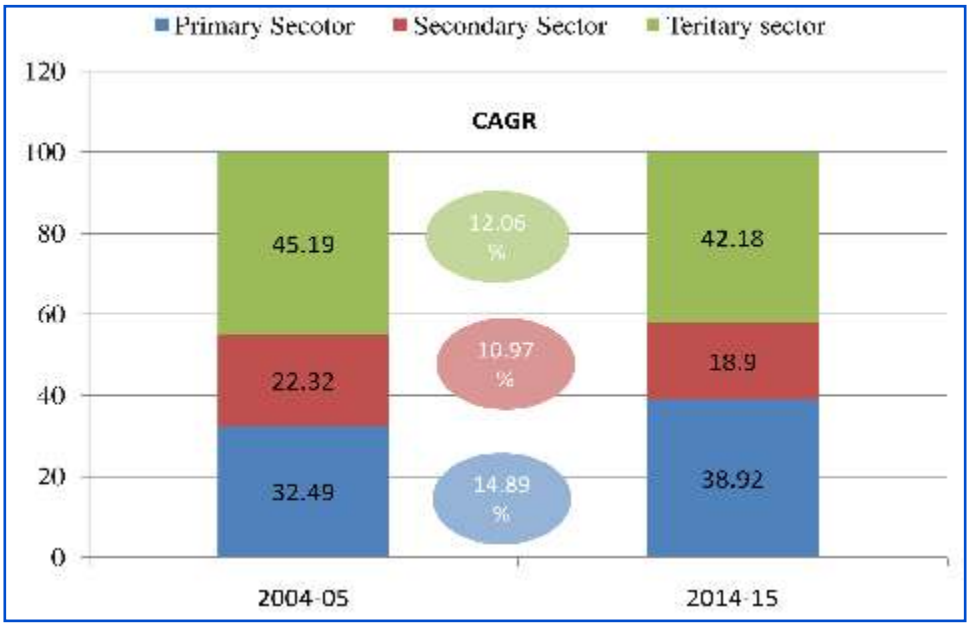
Fig. 3.3 : NSDP at Current Prices (in US$)

The state GSDP at current prices in the year 2014-15 was US$ 84.27 compared with US$ 25.20 in 2004-05 which was found to be increased at CAGR of 12.83 per cent during 2004-05-2014-15. (Fig. 3.4). The tertiary sector contributed 42.18 per cent to the state's GSDP at current prices, followed by primary sector (38.92 %) and secondary sector (18.90 %) in the year 2014-15 (Fig.3.5). At a CAGR of 14.89 per cent, the primary sector has been the fastest growing among the three sectors in the period from 2004-05 to 2014-15.

Sources : www.ibef.org (2015)

Fig. 3.4 : GSDP at Current Prices (in US$)

This was driven by agriculture, forest & logging, and fishing. The tertiary sector expanded at a CAGR of 12.06 per cent between 2004-05 and 2014-15. The growth has been driven by trade, hotels, real estate, finance, insurance, transport, communications and other services. The secondary sector expanded at a CAGR of 10.97 per cent between 2004-05 and 2014-15 driven by manufacturing, electricity, gas & water supply and construction. (Fig. 3.5)



Sources : www.ibef.org (2015)

Fig 3.5: Sector Wise Composition of GSDP

Madhya Pradesh lies in between **latitude** 21° 50' to 26°88'N and **longitude** 74°03' to 82°90'E and situated 1350 meters from **MSL** covering 308252 sq Km area with population of 726.30 lakh and 236 person/KM **population** density and sex ratio of 931 **female over 1000 male**. The **total working population**, cultivators and agricultural labours to total population were found to be 43.47, 31.18 and 38.61 per cent (Table 3.3)

Table 3.3: Demographic Features of Madhya Pradesh

Particulars	Madhya Pradesh
Geographical Situation	
Latitude	21°5' to 26°88' N
Longitude	74°03' to 82°90' E
Mean sea level (Meter)	1350
Rainfall (mm)	949.1
Area (in sq Km)	308252
Population Indicators (% to total population)	
Population (Lakh)	726.3
Male	51.79
Female	48.21
SC	15.62
ST	21.09
Urbanization Population (%)	27.62
Density/km	236
Literacy (%)	69.32
Sex Ratio (per 1000)	931
Total workers (% to Total population)	43.47
Cultivators (% to Total Workers)	31.18
Agriculture Labour (% to Total Workers)	38.61

Source: Census, 2011

The total workers were found to be 43.47 per cent out of total population and it was found to be 53.56 and 32.64 per cent out of total male and female population respectively. The majority of the population was found to be engaged as agricultural labourers (38.61%) followed by cultivators (31.18%), other workers (27.17%) and workers in household industries (3.04%) The majority of male population was found to be engaged as other worker (33.43%) followed by cultivators (32.71%), agricultural labourers (31.32%) and workers in household industries (2.54%), while, more than half female population were found to be engaged as agricultural labourer followed by cultivators (28.47%), other worker (16.14%) and workers in household industries (3.92%). (Table 3.4)

Table 3.4 : Composition Working Population in Madhya Pradesh

Particulars	Total Population	Total Workers (Main and Marginal)	Cultivators	Agricultural Labourers	Workers in Household Industry	Other Workers
Total	72626809	31574133 (43.47)	9844439 (31.18)	12192267 (38.61)	959259 (3.04)	8578168 (27.17)
Male	37612306	20146970 (53.56)	6591064 (32.71)	6310657 (31.32)	511048 (2.54)	6734201 (33.43)
Female	35014503	11427163 (32.64)	3253375 (28.47)	5881610 (51.47)	448211 (3.92)	1843967 (16.14)

Source: Agriculture Census, 2011

The total number of electric and diesel pumps were found to be 17.72 and 3.85 lakhs in the state, while number of tractors were found to be 3.55 lakhs with 28.49 and 9.23 lakhs wooden and iron plough respectively (Table 3.5).

Table 3.5: Agriculture Machinery and Implements in Madhya Pradesh 2012-13

Pumps		Tractors	Ploughs	
Electric	Diesel		Wooden (000)	Iron (000)
1771864	385428	355095	2849	923

Source: Commissioner, Land Records, Madhya Pradesh

The total number of holdings was found to be 88.72 lakhs with 158.35 lakh hectare area under these holdings in the state (Table 3.6). The maximum number of operational holdings belongs to the marginal category (43.86%) followed by small (27.60%), semi medium (18.65%), medium (8.89%) and large (1.00%), the area covered under these holdings was found to be 12.10, 21.89, 28.48, 28.70 and 8.84 per cent, respectively. As the size of holdings increases the number of holdings decreases, showing inverse relationship between number and area operated under different size of holdings.

Table 3.6 : Number and Area of Operational Holdings for All Social Groups (in "000" ha.)

Particulars	Number (000)	Area
Marginal	3891.02 (43.86)	1915.35 (12.10)
Small	2448.65 (27.60)	3466.14 (21.89)
Semi-medium	1654.83 (18.65)	4510.22 (28.48)
Medium	789.14 (8.89)	4544.53 (28.70)
Large	88.73 (1.00)	1399.63 (8.84)
Total	8872.38 (100)	15835.87 (100)

The Madhya Pradesh state has 307.56 lakh ha. of geographical area in which almost 50 per cent was found to be under cultivation. Amongst other parameter of land the area under forest contributed 28.27 per cent followed by area not available for cultivation

Table 3.7: Land Use Classification of Madhya Pradesh 2014-15 (in Lakh ha)

Particulars		Madhya Pradesh
	Reporting Area for LUS	307.56 (100)
	Forests	86.94 (28.27)
Not Available for Cultivation	Area Under Non Agricultural Uses	21.49 (6.99)
	Barren and Unculturable Land	13.57 (4.41)
	Total	**35.06** **(11.4)**
Other Uncultivated Land Excluding Fallow Land	Permanent Pasture and Other Grazing Land	13.03 (4.24)
	Land Under Misc. Tree Crops and Groves not Included in Net Area Sown	0.2 (0.06)
	Culturable Waste Land	10.1 (3.28)
	Total	**23.33** **(7.59)**
Fallow Land	Fallow Lands Other Than Current Fallows	4.83 (1.57)
	Current Fallow	3.88 (1.26)
	Total	**8.71** **(2.83)**
	Net Area Sown	153.51 (49.91)
	Cropped Area	238.1 (77.42)
	Area Sown More Than Once	84.59 (27.5)
	Cropping Intensity	155

Source: Directorate of Statistics and Economics

(11.40%), other cultivated land excluding fallow land (7.59%) and fallow land (2.83%). The area sown more than once was found to be 27.50 per cent with cropping intensity of 155 per cent. (Table 3.7)

The gross cropped area of the state was found to be 238.10 lakh hectare which was found, dominated by cereals and millets which occupied 42.09 per cent gross cropped area (Table 3.8) followed by oilseeds (31.25%), pulses (18.47%), other non food crops (4.17%) total fruits and vegetables (1.62%), total species (1.62%) and sugarcane (0.51%). Amongst different cereals wheat occupied maximum area (63%) followed by paddy (21%), maize (9%) and other cereals (7%). (Fig. 3.6) In case of oilseeds soybean (83%) occupied maximum area followed by mustard (8%), sesame (4%), ground nut (3%), linseed (1%) and other oilseed (1%) (Fig. 3.7) and in case of pulses gram (55%) occupied maximum area followed by arhar (8%) and other pulses including moong, urid, linseed etc. (37%) (Fig. 3.8) in Madhya Pradesh

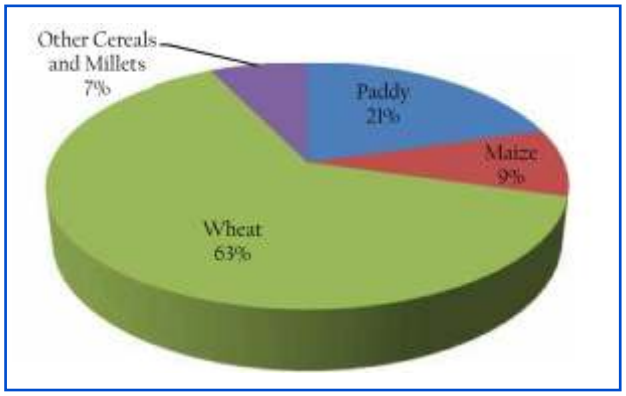


Fig. 3.6: Percentage Contribution of different Cereals in total Cereals

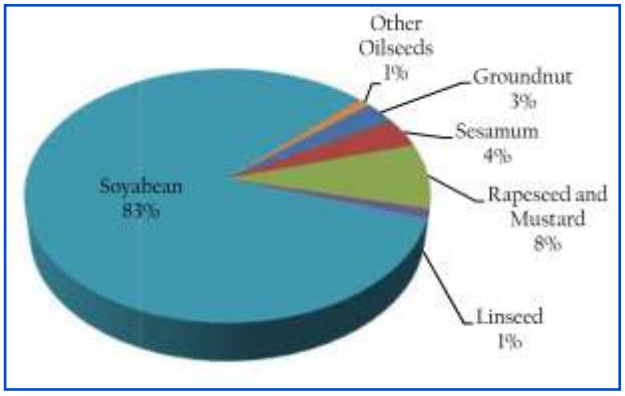


Fig. 3.7 : Percentage Contribution of different Oilseeds in total Oilseeds in M.P.

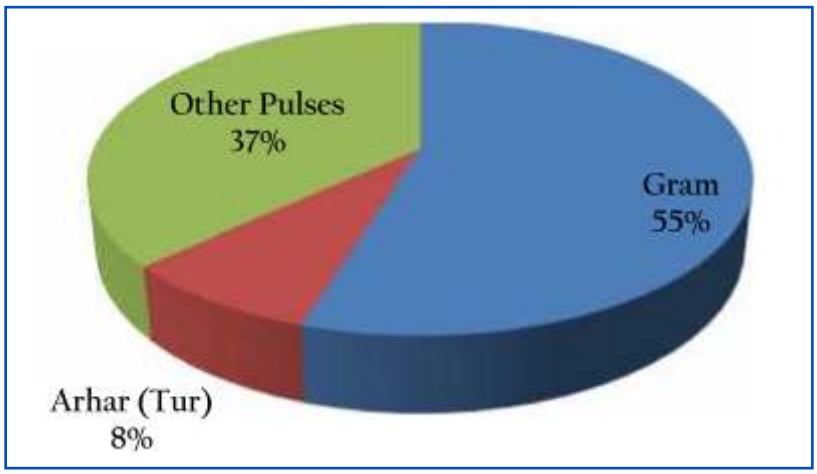


Fig. 3.8 : Percentage Contribution of different Pulses in total Pulses in M.P.

Table 3.8: Cropping Pattern of Madhya Pradesh (ha.)

Particulars	Madhya Pradesh
Paddy	2058048 (20.54)
Maize	885281 (8.83)
Wheat	6351107 (63.37)
Other Cereals and Millets	727540 (7.26)
Total Cereals and Millets	**10021976 (42.09)**
Gram	2445675 (54.82)
Arhar (Tur)	374794 (8.4)
Other Pulses	1641066 (36.78)
Total Pulses	**4461535 (18.74)**
Total Food Grains	**14483511 (60.83)**
Sugarcane	120943 (0.51)
Total Condiments and Spices	**385700 (1.62)**
Total Fruits and Vegetable	**385991 (1.62)**
Total Food Crop	**15376196 (64.58)**
Groundnut	211120 (2.84)
Sesame	279079 (3.75)
Rapeseed and Mustard	619516 (8.33)
Linseed	84913 (1.14)
Soybean	6167004 (82.89)
Other Oilseeds	78319 (1.05)
Total Oilseeds	**7439951 (31.25)**
Other Non Food Crop	993911 (4.17)
Total Cropped Area	**23810058 (100)**
Area Sown More Than Once	8458807
Net Area Sown	15351251

Source: Source: Directorate of Statistics and Economics

The 43.26 per cent area out of gross cropped area (238.10 lakh ha.) was found to be irrigated in the state (Table 3.9). The major source of irrigation was found to be well/tube well (66.53%) followed by canal (17.93%), other sources (12.83%) and tank (2.71%).

