“An impact of irrigation on agriculture development in Jalgaon District, (1990 – 2010)”

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2016

CERTIFICATE

This is to certify that the thesis entitled **"An Impact of Irrigation on Agriculture Development in Jalgaon District, (1990-2010)"** which is being submitted herewith for the award of the Degree of Vidyavachaspati (Ph. D) in Geography of Tilak Maharashtra Vidyapeeth, Pune is the result of original research work completed by Mr. Deshmukh Prasanna Suresh under my guidance and supervision. To the best of my knowledge and belief the work incorporated in this thesis has not formed the basis for the award of any Degree or similar title of this or any other University or examining body.

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I hereby declare that the thesis entitled **“An Impact of Irrigation on Agriculture Development in Jalgaon District, (1990-2010)”** completed and written by me has not previously formed the basis for the award of any degree or other similar title of thesis or any other University or examining body.

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Signature of Research Candidate

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0.1 INTRODUCTION

Water is the most important resource in agriculture, In India arid and semi-arid regions of availability of water has always been a constraint in crop production.

In India, the rainfall is very irregular and erratic which severely affects the Agricultural productivity and development Maharashtra State has limited water resource in comparison with other states and drought is expected to occur every two or three years, over exploitation of ground water without taking into consideration recharge component resulted in depletion of Water levels. Wherever the situation and efficient use of irrigation water is the basic need to increase agricultural production to satisfy the needs of increasing population.

Water is important resource of humidity. It helps not only in survival but also in making a living life, comfortable and Luxurious. Besides other use of water, the largest and important use of water is for irrigating lands.

Irrigation is the artificial application of water to land in order to grow crops or to improve crop yield. Where the large amounts of capital are available, concrete dams and channels are built. A flexible system which is increasing in popularity is the use of mobile overhead pipes, which can be moved from field to field. Irrigation brings about an increase in the gross cropped area by increasing net sown area in rainfall scarcity areas and by facilitating multiple cropping. It means the Irrigation has the effect of increasing the yield by almost 100% compared to unirrigated areas. In India the success of Agricultural is completely dependent on the monsoon failures in addition to insurance, today's trend is to consider irrigation as vital input in maximizing the production**.**

Agriculture Geography has been widely accepted by geographers as it describes not only spatial variation of agriculture phenomena but also explains the geological and socioeconomic bases of such variations. This definition may be made clear with the help of an illustration. For example, a large number of commercial cash crops are cultivated in tropical and subtropical regions but their cultivation and concentration depend on the geo climatic requirement of the crop.

In India the extent of irrigation is just 30.7 percent and in Maharashtra State, it is 13 percent. India being a tropical country with vast diversity of climate,

topographic and vegetation has to ultimately depend upon irrigation for survival of crops and cropping pattern.

0.2 PROBLEMS, SCOPE AND PURPOSE:-

Irrigation is the artificial application of water to the soil for crops production better crop quality with high quantity. It encourages the farmer to adopted scientific techniques and get in for more intensive cropping pattern in agriculture. It has to study the content of the adaptation of high yielding varieties of crops, chemical fertilizers and overall development of agriculture in Jalgaon district as well.

"**An Impact of Irrigation on Agricultural Development in Jalgaon District, (1990-2010)**" this has been selected for the present study, which is predominantly Agricultural being the backbone of its economy. The stability and development of Agriculture in a region depend on the availability of perennial supply of water for plant growth condition. The spatial differences in irrigation development are common in Maharashtra in general and Jalgaon district as it.

Compare to other regions of the Maharashtra state. The need of irrigation in the region arises in order to the uneven distribution and overall shortage of rainfall.

The aim of the present investigation is to analysis the spatio-temporal development of different modes of irrigation in relation to the physical demographic setting of the region. The impact of irrigation and associated inputs on land use, cropping pattern, and yield is proposed to be assessed at micro and macro levels. But it must be pointed out that no attempt is made to examine negative aspects live environmental degradations. For the purpose of this study the impact of irrigation is referred to as spatial change in Land Use, Cropping Pattern and also Crop Yield in the region.

IRRIGATION IN JALGAON DISTRICT:-

Jalgaon District has only one 'Tapi' the most important large river with their small tributaries out of which is Girna, Waghur, Anjani and the Bori; other seasonal rivers like More, Suki, Bahula, Aner, and Manyad are considerably supportive to agriculture, Besides maximum well watering and canal watering systems support the irrigations aspects. Irrigation facilities are being well developed in Jalgaon district, over the last two decades. According to 2004 - 2005

agricultural statistics for taluka comparative figures are available the irrigated area in Jalgaon district was the highest **(27.59 %)** in the whole of Maharashtra **(17.3%)**, the Net Irrigated Area however top of the five ranking in the state.

Almost all the dams like Hatnur, Girna and Waghur were built; they go throughout the district especially in Chopda, Yawal, Raver, Muktainagar, Jalgaon, Dharangaon, Erandol, Chalisgaon, Pachora and Parola talukas.

A detailed review of the progress of irrigation from the past it is difficult, hence an attempt is made here to investigate regional imbalance in irrigation facilities from the plan period onwards with the advent of planning 1951, and many attempts were made to tap the water for irrigation schemes in Jalgaon district.

The Government policies encourage the farmer to how utilize surface and ground water resources by giving them and financial assistance and subsidies.

Sugar factories, which have been established during the last fourteen years, have given impetus to irrigation by making it special in their commercial areas, apart from these factories rapid rural electrification. The awareness in farmers and increasing trend of education has stimulated irrigation developments.

The growth of the irrigation from the all sources in which 2, 19,352 hectares in 2004-2005. It could be observe from the figure that well irrigation is prominent in Jalgaon district. At present the total irrigated area 2, 47,506, hectares the irrigation by well is 2, 39,096 hectares (96.60 percent), by other sources of irrigation surface in 8410 hectares i.e. (3.40 percent.)

0.3 OBJECTIVES OF THE STUDY:-

The specific aims and objectives of the present study are as follows-

1) To examine the effect of Physical determinant on irrigation development in the district.

2) To analyze the Sources, methods, mean of Irrigation in Jalgaon District**.**

3) To review and illustrate the spatio temporal change in irrigation facilities.

4) To assess the effect of irrigation on the use of Mechanical and Biochemical inputs.

5) To review the general and agricultural land use pattern in the study area.

6) To illustrate the impact of irrigation on cropping pattern in general and irrigated crops.

7) To evaluate the overall role of irrigation in the agricultural productivity in the study area

0.4 HYPOTHESIS:-

1) Physical factors have a vital role in the introduction and expansion of irrigation.

2) There are spatio-temporal variations in irrigation facilities and these are observed more in the scarcity areas.

0.5 CHOICE OF THE REGION AND TOPIC:-

The selection of the area and the topic under investigation has been affected by several considerations.

A. Jalgaon District is total 15 tehsils and all tehsils are considered for the study. The different landforms in a region constitute its physical setup ex- northern hilly region, central plateau region of eastern and southern plains.

B. There are major soils in the district namely coarse shallow soils, medium black soils, deep black soil & soil content of alluvium. So, various cropping pattern depend upon the different part of study region.

C. Jalgaon District is divided into three Agro-Climatic Zones. i.e. Scarcity Zone, Plain Transition Zone and Heavy Rainfall Zone. These zones are depend upon the ground water potential, climatic conditions, rainfall, changing cropping pattern, availability & facilities of irrigation, and social and economical impact.

D. The main river is the **Tapi** of the district, and sub tributaries **Tapi** i.e. **Girna**, **Anjani**, **Waghur** and **Bori**, **Suki, Agnavati**, **Aner, Manyad, Bahula** rivers flowing throughout the district. The district is through well known for

Banana, Wheat Cotton, Jowar, Sugarcane cash product as well as Wheat, Bajra, Banana, and Cotton are prominent crop cultivated in the region. Besides there are many crops are locally grown which is entirely dependent on prevailing environmental conditions.

The income from cropping alone is not sufficient to sustain the farm families. Due to increasing population and decreasing per capita availability of the land for agriculture, the pressure on land has increased for production of more food grain, oilseeds, pulses, fruits, and mostly green vegetables. The present study is there for attempted to find out social economical impact of the region agriculture area.

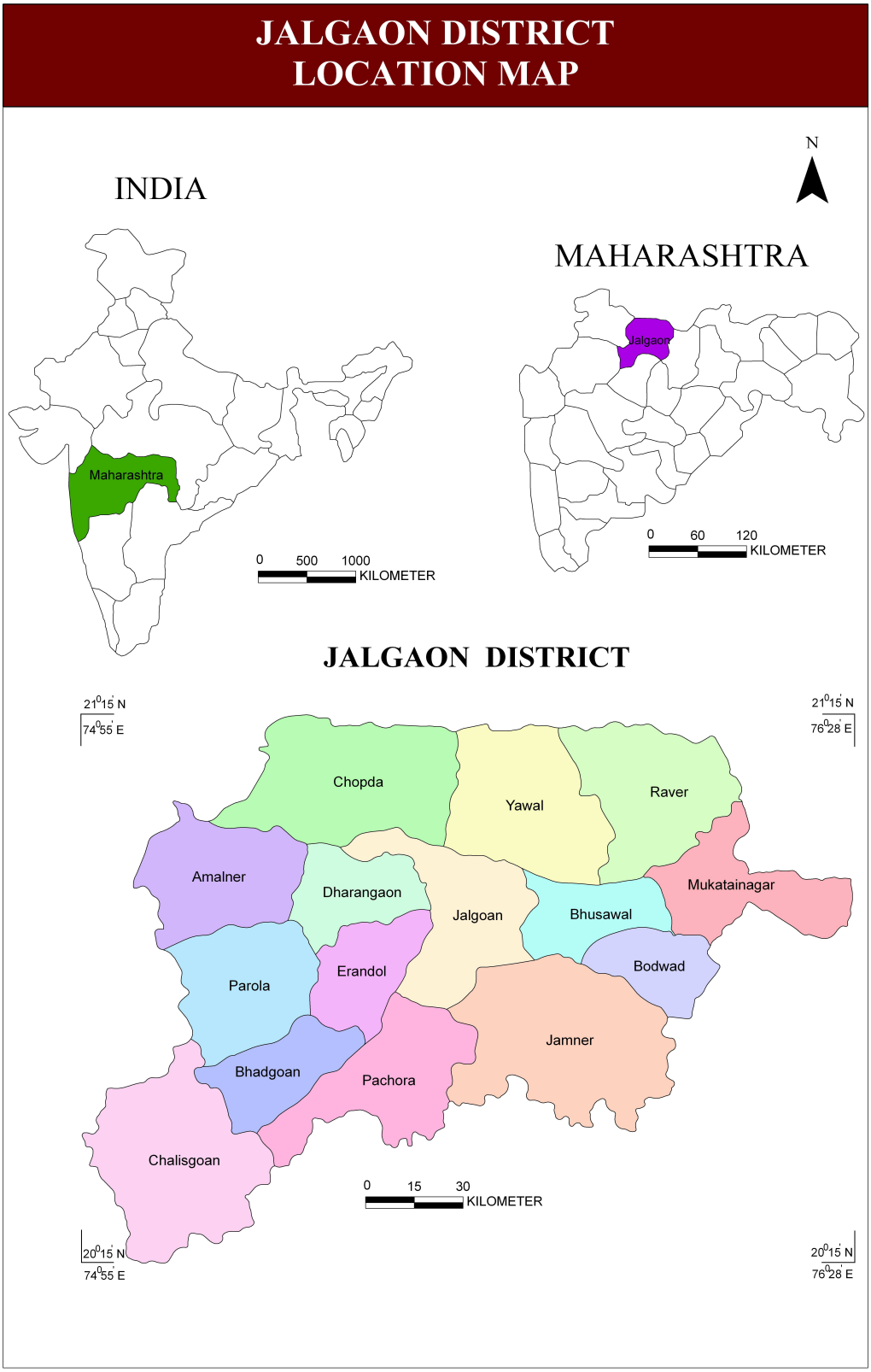
GEOGRAPHICAL LOCATION (STUDY AREA):-

Geographically Jalgaon district is one of the district of Khandesh regions and situated in North western part of Maharashtra. It is situated in the Northern part of the State abutting Madhya Pradesh and lies between north latitudes 20°15’ and 21°25’ and east longitudes 74°55’30’’ and 76°28’30’’. The total area of the district is 11,765 sq.km, And falls in parts of Survey of India degree sheets 46 K, 46 L, 46 P, 55 C, 55 D, and 56 O. The district is bounded on the North by Madhya Pradesh State, on the east by Buldhana, on the west by Nasik and Dhule district and on the south by Aurangabad district.

The district headquarters is located at Jalgaon City. For administrative convenience, the district is divided in 15 talukas viz., Jalgaon, Bhusawal, Yawal, Raver, Muktainagar, Amalner, Chopda, Erandol, Parola, Chalisgaon, Jamner, Pachora, Bhadgaon, Dharangaon and Bodwad. It has a total population of 36, 82,690 as per 2001 and 42, 24, 400 per 2011 of census record. The district has 15 towns and 1519 villages.

The major part of the district comes under Tapi basin. Tapi is the main river flowing through the district. Tapi is the life line whole district and all farmers.

Jalgaon district is one of the most of the 36 districts of Maharashtra state. It is most advanced and one of the oldest district in a state. It is popularly known as ‘Khandesh’ and now a day also known as a ‘Banana City’. It come existence from 19th century, after 50 years Jalgaon established in 1960.



LOCATION MAP

The Jalgaon oldest name was before 50 years a ‘Purva (East) Khandesh’ and after the Maharashtra Government has changed this place name and called the JALGAON.

The district can be divided into three main physiographic divisions– **Satpuda Hill Ranges** in the northern part with dense forest; **Tapi Valley** consisting of alluvial plain in the central part of the district and **Ajanta Hill Ranges**, flanking the hill ridges and small valley in the southern part of the district. **Tapi** is the main river flowing through the district and its major tributaries are Purna in the south and Bhokar, Suki, Morna, Harki, Manki and Gul in the north. And **Girna**, **Anjani**, **Waghur** and **Bori** these main rivers are flowing with high quantity of water in rainy season.

The soils in Jalgaon district are essentially derived from the basaltic lava flows and are classified as, a) Deep black soils, b) Medium black soils, c) Shallow and Black soils. Deep black soils are observed in northern part of Amalner, Erandol, Jalgaon, Bhusawal and Muktainagar talukas. Medium black soils occur over large areas in the district. In Tapi alluvial basin soils are Shallow black alluvial clay occurs in the southern parts of Yawal, Raver, Chopda, Jalgaon, Bhusawal, Chalisgaon, Amalner, and Bhadgaon.

Sandy soils texture observed on the foothills of Satpuda ranges and near southern hill ranges. The climate of the district is characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. The mean minimum temperature is 10.8°C and means maximum temperature is 45.2°C in summer. The normal annual rainfall over the district varies from about 660.40 mm to 763.40 mm, occupies 15 out 12 Tehsils.

0.7 DATABASE AND METHODOLOGY:-

The data collected and used for the period 1990 to 2010 come both primary and secondary sources. The primary data is the raw data collected through different sources for which questionnaire designed, information collected through various offices and farmers, the broad picture of present pattern of irrigation, land utilization of the region is prepared with the help of secondary data.

It is considered to necessary to supplement secondary information by in depth micro-studies at village level. For this purpose one village each from transition, scarcity and heavy rainfall zone are selected. A micro level study includes the covering of all information of relevant aspects such sources of irrigation and number of well and their depth and water table, methods of irrigation and problems pertaining to irrigation.

Secondary data: - Documental Records - Taluka wise and Agriculture and Irrigation Department.

- Jalgaon District Gazetteer,
- Agriculture Epitome,
- Socio-Economic Abstract of Jalgaon District,
- District Census Handbook 1991, 2001.
- Strategic Research and Extension Plan of Jalgaon District (Year wise),
- Taluka wise general descriptions,
- References books and other published information.

Statistical Techniques:-

1. Weaver's Crop Combination (Minimum Standard Deviation) method, 1954.

   Formula –

   $$S.D = \frac{\sum d2}{n} \qquad M.\ Standard\ deviation = \frac{\sum d}{n}$$

   Where,

   D= the difference between actual crop % in a given unit and the % in the theoretical distribution.

   N= the numbers of crops in a given combination.

2. Crop Concentration (Jasbir Singh,1976):-

   Crop concentration index is easy to calculate where in the location quotient values are to be transferred.

   Formula –

$$Ci = \frac{Pae}{Par} \times 100$$

Where,
C= Crop concentration or locational quotient

Ci=Crop concentration index.

Pae= % of the Crop ‘a’ to the total harvested area in an enumeration unit.

Par= % of the crop ‘a’ to the total harvested area in the entire region, state or country.

3. Crop Diversification (Bhatia’s 1965):-

Bhatia (1965) has evolved a simple formula by taking into account the cropped area to make an objective measurement of crop diversification.

Formula –

$$\text{Index of Crop Diversification} = \frac{\text{\% of sown area under ‘X’ crops}}{\text{Number of ‘X’ crops.}}$$

Where, ‘X’ crops are those crops that individually occupied 10% or more of the cultivated area in regional unit.

Or

Jasbir Singh (1976) modified formula –

Index of Crop Diversification-

$$\text{Index of Crop Diversification} = \frac{\text{\% of total harvested area under ‘n’ Crops}}{\text{Number of ‘n’ crops.}}$$

Where ‘n’ crops are those which individually occupied 05% or more of the total harvested area.

Cartographic Technique:-

Use of the SOI Toposheets in Location Map, Slope Map (physiographic), Drainage Map etc, other is Cartographic Technique use like-Tables, Graphs, Divided Circles etc.

The data thus collected through primary and secondary sources were processed and represented by statistical and cartographic techniques and methodological description and interpretation of regional patterns reveled through the coloured maps, ILWIS software use for prepare the mapping.

For studying the changes in land use patterns, five land use categories i.e. Area Under Forest, Area Not Available for Cultivation, Other Uncultivable Land, Fallow Land and Net Sown Area's are considered. In order to smooth but unusual fluctuations five years average data for the years 1990-95 and 2005-10 are used. Percentage of area under each categories of land to the geographical area is computed. While index of diversification is used for studying the crop diversification, applied of Weaver's technique is applied for delimiting the crop combination and overall productivity of agriculture is computed by crop concentration and yield index method of co-efficient method can be used.

0.8 REVIEW OF LITERATURE:-

For the successful crop production, adequate and timely water supply is a master key. Particularly in the semi arid and arid region where rainfall is erratic and scanty. Irrigation plays a crucial role in the development of Indian Agriculture, as rainfall is inadequate and untimely.

Irrigation means an artificial application of water to land in order to grow crops or to improve crop yield. Some review of the following research work as **'Irrigation'**, it is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in preventing soil consolidation. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry land farming. Irrigation systems are also used for dust suppression, disposal of sewage and in mining. Irrigation is often studied together with drainage, which is the natural or artificial removal of surface and sub-surface water from a given area.

Geographical studies on land use and cropping pattern are plenty in India and abroad, but the studies with special emphasis on irrigation are comparatively few in India. It must be mentioned that Geographers, Economist, Engineers, Agronomists, Administrators etc. also study irrigation from different angles. As a result, this subject required interdisciplinary dimensions.

Some author has tried to refer to most of the available studies on the concerned problems and allied topic yet only certain of selected studies has been reviewed here to bring home some gaps in the already available studies to trace out the possible of research for the present study.

“Anand” (1960), stated that irrigation introduces positive change in intensity, crop pattern and yields. Simultaneously, it also disturbs the equilibrium conditions in agriculture in a particular command area. To overcome this difficulty the least squares techniques may be adopted. The use of this technique was suggested by “Cuppock” (1964), and “Jasbir Singh” (1976) applied it for the derivation of crop combination.

According to “Dastane” (1965), of all the resources, water is the item, which is at present used on farms most carelessly. The wastage and losses are maximum in this commodity as compared to others, such as fertilizers, seeds etc. If properly utilized, it is possible to double the irrigated area on the farms the same quantity of water as is available today.

“Bhatia” (1965) has evolved a simple formula by taking into account the cropped area, to make an objective measurement of crop diversification. In such a case diversification is a very high degree and may be taken as an extreme case of crop diversification. In contrast, if a particular crop occupies 10 percent of the crop area, then there is no diversification at all. For instance, Punjab-Haryana plan hence prices is favorable for wheat and rice and vice versa, (Jasbir Singh and S.S.Dhillon, Agriculture Geography 3rd Edition, Tata McGraw-Hill Publishing co.ltd, New Delhi, 2006).

Pioneer work of great interest and significance to agriculture geographers all over the world. It has been observed that the technique of least deviation (i.e.

minimum standard deviation method) from the abstract theoretical combination value fails to operate in the enumeration units where the actual regional share of crops is quite closets one another (Jasbir Singh, 1967), or it is more discriminating when there are a few high but unequal percentage and less discriminating when there are many low but nearly equal percent "(Dikshit, 1973)".

"Clark" (1970) deals with economics of irrigation, other works carried out by foreign scholars on method of "irrigation and water management", are by "Manneir" (1974), "Bengtson" (1975), "Andreac" (1975) and "Garbrecht" (1978).

"Kulkarni, D.C" (1970) highlights the problems of irrigated agriculture as an agronomists and "Nadkarni, M.V" (1979) in "impact of irrigation" economic changes are analyzed according to the sources of irrigation on the basis of case studies.

Other the work done by "Shafi" (1977) in his direction of needs special mention. He assessed Von Thunens theory in Indian conditions. On the basis of the study of cropping pattern in 35 villages of Koli tehsils in Aligarh district of Uttar Pradesh (India), he concluded that intensity of land use not decrease with increase in distance from market city; rather it is affected more by distance from the source of irrigation.

In Maharashtra State, "Pawar and Shinde (1979), Khare, M.P (1980), and Pawar, C.T" (1981), has been studied impact of irrigation on land use in Krishna Basin, More and Mustafa (1984), expressed need for irrigation in Maharashtra in the context of average rainfall, cultivated area and rural population.

"Agrawal M.C and Goal, A.C" (1981), observed the effect of yield the leveling quantity on irrigation efficiency and crop yield. The result of showed that proper land leveling in areas irrigated by canals is an essential prerequisite for judicious use of scare irrigation water.

"Jayaram, T.K." (1982), examined the consumption of fertilizers in irrigation projects under uncertainties. The empirical study of consumption of NPK fertilizers in the irrigation project showed that, apart from the price factor, uncertainties in irrigation supplies are also the role of significant determinants. The

risks associated with fluctuations in irrigation supplies have a definite adverse impact on the farmer decision making process.

"Patel, A.S and Patel, H.F." (1983), studied the irrigation practices and efficiency of water use in Machu -1, irrigation project area in Gujarat State. They identified various problems closely related to under utilization of water resources and low intensity of land use in irrigated areas and interterm variations in water use. "Chatterjee, N." (1995), it was study in irrigated agriculture: a case study of West Bengal, Author assess the impact of irrigation on land use, cropping pattern, cropping intensity as well as agricultural efficiency macro and micro level analysis.

The level of crop diversification largely depends on the Geo- Climatic or Socio-Economic condition and Technological Development in a region. (Dr .B. C. Vaidya, Agriculture Land use in India, (A study in Yashoda basin,) Manek Publishing Pvt., Ltd., New Delhi, 1997). Many geographers and economic so far have applied the concept of diversification in variety of sense.

0.9 CHAPTER WISE PLAN OF THE THESIS:

The present study has been organized into seven chapters; the details of the organization of the research are given below.