Table 3.9: Source –Wise Irrigated Area in Madhya Pradesh (In "000" ha.) 2014-15

Particulars	Net Irrigated Area	Gross Irrigated Area
Canal	1646.46 (17.18)	1846.89 (17.93)
Tank	273.07 (2.85)	278.93 (2.71)
Well & Tube well	6402.97 (66.81)	6853.37 (66.53)
Other Source	1261.6 (13.16)	1321.42 (12.83)
Total	**9584.09** **(100)**	**10300.61** **(100)**

Source: Directorate of Statistics and Economics

3.2 Share of Fallow Land in Total Geographical Area

The share of fallow land in different parameters of land use pattern viz. area under forest, area under non agricultural uses, net area sown, permanent pasture & other grazing land, land under misc. tree crops & grove not included in net area sown, cultivated waste land, fallow land other than current fallow and current fallow in base and current year are presented in Fig.3.9 & Fig 3.10.

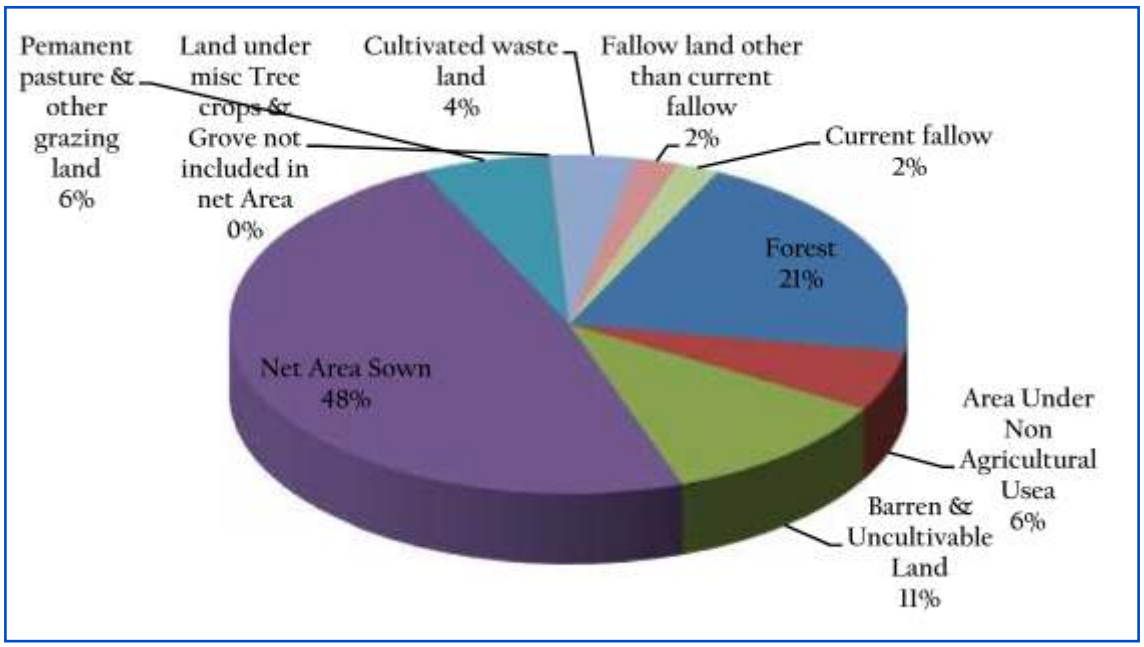


Fig 3.9: Share of different Parameters of Land Use in Base Year (TE average up to 1993)

It is observed from these figures that net sown area and area under non agricultural uses were found to be increased by 2 and 1 per cent respectively from 48 to 58 percent and 6 to 7 per cent in the current year over the base year during the period under study, while area under uncultivated land excluding fallow land, uncultivable waste land and current fallow was found to be decreased by 1 per cent from 5 to 4, 4 to 3 and 3 to 2 per cent respectively in the current year over the base year during the period under study.

The area under forest, barren and uncultivated land, fallow land and land under misc. trees & groves other than current fallow not included in net area were not showed any change and remain constant in base as well as in current year.

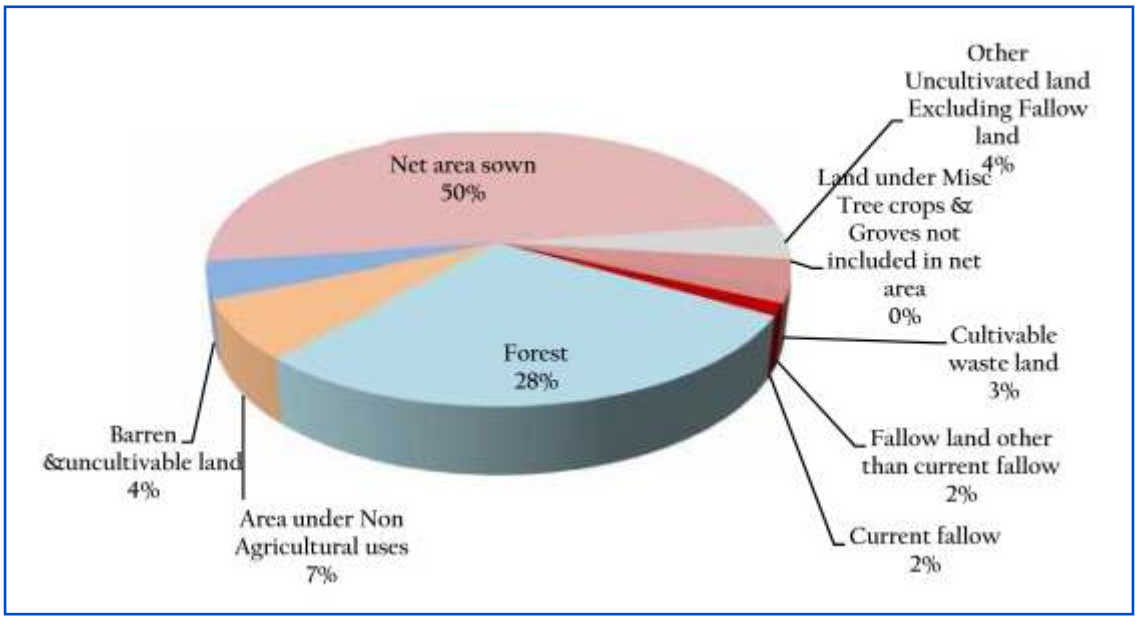


Fig 3.10: Share of different Parameters of Land Use in Current Year (TE average up to 2016)

3.3 Growth of Different parameters of Land Use Pattern

The compound annual growth rate of different parameter of land use pattern was analysed for all the districts of the state and the state considering the time series data from 1991-2016 and presented in table 3.10. The data related to the base year and current year and their absolute change, have been presented in appendix 1, 2, and 3 respectively.

It is clear from the data that in Madhya Pradesh the area under forest, area under non agriculture uses, net area sown and land under misc. tree crops and grove not included in net area were found to be increased with a growth of 1.76, 1.01, 0.20 and 0.13 per cent per year while, barren and uncultivable land, permanent pasture and other grazing land, current fallow, fallow land other than current fallow and cultivable waste land were found to be decreased with the growth of 2.58, 1.33, 1.25, 0.89 and 0.76 per cent per year respectively during the period under study.

The growth of area under current fallow

was found to be decreased across all the districts of State except in Datia (0.6 %/year), Chhatarpur (1.23%/year), Bhopal (0.49%/year), Sidhi (0.05%/year) Rewa (0.07%/year) and Balaghat (1.26%/year), in these districts it was found to be increased during the period under study. The growth of area under fallow land other than current fallow was also found to be decreased across all the district of State expect Datia (2.37/year%), Gwalior (2.53%/year), Bhopal (2.09%/year) and Balaghat (1.12%/year), in these districts it was found to be increased during the period under study. The growth of area under cultivated waste land was also found to be decreased across all the district of State except in Chhindwara (1.70%/year), Sidhi (1.47%/year), Jhabua (1.22%/year), Satna (1.03%/year), Bhind (0.35%/year),Rajgarh (0.33%/year) Tikamgarh (0.22%/year), Datia (0.08%/year) and Seoni (0.05%/year), in these districts it was found to be increased during the period under study. The growth of land under misc tree crops & grove not included in net area was also found to be decreased across all the district of State except Datia (275.34%/year) followed by Vidisha (17.3%/year), Rajgarh (13.74%/year), Sehore (11.53%/year), Balaghat (10.98%/year), Khargone (9.88%/year), Sidhi (6.52%/year), Ujjain (3.3%/year), Rewa (3.21%/year), Betul (3.11%/year), Chhindwara (2.99%/year), Shajapur (2.5%/year), Jhabua (2.17%/year), Raisen (2.14%/year), Bhind (2.02%/year), Ratlam (1.52%/year), Tikamgarh (0.96%/year), Dewas (0.24%/year), Indore (0.18%/year), Mandsaur (0.13%/year) and Shahdol (0.08%/year), in these districts it was found to be increased during the period under study. The growth of area under permanent pasture & other grazing land was found to be decreased across all the district of State except Betul (0.21%/year). In Betul it was found to be increased during the period under study, while the area under Barren & Uncultivable Land was found to be decreased in all the districts of the State.

The growth of net area sown was also found to be increased across all the district of State except Mandla (-2.05%/year), Khargone (-2.01%/year), Jabalpur (-1.65%/year), Mandsaur (-1.48%/year), Morena (-1.43%/year), Hoshangabad (-1.34%/year), Shahdol+Anuppur (-1.10%/year), Gwalior (-0.80%/year), Khandwa(+Burhanpur) (-0.39%/year), Bhopal (-0.13%/year), (Sidhi+Singrauli) (-0.11%/year), Indore (-0.14%/year), Satna (-0.03%/year) and Balaghat (-0.03%/year), it was found to be decreased in these districts during the period under study. The growth of area under non agricultural uses was also found to be increased across all the district of State except Morena (-1.63%/year) followed by Mandla (-1.60%/year), Khargone (-1.44%/year), Mandsaur (-0.92%/year), Jabalpur (-0.74%/year), Shahdol+Anuppur (-0.17%/year), Chhatarpur (-0.14%/year).

Table 3.10: Relative Change per year in Different Districts of Madhya Pradesh.

S.No.	Districts	Forest	Area Under Non Agricultural Uses	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land under Misc Tree Crops & Grove not included in Net Area	Cultivated Waste Land	Fallow Land Other than Current Fallow	Current Fallow
1	Balaghat	1.04	0.13	-3.51	-0.03	-1.53	10.98	-0.75	1.12	1.26
2	Shahdol	-0.76	-0.17	-3.20	-1.10	-2.70	0.08	-0.19	-1.29	-1.52
3	Mandla	1.99	-1.60	-3.98	-2.05	-2.08	-1.18	-1.15	-2.50	-2.80
4	Dindori	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Umaria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Rewa	3.97	0.59	-2.89	0.04	-1.37	3.21	-1.87	-0.02	0.07
7	Satna	5.58	0.20	-3.88	-0.03	-0.29	-0.62	1.03	-0.27	-1.41
8	Panna	1.60	0.42	-3.03	0.81	-1.02	-4.35	-1.40	-2.50	-2.56
9	Jabalpur	-1.54	-0.74	-3.27	-1.65	-2.58	-2.89	-2.79	-2.92	-3.38
10	Seoni	1.71	0.22	-3.31	0.41	-1.42	-0.18	0.05	-1.78	-2.38
11	Katni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Sidhi+Singrauli	0.44	2.25	-3.70	-0.11	0.00	6.52	1.47	-0.04	0.05
13	Bhopal	0.77	1.14	-3.77	-0.13	-0.14	-4.16	-0.98	2.69	0.49
14	Sagar	2.21	0.86	-3.51	0.26	-1.25	-0.93	-1.71	-1.26	-1.11
15	Damoh	1.52	0.49	-1.35	0.52	-0.54	-3.73	-2.90	-2.80	-2.94
16	Vidisha	0.22	0.74	-3.43	0.10	-1.25	17.30	-2.63	-1.02	-2.87
17	Raisen	1.21	0.32	-3.97	0.14	-0.50	2.14	-2.40	-2.10	-1.21
18	Sehore	2.53	1.40	-3.32	0.35	-2.28	11.53	-2.56	-3.23	-3.51
19	Narshingpur	0.83	0.65	-4.16	0.28	-0.77	-0.13	-2.18	-1.98	-2.14
20	Hoshangabad	-0.30	1.65	-4.19	-1.34	-2.21	-4.31	-2.41	-2.13	-2.92

S.No.	Districts	Forest	Area Under Non Agricultural Uses	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land under Misc Tree Crops & Grove not included in	Cultivated Waste Land	Fallow Land Other than Current	Current Fallow
21	Gwalior	2.29	-0.07	-1.94	-0.80	-1.59	-1.05	-0.04	2.53	-2.35
22	Shivpuri	1.86	2.03	-2.79	0.88	-2.22	-1.16	-1.81	-1.92	-2.49
23	Morena	-3.16	-1.63	-2.93	-1.43	-3.13	0.00	-2.80	-1.93	-2.47
24	Guna+Ashoknagar	2.18	0.50	-1.59	0.25	-1.09	-0.13	-0.46	-2.90	-3.24
25	Sheopur	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Bhind	2.57	0.89	-2.67	0.09	-1.30	2.02	0.35	-0.41	-0.84
27	Chhatarpur	11.86	-0.14	-4.31	1.07	-0.98	-1.84	-2.67	-2.51	1.23
28	Datia	3.96	-0.05	-1.13	2.63	-0.03	275.34	0.08	2.37	0.61
29	Tikamgarh	1.32	0.05	-1.58	0.52	-2.75	0.96	0.22	0.58	-0.88
30	Betul	1.39	0.07	-2.77	0.29	0.21	3.11	-0.71	-0.34	-3.08
31	Chhindwara	2.19	-0.04	-3.46	0.25	-0.23	2.99	1.70	-1.45	-2.27
32	Mandsaur	-1.90	-0.92	-3.36	-1.48	-3.29	0.13	-2.80	-2.04	-3.30
33	Neemuch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Ratlam	1.52	0.55	-1.81	0.26	-0.72	1.52	-2.10	-2.91	-3.40
35	Ujjain	-1.33	2.24	-3.79	0.30	-2.45	3.30	-2.17	-1.36	-1.54
36	Indore	1.01	1.66	-2.84	-0.14	-1.78	0.18	-2.07	3.48	3.53
37	Shajapur+Agar	0.80	1.20	-2.43	0.28	-1.73	2.50	-0.89	-2.14	-3.22
38	Rajgarh	3.09	0.66	-2.51	0.33	-1.69	13.74	0.33	-1.19	-1.85
39	Dewas	0.26	0.43	-3.17	0.48	-2.08	0.24	-1.67	-3.28	-4.03
40	Khandwa+Burhanpur	1.92	4.15	-3.48	-0.39	-0.17	-3.96	-3.70	-0.38	-0.94
41	Khargone	-1.73	-1.44	-2.04	-2.01	-2.47	9.88	-2.21	-1.28	-2.40
42	Barwani	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	Dhar	1.39	1.24	-0.99	0.01	-0.53	-0.45	-1.60	-1.87	-2.85
44	Harda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	Jhabua+Alirajpur	1.91	0.70	-1.45	0.04	-3.55	2.17	1.22	-0.89	-1.34
	Madhya Pradesh	**1.76**	**1.01**	**-2.58**	**0.20**	**-1.33**	**0.13**	**-0.76**	**-0.89**	**-1.25**

Source: Commissioner land record, Gwalior M.P.