Chapter 1: PHYSICAL DETERMINANTS AND IRRIGATION

This chapter deals with the physical determinants and irrigation which comprises location, boundaries of the study region, administrative divisions, evolution, geology, topography, drainage pattern, climate, natural vegetation, water resources, agro-climatic zone of Jalgaon district and most important soil factor from the point of view of their suitability for the development of irrigation and overall studied.

Chapter 2: DEMOGRAPHIC CHARACTERISTICS AND IRRIGATION

These chapters through light on demographic characteristics like population growth, density of population viz. crude, physiological, agricultural and fertility and mortality etc. Literacy, sex ratio of population in irrigated areas and occupational structure, social structure i.e. agricultural labourers, cultivated laborer

in irrigated area of study region, age structure and agriculture and its related works in cultivated area above subtopics are studied.

Chapter 3: DEVELOPMENT OF IRRIGATION

This chapter deals with the evolution of irrigation limitations for irrigation development, methods of irrigation, sources of irrigation, intensity of well irrigation, major and minor irrigation projects in study region, percolation tanks, dams, minor irrigation schemes, canal irrigation, intensity of canal irrigation, over all intensity of irrigation, traditional and mechanical inputs and biochemical inputs are studied.

Chapter 4: GENERAL AND AGRICULTURAL LAND USE

This chapter is devoted for meaning and importance of land use in which study of general and agricultural land use of Jalgaon district - taluka wise, the lands includes all types of category in using and land under the agriculture cultivated crops are studied during the investigation period.

Chapter 5: AGRICULTURAL PRODUCTIVITY

Chapter five through lights on cropping pattern and agricultural efficiency, crop combination, cropping intensity, crop concentration, crop diversification, terms of production selected agricultural crops, crop productivity in Jalgaon district, agricultural efficiency according to Kendall's method are studied in this chapter.

Chapter 6: CASE STUDIES

This chapter goes through the some village cases of the emerging features and themes are pursed through the studies at micro level, which are incorporated in this way.

Chapter 7: CONCLUSION ANS SUGGESTIONS

Finally this chapter covers important conclusions of the study region and specific suggestions are to solve the

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CHAPTER - I

PHYSICAL DETERMINANTS AND IRRIGATION

1.1 INTRODUCTION:–

Jalgaon district is known for its advances in horticulture, tissue culture, and crops in agriculture production and techniques in Irrigation. It has production of Bananas and Cotton, especially by using to drip irrigation system; it has created an imported role model for cultivators well as farmers in other parts of India. Bananas and Cotton grown in the district are exported outside the state and other countries.

In Maharashtra State, Jalgaon district famous for many places as tourism, holy places of temple, hospitality, meditation, education and co-education for women empowerment, rehabilitation and resettlement for affected in flood area, water shed management and rain water harvesting in some areas, famous for Gurukul with physical education, poetess, artist, as well as political leadership in India. Padmalaya is a holy place famous for two Ganesh temples, Muktainagar famous for Saint Muktabai birth place, at three rivers meet one place as Rameshwar destination holy of Mahadev temple in near Jalgaon. Amalner famous for big fair and rally for go to Pandharpur as Prati-Pandharpur in Aashadi-Ekadashi, and last Jalgaon known as Irrigation and Irrigation impact on agricultural land during the last decades.

1.2 LOCATION AND EXTENT OF JALGAON DISTRICT:–

Geographically Jalgaon district is one of the district of Khandesh regions and situated in North West part of Maharashtra. It is situated in the Northern part of the State abutting Madhya Pradesh and it lies between north latitudes 20°15’ and 21°25’ and east longitudes 74°55’30’’ and 76°28’30’’. The total area of the district is 11,765 sq.km, And falls in parts of Survey of India degree sheets 46 K, 46 L, 46 P, 55 C, 55 D, and 56 O. The district is bounded on the North by Madhya Pradesh State, on the east by Buldhana, on the west by Nasik and Dhule district and on the south by Aurangabad district.

The district headquarters is located at Jalgaon Town place. For administrative convenience, the district is divided in 15 talukas viz., Jalgaon,

Bhusawal, Yawal, Raver, Muktainagar, Amalner, Chopda, Erandol, Parola, Chalisgaon, Jamner, Pachora, Bhadgaon, Dharangaon and Bodwad. It has a total population of 42, 24,400 as per 2011 census record. The district has 15 towns and 1519 villages. The major part of the district comes under Tapi basin. Tapi is the main river flowing through the district. Central Ground Water Board has taken.

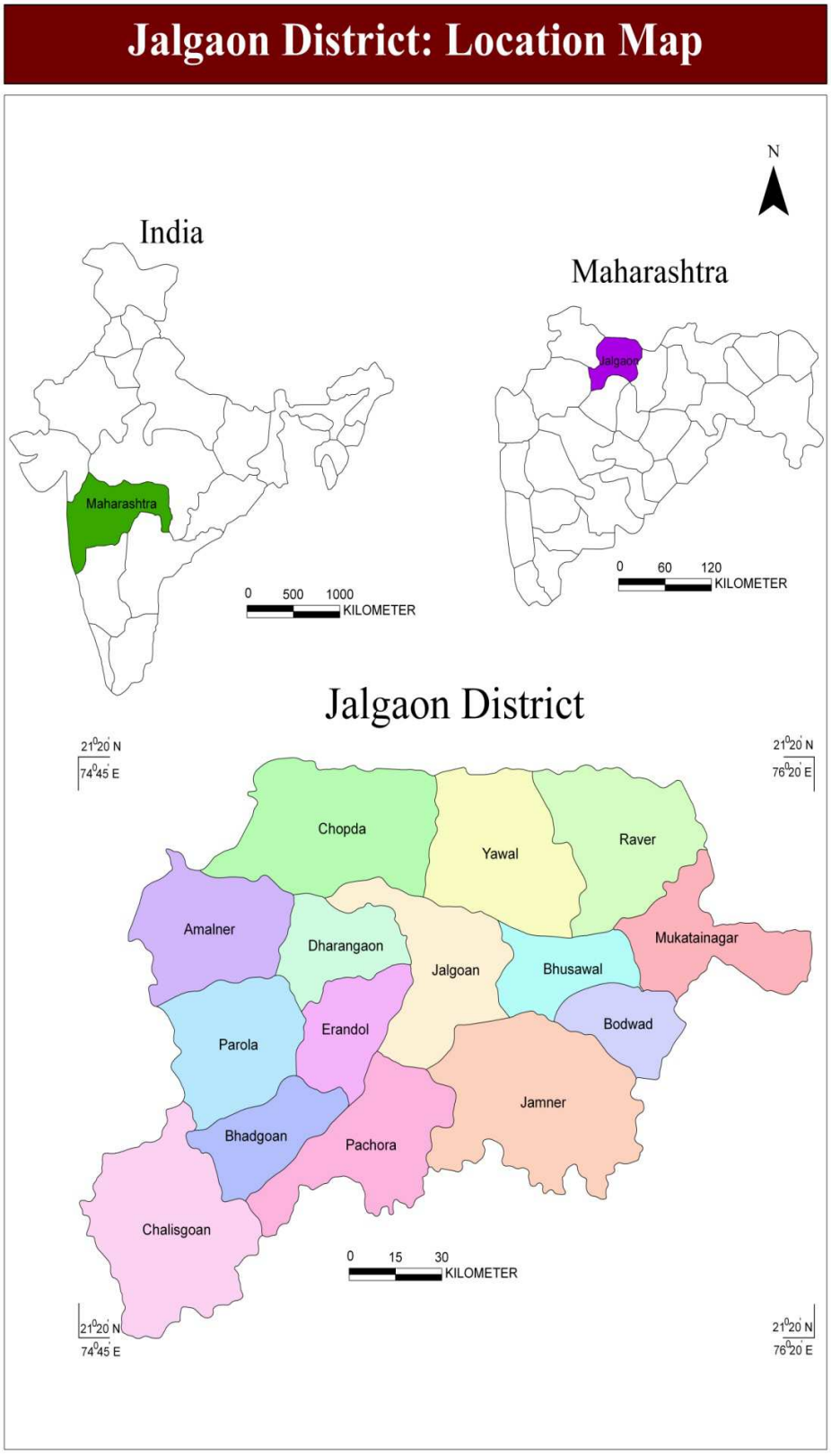
Jalgaon district is one of the most of the 36 districts of Maharashtra state. It is most technological and one of the oldest district in a state. It is popularly known as 'Khandesh' and now days known as a 'Banana City'. It come existence from 19th century, after 50 years Jalgaon established in 1960. The Jalgaon oldest name was before 50 years an 'East Khandesh and after the Maharashtra Government has changed the name and called as the 'JALGAON'.

DIFFERENCES BETWEEN NORTH AND SOUTH JALGAON DISTRICT:–

The Jalgaon district divided in to two parts, where the area is under the north and south part of a region. The north part of Jalgaon district, it has situated the upper piedmont plain of Satpuda mountain ranges and it's under the Tapi River basin, they flowing with large quantity of water and its drastic impact of this area. Most of Raver, Yawal and Chopda taluka the Tapi River can catch these taluka.

Total three taluka of district area under through Tapi basin, except Muktainagar (Tapi – Purna) taluka, the Purna river sub tributary of Tapi River flowing to this taluka and join the Tapi River at 'Changdev' Holy place in Muktainagar taluka. Those two rivers can join them and it is called as a **'Tapi – Purna River Sangam'** at Muktainagar of north east part of Jalgaon district.

The piedmount plains Satpuda mountain ranges lie between the North East to North West direction with Tapi river valley. This north part of district is highly production produce in agricultural crops with cash crops i.e. cotton, wheat, sugarcane, and banana, food grains and vegetables etc. Many variations are found in north and south of district, these characteristics are explain in next chapters. Other part of Jalgaon district is southern part, it comes under the 12 taluka (tehsils) with semi dry region with non perennial rivers which flow through this area. Girna, Bori, Waghur, Titur and Anjani River are non perennial streams can flow of this southern part of the Jalgaon district.



LOCATION MAP NO.1.1

TABLE NO.1.1 LIST OF RIVERS IN JALGAON DISTRICT

Sr. No	Name of River	Name of Taluka	Direction of flowing River	Perennial and non perennial
1	Tapi	Chopda, Yawal, Raver taluka	East to west	Perennial
2	Girna	Jalgaon taluka	South to north	Non perennial
3	Waghur	Jalgaon taluka	South to east	Non perennial
4	Aner	Chopda taluka	North to south	Non perennial
5	Panzara	Amalner taluka	South to north	Non perennial
6	Titur	Chalisgaon taluka	South to north	Non perennial
7	Purna	Muktainagar taluka	East to west	Perennial
8	Anjani	Erandol taluka	South to north	Non perennial
9	Bori	Parola taluka	South to north	Non perennial
10	Gul	Chopda taluka	North to south	Non perennial
11	Mor	Yawal taluka	North to south	Non perennial
12	Suki	Raver taluka	North to south	Non perennial
13	Agnavati	Bodwad taluka	South to north	Non perennial
14	Manyad	Chalisgaon taluka	West to north	Non perennial
15	Bahula	Pachora taluka	South to north	Non perennial
16	Hivara	Pachora taluka	South to north	Non perennial
17	Bhokar	Raver taluka	North to south	Non perennial

Source: Computed by Researcher

This area is also under the agriculture production like crops, vegetables, grains, fruits and pulses etc, so that the agriculture production are depend on monsoon season and maximum tube wells irrigation, it has to be use for artificial water support to the development of agriculture land of this region.

1.3 PHYSIOGRAPHY OF THE JALGAON DISTRICT

Physiography and its related aspects of geography is need not only for grasping geographical facts on the region but also for understanding its agricultural and irrigation development. The relief feature of the district has an immense variety not to witness to the same extent in many other districts of the

state. Various geological features are observed in Jalgaon district. Physical features detailed are as follows:

a) RELIEF FEATURE:-

Jalgaon district includes varied topographical features and landscapes, consisting of forest hills and vegetation, rich gardens and grooves, stretch of barren plain, rocky hills and bad land topography near major river banks. Regionally from east to west, parallel with the Tapi River there are three well marked belts of country; in the centre the rich Tapi valley in the north the high and Satpuda Mountain, and sout h-west by the Ajanta mountain ranges.

b) THE TAPY VALLEY:-

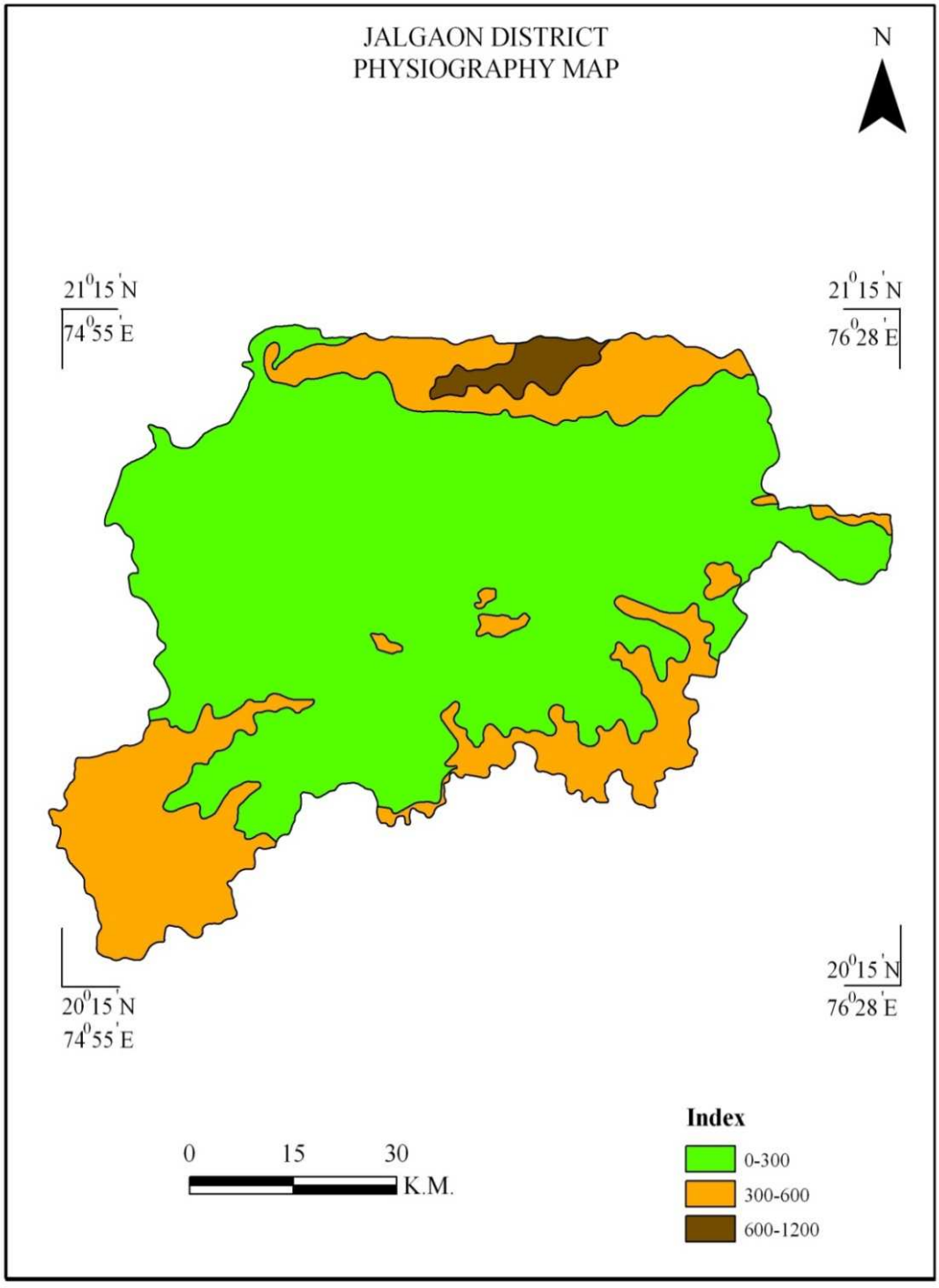
The Tapi river water is high due to heavy regional erosion flowing of the land with both sides of the district area. It run from north, north-east to south west seamed and stretch the foot of Satpuda Mountain. It comes from Burhanpur (Madhya Pradesh) to western line and long central plain near about 80 km. The Tapi enter in Jalgaon district meet to Aner and Bori River which is confluence also in Dhule district. The valley consist of alluvial plain and erosion of river as a river side of the Jalgaon district of its landscape so the soil are smooth and black, it is better for agriculture wealth of the region. All this feature impact and observation on the northern side Faizpur and Chopda and vicinity of the Girna and Waghur rivers.

c) HILLS:–

Hills/Mountain range are a physical natural relief feature on the earth surface, where the hill ranges or mountain played an important role in the district. Somewhere elevation is high and low at these mountain ranges of Jalgaon district. These are as follows:-

1) SATPUDA RANGES –

Here the Jalgaon district limits are three main hill ranges observed, the Satpuda range in the north, the Hatti hills in the south-east, and the Ajanta or Satmala ranges in the south.


JALGAON DISTRICT
PHYSIOGRAPHY MAP
N
21°15'N
74°55'E
21°15'N
76°28'E
20°15'N
74°55'E
20°15'N
76°28'E
0
15
30
K.M.
Index
0-300
300-600
600-1200

Map No.1.2

The Satpuda range a broad belt of mountain land to the north to west, stretching in a wall-like line along the north bank of the Tapi River, rise from the first range of hills, ridge behind ridge, to the central crest about 2,000 to 2,500 feet high and then slope gently to the Narmada valley range.

Among the peaks that rise upper about 3,000 feet the east looking down on Yawal taluka in Jalgaon district.

2) SATMALA OR AJANTA RANGES –

The Satmala hills ranges also known as Ajanta range or Chandor range, breaking off sharply from the Sahyadri ranges in the north-west of Nasik district, it runs about fifty miles east in a series of quaint basalt pinnacles and ridges. Near Manmad, after a gentle slope depression, it again rises about 600 feet above the plain, and forms a wall like boundary between Jalgaon and the Deccan plateau.

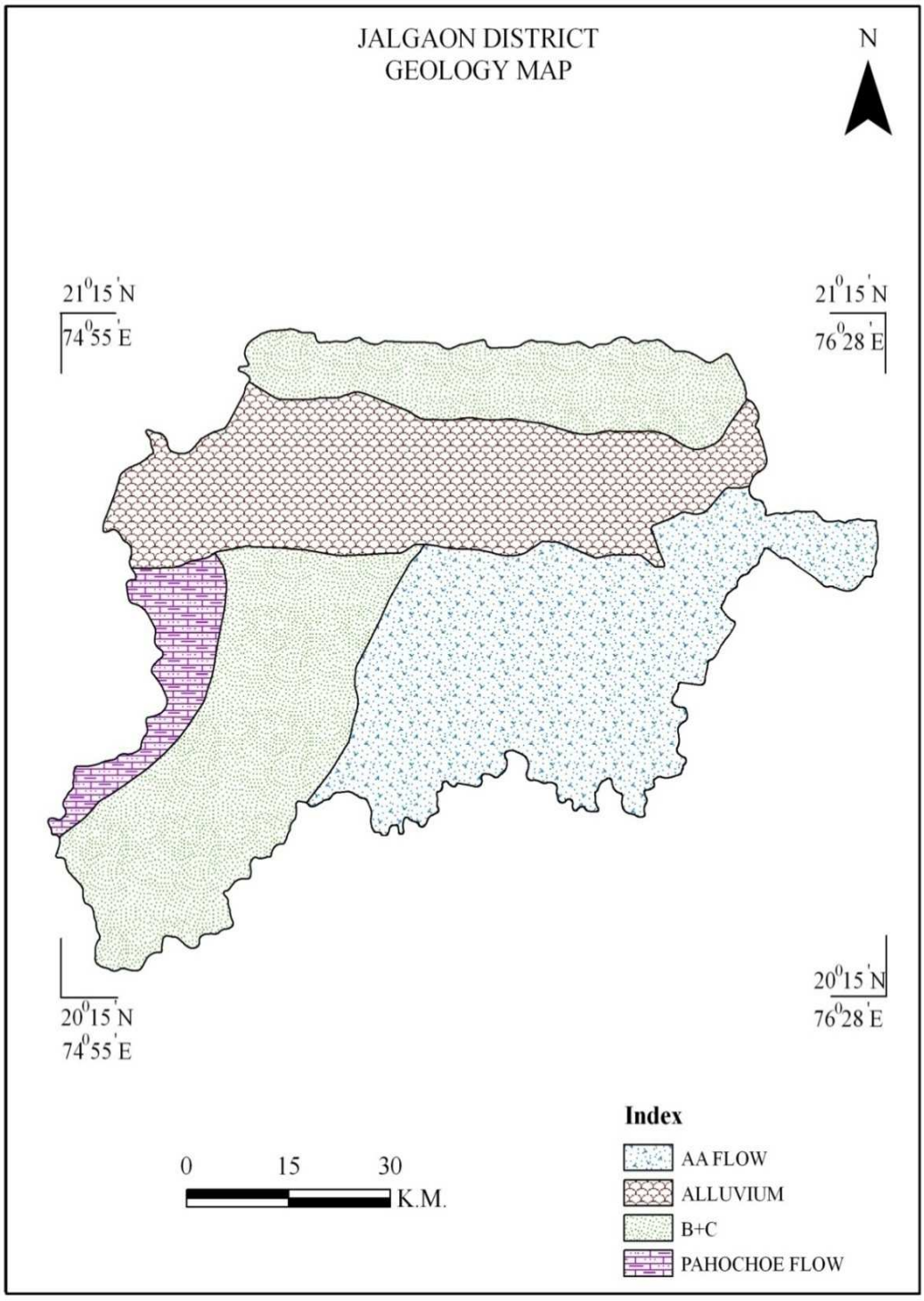
A few miles beyond Ajanta it turns south, merging in to the highlands that form the southern frontier of the Buldhana districts. As it is a narrow range, little more than the steep northern face of the Deccan table land, the Satmala contains few forest tracts. The sides, mostly bare or with a few scattered tress, have here and there strands large enough to shelter wild animals.

3) HATTI HILLS-

Hatti hills ranges located at the north east and line of the Buldhana district. In Jalgaon district Hatti hill ranges in Muktainagar, Bodwad and Jamner talukas at situated border line. This hill range height near about 500 to 1200 feet above the earth surface. Some slopes are gentle and steeply found here. Siddhagarh and Bhawanigarh peak found in this range. Climatic conditions affected from this Hatti hills, particularly rainfall and humidity in the area of Jalgaon district.

d) GEOLOGY:–

In physiography of the Jalgaon district, geologic features are observed of the district area is made up of high hill ranges on the north Satpuda mountain, alluvium in the centre and low hill ranges to the south of the Tapi.


JALGAON DISTRICT
GEOLOGY MAP
N
21°15' N
74°55' E
21°15' N
76°28' E
20°15' N
74°55' E
20°15' N
76°28' E
0
15
30
K.M.
Index
AA FLOW
ALLUVIUM
B+C
PAHOCHOE FLOW

Map No.1.3

On the north side, the hill ranges stretching east-west and form part of the Satpuda, the highest peak being about 3.500 feet. Some features like Trap rocks, Laterite, Alluvium and Crust rocks are found in region.

1.4 SOILS:–

The soils of the district are essentially derived from the underlying basalt rock, though the alluvium has a deep cover all along the broad Tapi valley range. The fertility of soils depending largely on their position vice-versa relief and their nearness to stream courses. The central belt of the wide Tapi valley, about half of the whole area, consists either of a black alluvial clay highly retentive and moisture, or of a loam overlying a stratum of yellowish clay of good depth.

On this soil, which for richness cannot be surpassed, wheat is extensively grown, in some places from year to year, without the aid of manure or change of crop. Skirting this rich tract along the base of the Satpuda where the level is somewhat higher, the soil develops poorer characters

Along the banks of the river, where the land is much cut by deep ravines, the soil is mixed or overlaid with lime nodules, and in some places the surface soil is entirely washed away or strips of rich alluvial deposit.

SOIL TYPES:-

Mostly in Jalgaon district the soils are observed in two types. Deep Black Soils and Medium Black Soils. But here in this region we observed some soils types are important role play in the district.

Soils in Jalgaon district are essentially derived from the basaltic lava flows and are classified as –

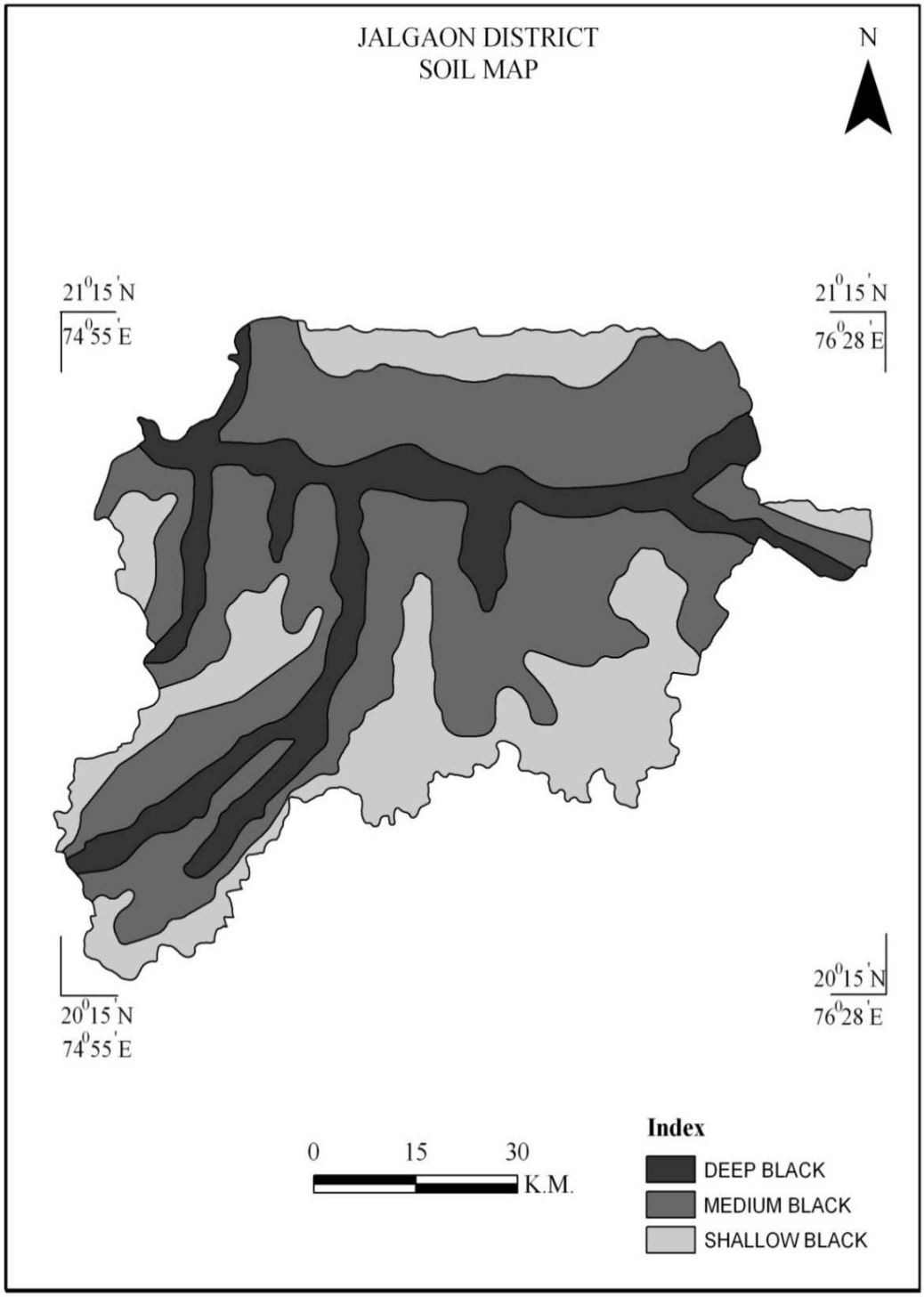
a) Deep Black Soils

b) Medium Black Soils

c) Shallow Black Soils

a) DEEP BLACK SOILS -

These soils are observed in northern part of Amalner, Erandol, Jalgaon, Bhusawal and Muktainagar talukas, soils play role of dryness and some places found has a low moisture of in the deep in the soils.


JALGAON DISTRICT
SOIL MAP
N
21°15'N
74°55'E
21°15'N
76°28'E
20°15'N
74°55'E
20°15'N
76°28'E
0
15
30
K.M.
Index
DEEP BLACK
MEDIUM BLACK
SHALLOW BLACK

Map No.1.4

This soil is rich in magnesium carbonates and calcium but poor in potash, phosphates and nitrogen, so the soil mostly clayey found in the region.

b) MEDIUM BLACK SOILS –

Medium black soils are occurring in over large areas in the district viz.; the central belt of the wide Tapi valley and southern Satpuda hills. Where the Tapi alluvial basin soils are black alluvial clay occurs in the southern parts of Yawal, Raver, Chopda, Jalgaon, Bhusawal, Chalisgaon, Amalner, and Bhadgaon taluka. Some soils could be found in dark brown in colour, where that slope mainly in Satpuda ranges. These soils belongs to basaltic lave and after extraction soil with alluminium ferrous magnesium minerals has given in the soils. So it is called "Regur". It is very useful for the growth of Cotton crop; therefore it has been named as "Black Cotton Soils". Soils are blackish and medium in size but high quantity retentive of moisture.

c) SHALLOW BLACK SOILS -

These shallow black soils are observed in the part of south east and south west in Jalgaon district. Most of the part of Amalner, Erandol, Jalgaon and Bhusawal and Bhadgaon taluka and Sandy soils observed on the foothills of Satpuda ranges and near southern hillocks portion of the district. Shallow black soils depend on climate and rainfall. In this region rainfall is very low (scanty), so the climate has dry and hot, so the soils structure has been separated and distributed its own places in this region. The soils make it unsuitable for irrigation and excessive water applied to it, water will be logged.

1.5 DRAINAGE SYSTEM:–

DRAINAGE-

The "drainage refers to river of water in excess of the quantity required for growth and development of any agriculture and man-made activity". The river water is important role for all agricultural purposes and development of the area. Drainage of Jalgaon district belongs one main river system flows on the northern boundary east to west of the district.

A main river of '**Tapi'** and its tributaries rising within the district in east to west and north-east to south-west direction of the district.

I) TAPI RIVER –

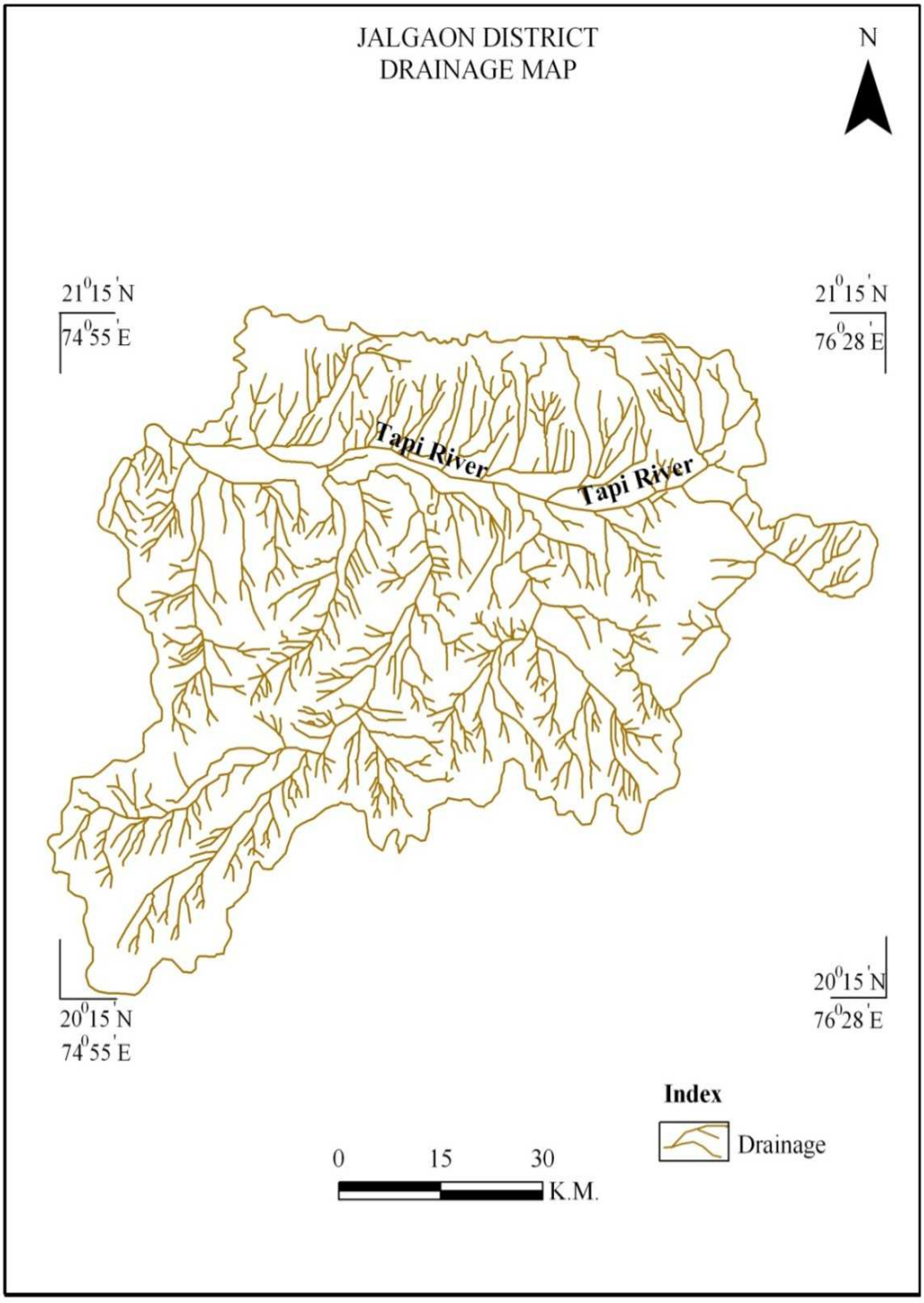
The chief feature of the district, the line to which almost it's whole surface drains, is the Tapi. With a course including meanders of about 450 miles, and a drainage area of about 30,000 square miles, the Tapi, flowing east from the highlands of Madhya Pradesh and about twelve miles west of Surat. Of the whole of its course, about 160 km. lie within the limits of Jalgaon. The main is Tapi River flowing through Muktainagar, Raver, Yawal, Bhusawal, Chopda and Amalner tehsils region from east to west direction. Practically throughout its course in this district, the valley of the Tapi is flat and well-tilled and the banks at almost every three-quarters of a mile are crowned with villages.

In their character and courses the Sahyadri streams have much in common. Starting hemmed in by spurs at right angles to the main line of the Sahyadri, they pass east, until, as the hills sink into the Jalgaon plain, they are free to follow the natural line of drainage, and turn north to the Tapi. Of these there are two chief streams, the Girna falling into the Tapi about twenty-five kilometer below the Waghur and the Bori about twenty miles further west.

II) GIRNA RIVER -

The Girna River rising in the western hills of the Kalvan village sub-division of Nasik, and fed by streams from the northern slopes of the Chandor or Saptashringi mountain range. In Jalgaon, except in one or two places where it is rocky hills, the Girna, with a broad sandy bed relief feature, flows through a well-tilled valley gradually spreading into the great central plain.

Girna river waters, both in Nasik and Jalgaon, are much used for irrigation. In Nasik lately repaired dams and channels water many of its upland valleys, and in Jalgaon, about ten miles north of Chalisgaon, the Jamda canals stretch east for about twenty-seven miles on the left and twelve miles on the right bank.


JALGAON DISTRICT
DRAINAGE MAP
N
21°15'N
74°55'E
21°15'N
76°28'E
Tapi River
Tapi River
20°15'N
74°55'E
20°15'N
76°28'E
Index
Drainage
0
15
30
K.M.

Map No.1.5

III) WAGHUR RIVER -

The Waghur river rises in the southern parts of Jalgaon district, where it flowing in Bhusawal taluka on the slopes of southern Ajanta range. Its flows for 88 km, in south to north direction between northeast to south east of Jalgaon district.

IV) BORI RIVER -

The Bori river, with a course of about 56 km. rising in the Malegaon sub-division of Nasik, drains in its upper reaches parts of Dhulia, and has a somewhat parallel course about fifteen miles north of the Girna. In the Jalgaon district, the river has a course of about thirty-five miles; for about ten miles it maintains an easterly course, and then, with rather a sudden turn, flows north for about twenty-five miles, where, taking another bend, it sets to the north-west joining the Tapi about twenty miles below the Girna. Like the Girna, in its upland valleys, the waters of the Bori are much used for irrigation.

1.6 FOREST:–

In earth surface "**FOREST"** is the dominant natural vegetation cover in India. They occupy **19.27 %** of the country's area. Most of the plant cover is in a degraded of the district of a state, i.e. low in quantity and content. The total forest cover in the Jalgaon district is near about (17%) **16.96 %** of the geographical area. Amount of rainfall is the effective factor for the thick growth of forest.

The natural vegetation refers to plant community that has been left undisturbed over a long time, so as to allow its individual species to adjust them to climatic and soil conditions as fully as possible. Northern part of district, vegetation is under the cover of Satpuda Mountain. There are two types of vegetation are found in the district i.e. tropical thorn and tropical dry deciduous forest.

Dry deciduous forests are similar to the moist deciduous. They occur in areas receiving annual rainfall between 100-150 cm in dry season. A variety of forest products is collected from these forests.

TABLE NO.1.2 TALUKA WISE AREA UNDER THE FOREST IN JALGAON DISTRICT (1990-95 & 2005-10)

Sr.No	Name of Taluka	1990 – 95 area under forest (hectares)	2005 – 10 area under forests (hectares)	Volume of Change in percentage at (1000 hectares)
1	Jalgaon	1430	4317	6.17
2	Chopda	2320	13151	3.05
3	Yawal	3010	30118	9.05
4	Raver	3500	25000	8.75
5	Muktainagar	1220	12150	1.46
6	Bhusawal	930	5213	4.83
7	Jamner	3110	16800	4.97
8	Pachora	720	7246	5.18
9	Chalisgaon	2600	15976	3.09
10	Bhadgaon	780	7548	5.85
11	Parola	1290	7422	9.54
12	Erandol	880	2425	2.11
13	Amalner	190	1905	0.36
14	Dharangaon	N.A	2327	2.3
15	Bodwad	N.A	4096	4.0
	Total Area under Forest	**21980**	**155694**	**70.71**

Source: Computed by Researcher and Socio – Economic Abstract of Jalgaon District (1990 – 95 & 2005 - 10)

The Forest is the play a dominant role in Maharashtra as well as Jalgaon district. The land of forests is vey less in India and Maharashtra, the present forest area have been brought under the agriculture and settlement.

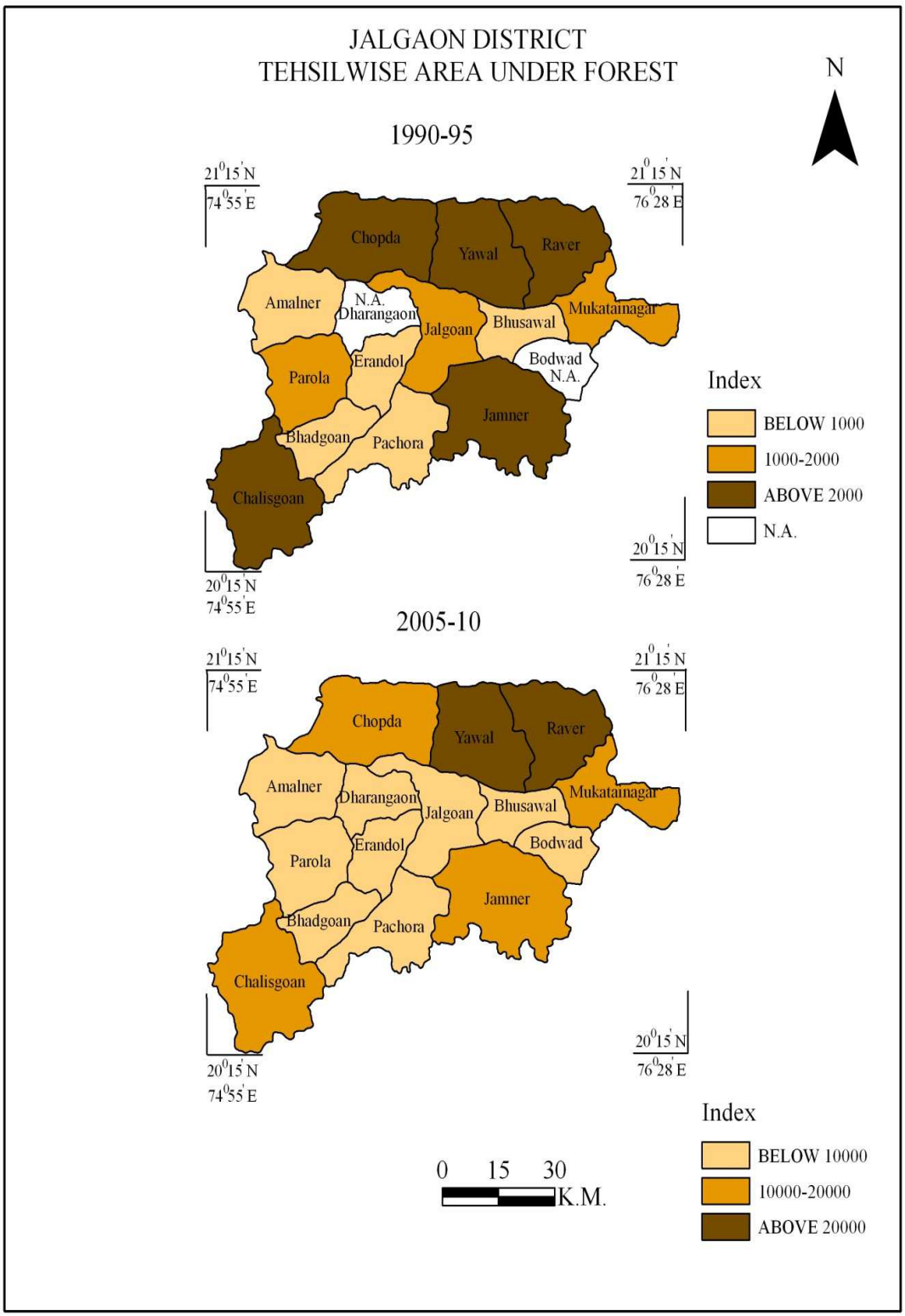
The total of the reserved forests of Jalgaon district is about (1707.58 Sq.km) it shows in table no1.2, which can be roughly brought arranged under three groups.

The forest area which forms near about 17% of the total area of this district exhibits different types of soil from steep hill slopes of the Satpuda, Satmala and hill of Muktainagar peat to undulating ground and almost flat portions of the middle and southern part of the Jalgaon district.

TABLE NO.1.3 TALUKA WISE DISTRIBUTION OF FOREST AREA IN JALGAON DISTRICT 2010

Sr.No	Taluka of Jalgaon District	Forest Area Sq. Km
1	Chopda	182.13
2	Yawal	308.18
3	Raver	264.05
4	Muktainagar	132.57
5	Bhusawal	29.60
6	Jamner	155.72
7	Pachora	72.46
8	Chalisgaon	121.11
9	Bhadgaon	78.49
10	Jalgaon	142.68
11	Parola	98.59
12	Erandol	24.26
13	Amalner	21.90
14	Dharangaon	19.47
15	Bodwad	56.37
	Total	**1707.58 Sq.Km**

Source: Computed by Researcher


JALGAON DISTRICT
TEHSILWISE AREA UNDER FOREST
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
BELOW 1000
1000-2000
ABOVE 2000
N.A.
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
0 15 30
K.M.
Index
BELOW 10000
10000-20000
ABOVE 20000

Map No.1.6

1.7 CLIMATE:–

The climate of the district is characterized by a hot in summer and general dryness during the major part of the year except south west monsoon season. So there are a number of important elements of the climatic condition overall the district, are as follows -

1) SEASONS -

Climatic conditions depend on monsoon or seasonal winds causing by heating and cooling of land masses and water bodies of surrounding area of region. In Jalgaon district is generally dry and hot except in the monsoon season. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to May. June to September is the monsoon season and October and November form the post-monsoon season.

2) RAINFALL -

Records of rainfall in the district are available for 13 stations for periods extending over 70 years. The details of the rainfall at the thirteen stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 740.7 mm. About 87 per cent of the annual rainfall is received during the monsoon months of June to September, July being the month with the highest rainfall. The central parts of the district comprising the talukas of Jalgaon, Bhusawal, Jamner and Pachora get a little more rain than the rest of the district.

During the fifty-year period, 1901 to 1950, the year 1931 was the one with the highest rainfall amounting to 161 per cent of the normal. In 1918, the year with the lowest rainfall, only 53 per cent of the normal rainfall was received. In the same fifty-year period there were 11 years when the district as a whole received less than 80 per cent of the normal rainfall.

Rainfall less than 80 per cent of the two consecutive years is not rare. Considering the district as a whole this has occurred twice. At some individual stations three such occasions have been recorded. Jamner had three consecutive years of low rainfall during 1923 to 1925 while at Muktainagar the period 1922 to 1926 was one of low rainfall.

TABLE NO. 1.4 ANNUAL RAINFALL DATA IN JALGAON DISTRICT

1998-2001 (in mm)

Sr. No	Taluka	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average
1	Jalgaon	803.40	606.00	740.00	772.00	939.70	1192.00	531.00	506.52	1444.20	974.23	821.03
2	Bhusawal	954.00	486.03	705.02	574.00	788.90	973.00	586.00	535.20	1420.00	674.02	749.27
3	Yawal	867.20	369.04	769.01	557.02	744.80	970.22	694.20	573.10	1458.02	565.01	776.95
4	Raver	1019.03	786.05	335.00	508.01	826.60	800.10	728.14	449.12	1232.05	569.10	721.99
5	Muktainagar	1023.55	597.00	495.11	607.08	939.40	705.12	732.33	508.20	1306.03	788.00	747.99
6	Amalner	1013.23	786.00	321.01	598.20	530.20	826.00	718.25	398.10	950.04	669.40	667.19
7	Chopda	1012.00	430.03	475.06	578.44	877.20	1064.00	622.30	443.30	1457.00	747.00	767.67
8	Erandol	1010.01	717.01	515.33	701.20	870.20	950.00	589.12	509.23	1334.00	637.20	778.78
9	Parola	1036.02	832.11	520.22	824.10	691.12	956.03	611.00	562.45	1441.05	627.10	807.31
10	Chalisgaon	1183.03	632.10	536.20	666.33	952.20	1158.05	506.00	379.20	1039.06	531.00	735.72
11	Jamner	1104.00	695.05	620.00	857.10	770.11	994.00	722.00	607.10	1103.00	834.30	830.84
12	Pachora	1102.05	553.03	384.00	588.20	587.32	985.22	566.06	588.00	984.00	536.00	698.96
13	Bhadgaon	1137.09	659.22	480.00	644.00	605.50	1067.00	628.05	662.00	1033.20	481.00	739.89
14	Dharangaon	1010.00	NA	490.00	617.00	651.40	924.33	745.04	633.00	1425.00	676.00	717.32
15	Bodwad	954.00	NA	435.00	839.00	663.10	765.11	815.00	481.02	1277.00	543.10	677.58
16	**Average**	1025.08	526.76	495.03	660.24	757.83	848.77	652.92	522.49	1260.34	641.87	749.23

Source: www.agri.mah.nic.in

After years the highest rainfall data are recorded in 2006 year of the Jalgaon district. maximum rainfall availability are fallen in Jalgaon, Bhusawal, Yawal, Raver, Muktainagar, Chopda, Erandol, Parola, Chalisgaon, Jamner,

Dharangaon, Bhadgaon and Bodwad taluka are fall above 1000 mm rainfall of this area.