Gwalior (-0.07%/year), Datia (-0.05%/year) and Chhindwara (-0.04%/year), in these districts it was found to be decreased during the period under study. The growth of forest was found to be increased across all the district of State except Morena (-3.16%/year), Mandsaur (-1.90%/year), Khargone (-1.73%/year), Jabalpur (-1.54%/year), Ujjain (-1.33%/year) Shahdol+Anuppur (-0.76%/year) and Hoshangabad (-0.30%/year). In these districts it was found to be decreased during the period under study.

Therefore in sum, the maximum and minimum growth in area under forest was found to be in Chattarpur (11.86% per year)and Morena (11.863.16 % per year)districts. The growth of area under non agricultural uses, net area sown, land under miscellanies tree crops and grove not included in net area was found to be ranged between -1.63 (Morena) to 4.15 (Khandwa + Burhanpur), -2.05 (Mandla) to 2.63 (Datia) and -4.35 (Panna) to 275.34 (Datia) per cent respectively. The growth of area under barren and uncultivable land, permanent pasture and other grazing land, current fallow, fallow land other than current fallow, cultivable waste land were found to be ranged between -4.31 (Chhatarpur) to 0.00 (Dindori, Umaria, Katni, Shyopur, Neemuch, Barwani and Harda), -3.55 (Jhabua + Alirajpur) to 0.21 (Betul), -4.03 (Dewas) to 3.53 (Indore), -3.28 (Dewas) to 3.48 (Indore) and -3.70 (Khandwa + Burhanpur) to 1.70 (Chhindwara) per cent per year respectively.

3.4 Determinants of Fallow Land

The multiple regression analysis was carried out to measures the change in share of total fallow land to cultivated land in response of monsoon rainfall and percentage of net irrigated area to net area sown with the help of following model. The data related to these are presented in Appendix 4.

$Y=a+b_1X_1+b_2X_2.....b_nX_n$

$Y=14.58+(-)0.00031X_1+(-)0.2687^{**}X_2$

$R^2=0.7811$

Where,

Y=share of total fallow land to total net sown area

X_1=Monsoon rainfall (mm)

X_2=percentage of net area irrigated

** = Highly significant at 1 % level of Probability

R^2 = Coefficient of multiple determination

It is observed from the above equation that with 1.00 per cent increase in net area irrigated to net area sown resulting highly significant decrease in share of total fallow land to total net sown area by 0.27 percent. The fitted model found to be good fit as it explained the selected independent variables explaining 78.11 per cent variability in the dependent variables.

Hence, it is clear from the above results that in most of the districts of Madhya Pradesh and Madhya Pradesh as a whole, due creation of irrigation facilities in the period under study, there was found remarkable decrease in the share of fallow land to net area sown in the state. The growth of net area sown less than the growth of area under non agricultural uses in all the district of Madhya Pradesh and State as a whole. This might be due to the fact that interference of real estate not only on net area sown but also as barren and uncultivated land, permanent pasture and other grazing, land under misc tree crops & grove not included in net area, area under cultivable waste land, fallow land other than current fallow during the period under study.

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CHAPTER-IV

EXTENT OF FALLOW LAND : MICRO LEVEL ANALYSIS

This Chapter is focused on the micro level analysis of extent of fallow land in different selected districts of Madhya Pradesh and included the profile of the selected districts viz. Bhopal (a district under lowest fallow land Category) and Mandla (a district under highest fallow land Category). The chapter also highlighted socio economics characteristics of various size of farmers, their sources of farm income, indebtedness, irrigation assets, land use pattern, extent of fallow land, cropping pattern and reasons for land leaved fallow.

4.1 Profile of Selected Districts

The Bhopal (a district under lowest fallow land Category) and Mandla (a district under highest fallow land Category) districts of the State has been considered for the study. The profile of these districts includes salient features, net irrigated area, irrigation potential, number and area of operational holdings and cropping pattern.

4.1.1 Salient Features of the Selected Districts

In salient features geographical situation, population parameters, land utilization pattern and irrigation potential of the selected districts i.e Mandla & Bhopal have been presented in table 4.1.

4.1.1.1. Mandla

It is observed from the data that Mandla district lies in between the latitude 22° 02' to 23° 22'N and longitude 80° 18' to 81° 50' E and situated 443 to 1000 meters from MSL covering 5800 sq KM area with population of 10.55 lakh and 182 person /KM population density and sex ratio of 1008 female over 1000 male. The total working population, cultivators and agricultural labours to total population were found to be 53.05, 26.61 and 56.98 per cent, respectively. Mandla district occupied 61.43 per cent of forest area to the total geographical area and had 5.64, 4.72 and 5.29 per cent of area not available for cultivation, other cultivable land excluding fallow land and fallow land respectively. Famers were found to cultivate only 22.92 per cent of geographical area with cropping and irrigation intensity of only 142.24 and 181.00 per cent per year respectively (Table 4.1).

4.1.1.2 Bhopal

Bhopal district lies in between the latitude 23° 04' to 23° 53'N and longitude 77° 12' to 77° 40' E and situated 472 to 630 meters from MSL covering 998.60 sq Km area with population of 123.71 lakh and 855 person /KM population density and sex ratio of 918 female over 1000 male. The total working population, cultivators and agricultural labours to total population were found to be 36.59, 8.46 and 12.13 per cent. Bhopal district occupied only 15.87 per cent of forest area to the total geographical area and had 13.57, 13.96 and 2.19 per cent of area not available for cultivation, other cultivable land excluding fallow land and fallow land, respectively. Famers were found to cultivate only 54.41 per cent of geographical area with cropping and irrigation intensity of only 152.05 and 116.00 percent per year respectively.

4.1.2. Net Irrigated Area

The net irrigated area (NIA) plays an important role in reducing the area under fallow land. Hence, percentage contribution of different source in net irrigated area in selected districts and in Madhya Pradesh were analysed for different periods viz. 1990-91, 2000-01, 2005-06, 2010-11 & 2015-16 and presented in table 4.2.

Table 4.1: Salient Features of Selected Districts

Particulars	Mandla	Bhopal
Geographical Situation		
Latitude	22°02' to 23°22' N	23°04' to 23°53' N
Longitude	80°18' to 81°50' E	77°12' to 77°40' E
Mean sea level (Meter)	443 to 1100	472 and 630
Rainfall (mm)	1245.80	998.60
Area (in sq Km)	5800.00	2772.00
Population Indicators (% to total population)		
Population (Lakh)	10.55	23.71
Male	49.79	52.13
Female	50.21	47.87
SC	4.59	15.08
ST	57.88	2.93
Urbanization Population (%)	12.34	80.74
Density/km	182.00	855.00
Literacy (%)	66.87	80.37
Sex Ratio (per 1000)	1008.00	918.00
Total workers (% to Total population)	53.05	36.59
Cultivators (% to Total Workers)	26.61	8.46
Agriculture Labour (% to Total Workers)	56.98	12.13
Land Utilization Pattern (percentage to Geographical Area)		
Forest	61.43	15.87
Not Available for cultivation	5.64	13.57
Other Uncultivated land Exc. Fallow land	4.72	13.96
Fallow Land	5.29	2.19
Net area sown	22.92	54.41
Cropping intensity (%)	142.24	152.05
Irrigation Statistics		
Net irrigated area (in Lakh ha)	0.21	0.89
Net Irrigated area to Net Area Sown (%)	9.49	58.86
Gross irrigated area (in Lakh ha)	0.38	1.03
Gross Irrigated area to Gross cropped area (%)	12.07	44.80
Irrigation Intensity (%)	181.00	116.00

It is observed from the data that canal followed by wells & tube wells, others and tanks were found to be major contributing sources of NIA in Mandla district, while wells & tube wells followed by others, canal and tanks were found to be contributing major source of NIA in Bhopal district of Madhya Pradesh in all the periods of the study. The percentage contributions of all these sources in NIA

Table 4.2: Source-Wise NIA in Selected Districts of M.P. during Different Periods of Time

Sources of irrigation	Years	Mandla	Bhopal
Wells & Tube Wells	1990-91	18.70	65.38
	2000-01	18.25	64.30
	2005-06	14.22	63.36
	2010-11	16.01	64.20
Canal	1990-91	69.82	13.39
	2000-01	70.47	6.02
	2005-06	77.45	6.43
	2010-11	74.11	6.58
Tanks	1990-91	0.09	0.55
	2000-01	0.00	1.21
	2005-06	0.00	1.35
	2010-11	0.34	2.21
Others	1990-91	11.40	20.69
	2000-01	11.28	28.47
	2005-06	8.33	28.86
	2010-11	9.54	27.01
Total	1990-91	100.00	100.00
	2000-01	100.00	100.00
	2005-06	100.00	100.00
	2010-11	100.00	100.00

were found to be increased over the period of time in all the selected districts except in other sources of irrigation. However, the contribution of wells and tube wells in NIA showed slight decrease 2010-11 (64.20%) as compared to 1990-91 (65.38%) in Bhopal and 18.70 % (1990-91) as compared to 16.01% (2010-11) Mandla district

4.1.3 Irrigation Potential

Irrigation potential in the selected district and in State as a whole was observed in the last 10 years i.e. for the year 2014-15 as compared to 2004-05 and presented in table 4.3. It is observed from the data that in last 10 years Madhya Pradesh average irrigation potential utilized (123.80%) was

Table 4.3: Average Irrigation Potential of the Selected Districts (In lakh ha)

Districts	Average Irrigation potential created in last 10 years	Average Irrigation potential utilized in last 10 years
Mandla	0.29 (152.63)	NA
Bhopal	0.27 (33.75)	NA
Madhya Pradesh	44.93 (73.26)	55.65 (123.86)

Figures in parenthesis shows percentage increase in year 2014-15 as compared to 2004-05

found to be more than the average irrigation potential created (73.26 %). Amongst the selected districts the per cent irrigation potential was created was found more in Mandla (152.63%) as compared to Bhopal (33.75%) district .

4.1.4 Number & Area under Operational Holdings

In Bhopal district the total number of land holdings has been found to be 71.06 thousand with the area of 146.06 thousand ha. Amongst different types of size holding the maximum number of holding was found to be related to small (33.48%) followed by marginal (30.13%), semi-medium (23.76%), medium (11.56%) and large(1.07%), while the area of these holdings was found to be more in medium (31.83%) followed by semi-medium (30.79%), small (21.98%) marginal (7.87%) and large (7.54%) holdings.(Table 4.4)

In Mandla district the total number of land holdings has been found to be 182.87 thousand with the area of 277.77 thousand ha. Amongst different types of size holding the maximum number of holding was found to be related to marginal (53.43%) followed by small (23.24%), semi-medium (14.96%), medium (7.69%) and large(0.67%), while the area of these holdings was found to be more in medium (29.31%) followed by semi-medium (27.20%), small (21.99%) marginal (15.61%) and large (5.88%) holdings. (Table4.4)

Table 4.4: Number and Area of Operational Holdings for All Social Groups (Area in "000" ha.)

Particulars	Bhopal		Mandla	
	Number (000)	Area	Number (000)	Area
Marginal	21.41 (30.13)	11.49 (7.87)	97.71 (53.43)	43.37 (15.61)
Small	23.79 (33.48)	32.10 (21.98)	42.50 (23.24)	61.09 (21.99)
Semi-medium	16.88 (23.76)	44.97 (30.79)	27.36 (14.96)	75.56 (27.20)
Medium	8.21 (11.56)	46.49 (31.83)	14.06 (7.69)	81.41 (29.31)
Large	0.76 (1.07)	11.01 (7.54)	1.23 (0.67)	16.34 (5.88)
Total	71.06 (100)	146.06 (100)	182.87 (100)	277.77 (100)

4.1.5 Cropping Pattern

The gross cropped area of Bhopal district was found to be 241899 ha in which 153068 ha of net area sown. In this gross cropped area farmers were found to be devoted their maximum area for cultivation of oilseed crops (42.85%) followed by cereals (40.20%) pulses (11.84%), fruits and vegetables (1.32%) condiments and spices (0.81%) and sugarcane (0.81%). In Oilseed soybean followed by ground nut was found be major crops cultivated by the farmers, while in cereals

wheat followed by paddy and maize was found to be major cereals crops of the district. In pulses gram and tur were major pulses of the district. (Table 4.5)

The gross cropped area of Mandla district was found to be 326520 ha in which

Table 4.5: Cropping Pattern of Selected Districts (ha.)