The measure of rain fall that in any brief spell of times is normally much more significance than the average or actual over a long period. What matters is therefore the concentrations and calculating the intensity of rainfall or evapotranspiration. These determine the effectiveness of rainfall either collectively or individually.

The climatic hazard to farming when it is characterized with scantiness and concentration. It is all the more important in the less rainfall regions where the average or normal rainfall is generally necessary for successful crop production.

Available records of rainfall in the Jalgaon district 1998 to 2001 from the 13 Rain Gauge stations are shown in table no.1.4.

2.1 Intensity of Rainfall:-

The term intensity of rainfall is used here to context of rainfall received during 24 hours. It is calculated by employing the formula propounded by Wilkinson method (1967).

Formula is,

$$I = \frac{A}{X}$$

Where, I – Intensity of rainfall

A – Annual rainfall

X – Number of rainy days

Calculating the intensity of rainfall in Jalgaon district shows all variables in table no. 1.5. With Talukawise millimeter of rainfall data. The intensity of rainfall which varies from taluka to taluka of Jalgaon district. Above 12 millimeter rainfall intensity was experienced in Jalgaon, Bhusawal and Bodwad taluka.

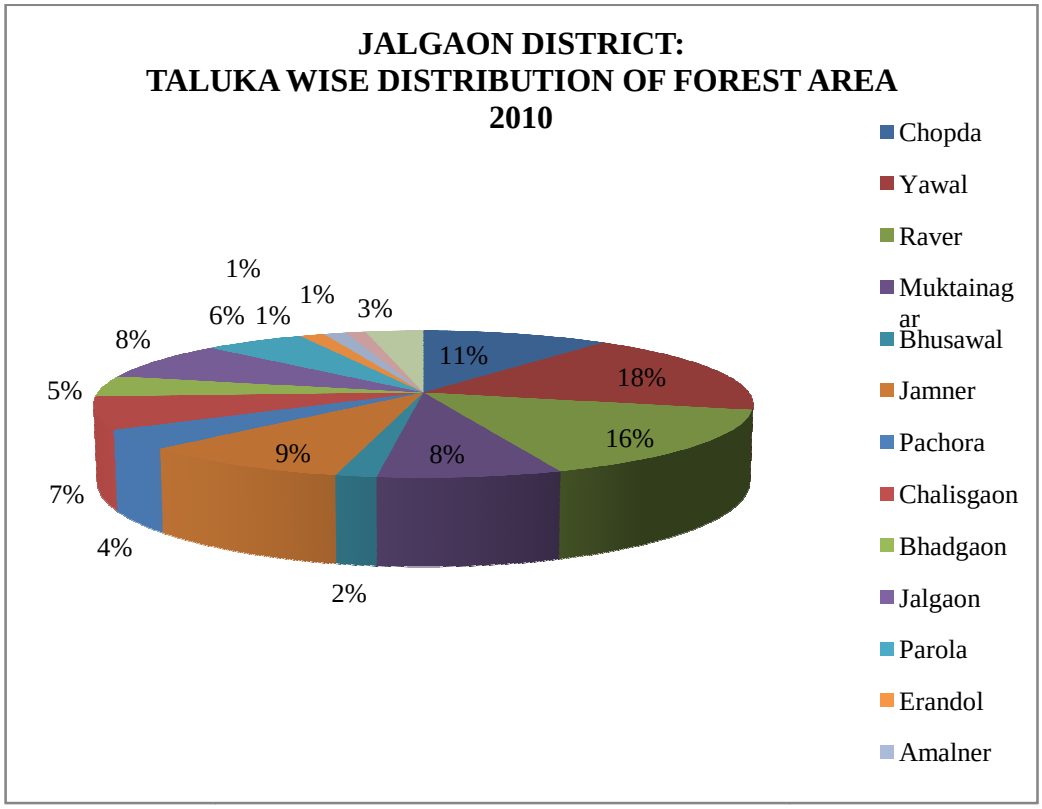
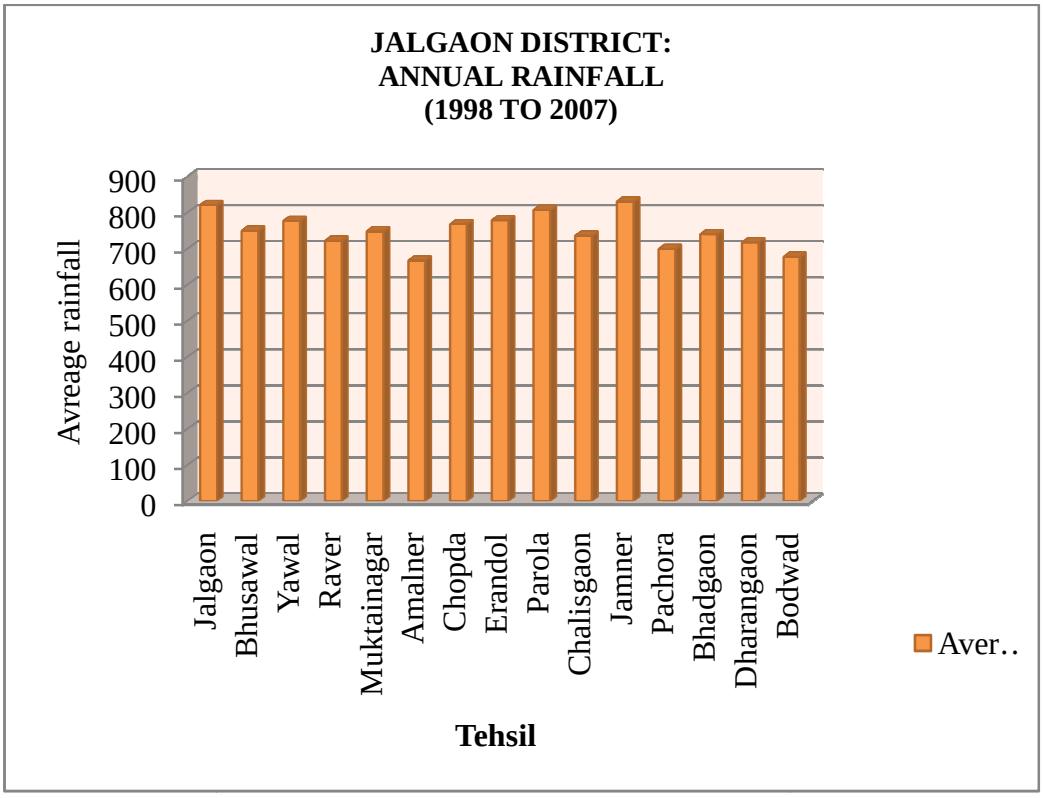


Diagram No.1.1



Graph No.1.1

TABLE NO.1.5 TOTAL TALUKAS RAINFALL INTENSITY OF THE JALGAON DISTRICT (2010)

Sr.No	Talukas	Total Rainfall Intensity
1	Jalgaon	12.24 mm
2	Bhusawal	12.01 mm
3	Yawal	11.03 mm
4	Raver	10.96 mm
5	Muktainagar	9.99 mm
6	Amalner	8.89 mm
7	Chopda	11.02 mm
8	Erandol	11 mm
9	Parola	10.07 mm
10	Chalisgaon	0.98 mm
11	Jamner	11 mm
12	Pachora	10 mm
13	Bhadgaon	11 mm
14	Dharangaon	10.95 mm
15	Bodwad	12.9 mm
16	**Total = 15 Talukas**	**District Average = 14.75 mm**

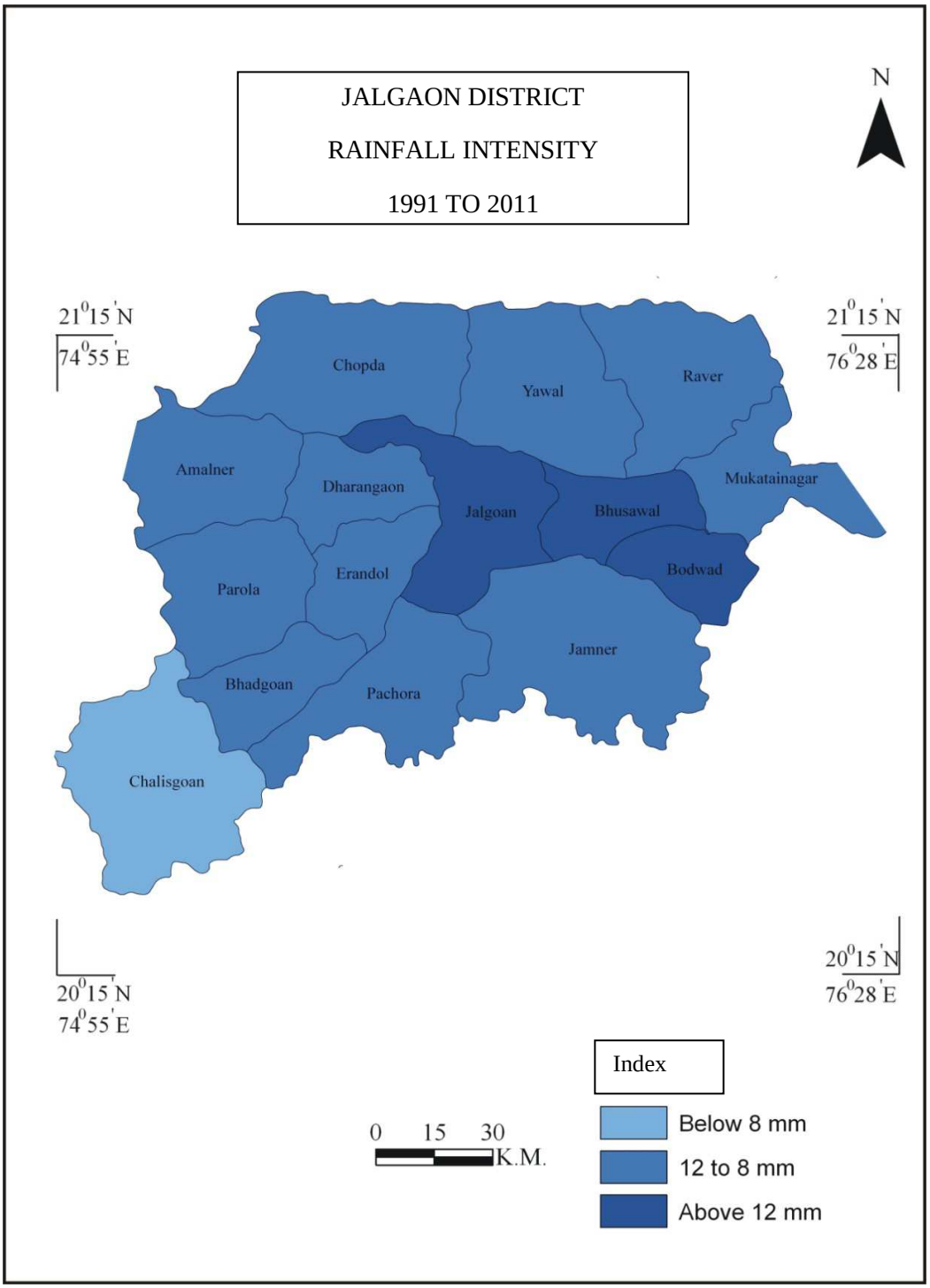
Source: Computed by Researcher

While the intensity of 10 to 12 mm are noted in Yawal, Raver, Chopda, Erandol, Parola, Jamner, Pachora, Bhadgaon and Dharangaon talukas. But very low rainfall intensity is observed below 10 mm in Muktainagar, Amalner and Chalisgaon taluka.

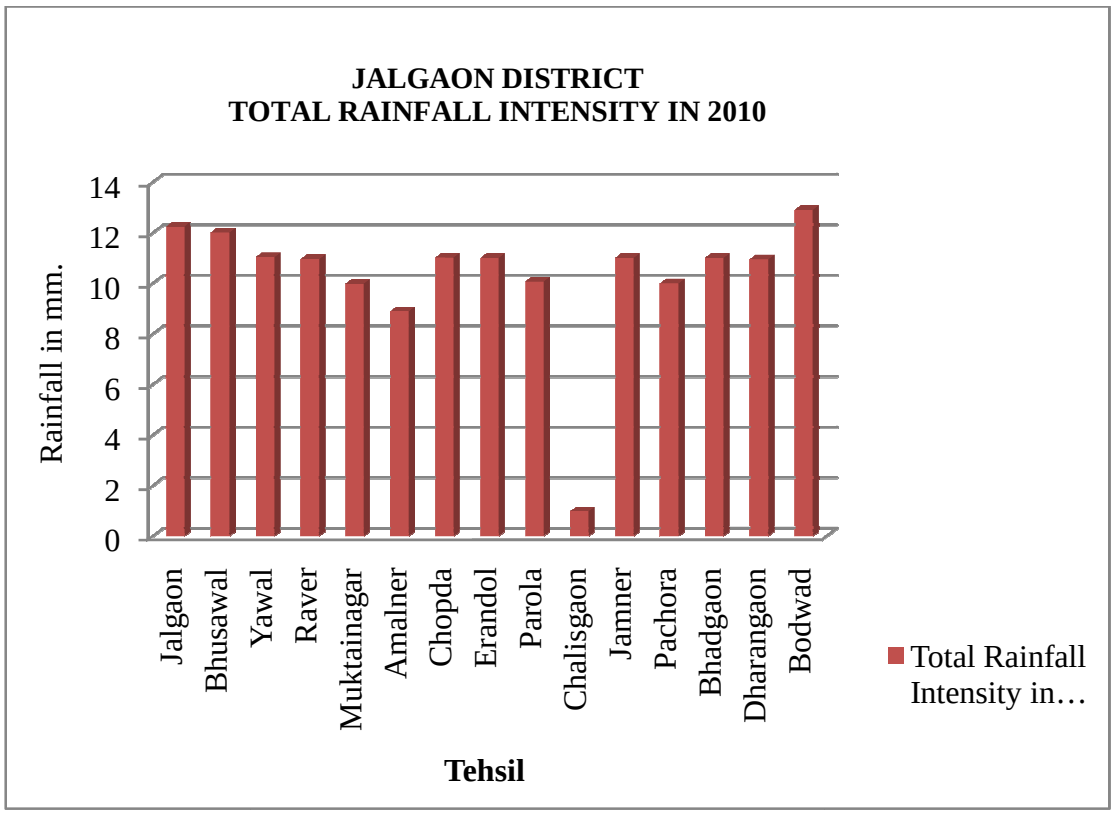
Generally, the climatic conditions are favorable in the north eastern talukas for the cultivation of seasonal and annual crops. The distinctly dry weather season in the western and southern part of Jalgaon district, discourages the cultivation of perennial crops. This clearly indicates the need of irrigation as mainly in the central and north eastern center parts of the district.

3) TEMPREATURE -

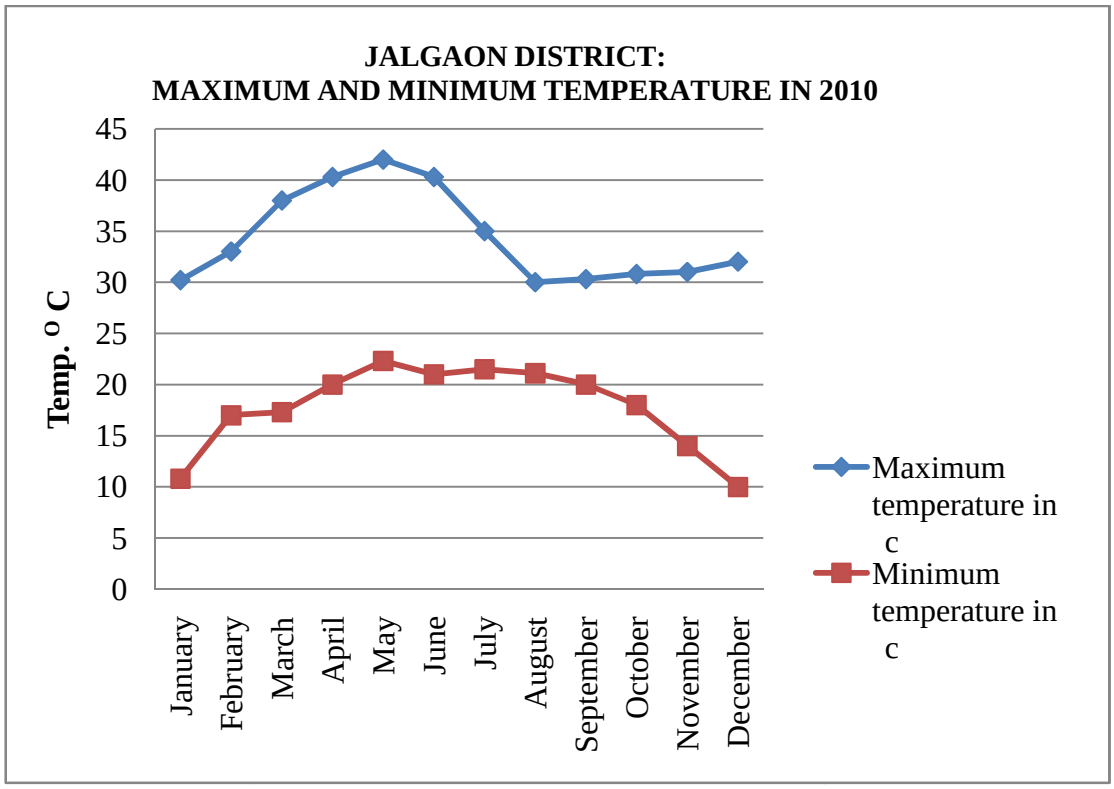
Temperature conditions have been far less erratic from year to year than rainfall conditions in each agricultural region. Each crops plant needs a certain number of effective heat units for germination, growth, stalking, maturing a ripening. This is called the thermal constant and varies from crop to crop. Temperature above the minimum is, therefore the effective in furthering the growth of a plant towards maturity and ripening.


JALGAON DISTRICT
RAINFALL INTENSITY
1991 TO 2011
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
Below 8 mm
12 to 8 mm
Above 12 mm
0 15 30
K.M.

Map No.1.7



Graph No.1.2



Graph No.1.3

Jalgaon is the main meteorological observatory station at Nashirabad village (Jalgaon Taluka) in the district. Temperatures begin to rise steadily from about the beginning of March and by May, the hottest month of the year; the mean daily maximum temperature reaches 42.5°C (108.5°F.) The highest maximum temperature recorded at Jalgaon was 47.8C (118.0° F.)

Actually temperature in Jalgaon district mostly dry and hot in condition. Very hot temperature in summer season and dry in winter season, both these climatic factors impact overall in the district during the investigation period. The monsoon period is generally pleasant.

4) HUMIDITY -

Humidity means the amount of water vapour present in the atmosphere at a particular time and place. The humidity in Jalgaon district except during the monsoon the air is generally dry because the possibility of precipitation is determined by the humidity, particularly in the afternoons and summer is the driest part of the year because the humidity capacity is related to the temperature lie higher the temperature high the humidity capacity and lower the temperature lower the humidity capacity.

5) CLOUDINESS -

Skies are generally clear or light clouded except during the monsoon period when heavily cloud to overcast conditions prevail. Skies are heavily clouded to overcast during the monsoons period months of (July to September) in the post monsoon months (October to December) to the cloudiness decreases. In the rest of i.e. pre-monsoon period the skies are cleared in the Jalgaon district.

6) WINDS -

In summer, winds are generally light in the mornings and blow from directions between south-west and north-west. In the afternoons they strengthen and sometimes veer to a northerly or northeasterly direction. In the monsoon months winds are stronger and blow predominantly from south-westerly or westerly directions.

TABLE NO.1.6 - MAXIMUM AND MINIMUM TEMPERATURE IN JALGAON DISTRICT: 2010

Sr. No	Name of Month	Maximum in temperature °c	Minimum in temperature °c
1	January	30.2	10.8
2	February	33	17
3	March	38	17.3
4	April	40.3	20
5	May	42	22.3
6	June	40.3	21
7	July	35	21.5
8	August	30	21.1
9	September	30.3	20
10	October	30.8	18
11	November	31	14
12	December	32	10
	Total District Average	**32.9**	**17.8**

Source: Socio-Economic Abstract of Jalgaon District-March 2010

1.8 AGRO-CLIMATIC ZONES:-

Maharashtra state is divided into nine Agro-Climatic Zones on the basis of climate, soils, and cropping pattern which in turn is determined by combination of the two factors. Jalgaon district is broadly divided into three categories or properly zones namely as –

a) Scarcity Zone
b) Transition Zone
c) Heavy Rainfall Zone

a) Scarcity Zone -

Out of 13 talukas in the district as many as 12 talukas and one third part of the south eastern part of Pachora taluka comes the scarcity zone i.e. 90% of the observing area. And other taluka Jalgaon, Muktainagar, Bodwad, Bhusawal, Jamner, Parola, Erandol, Dharangaon, Chopda, Amalner and Chalisgaon with the range of the annual rainfall in this part varies between 430 mm to 620 mm. the major soil group of this zone is dark brown soils varying depths and comprises three types of soils etc.

TABLE NO.1.8 AGRO-CLIMATIC ZONE IN JALGAON DISTRICT

Sr. No	**Agro-Climatic Zones**	**Number of Talukas (shows in %)**	**Name of Talukas**
1	Scarcity Zone	(90%), 12	Jalgaon Muktainagar, Bodwad, Bhusawal, Jamner, Parola, Erandol, Dharangaon, Chopda, Amalner, Pachora, Chalisgaon
2	Transition Zone	(4%), 001	Bhadgaon
3	Heavy Rainfall Zone	(6%), 002	Yawal, Raver,
4	**Total =**	**100% (15)**	**15**

Source: Computed by Researcher

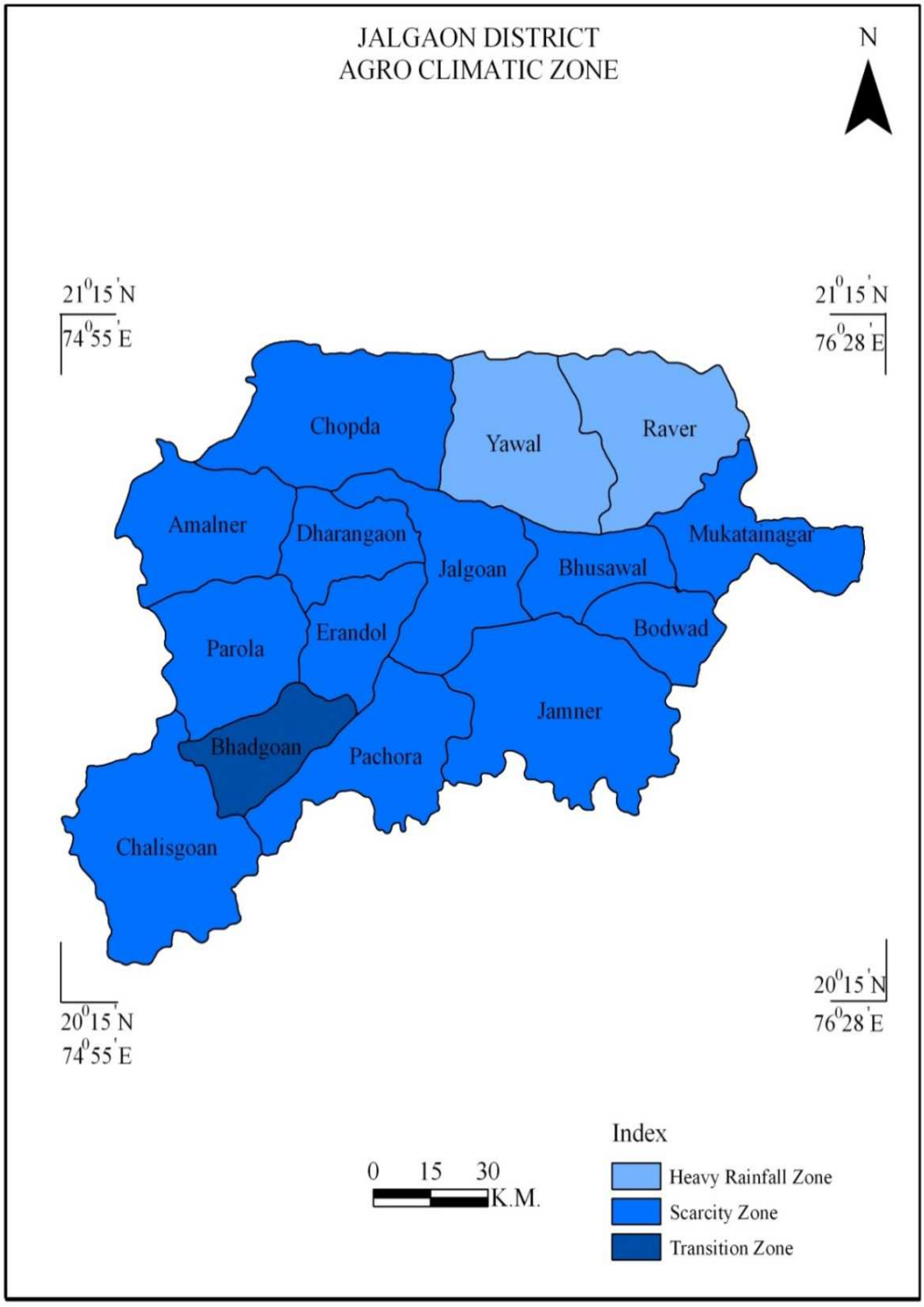
b) Transitions Zone -

This second zone covers only the middle part of Jalgaon district or taluka, i.e. 4% of the study area receiving the rainfall between 700 mm to 800 mm.

The soils group consists of dry soil of red brown colours with varied depth and texture. Non-laterite red to reddish brown, shallow light texture soils and brown to dark brown soils are observed only one Bhadgaon taluka of Jalgaon district.

c) Heavy Rainfall Zone -

This zone covers hilly terrain including Satpuda ranges and southern sloping land with variable altitude between 800 to1150 meters and receives rainfall more than 800 mm. Mostly Yawal and Raver taluka of the district that main fact of important soil types found in this region are high level, red to radish black laterite soil with black alluvial clay and dark brown soil which is called as a ‘Regur Soil’ or ‘Black Cotton Soil’ in this region, because these soils are mostly using in cotton & sugarcane crops production. So it is well known as ‘Black Cotton Soil’.


JALGAON DISTRICT
AGRO CLIMATIC ZONE
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
Heavy Rainfall Zone
Scarcity Zone
Transition Zone

Map No.1.8

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2) Gazetteer of India, Maharashtra State, Jalgaon District 1986, P.22

3) Government of Maharashtra (198 1-2001): "District wise General and Statistical Information of Agriculture Department", Part 2, Epitome of Agriculture in Maharashtra.

4) Singh, Jasbir and Dhillon, S.S (1995): "Agriculture Geography", Tata Mc-Graw – Hill Publishing Co. Ltd. New Delhi, pp. 70-86.

5) Socio-Economic Review and Statistical Abstract, Jalgaon District, (1991 – 2011)

CHAPTER - II

DEMOGRAPHIC CHARACTERISTICS AND IRRIGATION

2.1 INTRODUCTION:-

Demographic means a human population, Population character is an important role and important resources of any country or state. Human resources have been defined as “energies”, skills, talents and knowledge of the people which should be applied to the production of goods and rendering useful services.

Human resources are the wealth of the nation. Man himself is an element of nature but he does not a passive role like minerals or timber. He performs an active role as he is separated from other natural elements by his capacity to think and behave accordingly. Hence, human is a position to use the natural resources to his greatest benefits.

Man plays a dual role in economic activities as producer and consumer of goods and services. His mental capacity is unlimited. Because of this unique quality, he uses natural resources for his maximum benefit.

That’s why in the economic development of any country or a region. A man power is considered as one of the very important resources. Adequate and skilled man power is essential for any successful commercial activity. Hence, it is necessary to study the various aspects of population in our country and state.

2.2 POPULATION GROWTH IN JALGAON DISTRICT –

After Independence, the Government of India has adopted the concept of planned growth for welfare of the society; accordingly the Five Year Plan had been designed and implemented. The focal point of welfare schemes under F.Y.P is accent of human being hence the result of population census are of immense important of planning. The census also provides various socio-economic information thereby indicating status of country or state which helps to set the goals and achieve.

Maharashtra is the second largest state in India, after Uttar Pradesh as far as population is concerned, the total area has been occupied 9.37% of the area of India;

And Jalgaon district is the fifth in position similar to other district in Maharashtra. After independence population of Jalgaon district increasing in yearly period of 1961-1970, 1971-80, 1981-90, 1991-2000, 2001-2010 per ten years, where the last twenty years population has rapidly increasing but 2001 constant of portion in the district, similar to before twenty years.

The Maharashtra state was separate in 1st May 1960. In the year of 1960-80 growth rate are minimum average of the year, it means slow & fast processes increasing and 1981-1990, 1991-2000, 2001-2010 this year's population of Jalgaon district are increasing with so many physical and social factors are responsible for increase. Ex-Employment, safety for living, satisfaction, good infrastructure, climate, life-style, education, income sources, medical facility, transportation, industrialization, available water for maximum using and many more sources, etc.

In Jalgaon district an Irrigation development not only depends upon physical environment but also on demographic factors of the region. Agriculture is, of course a greatly affected by climate, temperature and rainfall availability but ultimately it is an outcome of human efforts, in which human population plays an important role.

Obviously the physical attributes of an area become resources only when the people living there are able to using them. Whether to accept and apply irrigation methods to developing for agriculture is to decision making factor of the man who practices in agriculture. Therefore, the man's role in irrigation is of great importance in his life.

GROWTH OF POPULATION IN JALGAON DISTRICT:

Growth of population, density of population, sex ratio, literacy and occupational structure are the elements of population are important in the social, cultural and economic development of the Jalgaon district. An attempt has been made to assess growth of population, fertility and mortality rate, density of population, literacy ratio, human population in relation to cultivated area and the irrigated area, the special characteristics of farmer. The land tenure system, size of land holdings in relation to cultivated area in general and irrigated area in particular.

All these aspects collectively influence on the development and impact on irrigation and agriculture as well. This analysis of different elements of population is as follows:-

A) POPULATION GROWTH:-

The growth of population in any area is an index of its economic and social development and its awaking and many others characters. The growth of population is one of the significant factors associated with man's occupancy. In other words, it flows in size from time to time and people migrate temporarily or permanently both within the administrative boundaries and across them.

The growth of population means any changing in population number. If these changes are a negative direction then population increases. In the present chapter we are discussing about the related of growth of population and its element or demographic factors since 1951 in entire study region.

THE GROWTH OF POPULATION SINCE 1951:-

The growth of population may be approached just taking into consideration the next growth of population over the basic year may approach the growth of population. The following formula is used to calculate the growth rate of population.

Formula are –

$$r = \frac{Pn - Po}{Po} \times 100$$

r = denotes growth rate of population

Pn = denotes current year of population

Po = denotes base year of population

We have taken into consideration the last six decades of population in Jalgaon district (1951-2011). The growth rate of population has a great significance for the geographers.

The given table no.2.1 shows that the total population has constantly increased from 1951 to 2011. The highest increase was observed in the decades of 1971 to 1981 (23.32%) where as the lowest increase was recorded in the decades of 1951to 1961 (11.46%). Rural population showed decreased between 1951 to 1961 due to some diseases and other natural causes like flood and draught.

TABLE NO.2.1 GROWTH RATE OF POPULATION

IN JALGAON DISTRICT, SINCE 1951

Census	Growth in Decades			
Years	Total (%)	Rural	Urban	Decadal
1951	1471351	68.20	31.80	11.46%
1961	1765047	77.5	22.5	19.96%
1971	2123121	76.4	23.6	20.29%
1981	2618274	74.9	25.1	23.32%
1991	3187634	72.6	17.4	21.75%
2001	3682690	71.4	28.6	15.53%
2011	4224440	68.2	31.8	14.70%

Source: Socio-Economic Abstract of Jalgaon District– 2011

The highest positive change in rural population growth was experienced in a year of 1971 to 1981decades, the percentage of decades (76.4%), the highest positive change in urban population growth was recorded during 1951to 1961 (31.80%) where as the lowest growth was observed in 1981 to 1991(17.4%) decades in urban population in Jalgaon district.

2.3 POPULATION DENSITY:-

For studying the pressure of population on agricultural land. The various land use of densities such as crude, physiological and agricultural are computed. If the density of population is very high, there would be abnormal pressure on land and if the land area is not sufficiently productive over the population will be result. A region having higher man-made ratio at early stage of development will have unemployment problem.

A higher density will indicate a lower standard of living and less mobility of labour. A higher density of population will also simply greater economic and an obvious use for a improving the standard of living, a greater struggle for existence and continuous competition.

CRUDE DENSITY:-

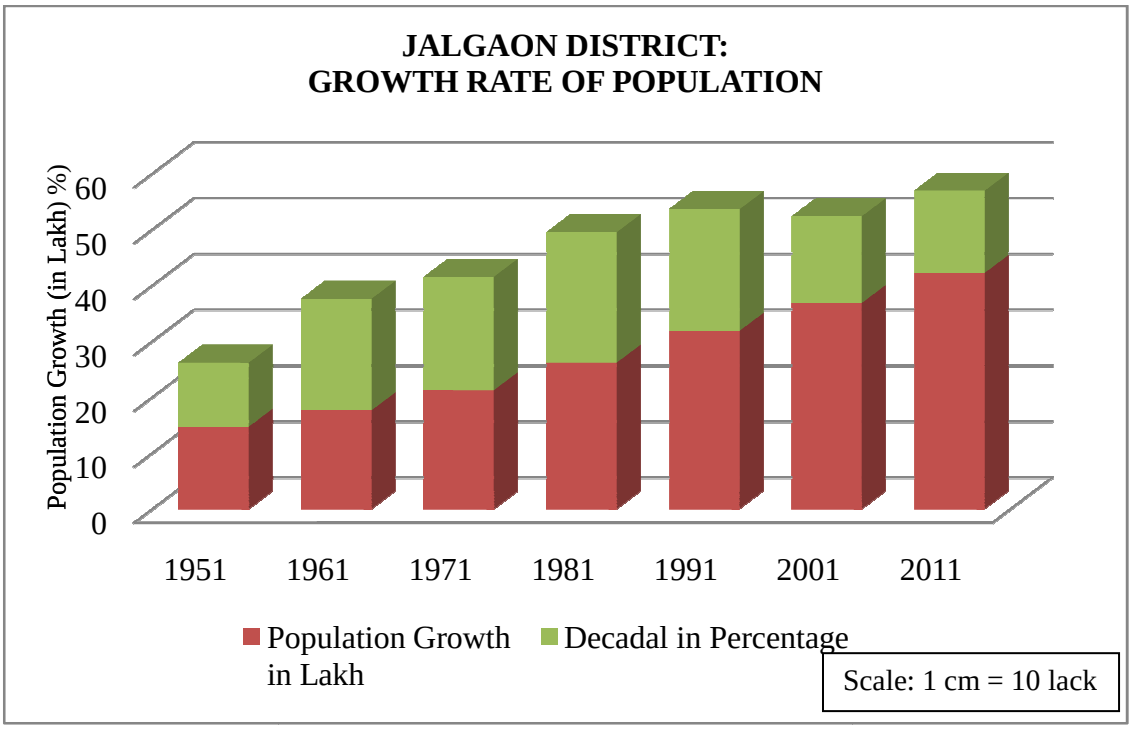
Crude density shows a general condition of population pressure on land in study region. Crude density is a simple statistical ratio which is computed by dividing total population by a total geographical area. The crude density of population in Jalgaon district was 270 Sq.Km recorded in 1991 and 2001 the crude density of district was 313 Sq.Km and year 2011 was record a crude density is 359 Sq.Km.

TABLE NO.2.2 CRUDE DENSITY OF JALGAON DISTRICT AND PERCENTAGE INCREASES

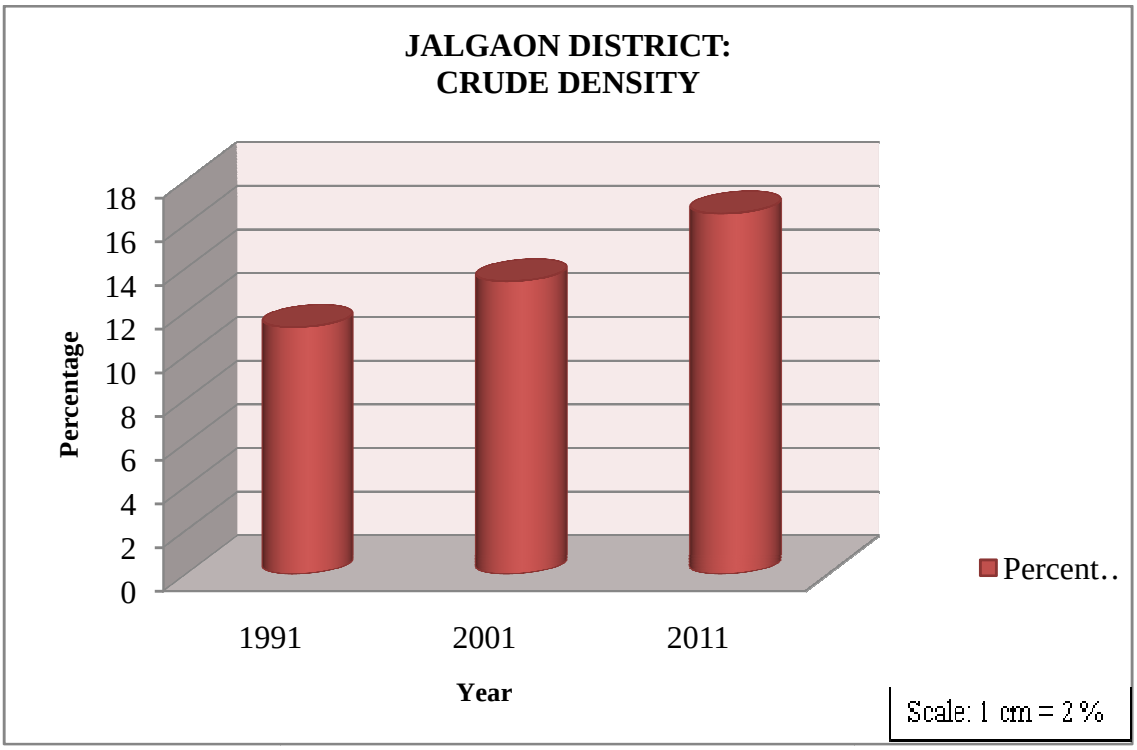
Sr.No	Years	Crude Density	Increase Ratio	Percentage
1	1991	270 sq.km	4.2	11.30%
2	2001	313 sq.km	4.3	13.40%
3	2011	359 sq.km	4.6	16.50%
		Total Ratio	**13.10**	**41.20%**

Source: Computed by Researcher

Crude density was found in 1991 of Jalgaon district is 270 sq.km, increase ratio 4.2 with the percentage of 11.30%, the next year of 2001a crude density was observed in 313 sq.km and increase ratio 4.3 with 13.40% here the crude density increase by 43 numerical total value. The highest crude density was recorded in 2011where the density is 359 sq.km ratio of 4.6 with 16.50% are observe in Jalgaon district.



Graph No.2.1



Graph No.2.2

Physiological Density:-

Physiological density is calculated by dividing the total population by total net sown area of the district, through it gives rather a clearer picture, it against fails to convey true picture of population pressure.

Physiological density calculated by the formula is:

$$\text{Physiological Density} = \frac{\text{Total Population}}{\text{Total Net Sown Area}} \times 100$$

Where: 100 is used as hectares to convert total physiological density per sq.km.

TABLE NO.2.3 PHYSIOLOGICAL DENSITY OF JALGAON DISTRICT

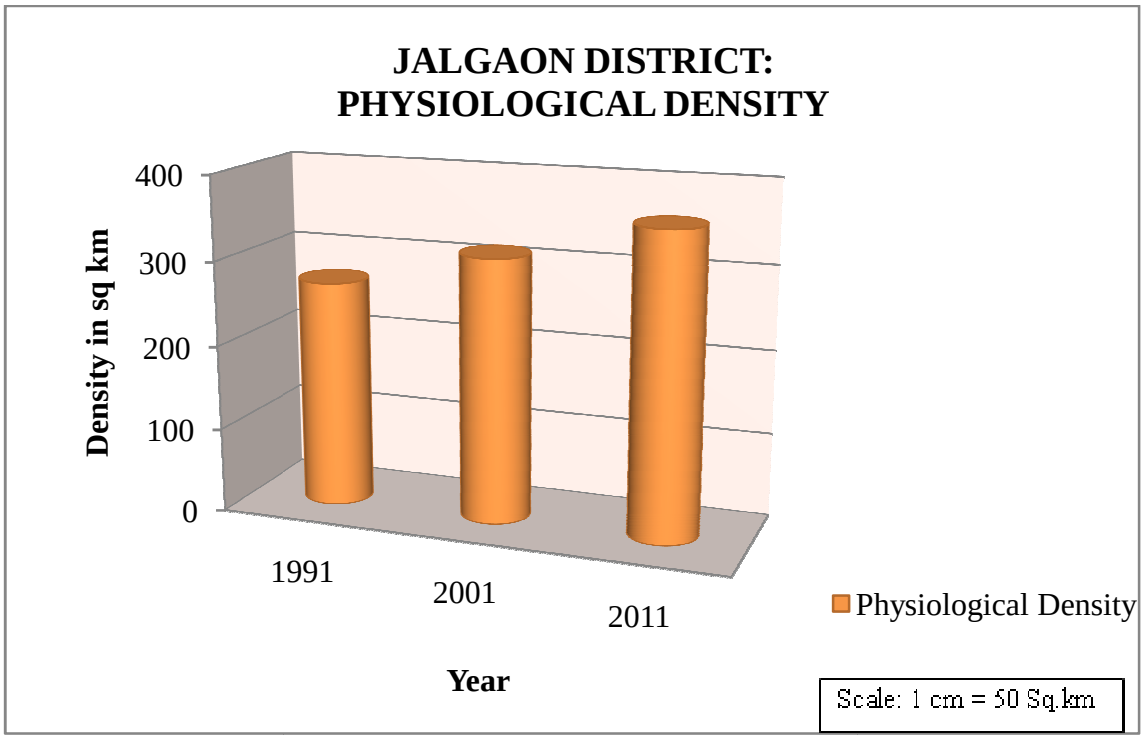
Sr.No	Years	Jalgaon District Population	Physiological Density
1	1991	3187634	270 Sq.Km
2	2001	3682690	313 Sq.Km
3	2011	4224440	359 Sq.Km

Source: Computed by Researcher

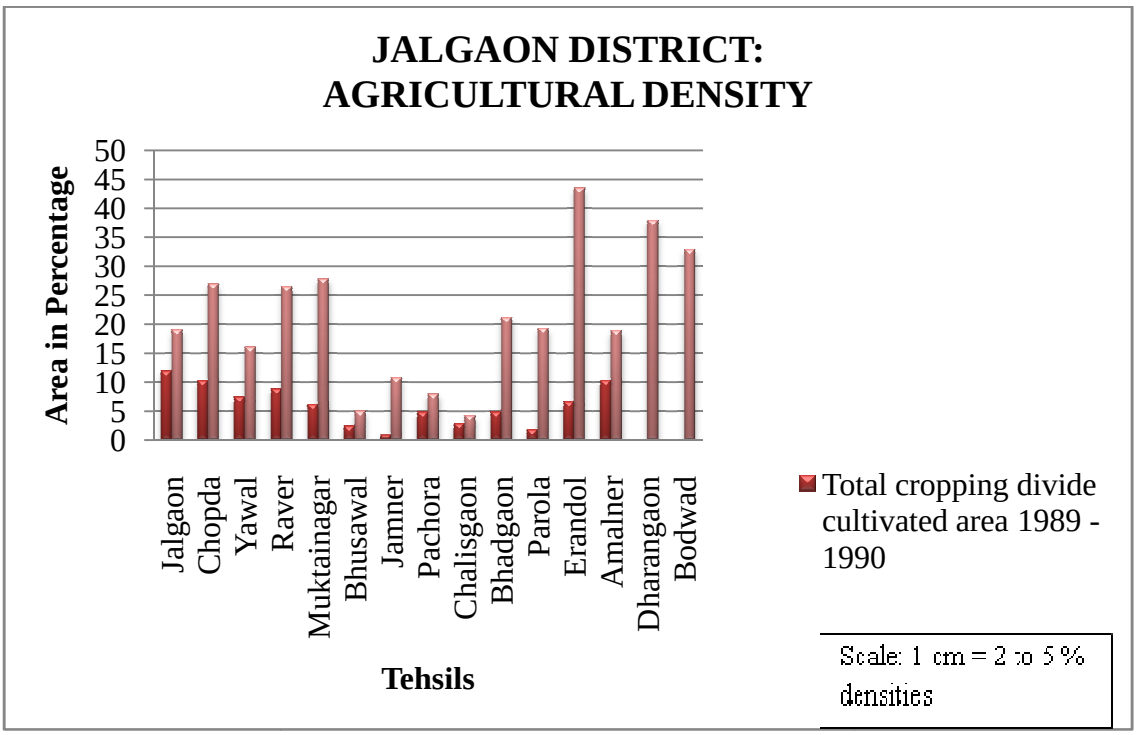
In 1991 the physiological density in Jalgaon district was 3187634 where as it was 270 sq.km and above 1991 in 2001 the physiological density 313 sq.km and highest density are observed in 2011 a 359 sq.km same as on a crude density of Jalgaon district. The physiological density is very low observed in year 1991 and middle high and observed in 2001 as well as very high density in 2011 is recorded in Jalgaon district.