Particulars	Bhopal	Mandla
Paddy	2939 (3.02)	132383 (58.4)
Maize	2329 (2.39)	18075 (7.97)
Wheat	91982 (94.58)	47887 (21.13)
Other Cereals and Millets	0.0 (0.0)	28320 (12.49)
Total Cereals and Millets	**97250 /40.2/(100.00)**	**226665 /69.42/(100.00)**
Gram	22322 (77.97)	9323 (14.36)
Arhar (Tur)	1896 (6.62)	5880 (9.06)
Other Pulses	4411 (15.41)	49714 (76.58)
Total Pulses	**28629 /11.84/(100.00)**	**64917 /19.88/(100.00)**
Total Food Grains	**125879 /52.04/(100.00)**	**291582 /89.3/(100.00)**
Sugarcane	**203 (0.08)**	**3123 (0.96)**
Total Condiments and Spices	**1970 (0.81)**	**480 (0.15)**
Total Fruits and Vegetable	**3188 (1.32)**	**2210 (0.68)**
Total Food Crop	**131240 /54.25/(100.00)**	**297395 /91.08/(100.00)**
Groundnut	418 (0.4)	2 (0.01)
Sesame	97 (0.09)	1409 (4.87)
Rapeseed and Mustard	76 (0.07)	16007 (55.38)
Linseed	23 (0.02)	5337 (18.47)
Soybean	103051 (99.41)	435 (1.51)
Other Oilseeds	0.0 (0.0)	5713 (19.77)
Total Oilseeds	**103665 /42.85/(100.00)**	**28903 /8.85/(100.00)**
Other Non Food Crop	**6994 (2.89)**	**222 (0.07)**
Total Cropped Area	**241899 /100/**	**326520 /100/**
Area Sown More Than Once	**88831**	**101786**
Net Area Sown	**153068**	**224734**

Source: Source: Directorate of Statistics and Economics
Figure in parenthesis show percentage to their respondents group, while in slashes show percentage to total cropped area

224734 ha of net area sown. In this gross cropped area farmers were found to be devoted their maximum area for cultivation of cereals and millets crops (69.42%) followed by pulses (19.88%), oilseeds (8.85%), fruits and vegetables (0.68%) condiments and spices (0.15%) and sugarcane (0.96%). In oilseeds mustard followed soybean, sesame, was found major crops cultivated by the farmers, while in cereals paddy followed by other cereals and millets, wheat and maize was found to be major cereals crops of the district. In pulses gram and tur were found to be major pulses of the district. (Table 4.5)

4.2 Profile of Sample Households

The socio economic characteristics, farm income, indebtedness, irrigation assets of sample farmers of selected districts were considered in profile of the sample households.

4.2.1 Socio Economic Characteristics of Sample Households

The various socio-economic characteristics viz. age, education, household size, caste, religion, size of holding, income from all the sources, and value of assets of te sample households have examined for the study and presented in table 4.6

It is observed from the data that at over all level the average age of the household was found to be 54 years, he spent 7 years in education, while one or more members in HHs were found to spent 14 years for attaining higher education. An average size of family of HHs was found to be 7 members, constituted by 2 female, 2 male and 3 children, including 4 earning members.

As for as the caste composition is concerned all were Hindu and maximum of them belong to ST (45.83%) followed by OBC (36.67%), SC (11.67%) and General (5.83%) categories. The average size of land holding was found to be 8.90 acres with average income of Rs.90377/year.

As for as the different locations of the study is concerned, the Mandla district where proportionate area under fallow land was more as compared to Bhopal district differs with respect to average size of holding, annual income per HHs and caste composition, which shows that Mandla was dominated by ST (76.6%) while OBC (64.70%) in Bhopal. The average size of holding per household was found to be more in Mandla (10.49 acres) as compared to Bhopal (7.32 acres), while the income was found to be low in Mandla (Rs.66658/year) as compared to Bhopal (Rs.114095/year).

4.2.2 Farm Income

The composition of farmers income in different size of farms in the selected districts and at overall level was analyzed under different income head i.e. income from farm business, live stock, nonfarm enterprises, agricultural labour, casual labour, hiring out agricultural machinery, water, rent from leased out land, rent from houses, interest on deposits or lending to individuals, salaries, remittances, pensions and income from

Table 4.6: Socio-economic Characteristics of Sample HHSs in different Selected Districts (Average)

Demographic Characteristics	Mandla	Bhopal	Overall
Age of Household Head (Years)	56	52	54
Education of Household Head (Years)	6	7	7
Highest Education of the Members in the Household (Average years)	13	15	14
Household Size	6	6	6
Number of Females in the Households	3	3	3
Number of Children (0-14 years)	1	2	2
Number of Girl Children (0-14 years)	1	1	1
Number of Working Members in the Household	4	5	4
Caste (%)	100	100	100
SC (Schedule Cast)	0.0	23.3	11.67
ST (Schedule Tribes)	76.6	15.0	45.83
OBC (Other Backward Cast)	11.7	61.7	36.67
General	11.7	0.0	5.83
Religion (%)	100.0	100.0	100.0
Hindu	100	100	100
Christian	0	0	0
Muslim	0	0	0
Land Size (Acre)	10.5	7.5	8.9
Income of the Households	66658	114095	90377
Asset Value (in Rs)	73513	310203	191858

Sources: Survey Data

other sources. It is observed from the data that none of the farmer reported that he earned income from rent from houses, interest on deposits or lending to individuals, salaries, remittances, and income from other sources in both the selected districts of Madhya Pradesh. (Table 4.7)

At overall level an average farmer was found to earn Rs. 90377/farm in a year. Amongst all the components of sources of income he received maximum income from farm business (70.92%) followed by livestock (9.86%), pensions (5.55%), nonfarm (4.67%), agricultural labour (3.52%), and hiring out agricultural machinery (1.15%). As the size of holding increases, the income received per farm found to be increased from Rs. 53725 (Marginal) to Rs. 129960 (Large).

At different location of the study an average farmer earned more income where contribution of fallow land was found to be less in total land viz. Bhopal (Rs. 114095/Farm) as compared to where contribution of fallow land was found to be more in total land viz. Mandla (Rs. 66658/Farm). The income per farm was found to be double in case of Bhopal as compared to Mandla which clearly reflects the more developed agriculture in Bhopal than the Mandla district. This calls for the immediate action for revival of fallow land not only to safeguard the interest of farmer in farming but also utilized the cultivable land in the efficient manner.

Although, the total income per farm was found to be increase with increase the size of farm. Amongst all the components of farm income, farm business income followed by income from livestock, nonfarm enterprises and agricultural labour plays an important role as

Table 4.7: Composition of Total Income per Farm in Various Size of Farms under Different Selected Districts (Rs.)

Sources of Income	Marginal	Small	Medium	Large	Overall
	Mandla				
Farm Business Income	28250 (56.50)	39200 (76.12)	42476 (64.71)	50380 (64.23)	44275 (66.42)
Livestock	3750 (7.50)	3900 (7.57)	4214 (6.42)	6600 (8.41)	5125 (7.69)
Nonfarm Enterprise	0 (0.00)	1700 (3.30)	1809 (2.76)	5440 (6.94)	3183 (4.78)
Agricultural labour	10750 (21.50)	6550 (12.72)	6428 (9.79)	3680 (4.69)	5592 (8.39)
Casual labour	7250 (14.50)	0 (0.00)	5000 (7.62)	2740 (3.49)	2458 (3.69)
Hiring out agricultural machinery/ Water sale	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Pensions	0 (0.00)	150 (0.29)	5714 (8.71)	9600 (12.24)	6025 (9.04)
Total Income	50000 (100.00)	51500 (100.00)	65642 (100.00)	9600 (100.00)	66658 (100.00)
	Bhopal				
Farm Business Income	43750 (75.15)	54428 (73.00)	60944 (71.00)	154118 (75.00)	83916 (73.55)
Livestock	0 (0.00)	9547 (13.00)	12111 (14.00)	20206 (10.00)	12700 (11.13)
Nonfarm Enterprise	0 (0.00)	3095 (4.00)	4722 (5.00)	9753 (5.00)	5263 (4.61)
Agricultural labour	4950 (8.62)	3242 (4.00)	2556 (3.00)	0 (0.00)	2232 (1.96)
Casual labour	8750 (15.23)	4190 (6.00)	3778 (4.00)	2529 (1.00)	3900 (3.42)
Hiring out agricultural machinery/ Water sale	0 (0.00)	0 (0.00)	2222 (3.00)	5000 (2.00)	2083 (1.83)
Pensions	0 (0.00)	0 (0.00)	0 (0.00)	14118 (7.00)	4000 (3.51)
Total Income	57450 (100.00)	74505 (100.00)	86333 (100.00)	205724 (100.00)	114095 (100.0)
	Overall				
Farm Business Income	36000 (67.01)	49516 (73.81)	51000 (69.12)	92369 (71.07)	64096 (70.92)
Livestock	1875 (3.49)	7726 (11.52)	7859 (10.65)	12107 (9.32)	8913 (9.86)
Nonfarm Enterprise	0 (0.00)	2645 (3.94)	3154 (4.27)	7186 (5.53)	4223 (4.67)
Agricultural labor	7850 (14.61)	4310 (6.42)	4641 (6.29)	2190 (1.69)	3912 (4.33)
Casual labor	8000 (14.89)	2839 (4.23)	3026 (4.10)	2655 (2.04)	3179 (3.52)
Hiring out agricultural machinery/ Water sale	0 (0.00)	0 (0.00)	1026 (1.39)	2024 (1.56)	1042 (1.15)
Pensions	0 (0.00)	48(0.07)	3077 (4.17)	11429 (8.79)	5013 (5.55)
Total income	53725 (100.00)	67084 (100.00)	73783 (100.00)	129960 (100.00)	90377 (100.00)

Sources: Survey Data

compared to other components of farm income in both the situation.

4.2.3 Indebtedness

Indebtedness in terms of total outstanding among different categories of farmers in the selected districts (Mandla & Bhopal) and at overall level was worked out and presented in table 4.8.

Table 4.8: Indebtedness in Different Locations of the Study at Various Size of Farms in Different Selected Districts (Rs./farm)

Farm-Size Categories	Number of Farmers with Outstanding Loans	Amount Outstanding	Share from Institutional Source	Share from non-Institutional Source	Share used for Productive Purpose
Mandla					
Marginal	0	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Small	1	1120 (100)	635 (56.70)	485 (43.30)	461 (41.16)
Medium	3	2952 (100)	2333 (79.03)	619 (20.97)	1679 (56.88)
Large	1	22000 (100)	18530 (84.23)	3470 (15.77)	12526 (56.94)
Total	5	26072 (100)	21498 (82.46)	4574 (17.54)	15693 (60.19)
Bhopal					
Marginal	1	27500 (100)	21250 (77.27)	6250 (22.73)	15117 (54.97)
Small	8	52809 (100)	44238 (83.77)	8571 (16.23)	29193 (55.28)
Medium	11	84722 (100)	72889 (86.03)	11833 (13.97)	48703 (57.49)
Large	10	241765 (100)	194706 (80.54)	47059 (19.46)	122394 (50.63)
Total	30	406796 (100)	333083 (81.88)	73713 (18.12)	215407 (52.95)
Overall					
Marginal	1	13750 (100)	10625 (77.27)	3125 (22.73)	7559 (54.97)
Small	9	26965 (100)	22437 (83.21)	4528 (16.79)	14827 (54.99)
Medium	14	43837 (100)	37611 (85.80)	6226 (14.20)	25191 (57.47)
Large	11	131883 (100)	106618 (80.84)	25265 (19.16)	67460 (51.15)
Total	35	216434 (100)	177291 (81.91)	39144 (18.09)	115550 (53.39)

Sources: Survey Data

It is observed from the data that at overall level an average farmer was found to have Rs. 108217.00 per farm of outstanding loan in which share of institutional (81.91%) was found more as compared to non institutional (18.08%) sources. As the size of holding increase the total outstanding increases from Rs. 27500 (Marginal) to 263765 (Large) per farm. Out of the total 120 HHs only 35 (29.17%) were found to have outstanding loan and found more in Bhopal (30) as compared to Mandla (5) district.

4.2.4 Irrigation Assets

The details of owned irrigation assets and procured on rental basis in different locations of the study and at overall level were analysed and presented in table 4.9.

Table 4.9: Details of Irrigation Assets in Different Selected Districts

Assets	Number of People with Ownership	Average Price (Rs./Acre)	Number of People Renting	Average Rental Rates (Rs./acre)
Mandla				
Tube well/bore well	0	0	1	1123
Diesel Pump	9	565	3	895
Electric Pump	10	619	6	917
Submersibles	1	492	1	788
Drip Irrigation	0	0	0	0
Bhopal				
Tube well/bore well	18	761	1	1220
Diesel Pump	12	583	6	910
Electric Pump	16	674	3	1062
Submersibles	11	722	1	834
Drip Irrigation	0	0	0	0
Overall				
Tube well/bore well	18	761	2	1172
Diesel Pump	21	574	9	903
Electric Pump	26	647	9	990
Submersibles	12	607	2	811
Drip Irrigation	0	0	0	0

Sources: Survey Data

It is observed from the data that at overall level maximum number of farmers (64.17%) have their owned irrigation assets. The tendency of hiring irrigation assets from outside was not found so common, only 18.33 per cent of the farmers used to hire irrigation assets on rental basis. Out of the total HHs only 18 farmers have their owned tube well/bore wells. 26, 21 and 13 number of HHs was found to have electric pump, diesel pump and submersible pump respectively. None of the farmer was found to use drip irrigation in the

Table 4.10: Information of Land Used for Cultivation in Different Selected Districts (Average/farm)

Particulars	Marginal	Small	Medium	Large	Overall
Mandla					
No. of Plots	2	2	4	5	3
Land Owned (Acres)	1.25	3.59	6.47	17.30	7.15
Land Leased in (Acres)	0	0	0.08	0.44	0.13
Land Leased -out (Acres)	0.00	0.00	0.00	0.25	0.06
Size of Operational holding (Acres)	1.25	3.59	6.55	17.49	7.22
Irrigated Area (Acres)	0.14	0.48	0.60	3.44	1.16
No. of Plots Fallow	1	1	2	2	1.50
area under fallow (acres)	0.33	1.56	3.33	8.44	3.41
Area under food grains	0.87	1.94	2.95	8.74	3.62
Area under Fruits and veg.	0.05	0.09	0.27	0.31	0.18
Area under trees	0.00	0.00	0.00	0.00	0.00
No. of plots uncultivable land	0.00	0.00	0.00	0.00	0.00
Area under uncultivable land	0.00	0.00	0.00	0.00	0.00
Bhopal					
No. of Plots	2	2	3	4	3
Land Owned (Acres)	1.75	3.53	5.52	15.18	6.50
Land Leased in (Acres)	0.00	0.07	0.34	0.46	0.22
Land Leased -out (Acres)	0.00	0.00	0.00	0.21	0.05
Size of Operational holding (Acres)	1.75	3.60	5.86	15.43	6.66
Irrigated Area (Acres)	1.00	2.29	2.98	10.90	4.29
No. of Plots Fallow	1	1	1	1	1
Area under fallow (acres)	0.02	0.70	1.13	3.12	1.24
Area under food grains	1.43	2.69	4.61	12.04	5.19
Area under Fruits and veg.	0.30	0.21	0.13	0.27	0.23
Area under trees	0.00	0.00	0.00	0.00	0.00
No. of plots uncultivable land	0.00	0.00	0.00	0.00	0.00
Area under uncultivable land	0.00	0.00	0.00	0.00	0.00
Overall					
No. of Plots	2	2	4	5	3
Land Owned (Acres)	1.50	3.56	6.00	16.24	6.82
Land Leased in (Acres)	0.00	0.04	0.21	0.45	0.17
Land Leased -out (Acres)	0.00	0.00	0.00	0.23	0.06
Size of Operational holding (Acres)	1.50	3.60	6.20	16.46	6.94
Irrigated Area (Acres)	0.57	1.38	1.79	7.17	2.73
No. of Plots Fallow	1	1	2	2	1
Area under fallow (acres)	0.18	1.13	2.23	5.78	2.33
Area under food grains	1.15	2.31	3.78	10.39	4.41
Area under Fruits and veg.	0.18	0.15	0.20	0.29	0.20
Area under trees	0.00	0.00	0.00	0.00	0.00
No. of plots uncultivable land	0.00	0.00	0.00	0.00	0.00
Area under uncultivable land	0.00	0.00	0.00	0.00	0.00

Sources: Survey Data

area under study. It was found that providing irrigation to the crops using own assets is cheaper than on rental basis which varies from Rs. 574 (diesel pump) to 761 (tube/bore well) per acre in case of own assets, while Rs. 811 (submersible pump) to 1172 (tube/bore well) per acre on rental basis. The similar finding was found in the different location of the study however; charges of irrigation through own assets as well as on rental basis were found to be higher in Bhopal as compared to Mandla across various assets used for irrigation.

4.2.5 Land Use Pattern

The information regarding land use pattern of selected HHs according to their size of farms in different locations of the study and at overall level is presented in Table 4.10.

It is observed from the data that at overall level an average HHs had 3 numbers of plots with 6.94 acres of operational holding, out of which 1 plot and 2.33 acres of land was found fallow. Out of total operational holding 2.73, 4.41 and 0.20 acres were found under irrigation, cultivation of food grains and vegetables respectively. It was also observed that none of the farmer was found to have area under trees and uncultivated land. As the size of farm increases the area under leased in, leased out, irrigation, fallow land, food grains, fruits and vegetables was also found to be increased.

These finding are found to be similar amongst the different locations of the study. However, the size of operational holding was found to be more in Mandla (7.22 acres) as compared to Bhopal (6.66 acres), while area under irrigation and food grains was found to be more in Bhopal (4.29 and 5.19 acres) as compared to Mandla (1.16 and 3.62 acres).

The area occupied under food grain and fruits and vegetables out of total irrigated area in selected districts at overall level across various sizes of holdings is presented in table 4.11.

It is observed from the data that at overall level the total irrigated area were found to be 2.73 acres which accounts for 36.90 per cent, out of which 53.86 and 46.14 per cent area was found to be covered under food grains and fruits/vegetables. In case of Mandla the area under irrigation was 1.16 acres accounting 13.28 per cent and distributed among food grains (62.29%) and fruits/vegetables (37.71%), while in Bhopal it was found to be 45.43 and 54.57 per cent with 4.29 acres of area under irrigation.

4.3 Extent of Fallow Land

The extent of fallow land was observed across various sizes of holdings as well caste composition in the area under study.

4.3.1 According to Size of Farm

The extent of fallow land according to different size of farm in different locations of the study is presented in Table 4.12.

It is observed from the data that extent of fallow land in the selected districts at over all level was found to be more under current fallow (2.33 acres) as compared to permanent fallow (0.06 acres), which accounts to be 28.62 and 0.52 per cent to total operational holding. It was also found that as the size of holding increases the area under fallow land also increases (Table 4.12).

Table 4.11: Land Irrigation and others Related Parameters in Different Selected Districts (acre/farm)

Particulars	Marginal	Small	Medium	Large	Overall
Mandla					
Irrigated Area	0.14	0.48	0.60	3.44	1.16
% of irrigated Area	11.00	13.29	9.17	19.67	13.28
Irrigated Area under food grains	0.09	0.27	0.36	2.31	0.76
% of irrigated Area	65.45	56.57	60.00	67.15	62.29
Irrigated Area under fruits and vegetables	0.05	0.21	0.24	1.13	0.41
% of irrigated Area	34.55	43.43	40.00	32.85	37.71
Bhopal					
irrigated Area	1.00	2.29	2.98	10.90	4.29
% of irrigated Area	57.14	63.48	50.77	70.67	60.52
Irrigated Area under food grains	0.43	1.09	1.06	6.04	2.16
% of irrigated Area	43.00	47.70	35.63	55.39	45.43
Irrigated Area under fruits and vegetables	0.57	1.20	1.92	4.86	2.14
% of irrigated Area	57.00	52.30	64.37	44.61	54.57
Overall					
irrigated Area	0.57	1.38	1.79	7.17	2.73
% of irrigated Area	34.07	38.39	29.97	45.17	36.90
Irrigated Area under food grains	0.26	0.68	0.71	4.18	1.46
% of irrigated Area	54.23	52.13	47.82	61.27	53.86
Irrigated Area under fruits and vegetables	0.31	0.70	1.08	3.00	1.27
% of irrigated Area	45.77	47.87	52.18	38.73	46.14

Sources: Survey Data

Table 4.12: Extent of Fallow land According to Different Size of Farm

Particulars	Marginal	Small	Medium	Large	Overall
Mandla					
Current Fallow Land (Acres)	0.33	1.56	3.33	8.44	3.41
Percentage of Total Land left Current Fallow (%)	26.40	43.56	50.80	48.27	42.26
Permanent Fallow Land (Acres)	0.00	0.03	0.06	0.37	0.11
Percentage of Total Land left Permanent Fallow (%)	0.00	0.70	0.92	2.14	0.94
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Percentage of Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00
Bhopal					
Current Fallow Land (Acres)	0.02	0.70	1.13	3.12	1.24
Percentage of Total Land left Current Fallow (%)	1.14	19.38	19.20	20.21	14.98
Permanent Fallow Land (Acres)	0.00	0.00	0.00	0.06	0.01
Percentage of Total Land left Permanent Fallow (%)	0.00	0.00	0.00	0.38	0.10
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Percentage of Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00
Overall					
Current Fallow Land (Acres)	0.18	1.13	2.23	5.78	2.33
Percentage of Total Land left Current Fallow (%)	13.77	31.47	35.00	34.24	28.62
Permanent Fallow Land (Acres)	0.00	0.01	0.03	0.22	0.06
Percentage of Total Land left Permanent Fallow (%)	0.00	0.35	0.46	1.26	0.52
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Percentage of Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00

Sources: Survey Data

4.3.2 According to Caste Composition

According to caste composition, the sample HHs are classified into SC, ST, OBC and General Categories and presented in Table 4.13. It is observed from the table that at overall level 24.12 and 1.49 per cent of total land left as current and permanent fallow by the sample farmers. The majority of OBC (34.73%) were found to possess fallow land as compared to ST (30.39%), General (27.01%) and ST (4.34%).

Table 4.13: Extent of Fallow Caste Categories-Wise (Average)

Particulars	SC	ST	OBC	General	All
Mandla					
Current Fallow Land (Acres)	0.00	7.10	3.55	3.00	3.41
Total Land left Current Fallow (%)	0.00	87.89	43.95	37.19	42.26
Fallow Land (Acres)	0.00	0.24	0.12	0.10	0.11
Total Land left Permanent Fallow (%)	0.00	1.95	0.97	0.82	0.94
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00
Bhopal					
Current Fallow Land (Acres)	0.53	0.64	2.69	1.99	1.46
Total Land left Current Fallow (%)	7.04	8.60	35.97	26.59	19.55
Fallow Land (Acres)	0.01	0.01	0.06	0.04	0.03
Total Land left Permanent Fallow (%)	0.12	0.15	0.61	0.45	0.33
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00
Overall					
Current Fallow Land (Acres)	0.39	2.72	3.11	2.42	2.16
Total Land left Current Fallow (%)	4.34	30.39	34.73	27.01	24.12
Fallow Land (Acres)	1.44	10.08	11.52	8.96	8.00
Total Land left Permanent Fallow (%)	0.27	1.88	2.15	1.67	1.49
Pasture Land (Acres)	0.00	0.00	0.00	0.00	0.00
Total Land left as Pastures (%)	0.00	0.00	0.00	0.00	0.00

Sources: Survey Data

Amongst the different locations of the study ST (87.89%) were found to be possess more fallow land as compared to OBC (43.95%) and General (37.19%) in Mandla district, while in Bhopal OBC (35.97%) followed by General (26.59%), ST (8.60%) and SC (7.04%) have maximum percentage of current fallow in total land.

4.4 Cropping Pattern

The crops which were found to be cultivated by the sample farmers during the year in different season in both the locations and at overall level were analysed for the study and presented in Table 4.14.

It is observed from the data that at over all level kharif (43.90%) was found to be major season of cultivation of crops as compared to rabi (39.24%) and summer (16.86%) season (Fig. 4.1). In kharif season soybean (39.05%) followed paddy(18.87%) maize (15.84%), tur (13.02%) were found to be major crops grown

Table 4.14: Cropping Pattern of Madhya Pradesh and their Selected District (Acre/farm)

Particulars	Mandla	Bhopal	Overall
Kharif			
Paddy	1.37 (36.05)	0.37 (6.83)	0.87 (18.87)
Soybean	0.38 (10)	3.22 (59.41)	1.8 (39.05)
Maize	0.62 (16.32)	0.84 (15.5)	0.73 (15.84)
Bajra	0.29 (7.63)	0.12 (2.21)	0.21 (4.45)
Kodo	0.09 (2.37)	0 (0)	0.05 (0.98)
Kutki	0.13 (3.42)	0 (0)	0.07 (1.41)
Mixed crops (Tur)	0.73 (19.21)	0.47 (8.67)	0.6 (13.02)
Vegetables	0.18 (4.74)	0.23 (4.24)	0.21 (4.45)
Others	0.01 (0.26)	0.17 (3.14)	0.09 (1.95)
All Kharif	3.8 (100)	5.42 (100)	4.61 (100)
Rabi			
Wheat	1.08 (36.24)	3.7 (70.34)	2.39 (58.01)
Gram	0.81 (27.18)	0.91 (17.3)	0.86 (20.87)
Lentil	0 (0)	0.04 (0.76)	0.02 (0.49)
Mustard	0.66 (22.15)	0.07 (1.33)	0.37 (8.86)
Mixed crops	0.22 (7.38)	0.39 (7.41)	0.30 5(7.4)
Vegetables	0.1 (3.36)	0.12 (2.28)	0.11 (2.67)
Others	0.11 (3.69)	0.03 (0.57)	0.07 (1.7)
All Rabi	2.98 (100)	5.26 (100)	4.12 (100)
Zaid (Summer)			
Urd+Moong	0.89 (52.05)	0.74 (43.27)	0.815 (47.66)
Vegetables	0.82 (47.95)	1.08 (63.16)	0.95 (55.56)
Total Summer	1.71 (100)	1.82 (100)	1.765 (100)
Gross Cropped Area	8.49	12.50	10.50

Figure in parenthesis show percentage to their respondent group i.e. Kharif and Summer season

by an average HHs, while in rabi wheat (58.01%) followed by gram (20.87%) and mustard (8.86%) were found to be major crop in the area under study. In summer vegetables (55.56%) and urd/moong (47.66%) were found to be grown by the sample HHs.