AGRICULTURAL DENSITY:-

In order to assess the agricultural development in the study region the study of agricultural density of patterns is necessary. In the areas where the agricultural density is more the people try to increase the production by adopting a new techniques and putting more inputs into land and thus the transformation of agriculture becomes a necessity.



Graph No.2.3



Graph No.2.4

Agricultural density has been worked out by using the following formula –

$$\text{Agricultural Density} = \frac{\text{Agricultural labourers + cultivators}}{\text{Cultivated area or net sown are}} \times 100$$

It shows: 100 are used as hectares to convert of total agricultural density per square kilometers.

Once the process of transformation being and prosperity shows signs it attracts of more rural population and more transformation takes place. Agricultural density is a better approach to analysis of land use in agricultural countries where heavy reliance is place on farming. The cultivated area takes no account of area shown more than once but does include fallow land.

In 1989 – 90 and year 1998 – 99 the available data are put and calculating it, it shows in table no 3.3.3. In 1989 – 90 the percentage below 5.00% the density was recorded in Bhusawal, Jamner, Pachora, Chalisgaon, Bhadgaon, Parola taluka.

And above 5.00% density was recorded in Jalgaon, Chopda, Yawal, Raver, Muktainagar, Erandol and Amalner talukas. But this picture change in 1998 – 99 year of Jalgaon district. The all data change with its variations and technique of cropping pattern are using by farmers. All the information put in table no. 2.3.3 as below.

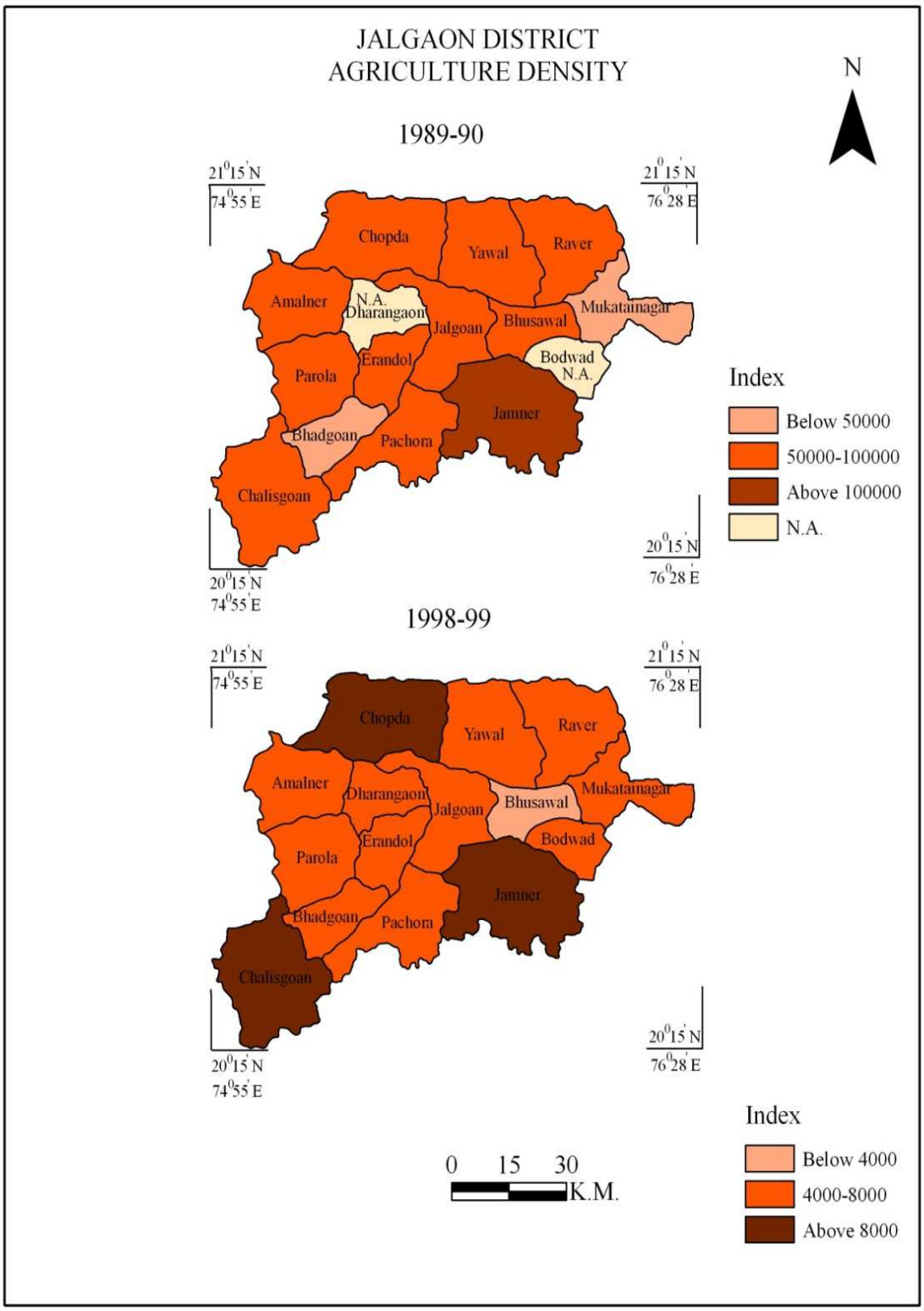
Total density depend on the area which under the cultivated land or area in hectares. The given percentage shows higher in 1998-99 than the lower of the year 1989-90. Highest percentage recorded in Erandol taluka and lower was observed in Pachora taluka since 1998-99. Another value of Dharangaon and Bodwad shows zero value but they are also important in study region of cultivated area.

In 1998 – 99 the density above 20% are observed in Chopda, Raver, Muktainagar, Bhadgaon and Erandol talukas. And below 20% are record in Jalgaon, Yawal, Bhusawal, Jamner, Pachora, Chalisgaon, Parola and Amalner talukas. In 1989-90 the density shows very low in Jamner and highest observed in Jalgaon taluka, but every density of taluka was decrease than the period of 1998-99 during the investigation period.

TABLE NO. 2.4 TOTAL CULTIVATED AREA AND AREA PERCENTAGE OF JALGAON DISTRICT YEAR 1989 – 90 AND 1998 - 99

Sr. No	**Jalgaon district**	**Agri. Land 1989 – 90**	**Agri. Land 1998 – 1999**	**Area Percentage (%)**	**Area percentage (%)**
No	**Taluka**	**Cultivated area (hectares)**	**Cultivated area (hectares)**	**Total cropping divide cultivated area 1989 - 90**	**Total cropping area divide cultivated area 1998 - 1999**
1	Jalgaon	63629	7990	11.93	19.02
2	Chopda	77187	8910	10.23	26.94
3	Yawal	57897	6910	7.43	16.06
4	Raver	54753	7320	8.82	26.50
5	Muktainagar	38662	4250	6.17	27.83
6	Bhusawal	62867	3600	2.42	5.00
7	Jamner	101025	9290	0.88	10.76
8	Pachora	68570	6040	4.81	7.95
9	Chalisgaon	91209	8250	2.86	4.24
10	Bhadgaon	37221	4210	4.85	21.14
11	Parola	54731	6790	1.80	19.29
12	Erandol	86825	5720	6.63	43.53
13	Amalner	75049	7140	10.32	18.90
14	Dharangaon	NA	N.A	NA	N.A
15	Bodwad	NA	N.A	NA	N.A
	Total =	**869625**	**97060**	**5.93%**	**20.66%**

Source: Socio-Economic Abstract of Jalgaon District 1989-90 & 1998-99


JALGAON DISTRICT
AGRICULTURE DENSITY
N
1989-90
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
Below 50000
50000-100000
Above 100000
N.A.
1998-99
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
0 15 30
K.M.
Index
Below 4000
4000-8000
Above 8000

Map No.2.1

FERTILITY (BIRTH RATE) & MORTALITY (DEATH RATE):-

The rapidly increases growth of population is one of the most important problem of new trends modern world in this 21st century or any country, state, district. So many causes, impact & variations for the rapidly growth of the population, i.e. the variations of physical, political, social, economic, and safe and security, employment factors are responsible for increase the population. It also spatial distribution of world population is not uniform. Whereas the Fertility which means occurrence of birth.

The research study of human fertility is occupies a central position in the study of population for several reasons. In human being the human fertility is responsible for biological exchanging and for the maintenance of the human society.

Fertility means birth rate it is measured by Crude Birth Rate (CBR), Age Specific Rate (ASR), General Fertility Rate (GFR), and Total Fertility Rate (TFR) etc... Other the mortality it means occurrence of death. The study of Mortality is useful for analysis current demographic conditions of the future life. It is possible to study or research mortality & fertility from several angles, it mean the changes of biological, social, economic, and cultural factors effect and impact the health of an individual and consequently the death rate/ birth rate in society.

Various measurements find out the mortality i.e. Crude Death Rate (CDR), Age Specific Death Rate (ASDR), Age and Sex Specific Death Rate (ASSDR), Infant Death Rate (IDR) etc. It is calculate by a simple formula of CBR and CDR

FERTILITY–

Fertility or birth rate is calculated by the number of births per thousands of inhabitants. This is done by dividing the number of births in a given year by the population, living in the same territory during the year.

The study of human birth rate occupies a central position in the study of population for several reasons. The birth rate is responsible for biological exchanging and for maintenance of human society. There are a large number of biological, social, cultural, economic and psychological factors which influencing the fertility levels.

The present study observation the age at marriage and crude birth rate. The fertile period of a woman it begins at the age of her marriage. Therefore the late and

early marriage may depress fertility by increasing the span of productive period. In Jalgaon district mean age at marriage for both male and female is higher than the state average.

There is more difference of male age to compare to state male age. But female age is differing above 4 to 6 years. Generally all the lowest female mean age at marriage belonging to upper and lower casts. It means educated family or non educated family who belongs to agricultural farming. The peoples are belongs to all categories and casts.

Crude Birth Rate:–

It is expressed in terms of number of births in a year per thousands of the midyear population. According to the available data of birth rate in Jalgaon district, crude birth rate is calculated by following formula.

$$\text{Crude Birth Rate (CBR)} = \frac{B}{P} \times K$$

Where, the B is the total number of live birth during the year

P is the total population in the middle of the year

K is 1000 (constant)

It is the most common and most easily calculated and the most easily understand measured of birth rate. The crude birth rate is calculated for all the taluka and as whole the district. This crude birth rate has been achieved through changes in several social, economic, political and demographic variables over that time.

Many of these factors related to woman's unequal status in society and by improvement in the following parameters translate into a development just in crude birth rate but many other health indicators as well as woman's age at marriage, her education levels, maturity and her increase age their participation in agricultural and non agricultural sector and per capita income.

In addition an improvement in medical facilities at different levels one stages as there has been a considerable expansion of health institution and staff in government and private sector.

MORTALITY:–

Death rate or mortality is calculated by dividing the number of deaths in a given year by the population in the same year and multiplying the result by 1000 as to avoid an excess of decimals.

TABLE NO.2.5 - CRUDE BIRTH RATE IN JALGAON DISTRICT

Sr.No	Jalgaon District Talukas	Crude Birth 1995-96	Crude Birth 2005-06
1	Chopda	16.86	5.84
2	Yawal	13.98	4.57
3	Raver	18.66	7.28
4	Muktainagar	5.37	2.71
5	Bodwad	N.A	1.20
6	Bhusawal	27.67	8.10
7	Jalgaon	38.55	15.80
8	Erandol	17.18	2.79
9	Dharangaon	N.A	2.48
10	Parola	9.85	2.69
11	Bhadgaon	8.12	2.74
12	Chalisgaon	23.04	7.76
13	Amalner	19.48	5.55
14	Pachora	14.43	4.47
15	Jamner	17.37	5.67
	Total = Jalgaon District of C.B.R	**7.23**	**2.49**

Sources: District at a Glance 1995-1996, 2005-06 Jalgaon & District Statistic Books, Jalgaon.

A death rate is one of the three factors of demographic changes, other is two being fertility and migration. The study of death rate is useful for analysis current population conditions as well as for determining the prospects of potential changes in death rate conditions of the future in life. Various measures are employed in the analysis of mortality.

To study the death rate of Jalgaon district the following formula is used –

$$\textbf{Crude Death Rate} = \frac{D}{P} \times K$$

Where, the D is the total number of death registered during a year

P is the total population at the middle of the year

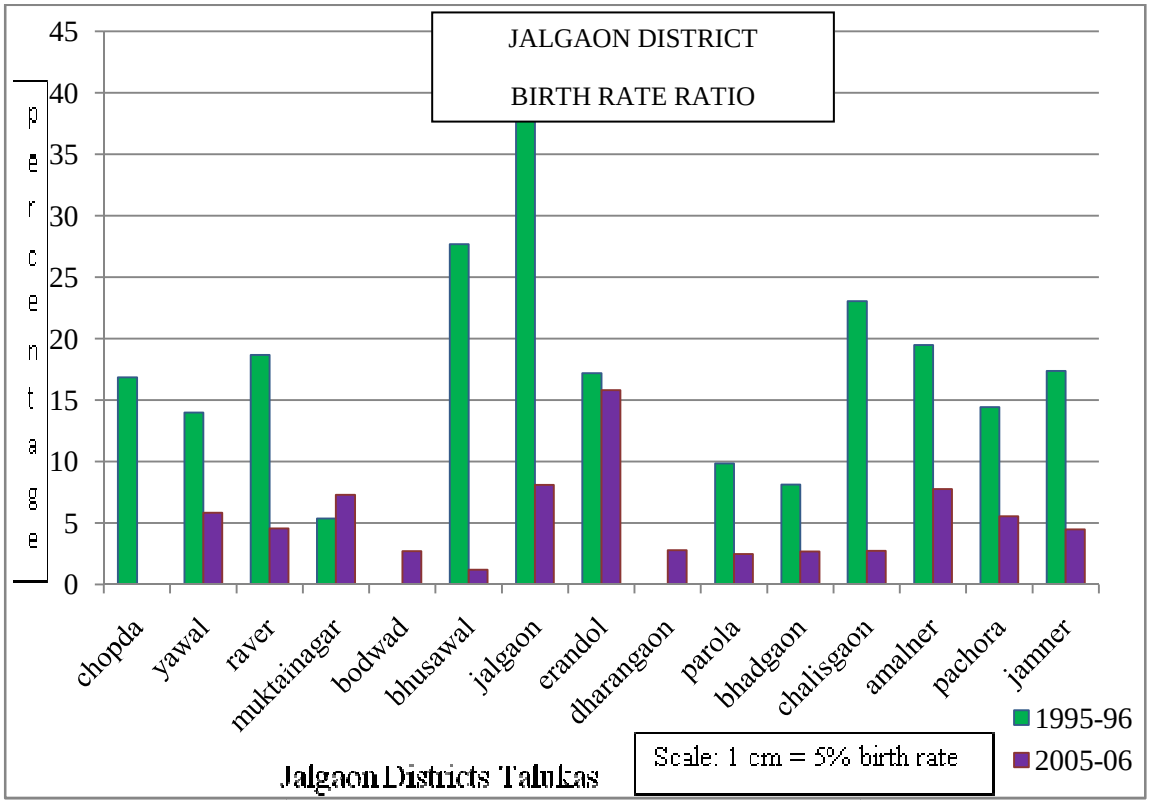
K is 1000 (constant)

Where the most simple and easily find out of mortality, it is used a measure of death rate which can be quickly and the same time easily understood. The crude death rates of Jalgaon district are as follows-

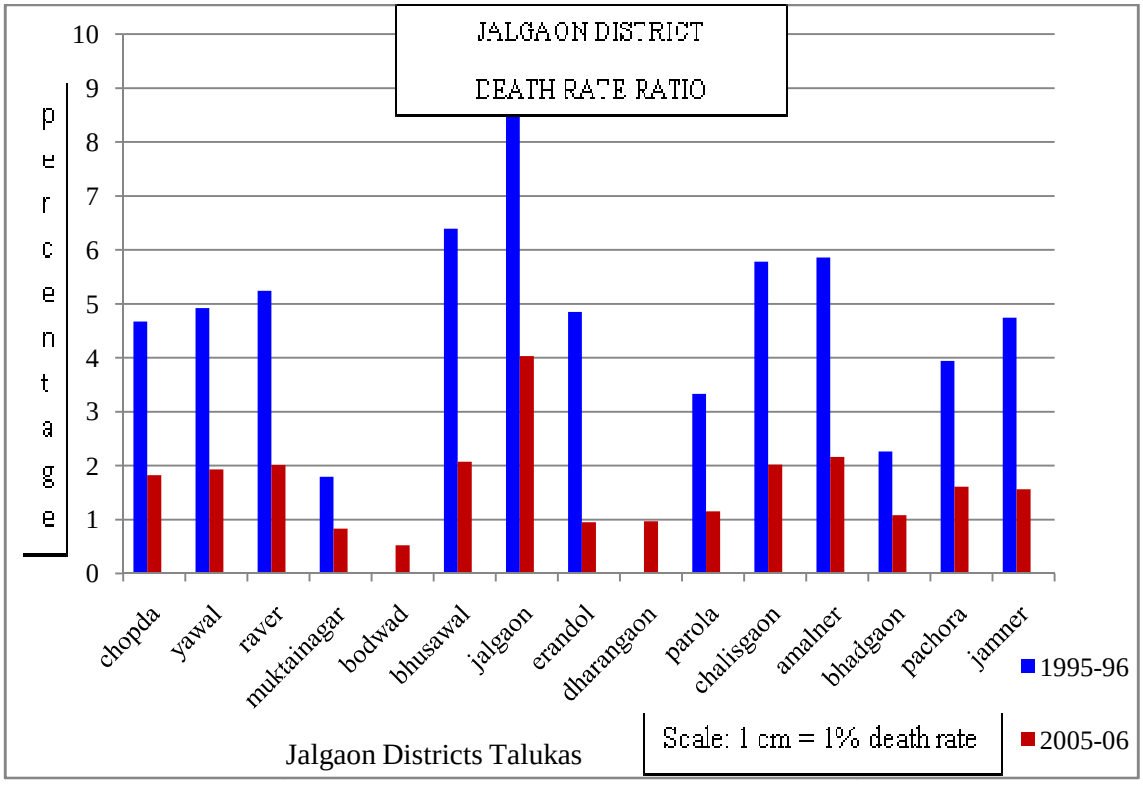
TABLE NO.2.6 – CRUDE DEATH RATE OF JALGAON DISTRICT

Sr.No	Talukas	Crude death rate 1995-96	Crude death rate 2005-06
1	Chopda	4.67	1.82
2	Yawal	4.92	1.93
3	Raver	5.24	2.01
4	Muktainagar	1.79	0.83
5	Bodwad *	N.A	0.52
6	Bhusawal	6.39	2.07
7	Jalgaon	8.84	4.03
8	Erandol	4.85	0.95
9	Dharangaon	N.A	0.97
10	Parola	3.33	1.15
11	Chalisgaon	5.78	2.02
12	Amalner	5.86	2.16
13	Bhadgaon	2.26	1.08
14	Pachora	3.94	1.61
15	Jamner	4.74	1.56
	Total = Jalgaon District C.D.R	**6.02**	**2.50**

Sources: District at a Glance 1995-1996 Jalgaon & District Statistic Books 2005-2006 Jalgaon



Graph No.2.5



Graph No.2.6

By using the given formula the crude death rate is calculated for all the talukas and as well as the whole district.

TABLE NO.2.7 – COMPARISON OF JALGAON DISTRICT AND MAHARASHTRA STATE

Sr. No	**Indicators**	**Jalgaon District**		**Maharashtra State**	
1	All Indicators	1991	2001	1991	2001
2	Total birth rate	26.74	**24.84**	26.2	**20.7**
3	Infant death rate	55	35	44	45
4	Crude birth rate	26.47	**24.80**	26.0	**20.0**
5	Crude death rate	5.88	5.60	8.2	6.6

Sources*:* Economic Survey of Maharashtra 1991, 2001 & Jalgaon District at a Glance 1991, 2001

Here comparison of both data, where Maharashtra state of record of fertility and mortality for the compare and analysis of fertility and mortality of Maharashtra and Jalgaon district from census 1991 and 2001 census, it could be easily observed and find out the birth rate/death rate but birth rate are higher than Maharashtra state and death rate are lower than Maharashtra state. It shows in Table No.2.3.6

TABLE NO.2.7.1 - COMPARISON BOTH JALGAON & MAHARASHTRA'S PERCENTAGE

Sr. No	**Indicators**	**Jalgaon 2001**	**Maharashtra 2001**
1	**Total birth rate**	**24.84**	**20.7**
2	Infant mortality rate	35	45
3	**Crude birth rate**	**24.80**	**20**
4	Crude death rate	5.60	6.6

Source: Computed by Researcher

This still observation and finding the remarks of Jalgaon district it has a dominated by villages in Jalgaon district as a Maharashtra state. The population distribution of Jalgaon district is very uneven in particular. The district of Jalgaon

taluka has the largest population area. The main reason is inclusions of Jalgaon district head office, corporate sector, municipal office, many markets, mall, agricultural offices, all government or non government offices with large spread area sector of MIDC at Jalgaon city. Jalgaon city is a main city in centre position of the district.

The socio-cultural, economic, educational changes and variations at the city, marriage age for both male and female as higher than the state. So Crude birth rate & Crude death rate decline through the changing in many socio-economical, political, cultural, and demographic factor over that time. So crude birth rate is higher (24.87%) than the Maharashtra state, but death rate a small average ratio lower (6.6%) the Maharashtra state. It means Fertility is high of the Jalgaon district than state.

2.4 LITERACY:-

Literacy is necessity for all those who wish to practice in the agricultural and non agricultural occupation sector on modern trends of life. Literacy and Population growth are two factors which being about a change in agriculture, therefore the worth of literacy has to assess by its effectiveness as an instrument of agricultural development on progressive fields. The period considered for present investigation is from 1991, 2001 and 2011. Here all tehsils has selected as a basic unit of investigation.

Literacy of Jalgaon district, percentage was increase and increase in 1991, 2001 and 2011 census ratio. Where the census 1991 the ratio of literacy percentage is 64.30% but very high in census 2001was observing, because this period the literacy was increase in 11.10%, it shows in table no.2.4.1 So many changes and development like migration, facility etc are find here.

Literacy rate or percentage was increased to a greater extent in every taluka of Jalgaon district during the period of collected data, observation and searching.

But according to census 2011 the literacy percentage are little increase with 4.33% are recorded. Because the development or other occupational and social activity are constant in 2001 to 2010 period. It shows in table no.2.4.1.

Comparison of three census record of population of the Jalgaon district, the literacy rate in talukas the percentage below 60% are observed in Chopda, Muktainagar, Jamner, and Parola talukas.