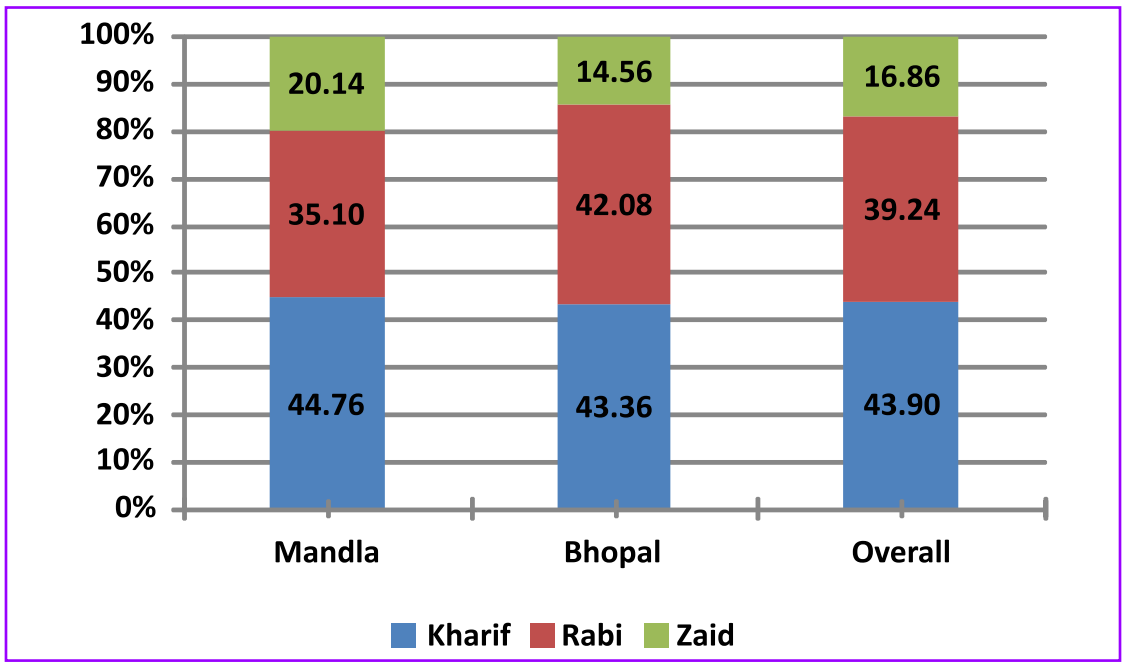

Fig. 4.1: Percentage of Gross Cropped Area in different Season

The cropping pattern of both the locations was found be almost similar to overall level. However, paddy followed by maize, soybean, tur and bajra in Mandla & Soybean followed by maize, paddy and tur in Bhopal were found to be major kharif crops and Wheat followed by gram and mustard in Mandla and Wheat followed by gram were found to be major rabi crops grown by sample HHs.

4.5 Reasons for Land Leaved Fallow

The reasons for land leaved fallow were also observed according to rank (1-5, where 5 is most important) given by the sample respondents with their Standard Deviation and Coefficient of Variance in different locations of Madhya Pradesh.

4.5.1 Mandla

It is observed from the data that the most important reasons for leaving land fallow as reported by the majority of the sample respondents in Mandla district were found to be uncertainty in rainfall, lack of assured irrigation, close mountain/forest and land is not suitable for cultivation. (Table 4.15).

Whereas, the important reasons were found to be left land for crop rotation, issues related to land entitlement, not able to recover costs in farming/ low profit, land set apart for conversion into non-agricultural purposes, low fertility of soil & lack of Interest in cultivate in unfavourable season, weed infected, to conserve moisture & prepared land for next

Table 4.15: Reasons for Land Leaved Fallow in Mandla

Particulars	Average*	SD	CV
Land is not suitable for cultivation	4	1.35	34.10
Land set apart for conversion into non-agricultural purposes	3	0.93	34.98
Not able to recover costs in farming/ Low profit	3	1.08	34.97
Lack of assured irrigation	4	1.12	26.94
Moved into other occupations which are more profitable	2	1.15	46.47
Providing grazing lands for the cattle	3	1.42	49.15
To Conserve moisture & prepared land for next crops	3	1.17	36.18
Labour is not available for cultivation	3	1.49	53.80
High yield volatility in the previous years	3	1.22	43.92
Lack of assured market for the produce	3	1.04	40.88
High price volatility in the previous years	3	1.68	60.30
High production cost/lack of resources	3	1.28	41.50
Lack of agricultural extension	3	1.35	52.77
No access to credit	3	1.77	56.69
Surface runoff	3	1.83	70.57
Lack of watershed or similar efforts which could recharge ground water	3	2.11	64.99
Water logging	3	2.01	73.96
Uncertainty in rainfall	4	1.10	25.29
Issues related to land entitlement	3	0.91	34.55
Lack of expertise/experience in cultivation	3	1.07	37.77
Shocks in personal life (like accident or death of a member)	3	1.10	42.10
Low fertility of Soil & lack of Interest in cultivate in unfavourable season	3	1.07	35.19
Lack of plough/tractor/Farm Yard Manure (FYM)	3	1.08	39.20
Weed infected	3	0.94	35.65
Close mountain/forest	4	1.17	32.34
Left land for crop rotation	3	1.04	31.41

Survey Data *Average ranking of the sample HHs from 1 to 5; 1 is not a major reason but 5 is a major reason

crops, lack of expertise/experience in cultivation, lack of plough/tractor/farm yard manure (FYM), lack of assured market for the produce, high production cost/lack of resources, shocks in personal life (like accident or death of a member), high yield volatility in the previous years, providing grazing lands for the cattle, lack of agricultural extension, labour is not available for cultivation, no access to credit, high price volatility in the previous years, lack of watershed or similar efforts which could recharge ground water, surface runoff and water logging. The least important reason to leaved land fallow in Mandla districts was found to be moved into other occupations which are more profitable.

4.5.2 Bhopal

The most important reasons for leaving land fallow as reported by the majority of the sample respondents in Bhopal district

Table 4.16: Reasons for Land Leaved Fallow in Bhopal

Particulars	Average*	SD	CV
Land is not suitable for cultivation	2	1.16	61.06
Land set apart for conversion into non-agricultural purposes	2	0.72	37.98
Not able to recover costs in farming/ Low profit	2	0.95	43.40
Lack of assured irrigation	4	1.13	25.23
Moved into other occupations which are more profitable	2	0.68	38.00
Providing grazing lands for the cattle	2	0.87	36.31
To Conserve moisture & prepared land for next crops	3	1.32	39.83
Labour is not available for cultivation	2	0.87	41.73
High yield volatility in the previous years	3	1.35	46.96
Lack of assured market for the produce	3	1.16	45.97
High price volatility in the previous years	3	1.06	41.44
High production cost/lack of resources	3	1.07	42.63
Lack of agricultural extension	2	0.92	38.51
No access to credit	2	1.06	52.88
Surface runoff	2	1.03	44.60
Lack of watershed or similar efforts which could recharge ground water	3	1.54	45.93
Water logging	2	1.16	57.24
Uncertainty in rainfall	4	1.28	29.81
Issues related to land entitlement	2	0.86	46.49
Lack of expertise/experience in cultivation	2	0.77	31.37
Shocks in personal life (like accident or death of a member)	2	1.06	44.20
Low fertility of Soil & lack of Interest in cultivate in unfavourable season	3	1.07	37.83
Lack of plough/tractor/Farm Yard Manure (FYM)	3	1.04	39.53
Weed infected	3	1.27	50.07
Close mountain/forest	3	1.44	56.98
Left land for crop rotation	3	1.09	32.34

Survey Data *Average ranking of the sample HHs from 1 to 5; 1 is not a major reason but 5 is a major reason

were found to be lack of assured irrigation and uncertainty in rainfall. (Table 4.16).

Whereas, the important reasons were found to be left land for crop rotation, low fertility of soil & lack of Interest in cultivate in unfavourable season, lack of plough/ tractor/farm yard manure (FYM), to conserve moisture & prepared land for next crops, high price volatility in the previous years, high production cost/lack of resources, lack of watershed or similar efforts which could recharge ground water, lack of assured market for the produce, high yield volatility in the previous years, weed infected and close mountain/forest. The least important reasons were found to be lack of expertise/experience in cultivation, providing grazing lands for the cattle, land set apart for conversion into non-agricultural purposes, moved into other occupations which are more profitable, lack of

agricultural extension, labour is not available for cultivation, not able to recover costs in farming/ low profit, shocks in personal life (like accident or death of a member), surface runoff, issues related to land entitlement, no access to credit, water logging, and land is not suitable for cultivation.

4.5.3 Overall

The most important reasons for leaving land fallow as reported by the majority of the sample respondents at overall level were found to be lack of assured irrigation and uncertainty in rainfall. (Table 4.17)

Table 4.17: Reasons for Land Leaved Fallow at Overall Level

Particulars	Average*	SD	CV
Land is not suitable for cultivation	3	1.26	47.58
Land set apart for conversion into non -agricultural purposes	2	0.82	36.48
Not able to recover costs in farming/ Low profit	3	1.01	39.19
Lack of assured irrigation	4	1.12	26.08
Moved into other occupations which are more profitable	2	0.92	42.24
Providing grazing lands for the cattle	3	1.14	42.73
To Conserve moisture & prepared land for next crops	3	1.25	38.01
Labour is not available for cultivation	2	1.18	47.76
High yield volatility in the previous years	3	1.28	45.44
Lack of assured market for the produce	3	1.10	43.43
High price volatility in the previous years	3	1.37	50.87
High production cost/lack of resources	3	1.17	42.06
Lack of agricultural extension	2	1.13	45.64
No access to credit	3	1.41	54.79
Surface runoff	2	1.43	57.58
Lack of watershed or similar efforts which could recharge ground water	3	1.83	55.46
Water logging	2	1.59	65.60
Uncertainty in rainfall	4	1.19	27.55
Issues related to land entitlement	2	0.88	40.52
Lack of expertise/experience in cultivation	3	0.92	34.57
Shocks in personal life (like accident or death of a member)	3	1.08	43.15
Low fertility of Soil & lack of Interest in cultivate in unfavourable season	3	1.07	36.51
Lack of plough/tractor/Farm Yard Manure (FYM)	3	1.06	39.36
Weed infected	3	1.11	42.86
Close mountain/forest	3	1.31	44.66
Left land for crop rotation	3	1.06	31.87

Survey Data *Average ranking of the sample HHs from 1 to 5; 1 is not a major reason but 5 is a major reason

Whereas, the important reasons were found to be left land for crop rotation, lack of expertise/experience in cultivation, low fertility of soil & lack of Interest in cultivate in unfavourable season, to conserve moisture & prepared land for next crops, not able to recover costs in farming/ low profit, lack of plough/tractor/farm yard manure (FYM), high production cost/lack of resources, providing grazing lands for the cattle, weed infected,

shocks in personal life (like accident or death of a member), lack of assured market for the produce, close mountain/forest high yield volatility in the previous years, land is not suitable for cultivation, high price volatility in the previous years, no access to credit, lack of watershed or similar efforts which could recharge ground water. The least important reasons were found to be land set apart for conversion into non-agricultural purposes, issues related to land entitlement, moved into other occupations which are more profitable, lack of agricultural extension, labour is not available for cultivation, surface runoff and water logging.

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CHAPTER-V

CONCLUSIONS & POLICY IMPLICATION

This chapter deals with the conclusions and policy implication made from the data analysis and discussion presented in the previous chapters. The following conclusions and policy implication are made from the study.

5.1 Conclusions

The following conclusions are made from the finding of the study:

1. Barren land, uncultivated land, permanent pastures, land under miscellaneous tree crops, grooves and cultivable waste recorded significant negative growth but there was a substantial growth in the current fallow, which was the consequence of year to year rainfall variations. There was an inverse relationship between rainfall and current fallow. It was also found that there is sharp increase in the land put into non-agricultural uses due to increasing rate of urbanization and industrialization. Availability of labour is an emerging factor in determining fallow land. The positive association between fallow land and proportion of main female cultivators, indicating gender biased labour markets. availability of tube well and well irrigation with electricity; higher monsoon and post-monsoonal rainfall; increased market frequency; availability of power supply for agriculture; density of community workers (proxy for technical assistance and incentives for agriculture); availability of communication facility (e.g., bus, trains; proxy for connectivity to markets); and availability of agricultural credit institutions, and higher average income per capita (both indicating access to capital and ability to invest). Knowledge to reclaim land is an important factor to reduce fallow land.

2. It is a matter of great achievement that area under fallow land other than current fallow and current fallow was not found to be increased in most of the districts of the State, With the result of this the net area sown and area under non agricultural uses was found to be increased significantly in at most all the district of Madhya Pradesh.

3. Most of the districts of Madhya Pradesh and Madhya Pradesh as a whole, due creation of irrigation facilities in the period under study, there was found remarkable decrease in the share of fallow land to net area sown in the state. The growth of net area sown less than the growth of area

under non agricultural uses in all the district of Madhya Pradesh and State as a whole. This might be due to the fact that interference of real estate not only on net area sown but also as barren and uncultivated land, permanent pasture and other grazing, Land under misc Tree crops & Grove not included in net Area, net included in net area, area under cultivable west land, fallow land other than current fallow during the period under study.

4. In Madhya Pradesh 73.26 per cent irrigation potential was created by the Govt. of Madhya Pradesh during the last 10 year which was found more in Mandla (152.63%) as compared to Bhopal (33.75%) district. The 123.86 per cent irrigation potential was found to be utilized in the State.

5. As far as different locations of the study are concern, the Mandla district where proportionate area under fallow land was more as compared to Bhopal district differs with respect to average size of holding, annual income per HHs and caste composition, which shows that Mandla was dominated by ST (76.6%) while OBC (64.70%) in Bhopal. The average size of holding per household was found to be more in Mandla (10.49 acres) as compared to Bhopal (7.32 acres), while the income was found to be low in Mandla (Rs.66658/year) as compared to Bhopal (Rs.114095/year).

6. At the different location of the study an average farmer earned more income where contribution of fallow land was found to be less in total land viz. Bhopal (Rs. 114095/Farm) as compared to where contribution of fallow land was found to be more in total land viz. Mandla (Rs. 66658/Farm).

7. The total income per farm was found to be increased with the size of farms. Amongst all the components of farm income, farm business income followed by income from live stock, nonfarm enterprises and agricultural labour plays an important role as compared to other components of farm income in both the situation.

8. An average farmer was found to have Rs. 108217.00 per farm of outstanding loan in which share of institutional (81.91%) was found more as compared to non institutional (18.08%) sources. As the size of holding increase the total outstanding increases from Rs. 27500 (Marginal) to 263765 (Large) per farm. Out of the total 120 HHs only 35 (29.17%) were found to have

outstanding loan and found more in Bhopal (30) as compared to Mandla (5) district.

9. The maximum numbers of farmers > 60% have their owned irrigation assets. The tendency of hiring irrigation assets from outside was not found so common. It was found that providing irrigation to the crops using own assets is cheaper than on rental basis. None of the farmer was found to be use drip irrigation in the area under study.