TABLE NO.2.8 LITERACY DATA IN JALGAON DISTRICT

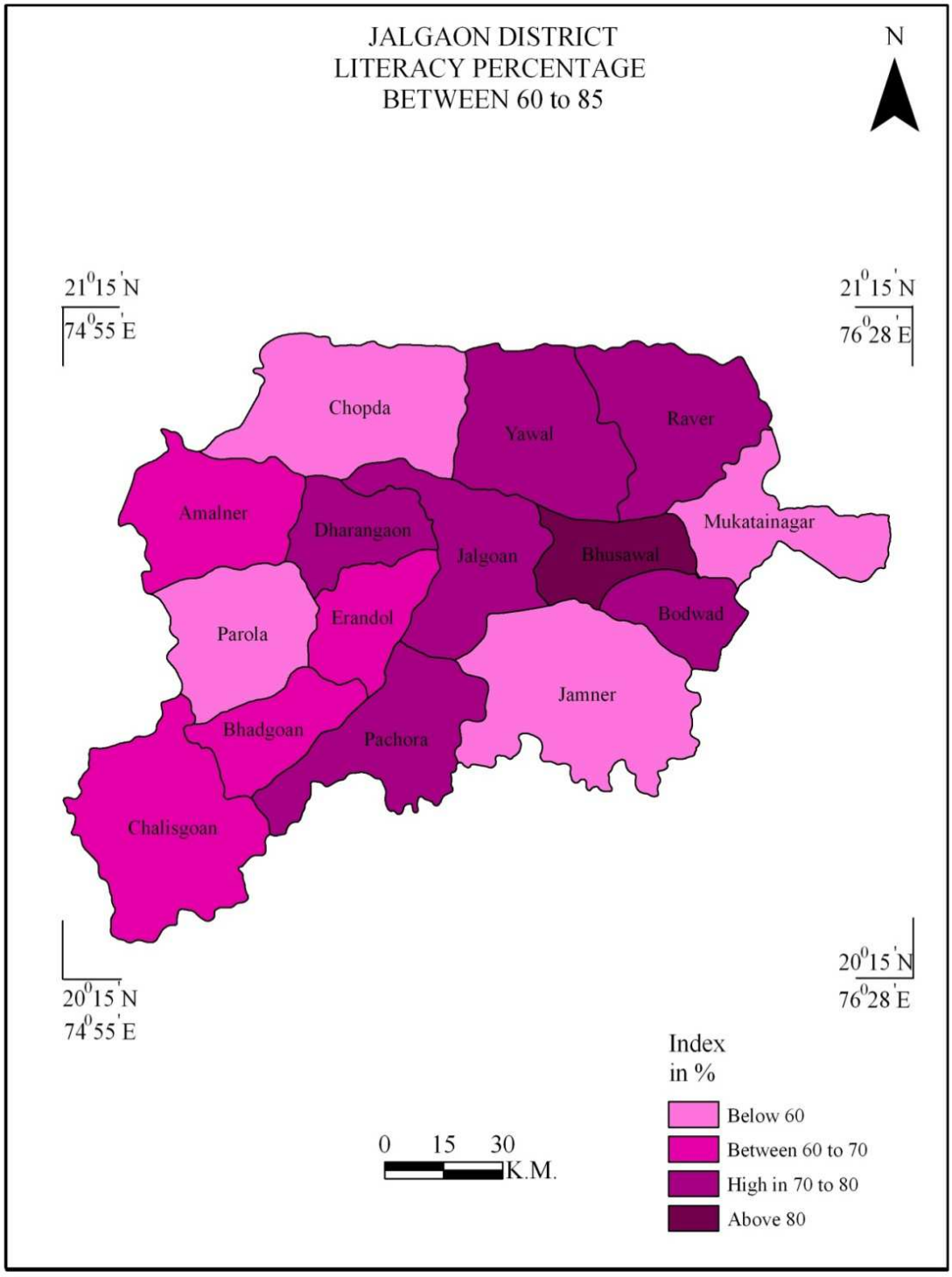
CENSUS 1991, 2001 AND 2011

Sr. No	Taluka	Census 1991(%)	Census 2001(%)	Census 2011(%)
1	Jalgaon	72.52	82.40	85.78
2	Chopda	59.53	68.60	74.13
3	Yawal	65.78	76.20	79.56
4	Raver	63.80	74.00	79.05
5	Muktainagar	55.12	71.40	77.18
6	Bhusawal	75.64	85.50	88.33
7	Jamner	56.97	70.20	75.76
8	Pachora	62.13	73.60	77.05
9	Chalisgaon	61.34	74.70	77.00
10	Bhadgaon	61.12	74.30	77.27
11	Parola	54.57	71.40	75.98
12	Erandol	60.43	70.10	75.50
13	Amalner	66.22	74.60	80.89
14	Dharangaon	NA	72.90	78.65
15	Bodwad	NA	73.30	81.00
	District Average Percentage	**64.30%**	**75.40%**	**79.73%**

Source: Socio-Economic Abstract and Census Report of Jalgaon District.

Whereas 60 to 70% literacy was noticed in Chalisgaon, Bhadgaon, Erandol and Amalner talukas. Above 70 to 80% literacy are observed in Jalgaon, Bodwad, Pachora, Yawal, Raver and Dharangaon. But very highest literacy rate above 80% was recorded and experienced in Bhusawal taluka. Because Bhusawal is located in center of Jalgaon district.

This center place is head quarter and main junction of railway station situated here, so many people belongs all community and cast are living together and work here.


JALGAON DISTRICT
LITERACY PERCENTAGE
BETWEEN 60 to 85
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Below 60
Between 60 to 70
High in 70 to 80
Above 80
0 15 30
K.M.

Map No.2.2

TABLE NO.2.9 PERCENTAGE BETWEEN 60 TO 85% OF TALUKAS

Sr.No	Percentage between 60 to 85%	Talukas of Jalgaon District
1	Less Below 60%	Chopda, Muktainagar, Jamner and Parola
2	Moderate 60 to 70%	Chalisgaon, Bhadgaon, Erandol and Amalner
3	High in 70 to 80%	Jalgaon, Bodwad, Pachora, Yawal, Raver and Dharangaon
4	Very High above 80%	Bhusawal

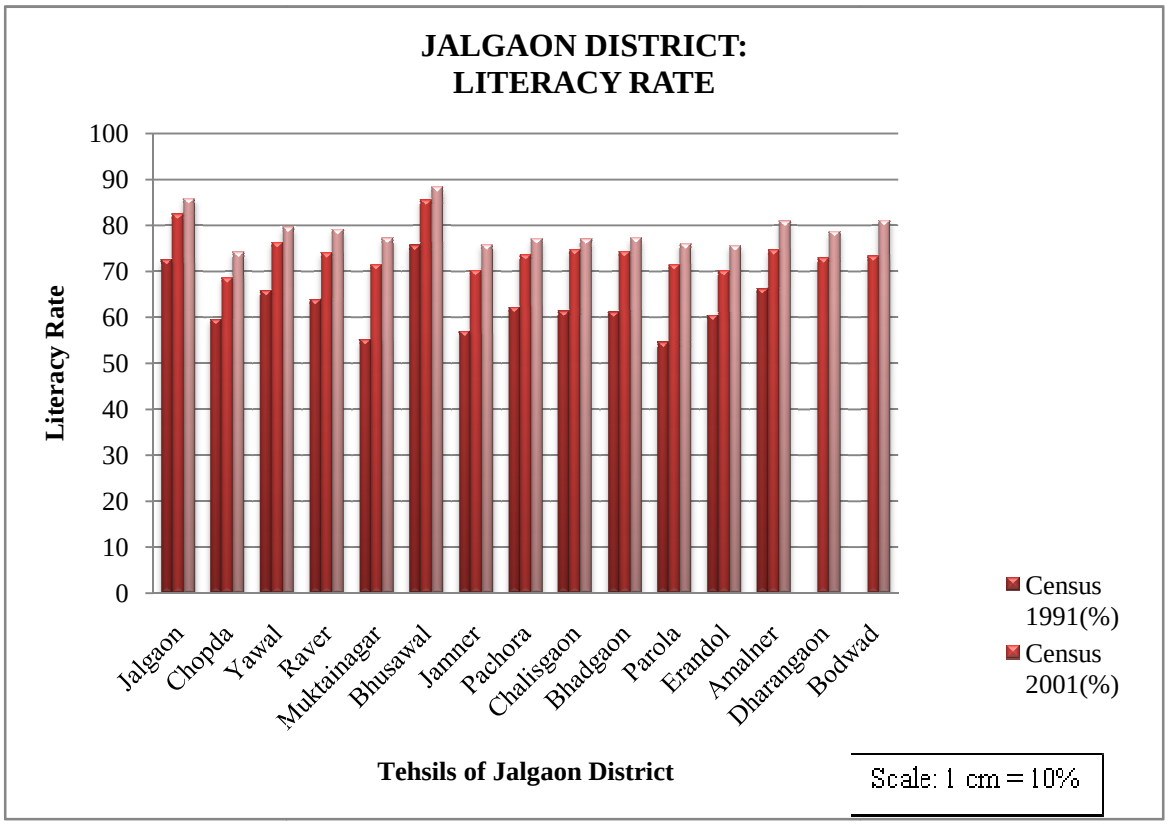
Source: Computed by Researcher

So, here literacy plays a very crucial role in the social and economic development in Jalgaon district, Maharashtra state. A low level literacy in a population retards the progress along the path of social and economic and also agriculture development in Jalgaon district. Illiteracy particularly among the adults in a rural society, but results in stagnation of development of agriculture, social and cultural lags weakness of national security and overall staginess of the economic and agriculture development progress.

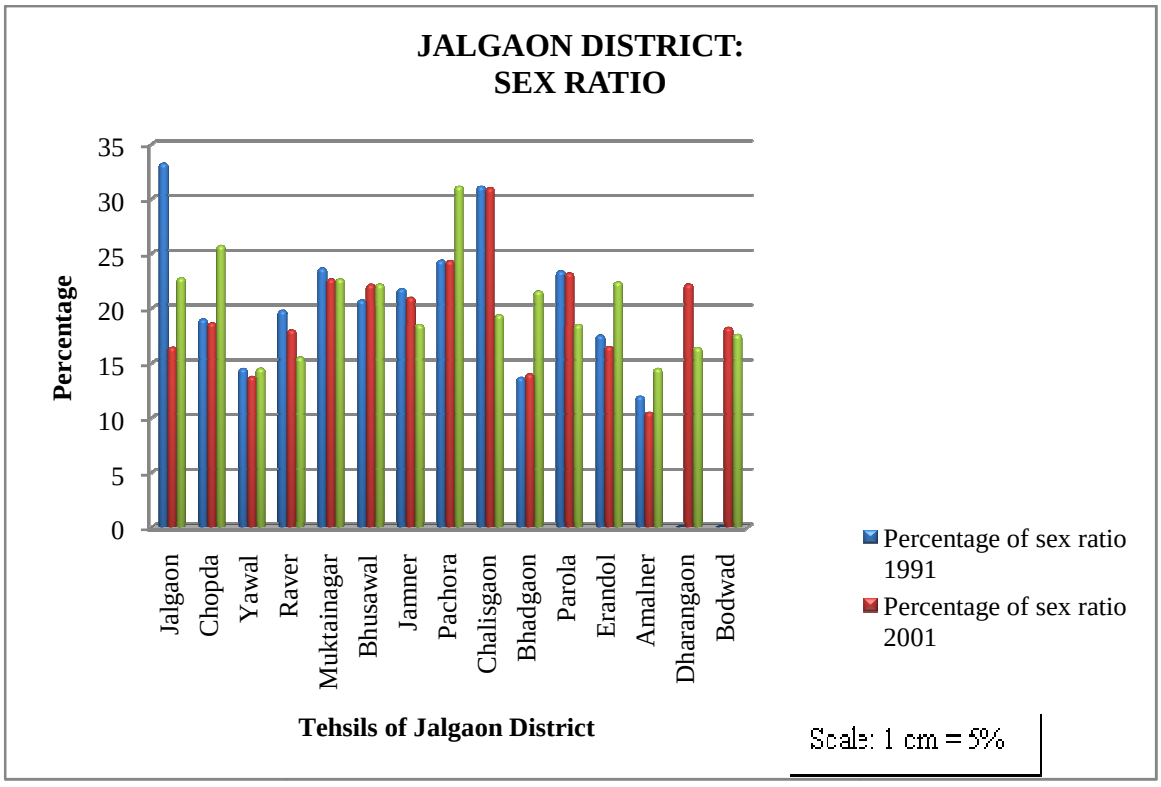
2.5 SEX RATIO:-

The study of population composition is important since it can be viewed as factors that determine the conditions to sub divide the demographic social composition of population. Sex ratio is the basic tool for the analysis of the composition of population and is defined as the number of per females per 1000 males of any particular population of the region. Sex ratio of the different regions and reveals that the margin between the male & female in the district less and more over this gap has in a general further less over the decade. Actually the ratio should be more or less the same but variations occurred due to several reasons.

The sex ratio may vary among different regions of the area at district. The communities differ in sex composition i.e. composition of male and female. Sex composition has been the subject of great interest to population geographers. Sex ratio is an index of socio-economic conditions of an area.



Graph No. 2.7



Graph No.2.8

It has an important tool of regional and social analysis and profound effect on the demographic structure of region. Because it is important feature of any landscape in population surface in the earth. The sex ratio can be easily find out with formula where the sex ratio measured in terms of number of females per thousand following formula -

$$\text{Sex Ratio} = \frac{\text{Female population}}{\text{Male population}} \times 1000$$

The 1000 is total number of male and female dividing.

To make the comparative analysis the sex ratio of has been computed. It can give better understanding regarding the issues pertaining to rise or fall in either of the sex ratios.

According to census 1991 of the Jalgaon district is the highest sex ratio are recorded with 940 numerical value. Where the Jalgaon district has the highest sex ratio above the percentage of 20 % are record in Jalgaon, Muktainagar, Bhusawal, Jamner, Pachora, Chalisgaon and Parola talukas. But below 20% are observing in Chopda, Yawal, Raver, Bhadgaon, Erandol and Amalner talukas.

In 2001 census of the Jalgaon district of sex ratio are decrease by census of 1991 the ratio number is 933 in districts are recorded. The percentage of Jalgaon district above 20 % are recorded in Muktainagar, Bhusawal, Jamner, Pachora, Chalisgaon, Parola and Dharangaon talukas and below 20% are observing in Jalgaon, Chopda, Yawal, Raver, Bhadgaon, Erandol, Amalner and Bodwad talukas.

The geographically study i.e. 1991, 2001 and 2011 has been analyzed for concentration of sex ratio of Jalgaon district with 15 tehsils. All data is recorded and it shows in Table No.2.10

Last observation of sex ratio, census of 2011are observed in Jalgaon district is very lower than census of 2001 and 1991. The sex ratio is 922 are noted of Jalgaon district. These value are not increase and above decrease by the ratio of 933.

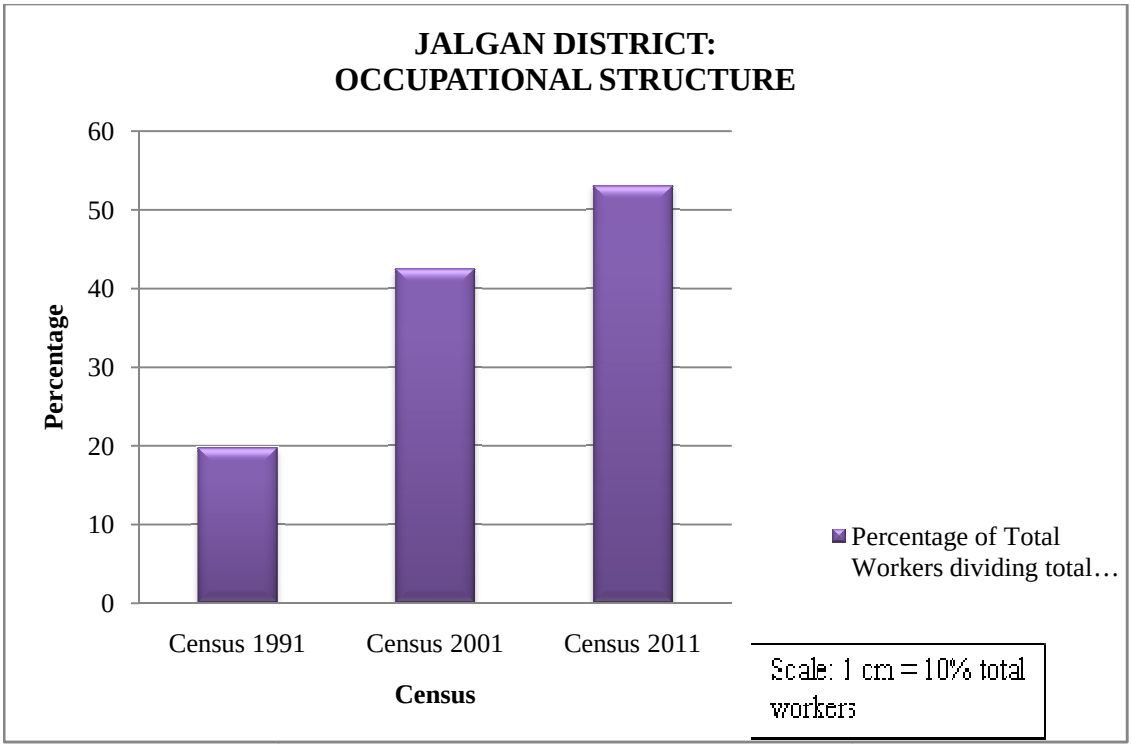
In Jalgaon district the sex ratio are recorded in above 20% Jalgaon, Chopda, Muktainagar, Pachora, Bhadgaon and Erandol talukas. The ratio of below 20% is observing in Yawal, Raver, Jamner, Chalisgaon, Parola, Amalner, Dharangaon and Bodwad talukas.

TABLE NO.2.10. SEX RATIO OF JALGAON DISTRICT (1991, 2001 AND 2011)

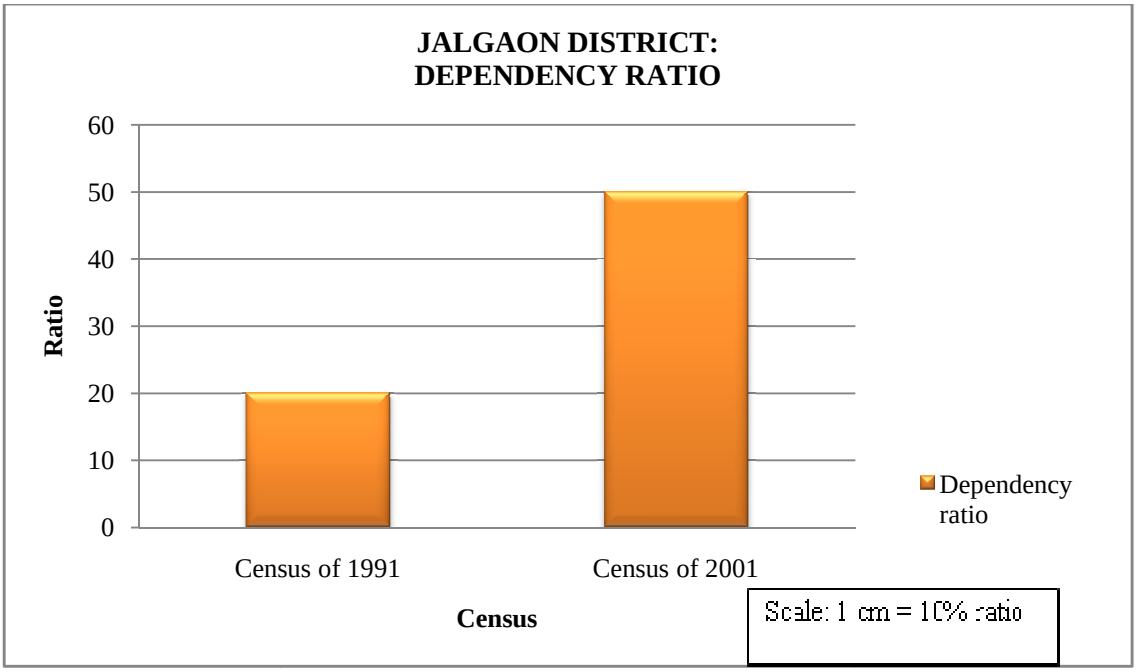
Sr. No	Talukas	Total number of females/ male 1991	Percentage of sex ratio 1991	Total number of females/ male 2001	Percentage of sex ratio 2001	Total number of females/males 2011	Percentage of sex ratio 2011
1	Jalgaon	919	33.24	911	16.45	913	22.78
2	Chopda	958	19.02	948	18.67	933	25.73
3	Yawal	948	14.50	938	13.77	944	14.52
4	Raver	945	19.81	942	18.03	934	15.53
5	Muktainagar	949	23.66	937	22.68	937	22.68
6	Bhusawal	919	20.75	922	22.18	926	22.20
7	Jamner	944	21.80	942	21.00	914	18.50
8	Pachora	940	24.38	938	24.35	919	31.15
9	Chalisgaon	919	31.15	913	31.00	903	19.40
10	Bhadgaon	939	13.69	947	14.00	927	21.58
11	Parola	949	23.41	944	23.22	914	18.50
12	Erandol	957	17.54	947	16.50	923	22.40
13	Amalner	953	11.97	942	10.50	927	14.50
14	Dharangaon	N.A	N.A	944	22.20	909	16.40
15	Bodwad	N.A	N.A	937	18.25	923	17.60
	Total =	**940**	**21.74**	**933**	**19.40**	**922**	**18.20**

Source: Computed by Researcher

The sex composition of population according to sex generally influences the form, tempo and life of any region group or community. The Jalgaon district are balances between the sexes is an important aspect of population structure.



Graph No.2.9



Graph No.2.10

The proportion of male and female to the total population has vital bearings as this effect the supply of labour through marriages. In case of the proportion of males workers will be available with the exception of the females of lower classes; the customs and institution of the country or state include women in our country contribution to wealth. The sex ratio of the composition in its own turn may be affected by post fertility, mortality and migrations; it plays an important part in determining birth and death rates in community.

The sex ratio in Jalgaon district fluctuated between 940 to 922 during the last 30 years; they are exhibiting more or less declining trends. It is inferred that the all cast of community being much left behind in terms of social and economic development as well as agricultural development. Because women's working in maximum number in agriculture land and also farming with family.

2.6 AGRICULTURAL LABOURERS: -

Agricultural labour structure shows the labour implies trade or profession of the nature of economic progress of India country. It is related to agriculture, industry, government - non government sector and services. Occupations depend up on the degree of economic base of Agriculture development and sophistication of the region. Occupational structure influences many aspects of population in a region. These characteristics of population are reflected in the working force, dependency load, employment and unemployment of people (non-workers).

In spite of that, occupational structure is a key component and manifestation of population composition. It gives a proper illustration of ratio of the working and non-working population in an area. The Economic Progress is generally associated with certain distinct, necessary and predictable changes in occupational structure (Clark, 1940).

Here mention the Man is an important resource of any place or a region, playing decisive role in the development of economic sectors, the farmer in fact is the Prime Mover, in irrigation utilization and agricultural development process. The development of water resources of a given region required not merely man power but also the devotion, co-operation, and spirit of most tradition bounded and have certain unique characteristics.

As per the agriculture occupation of the total population, census authorities has been adopted three-fold classification of population, *viz.* main workers, marginal

workers and non-workers in irrigation and non irrigation area of the Jalgaon district. According to the Census of India, all those who had worked for the major part of the preceding year (at least 6 months or 183 days) were recorded as main workers, while those who worked for some time during the preceding year but not for the major part, have been treated as marginal workers. All those who had not worked at all during the last year, where recorded as non-workers. Persons engaged in household duties, students, dependents, retired persons, beggars are some of the categories grouped into non-workers.

The study of cultivated and non cultivated labour structure in irrigated and non irrigated area of study region dealing with working (main and marginal) and non-working population, the size of working force, its division into different economic activities are fair indicators of the social status of regional population are compared to general population in this region. Similarly, the trend in working force and occupational structure of regional population are associated with the overall physical and social economic set up of the Jalgaon district.