10. As the size of farm increases the area under leased in, leased out, irrigation, fallow land, food grains, fruits and vegetables was found to be increased. However, the size of operational holding was found to be more in Mandla (7.22 acres) as compared to Bhopal (6.66 acres), while area under irrigation and food grains was found to be more in Bhopal as compared to Mandla.

11. The current fallow (2.33 acres) was found to be more as compared to permanent fallow (0.06 acres), as the size of holding increases the area under fallow land also increases cast not play it role as show of fallow land in total land in the different locations of the study ST (87.89%) possessed more fallow land as compared to OBC (43.95%) and General (37.19%) in Mandla district, while in Bhopal OBC (35.97%) followed by General (26.59%), ST (8.60%) and SC (7.04%) have maximum percentage of current fallow in total land.

12. At over all level kharif (43.93%) was found to be major season of cultivation of crops as compared to rabi (39.26%) and summer (16.82%) season. In kharif season soybean (39.05%) followed by paddy(18.87%) maize (15.84%), tur (13.02%) were found to be major crops grown by an average HHs, while wheat (58.01%) followed gram (20.87%) and mustard (8.86%) in rabi season. In summer vegetables (55.56%) and urd/moong (47.66%) were found to be grown by the sample HHs. The cropping pattern of both the locations was found similar as in overall level. However, paddy followed by maize, soybean, tur and bajra in Mandla & Soybean followed by maize, paddy and tur in Bhopal were found to be major kharif crops and Wheat followed by gram/mustard in Mandla and Wheat followed by gram in Bhopal were found to be major rabi crops grown by sample HHs.

13. On the basis of ranking by the respondents and coefficient of variance the reason of land kept fallow was divided into most important, important and least important

a) The most important reasons for leaving land fallow were found to be lack of assured irrigation and uncertainty in rainfall.

b) The important reasons were found to be left land for crop rotation, lack of expertise/experience in cultivation, low fertility of soil & lack of Interest in cultivate in unfavourable season, to conserve moisture & prepared land for next crops, not able to recover costs in farming/ low profit, lack of plough/tractor/farm yard manure (FYM), high production cost/lack of resources, providing grazing lands for the cattle, weed infected, shocks in personal life (like accident or death of a member), lack of assured market for the produce, close mountain/forest high yield volatility in the previous years, land is not suitable for cultivation, high price volatility in the previous years, no access to credit, lack of watershed or similar efforts which could recharge ground water.

c) The least important reason for leaving land fallow were found to be land set apart for conversion into non-agricultural purposes, issues related to land entitlement, moved into other occupations which are more profitable, lack of agricultural extension, labour is not available for cultivation, surface runoff and water logging.

Box 5.1 Land Use According to their Capabilities

Classes that grow crops
• Class I- Perfect land for growing crops • Class II-Have some limitations that reduce the choice of plants and require moderate conservation practices • Class III-Same as II but require special and intensive conservation practices • Class IV -very severe limitations that restrict plant choice and require careful management
Classes that do not grow crops
• Class V- cannot be tilled, therefore it's used for pasture, timber or wildlife. • Class VI- Same as V • Class VII- Woodland and wildlife use • Class VIII- Recreation, wildlife, aesthetic uses only

5.2 Policy Implications

Looking to the above findings of the results obtained from the study and reviews collected for the study the following policy implication may be taken

1. Utmost care should be taken so that land suitable for cultivation viz. fallow land other than current fallow and current fallow land should not be converted for the purpose of non-agricultural uses and efforts should be made to divert barren & uncultivable land which fall under the land capabilities classes V to VIII for industrial, real estate etc. purposes (Box 5.1)

These calls for government attention to frame effective and feasible land use policy in the interest to protect cultivable land from its diversion to non agricultural purposes. The law must be enacted in such a way so that diversion can be checked effectively. The government policy, programme and self awareness are very much important for efficient land use management. Looking to teaming population which is increasing at a faster rate causing reduction in land man ratio. This warns that cultivated land should not be wasted at any cost and requires taking the corrective measures urgently in a planned manner.

2. As increase in net irrigated area significantly reduces the area under fallow land. Hence, emphasis should be given to bring more and more area under irrigation. Apart from this efficient method and system of irrigation should be popularized amongst the farming community such as in situ moisture conservation, water management technologies, location specific suitable crop varieties requires less water etc. to increase the water use efficiency in a significant manner in the years to come.

3. Efforts should be made not only to introduce an effective, efficient local specific integrated land use planning but also its effective implementation should be ensured because it was found that land use pattern, cropping pattern, irrigation intensity, method and system of irrigation etc. features of various districts also differ remarkably and the most important, important and least important reasons of left land fallow are not same across the different districts.

4. The tolerant crop varieties could generate better returns and are economically feasible. Therefore, instead of investing more on reclamation programme, the small and marginal farmers could opt for low-cost technologies. The input delivery should be restructured and strengthened. All the inputs which are necessary for reclamation should be made available at one place at subsidized rates in order to promote the use of such inputs for

land reclamation. There is a greater need for crop options that are tolerant to salts

5. Finally, there is need for scientific, creative and orderly disposition of land resources, facility and services with a view to securing the physical, economical and social efficiency, health and well-being of communities. There is need for an effective, efficient and integrated land use planning which inter-alia includes agriculture, industry, commerce, forests, mining, housing infrastructure, and urban settlement, transportation facilities etc. to resolve claims/counter-claims of these sectors.

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APPENDIX - II

Coordinator's Comment on the Draft Report and Action Taken

Title: Dynamics and Revival of Fallow Land in Madhya Pradesh	
Date of receipt of the draft report:	**13.06.2017**
Date of dispatch of the comment:	**25.09.2017**

by

AERU

Institute of Economic Growth

Delhi

Reports by

1. Gokhale Institute of Politics and Economics, AERC, Pune

   Investigator- Jayanti Kajale and Sangeeta Shroff, Study Area- Maharashtra.

2. AERC, Bhagalpur

   Investigator- Dr. Rajiv Kumar Sinha, Study Area- Jharkhand

3. AERC, Chennai, University of Madras

   Investigator- Dr. K. Jothi Sivagnanam, Study Area- Kerala

4. AERC, Jabalpur

   Investigator- Dr. Hari Om Sharma, Study Area- Madhya Pradesh

Dear Friends and collaborators

As you may be aware I am assigned to handle the coordinated study as of now. Thank you for the opportunity and your cooperation.

I have gone through the documents in hand i.e., questionnaires circulated and the four draft reports from you. Keeping the information collected by you as presumably advised by the earlier coordinator and the need for consistency among the studies in mind before compiling and comparing the results I am making the following comments. I also add some minimal suggestions for making sense of the results obtained from diverse field studies for consolidating the final report (which is usual in coordinated studies).

I may mention that there are some variations among the reports in terms of specific aspects addressed and tables made. Also, there are limited inadequacies for drawing inferences at least at an integrated level. Therefore, all though the suggestions are common some of them may have been already addressed in one or more of the reports and the researchers may ignore my comments if the work is already done.

My ideas are obviously based on an integrated look at all your reports and my suggestions are drawn from the strengths of each report.

1. My first comment is on the scattered nature of the tables and write-ups that fail to bring out clear conclusions. The reports need to be more reader friendly and bring out clear inferences from the work done. My suggestions aim to help you in this.

2. The Chapters may please be reorganized to maintain an order. The 'Method' chapter must lay down not only the sampling method (which is evident in all cases) but also the other methods (such as statistical techniques, regressions if any (as done by AER, Jabalpur), ratings (done by all Centres for identifying factors causing fallowing but not explained by any one), the qualitative (perception based) approach, definitions and specifications (most have done this), selection of districts (AERC, Kerala may explain this) and any other method used.

3. In the same chapter, a background needs to be given of the specific state using only latest available data :

Economy: per capita GDP if available, sectoral composition of GDP, poverty rate, Infrastructure (whatever data you can give roads, electricity etc. per capita), GDP growth, population growth (base to current preferably or Census based) share of rural population, Education statistics etc. *Employment indicators for rural sector*: Population growth rate, rural share, female headed household share, Work force participation, Employment in Agriculture (from Census) etc., *Land use*: Geographical features, Farm size, Share of Marginal and Small farms, Irrigation share on GCA, NSA and sources of irrigation, Cropping intensity, Rainfall, drought-prone or flood prone

districts, *Agriculture:* Major crops and cropping pattern (share of Rice, Wheat, Pulses, Oilseeds, F&V, Plantations), Yield rates of major crops etc. My indicators can serve only as some suggestions.

4. Similar background with tables (as in point 2) may be provided for the selected sample districts too subject to data constraints.

5. For easy reading, the tables (2-3) should be consolidated as possible, based on latest data with clear mention of reference year, source, explanations for short forms. Some of you have given much of the information I mention in different tables but may consider consolidating/reformatting the tables. I have given a crude format at the end (A2) but you may improve on that and add more/less information than I suggested.

6. The background tables must be backed up by descriptive assessment with writer's insights, literature and official report review (not repeating data already seen in the Tables), mentioning any special feature (such as in geography or water shortage, natural disasters, farmer distress, conflicts or any other events in news relevant to the context of economic decision making.

7. Tables on land use and CAGR of land use categories are part of the substantial results of the study using secondary data and are important to merit a consolidated chapter. These tables on state total and districts etc., may be given in a common chapter following the chapter on method (some of you have given some district tables in the Method chapter to explain the sample selection which is OK but that is for a different purpose).

8. There is total confusion with the reference years for secondary data based study on trend in fallow land in districts. District level data not being updated, regular and consistent can be a cause for this divergence. AERCs in Jabalpur and Bhagalpur treated 2001-03 as base and 2012-2014/2014-16 as current years and calculated CAGR between the two trienniums. AERC in Madras (on Kerala) gave data on and CAGR between 1990-91 and 2015-16. AERC Pune gave Land use data for districts for current period (year is not clear). They also gave decadal CAGRs and a few long period CAGRs starting from 1980.

9. Based on all this multitude of information I suggest all of you to provide the district level land use data for latest 3-year average (stating the years and the source) and one from early 2000s three year (specify years and source). Also, please give CAGR between the two trienniums. The Kerala study may have to provide the CAGR and data for the base year and Maharashtra study has to provide data for a base year.

10. The land use and CAGR must be given in tables both for the state and all districts in the state.

11. In the primary study, to arrive at a meaningful distinction among fallowing tendencies, I would suggest making a separate single Table to give Fallow tendency (as %) against different

socio-economic and endowment indicators. Similar work has actually been done through several tables leaving the reader confused. A rough format for the table (with minimal adjustments) is given in A3 below. The discussion will compare among groups such as say small farmers and large farmers, social groups, cereal growers and commercial crop growers etc. in respect of their land fallowing tendency.

12. Any, programme if discussed, may have relevance to land use and fallow land. The report on Kerala makes a focused study on Kudumbashree but unfortunately it does not specifically throw any light (except in a small section) on its influence on land fallowing. I would suggest keeping the details on the programme in Appendix but discuss the fallow land implications in the text if possible also with tables. Otherwise the section does not fit in with the main topic.

13. The objectives stated by the Centres are not all same. According to my records the list of objectives are as given below (see A1 below) and these are mentioned by some of the Centres. However the last two objectives are hardly addressed. In the study by AERC Pune a last section (4.8) is devoted to this aspect based on perceptions. This section could be expanded to address the objectives. In fact, the subjective response based findings on fallowing stated in the Appendix may be discussed by AERC Pune in this section more in detail. This approach is advisable for others making use of subjective responses. In any case if data collected permits, the sections may be written to answer the questions raised in the last two objectives only if there is substantial information. Otherwise these objectives must not be mentioned at the outset. The Centres may decide.

14. AERC Bhagalpur (only) has mentioned the crops grown before 'seasonal' fallowing. Other can follow if data is available.

15. It is strange and disappointing to find that in a responsible team work, the hard work put in by the actual earlier coordinator (Dr. Thiagu Ranganathan), who prepared the study design, questionnaire etc. is not acknowledged. To make the report acceptable kindly acknowledge and mention the coordinators Thiagu Ranganathan and Nilabja Ghosh.

16. There are spelling mistakes, other grammatical errors and lack of clarity in tables (headings or Note) that may be corrected. If additional information and tables are provided in the reports compared to what is suggested by the reviewer), they may continue.

Action Taken

All the corrections as suggested related to AERC, Jabalpur have been incorporated in the research report.

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Table-1 : Area Under different Parameters of Land Use Pattern in the Base Year TE Average up-to 1993 ('000ha.)

S. No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
1	Balaghat	407.91	46.70	49.17	274.67	47.86	0.21	25.97	16.23	12.27
2	Shahdol+Anuppur	368.31	90.09	129.53	451.00	41.38	1.18	61.70	70.54	75.33
3	Mandla	406.98	68.84	126.10	424.00	38.42	0.09	32.03	61.80	66.50
4	Dindori	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Umaria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Rewa	44.67	54.88	97.50	357.33	38.56	1.45	10.67	26.86	25.27
7	Satna	89.23	58.05	141.63	354.67	20.85	4.12	46.53	17.81	20.47
8	Panna	219.23	39.77	75.27	223.00	15.10	0.13	67.17	16.96	18.97
9	Jabalpur	120.17	49.83	149.17	441.67	98.48	0.36	66.47	46.69	47.80
10	Seoni	235.65	47.41	49.50	361.33	30.32	0.03	31.07	32.47	41.87
11	Katni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	SIDHI+Singrauli	395.07	59.12	115.10	343.00	0.01	0.00	54.70	30.07	41.33
13	Bhopal	37.44	26.65	30.37	158.00	32.84	0.70	6.93	2.69	1.33
14	Sagar	197.43	48.70	65.23	517.00	107.05	0.90	17.40	14.52	10.60
15	Damoh	197.93	29.25	85.80	284.33	40.47	0.78	29.03	11.03	9.77
16	Vidisha	104.27	35.30	46.10	522.00	37.47	0.05	13.30	3.29	3.23
17	Raisen	261.07	37.74	41.10	419.67	29.52	0.07	17.83	4.08	2.37
18	Sehore	109.06	32.30	40.77	368.33	56.23	0.01	13.40	3.21	1.67
19	Narshingpur	114.32	22.70	23.43	291.33	29.10	0.17	19.87	7.49	5.23
20	Hoshangabad	275.17	32.49	66.33	455.33	51.61	2.12	37.73	10.85	9.43
21	Gwalior	72.73	34.64	88.07	258.00	21.70	0.11	24.17	6.78	8.13
22	Shivpuri	231.68	41.69	104.60	377.67	54.86	3.49	88.83	22.22	17.33
23	Morena	188.07	65.85	272.60	403.67	67.12	0.00	59.47	9.33	9.17
24	Guna+Ashoknagar	103.37	57.73	157.07	613.67	57.36	0.02	90.73	9.34	10.47
25	Sheopur	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Bhind	5.54	31.69	57.77	333.33	23.57	0.36	10.53	5.02	3.77
27	Chhatarpur	57.45	46.63	150.10	348.33	92.63	0.33	90.20	46.97	32.80
28	Datia	15.41	18.86	21.87	130.00	6.08	0.06	13.47	3.32	4.83
29	Tikamgarh	53.18	37.71	86.07	241.00	50.29	0.13	21.57	16.33	15.50
30	Betul	300.87	46.15	71.37	407.67	26.51	0.00	46.33	29.93	29.23
31	Chhindwara	317.65	51.13	101.30	482.00	56.91	0.03	21.53	32.12	42.03
32	Mandsaur	72.00	100.91	195.60	542.00	54.40	0.06	41.67	2.73	3.60
33	Neemuch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	Ratlam	25.47	26.82	69.33	317.67	33.00	0.09	29.83	2.61	2.43

S. No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
35	Ujjain	4.53	38.93	44.67	468.33	72.37	0.08	13.37	2.61	2.63
36	Indore	42.40	28.48	31.30	259.33	30.10	0.07	4.43	3.06	1.93
37	Shajapur+Agar	5.17	42.92	89.90	431.67	64.75	0.05	21.57	2.80	1.73
38	Rajgarh	10.31	38.87	68.67	408.67	86.05	0.06	25.67	4.62	2.33
39	Dewas	194.81	32.05	46.60	362.00	80.43	0.02	3.37	1.76	1.63
40	Khandwa+Burhanpur	351.98	54.29	69.17	446.00	67.91	0.43	1.83	12.01	8.00
41	Khargone	338.85	51.71	115.00	639.00	92.42	0.00	30.83	8.94	4.47
42	Barwani	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	Dhar	90.88	45.85	98.07	501.00	52.92	0.04	20.23	4.31	4.10
44	Harda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	Jhabua+Alirajpur	91.80	50.77	123.57	358.00	41.72	0.00	19.87	4.55	6.43
	Madhya Pradesh	**6158.03**	**1723.47**	**3394.77**	**14575.67**	**1848.37**	**17.79**	**1231.30**	**607.95**	**606.00**

Source: Commissioner Land Record, Gwalior M.P.

Table-2 : Area Under different Parameters of Land Use Pattern in the Current Year TE Average upto 2016 ('000ha.)

S.No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
1	Balaghat	505.08	48.07	9.46	272.46	30.99	0.74	21.48	20.41	15.83
2	Shahdol+Anuppur	304.33	86.61	34.05	336.59	15.70	1.20	58.95	49.67	48.92
3	Mandla	593.20	43.51	10.75	224.41	20.06	0.07	23.57	26.28	23.70
4	Dindori	25.39	28.10	11.08	201.54	13.18	0.02	16.89	28.66	34.04
5	Umaria	236.71	34.94	8.81	103.79	12.78	0.16	19.77	17.69	15.68
6	Rewa	85.41	62.32	32.70	360.77	26.42	2.52	6.08	26.73	25.69
7	Satna	203.74	60.67	15.36	351.83	19.48	3.54	57.53	16.69	13.83
8	Panna	299.71	43.57	22.82	264.75	11.55	0.00	45.57	7.19	7.78
9	Jabalpur	77.65	41.38	36.92	274.31	39.95	0.12	23.81	15.38	10.67
10	Seoni	328.52	49.78	11.83	395.38	20.39	0.03	31.44	19.15	18.98
11	Katni	100.03	35.33	37.14	213.71	39.74	0.03	30.70	19.49	16.94
12	SIDHI+Singrauli	434.85	89.72	17.22	334.45	19.08	0.01	73.18	29.79	41.85
13	Bhopal	44.11	33.66	4.03	153.22	31.76	0.03	5.37	4.35	1.49
14	Sagar	297.98	58.31	12.63	548.10	76.31	0.71	10.56	10.29	7.89
15	Damoh	267.12	32.52	59.12	318.07	35.46	0.11	9.66	3.92	3.15
16	Vidisha	109.62	41.29	9.72	533.68	26.72	0.23	5.27	2.52	1.10
17	Raisen	333.67	40.52	3.58	433.12	26.12	0.11	8.00	2.11	1.71
18	Sehore	172.61	42.72	9.60	398.30	26.77	0.03	5.51	0.83	0.32
19	Narshingpur	136.18	26.07	1.02	309.81	23.93	0.17	9.91	4.08	2.66
20	Hoshangabad	256.12	44.81	2.42	314.54	25.41	0.02	16.82	5.53	3.09
21	Gwalior	111.05	34.06	48.74	210.43	13.74	0.08	23.94	10.72	3.74
22	Shivpuri	330.57	61.12	37.51	453.89	26.84	2.56	51.91	12.41	7.43
23	Morena	51.42	41.12	88.99	271.19	18.79	0.00	21.12	5.19	3.96
24	Guna+Ashoknagar	155.28	64.35	99.61	648.98	42.99	0.02	81.18	3.11	2.66
25	Sheopur	292.88	39.60	85.11	168.23	37.12	0.00	38.28	2.88	2.75
26	Bhind	8.81	38.17	22.31	340.12	16.55	0.53	11.39	4.55	3.03
27	Chhatarpur	214.19	45.16	1.47	433.70	71.82	0.19	34.71	19.80	42.10
28	Datia	29.43	18.64	16.17	208.69	6.04	3.99	13.72	5.12	5.51
29	Tikamgarh	69.31	38.18	54.84	269.90	18.50	0.16	22.65	18.52	12.36
30	Betul	397.39	46.85	25.94	434.93	27.80	0.00	38.77	27.58	8.53
31	Chhindwara	477.36	50.70	20.71	510.25	53.84	0.05	29.96	21.37	20.12
32	Mandsaur	40.59	79.62	44.31	357.09	13.22	0.06	14.81	1.45	0.86
33	Neemuch	94.41	48.67	39.83	183.42	9.34	0.00	16.73	0.68	0.65
34	Ratlam	34.34	30.24	40.39	336.56	27.52	0.12	15.42	0.86	0.53
35	Ujjain	3.15	58.98	5.74	500.15	31.58	0.13	6.70	1.79	1.70

S.No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
36	Indore	52.21	39.33	10.82	250.97	17.80	0.08	2.33	5.51	3.50
37	Shajapur+Agar	6.12	54.77	39.63	459.90	38.99	0.08	17.15	1.42	0.45
38	Rajgarh	17.64	44.75	29.00	439.72	52.69	0.25	27.62	3.35	1.34
39	Dewas	206.64	35.21	12.63	402.23	41.93	0.03	2.08	0.43	0.12
40	Khandwa+Burhanpur	507.27	106.14	13.81	406.41	65.29	0.04	0.27	10.97	6.26
41	Khargone	204.34	34.61	61.12	343.71	39.92	0.01	15.14	6.31	2.00
42	Barwani	183.07	28.06	73.57	230.19	4.56	0.00	6.89	2.31	1.22
43	Dhar	119.99	58.88	75.83	501.76	46.53	0.03	12.79	2.45	1.41
44	Harda	103.44	22.61	3.44	184.44	9.04	0.08	6.39	0.86	0.31
45	Jhabua+Alirajpur	132.04	59.00	82.44	361.06	7.66	0.00	25.43	3.62	4.45
	Madhya Pradesh	**8654.957**	**2122.725**	**1384.185**	**15250.74**	**1281.887**	**18.30933**	**1017.451**	**484.0107**	**432.311**

Source: Commissioner Land Record, Gwalior M.P.

Table-3 : Absolute Change in different Parameters of Land Use Pattern in the Current Year over the Base Year (000' ha)

S. No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
1	Balaghat	97.17	1.37	-39.70	-2.21	-16.87	0.53	-4.49	4.17	3.56
2	Shahdol+Anuppur	-63.98	-3.48	-95.48	-114.41	-25.69	0.02	-2.75	-20.87	-26.42
3	Mandla	186.23	-25.33	-115.35	-199.59	-18.36	-0.03	-8.46	-35.52	-42.80
4	Dindori	25.39	28.10	11.08	201.54	13.18	0.02	16.89	28.66	34.04
5	Umaria	236.71	34.94	8.81	103.79	12.78	0.16	19.77	17.69	15.68
6	Rewa	40.75	7.45	-64.81	3.44	-12.13	1.07	-4.58	-0.13	0.42
7	Satna	114.50	2.62	-126.27	-2.83	-1.37	-0.58	11.00	-1.12	-6.64
8	Panna	80.49	3.81	-52.45	41.75	-3.55	-0.13	-21.60	-9.77	-11.18
9	Jabalpur	-42.52	-8.44	-112.25	-167.35	-58.52	-0.24	-42.65	-31.31	-37.13
10	Seoni	92.87	2.37	-37.67	34.04	-9.93	0.00	0.37	-13.32	-22.88
11	Katni	100.03	35.33	37.14	213.71	39.74	0.03	30.70	19.49	16.94
12	SIDHI+Singrauli	39.78	30.60	-97.88	-8.55	19.07	0.00	18.48	-0.28	0.51
13	Bhopal	6.66	7.00	-26.34	-4.78	-1.08	-0.67	-1.56	1.66	0.15
14	Sagar	100.55	9.61	-52.60	31.10	-30.73	-0.19	-6.84	-4.22	-2.71
15	Damoh	69.19	3.27	-26.68	33.74	-5.01	-0.67	-19.37	-7.11	-6.61
16	Vidisha	5.35	6.00	-36.38	11.68	-10.75	0.18	-8.03	-0.77	-2.14
17	Raisen	72.60	2.78	-37.52	13.46	-3.40	0.04	-9.83	-1.97	-0.66
18	Sehore	63.55	10.42	-31.16	29.96	-29.46	0.02	-7.89	-2.38	-1.34
19	Narshingpur	21.87	3.37	-22.41	18.48	-5.17	0.00	-9.96	-3.41	-2.57
20	Hoshangabad	-19.05	12.32	-63.92	-140.80	-26.20	-2.10	-20.91	-5.32	-6.34
21	Gwalior	38.31	-0.58	-39.33	-47.57	-7.96	-0.03	-0.23	3.94	-4.40
22	Shivpuri	98.89	19.43	-67.09	76.22	-28.02	-0.93	-36.92	-9.81	-9.91
23	Morena	-136.65	-24.73	-183.61	-132.48	-48.33	0.00	-38.34	-4.15	-5.21
24	Guna+Ashoknagar	51.92	6.62	-57.46	35.31	-14.37	0.00	-9.55	-6.23	-7.81
25	Sheopur	292.88	39.60	85.11	168.23	37.12	0.00	38.28	2.88	2.75
26	Bhind	3.27	6.48	-35.46	6.79	-7.02	0.17	0.86	-0.48	-0.73
27	Chhatarpur	156.74	-1.46	-148.63	85.36	-20.81	-0.14	-55.49	-27.17	9.30
28	Datia	14.02	-0.21	-5.70	78.69	-0.04	3.93	0.25	1.81	0.68
29	Tikamgarh	16.12	0.47	-31.23	28.90	-31.79	0.03	1.09	2.18	-3.14
30	Betul	96.52	0.70	-45.42	27.27	1.29	0.00	-7.57	-2.35	-20.70
31	Chhindwara	159.71	-0.43	-80.59	28.25	-3.07	0.02	8.42	-10.75	-21.91
32	Mandsaur	-31.41	-21.28	-151.29	-184.91	-41.19	0.00	-26.85	-1.28	-2.74
33	Neemuch	94.41	48.67	39.83	183.42	9.34	0.00	16.73	0.68	0.65
34	Ratlam	8.87	3.41	-28.94	18.89	-5.48	0.03	-14.41	-1.74	-1.90

S. No.	Districts	Forest	Area Under Non Agricultural Area	Barren & Uncultivable Land	Net Area Sown	Permanent Pasture & Other Grazing Land	Land Under Misc Tree Crops & Grove not Included in Net Area	Cultivated Waste Land	Fallow Land other than Current Fallow	Current Fallow
37	Shajapur+Agar	0.95	11.85	-50.27	28.23	-25.75	0.03	-4.42	-1.38	-1.28
38	Rajgarh	7.32	5.88	-39.67	31.05	-33.37	0.19	1.96	-1.27	-0.99
39	Dewas	11.82	3.17	-33.97	40.23	-38.50	0.00	-1.29	-1.33	-1.51
40	Khandwa+Burhanpur	155.28	51.85	-55.36	-39.59	-2.62	-0.39	-1.56	-1.04	-1.74
41	Khargone	-134.51	-17.11	-53.88	-295.29	-52.50	0.01	-15.70	-2.63	-2.47
42	Barwani	183.07	28.06	73.57	230.19	4.56	0.00	6.89	2.31	1.22
43	Dhar	29.11	13.03	-22.24	0.76	-6.40	0.00	-7.45	-1.86	-2.69
44	Harda	103.44	22.61	3.44	184.44	9.04	0.08	6.39	0.86	0.31
45	Jhabua+Alirajpur	40.24	8.23	-41.12	3.06	-34.06	0.00	5.57	-0.94	-1.98
	Madhya Pradesh	**2496.92**	**399.25**	**-2010.58**	**675.08**	**-566.49**	**0.52**	**-213.85**	**-123.93**	**-173.69**

Source: Commissioner Land Record, Gwalior M.P.

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