TABLE NO.2.11. AGRICULTURAL LABOUR STRUCTURE TO TOTAL PERCENTAGE IN JALGAON DISTRICT (1991 TO 2011)

Sr.No	Jalgaon District	Total Workers	Total Population	Percentage of Total Workers dividing total population
1	Census 1991	628780	3187637	19.72%
2	Census 2001	1563983	3682690	42.47%
3	Census 2011	2240322	4224400	53.03%

Source: Computed by Researcher and Census Statistical Abstract of Jalgaon District

According to census 1991, 2001 and 2011 are increase of total workers in every 10 year census. Total worker as well as total population is also increasing in the Jalgaon district. It shows in table no. of total occupational structure of Jalgaon District. Highest percentage are increase in 2011 at 53.03% where the lower percentage are find out in 2001 is 42.47% and very lower than low percentage are noted in 1991 is 19.72 of Jalgaon district. The frequency of Jalgaon district is very rare in 1991. Because so many socio-economic influence responsible of that time.

These all data collected of Census authorities and have classified as the working population into categories considering the Indian economy. The rationale of classification of workers followed by 1991 census, they classified only into four categories viz. (i) cultivators, (ii) agricultural labourers, (iii) Household industry and (iv) other worker & non worker. The total clear result shows in table and graph.

It is observed that, the Jalgaon districts showed increasing trends in the total working population and all the average working population of the region with some exceptions. In Jalgaon district after 2005 small business, plant, agro industries, farming and tissue culture technique, always new irrigation technology with which have shortly started the urbanization and industrialization process mostly subjugated by secondary and tertiary in Jalgaon district sector, and much population is not engaged and engaged in these sectors, as these activities require skilled labour force on the large scale. Consequently, the all features depend on the land ownerships, tenure and size of holdings at side of irrigation land the study region. District workers recorded as a low per cent of working population. Another reason is that, people migrated towards the district tehsils to other tehsils in migrate the search of employment in the secondary and tertiary sector and due to that, there is increase in the dependency ratio. All these things are observed in Jalgaon district and are influenced on the structure of working population.

2.7 SOCIAL STRUCTURE:-

The certain social aspects of the proportion of SC & ST population in Jalgaon district. In agricultural area of the irrigation sources the population affected and spatial distribution of Jalgaon district, but social structure in not balanced and the population of rural and urban is also different as well as at that in scheduled cast and scheduled tribal population.

Where the SC and ST population it means where the India country generally known as the classic land of castes and creeds. These are approximately three thousand casts and tribes are found and living in India. Term ‘tribal’ means is usually applied to the aboriginal population of India, they speak different languages. They are racially homogenous through all of them, but are not in the same stage of culture in Indian Region. Tribal people live in remote area and wild and accessible forests region.

In Jalgaon district scheduled tribe population is 11.80 of other population. This is higher than the state average of 7.80%. The sex ratio of scheduled tribes is 947 females for 1000 males in the total area and the 950 females in the rural area and 913 in urban areas. Social structure within the district varies from tehsils to tehsils in 1991 & 2001. In Jalgaon district tehsils 934 in rural and 940 in urban in 1991 of population, but in 2001 the rural 912 and urban in 917 number of population. In Jalgaon district most of the tehsils Yawal, Raver, Chopda, Muktainagar and Dharangaon are the scheduled tribe population in the proportion over the decades more on less equal to male counterparts.

TABLE NO.2.12. TOTAL NUMBER OF S.C & S.T POPULATION IN JALGAON DISTRICT, 1991-2001

Sr. No	**1991**	**1991**	**Total Population**	**2001**	**2001**	**Total population**
1	Scheduled cast	Scheduled tribes	(Total Male + Female)	Scheduled cast	Scheduled tribe	(Total Male + Female)
2	295047	313551	608598	286777	435951	722728
Sr. No	**1991(total male)**	**1991(total female)**	**Total population**	**2001(total male)**	**2001(total female)**	**Total population**
1	**1642873**	**1544761**	**3187934**	**1905493**	**1777197**	**3682690**

Source: Socio-Economic Abstract of Jalgaon District, 1991 & 2001

The scheduled tribe population less concentrated in rural areas than in the urban area, but exception variations is change in other tehsils. From the given table no. 2.7.1 social structure of population composition of the total, rural, urban population and scheduled caste and scheduled tribe population of urban and rural population 1991& 2001 of Jalgaon District.

But the scheduled caste and scheduled tribe sex ratio is very different. The district sex-ratio of scheduled cast and scheduled tribe population was much higher in 2001 in the urban areas of Jalgaon and other tehsils area.

2.8 AGE STRUCTURE: -

Age composition refers to the number of people in a total population found in each group. There are different methods of analyzing age composition but true value of calculated composition of age by the method of '**Dependency ratio'**. This method

is indicating the value of percentage of population. It includes all ages of number of population; so this method using for the structure of ages in Jalgaon district.

Age Pyramids: It is also known as age and sex pyramid. This method is commonly used. The age pyramid on its vertical axis represents the age group at a regular interval of 5 years. Starting from 0 to 5 and ending according to the age structure of the population under the study. The horizontal axis represents the total population or population of males and females separately. Under the normal situations the number of persons in each successive year, therefore the age composition represents the shape of a pyramid.

Age Groups: The population categorized into a various age groups allows geographers to draw regional comparisons on colour or choropleth maps. In general, the population is divided into three broad age groups a) the young, b) the adults, c) the old ages.

Age Indices: Such ratios are calculated with the help of three age groups on a broad basis where the ratio between and aged and the adults, the young and the aged so on. The ratio between the adults and the young plus aged is called as dependency ratio. These all method is used to calculate the age composition. But true value of age composition calculated by the **'dependency ratio'**. This method is useful for the correct value of age composition rather than age pyramids, age groups and age indices.

DEPENDENCY RATIO:-

The dependency ratio is computed by dividing the number of children plus old people by the adults and multiplying it by hundred. It is mainly governed by the age of structure of the population. But in Oxford Dictionary of Geography defines a dependency ratio as the ratio between the number of people in a population between the ages of 15 and 64 and the dependent population: children (0-15) and elderly people (65 and over).

The dependency ratio is very useful aspects of the population of every country or state. This type of ratio is suggested the development of the region is undeveloped when the ratio on an average the region is developing while calculating the dependency ratio. The total population of the region can be divided in to two groups like;

1. Working Population (Independent population)

2. Non-working Population (Dependent population)

The total male and female between the age of 15 and 64 years is called as working population that is independent population.

The total male and female below 15 years and above 64 years are known as non working population means dependent population. The dependency ratio depends on the birth rate & death rate of population. Dependency ratio are quantifies the ratio between the economically active population and the dependent population.

The age limits for dependency ratio are arbitrary in different region and States of the India.

Calculating the dependency ratio using the following formula:

$$D.R = \frac{\text{Number of persons below 15 years + Number of person above 65years}}{\text{Number of persons (between 15 and above 64)}} \times 100$$

(D.R = Dependency Ratio) In Jalgaon district region of census 1991 & 2001 is part of Maharashtra State, it can be find out the dependency ratio of the following table with the help of numerical values.

TABLE NO.2.13 SHOWS THE NUMERICAL VALUES OF RURAL AND URBAN POPULATION DATA TAKING FROM THE CENSUS 1991

Sr. No	**Number of persons below 15 years**	**Number of persons between 15 and 64**	**Number of persons above 64 years**
1	102780	1409700	180700

Source: Computed by Researcher

The dependency ratio of the Jalgaon district region according to census 1991 the ratio is **20.10.**

TABLE NO.2.13.1 ACCORDING TO CENSUS 2001 THE POPULATION DATA SHOWS IN NUMERICAL VALUE

Sr.No	**Number of persons below 15 years**	**Number of persons between 15 and 64**	**Number of persons above 64 years**
1	691923	2103419	361680

Source: Computed by Researcher

The dependency ratio of the Jalgaon district region according to census 2001 the ratio is **50.09**. So the dependency ratio is found in 2001 according to census the given accurate value is 50.09 is higher than according to 1991 population census data the value is 20.10. Since the 2001years they start from the development of the Jalgaon district region in field of agriculture, social, and economical activity.

2.9 AGRICULTURE OCCUPATION AND ITS RELATED WORK (Live Stock, Poultry etc.)

In agriculture the live stock is oldest form of occupational and economical activity, when the man was evolution in past century a man conscious form of life and multiplication of human population. It need to hunting of animals in forest and then understanding the necessity of rearing of animals for his food. The beginning of agriculture lies in the pastoral form when man started domesticating animals for meeting his food requirements (Raj Veer Singh 1979).

All the agriculture operations or related agriculture working and farming are based on livestock and they are chief sources of power and manure. As the land of little use to the farmer without poor creatures that draw the plough and scratch the soil, that they are the key stone of farming. The treatment towards the livestock is rather niggardly (Singh. Jasbir, 1974). It is well known of the fact of India has the largest number of livestock in the world. India is at the top of having 17% of total livestock population which is less than one fifth of cattle, buffalos and one fifth of goat and sheep (India 2008 animal husbandry record).

The agriculture production and livestock sector not only provides proteins and nutrients of human health but diet through milk, eggs, meat and other food and non food but also plays an important role in the use of non-edible agriculture products. The livestock also provide raw material from animals by products such as meat, milk, skins, hairs and fat etc.

This sector plays an important role in the rural economy region through the agriculture base in the supplementary the rural incomes of households. It also provides the subsidiary the occupation in semi urban and rural areas and more so far people living in hilly or dry areas where the crop output may not be sustain the family person.

Talukawise Livestock Distribution in Jalgaon District (1992-2003)

1. Buffaloes : -

Buffaloes are a human loving animal in the world. They provide lots of milk from these animals. It thrives the best in areas living of warm and humid climate region of the district. Buffaloes are reared mainly for milk but male buffaloes are used to drought animals in certain parts of the study region.

The proportion the buffaloes of population was varied from taluka to taluka in Jalgaon district. The table no.2.14 shows indicate that out of the total livestock above 15% found in Yawal and Chalisgaon tehsils, where the population of buffaloes is very high to other tehsils.

TABLE NO.2.14 TEHSILWISE LIVESTOCK DISTRIBUTION IN JALGAON DISTRICT 1992 & 2003

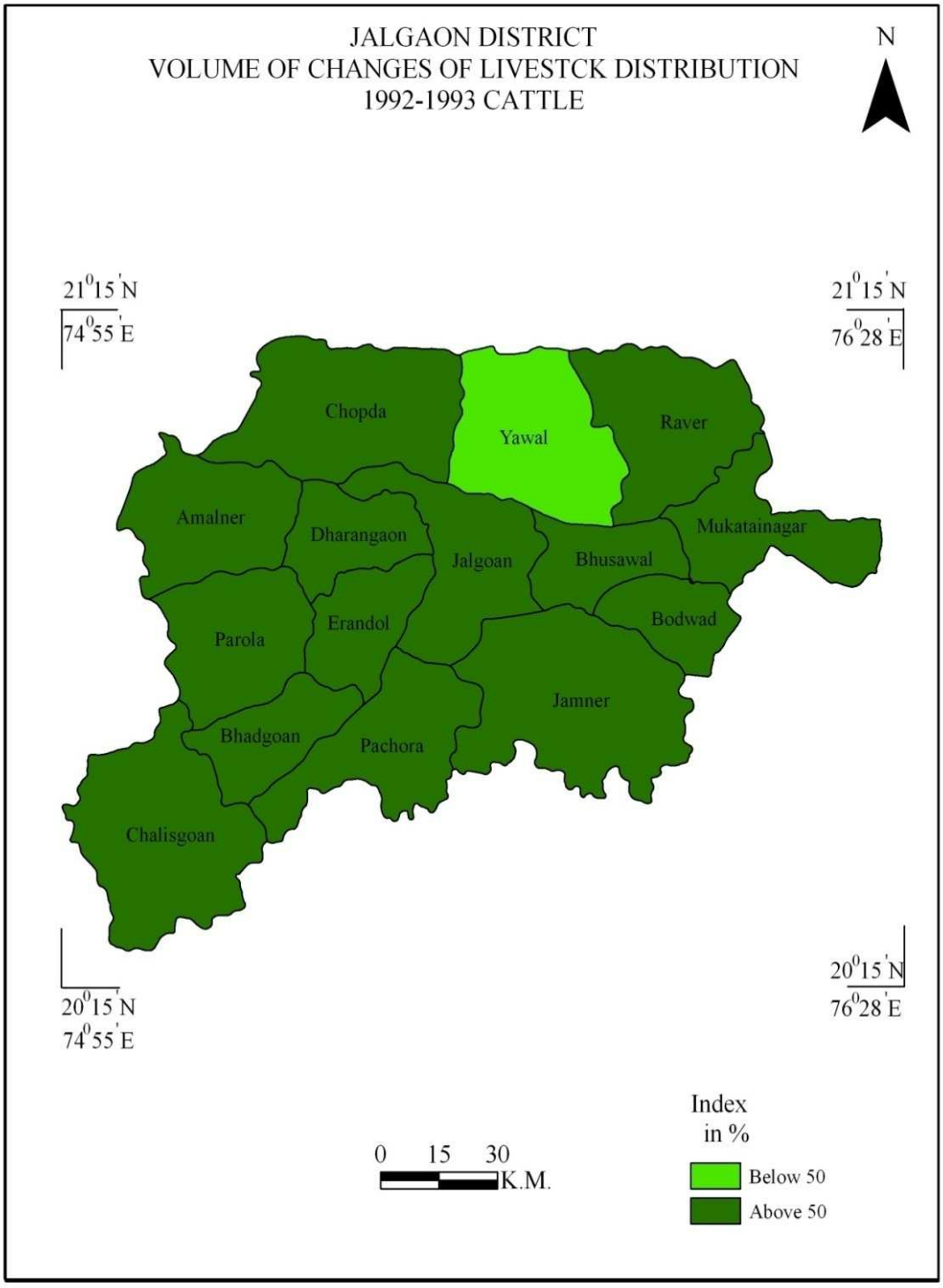
Sr. No	Tehsils	Census	Total Buffaloes	Total Cow	Total Goat/ sheep	Other Livestock	Total Livestock
1	Chopda	1992	19094	23479	36189	1145	79907
		%	65.50	97.33	7.70	10.23	100
		2003	29926	44745	36892	717	112280
		%	69.84	78.22	8.50	5.5	100
	Vol. Change		**2.34**	**19.11**	**0.80**	**5.18**	
2	Yawal	1992	31001	19359	35120	2339	87819
		%	63.10	56.22	10.20	15.23	100
		2003	25636	31300	34965	1850	93751
		%	85.52	45.22	8.40	11.21	100
	Vol. change		**22.42**	**14.00**	**1.80**	**4.02**	
3	Raver	1992	32337	17242	35010	2011	86600
		%	60.12	52.55	8.50	18.78	100
		2003	32994	35477	37995	1518	107984
		%	60.14	65.60	10.20	15.65	100
	Vol. change		**0.02**	**13.05**	**1.70**	**3.13**	
4	Muktainagar	1992	14775	12404	33983	772	61934
		%	63.30	56.64	10.50	10.36	100
		2003	19914	36875	44902	687	102378
		%	64.52	68.45	12.50	9.5	100

	Vol. change		**1.22**	**11.81**	**2.00**	**0.86**	
5	Bodwad	1992	N.A	N.A	N.A	N.A	N.A
		%	N.A	N.A	N.A	N.A	N.A
		2003	10971	18765	14853	841	45430
		%	45.20	62.21	8.50	5.5	100
	Vol. change		**3.20**	**2.21**	**4.50**	**2.5**	
6	Bhusawal	1992	24755	19772	58406	4048	106981
		%	78.48	52.23	15.50	18.55	100
		2003	24691	30988	24893	1107	81679
		%	78.00	65.12	8.50	10.40	100
	Vol. change		**0.48**	**13.08**	**7.00**	**8.15**	
7	Jalgaon	1992	23289	26361	35027	1542	86219
		%	72.21	45.12	12.30	12.60	100
		2003	18956	30532	22352	3816	75656
		%	62.15	54.32	10.80	19.50	100
	Vol. change		**10.06**	**9.2**	**1.50**	**6.90**	
8	Erandol	1992	36338	29776	49157	776	116047
		%	64.20	65.21	15.50	7.5	100
		2003	14724	22338	32177	598	69837
		%	53.24	64.32	14.40	5.5	100
	Vol. change		**11.06**	**0.89**	**1.10**	**2.00**	
9	Dharangaon	1992	N.A	N.A	N.A	N.A	N.A
		%	N.A	N.A	N.A	N.A	N.A
		2003	14292	20955	27600	863	63710
		%	54.30	63.21	9.40	7.8	100
	Vol. change		**2.30**	**5.02**	**8.40**	**2.04**	
10	Amalner	1992	22530	24948	41910	3202	92590
		%	65.23	65.00	12.20	8.8	100
		2003	24384	38385	44136	4543	111448
		%	66.77	69.85	16.80	10.50	100
	Vol. change		**1.54**	**4.15**	**4.60**	**1.70**	
11	Parola	1992	21822	19652	31173	1294	73941
		%	58.92	68.54	12.40	13.50	100
		2003	20505	33825	49289	1292	104911

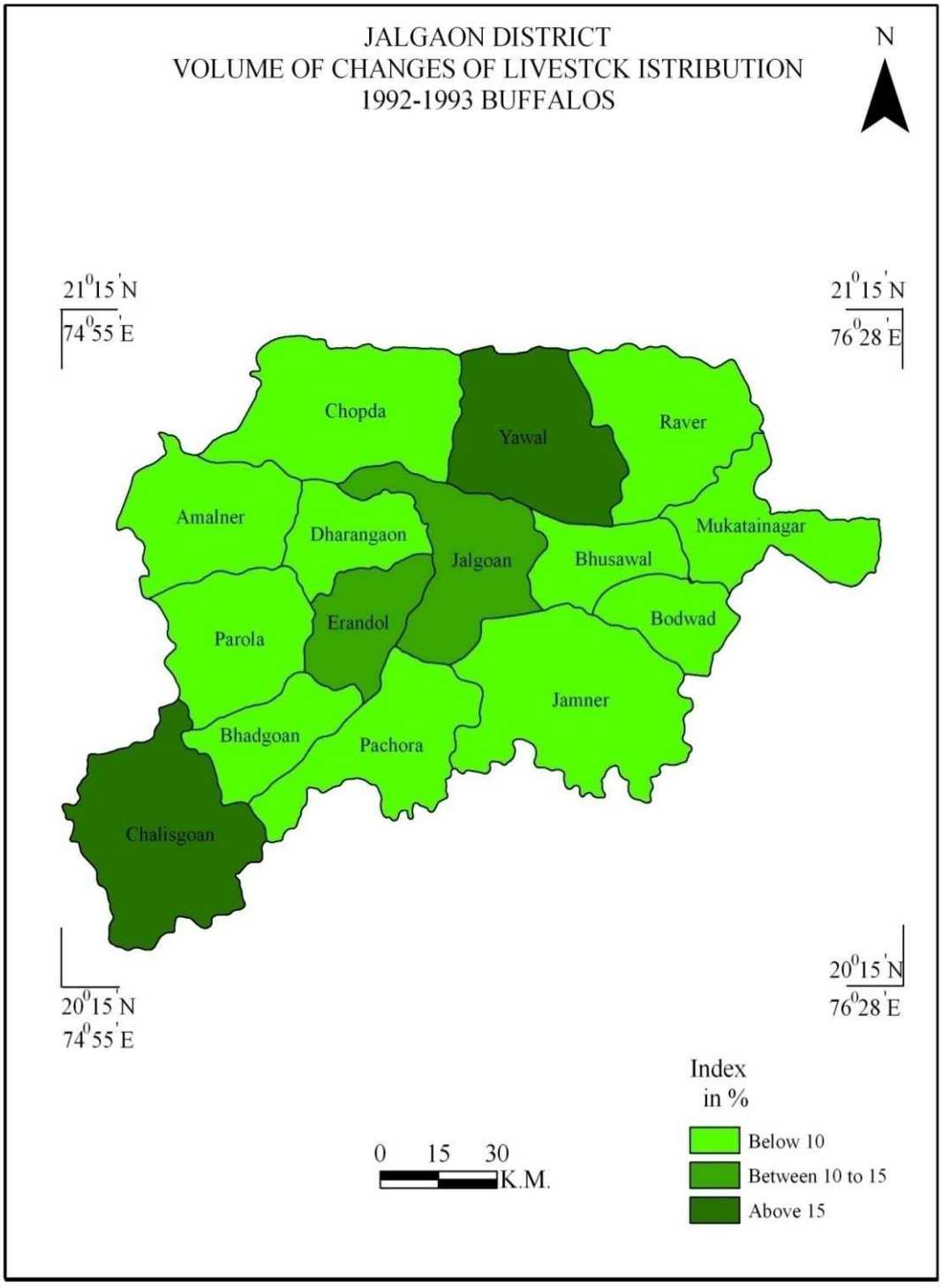
		%	52.96	72.21	17.80	13.20	100
	Vol. change		**5.96**	**4.33**	**5.40**	**0.30**	
12	Bhadgaon	1992	17988	13303	18862	1678	51831
		%	51.21	61.47	5.40	12.50	100
		2003	13486	19701	22437	253	55877
		%	48.00	65.44	8.20	4.5	100
	Vol. change		**3.21**	**4.03**	**2.80**	**8.45**	
13	Chalisgaon	1992	42130	35633	68197	4051	147011
		%	95.20	65.85	17.50	14.50	100
		2003	25642	50399	78091	3976	158108
		%	75.45	77.87	20.00	12.00	100
	Vol. change		**19.75**	**12.02**	**2.50**	**2.50**	
14	Pachora	1992	25195	21658	46662	1626	95141
		%	74.25	68.78	16.65	12.00	100
		2003	26816	30833	39223	4733	101605
		%	78.65	79.89	9.50	15.50	100
	Vol. change		**4.04**	**11.11**	**7.15**	**3.50**	
15	Jamner	1992	31788	36157	78048	3891	89884
		%	75.20	88.88	18.00	12.05	100
		2003	30414	98929	61548	1882	192767
		%	69.21	89.88	12.30	10.00	100
	Vol. change		**5.99**	**1.00**	**6.30**	**2.05**	

Source: Socio-Economic Abstract of Jalgaon District in 1992 and 2003

The above 10% and below 15% of buffaloes are found in Jalgaon and Erandol tehsils where very low percentage of buffaloes below 10% are found in Chopda, Raver, Muktainagar, Bodwad, Bhusawal, Dharangaon, Amalner, Parola, Bhadgaon, Pachora and Jamner tehsils comparatively 1992 than 2003 because during this period the however the shortage of fodder crops and green grass during the summer season in 1992, it shows in map no. 2.14


JALGAON DISTRICT
VOLUME OF CHANGES OF LIVESTCK DISTRIBUTION
1992-1993 CATTLE
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Below 50
Above 50

Map No.2.3


JALGAON DISTRICT
VOLUME OF CHANGES OF LIVESTCK ISTRIBUTION
1992-1993 BUFFALOS
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Below 10
Between 10 to 15
Above 15

Map No.2.4

2. Cow:-

In Jalgaon district the cow population is large number however they are poor and average quality. The cattle is using for the main purpose of white pure milk and for drought purpose. The total cattle include jercy bullocks, jercy cow and other stock of hybrid cow, breeds in normally found in Jalgaon district. Where bullocks car are such using for the vehicle which not only serving as a means of transportation of goods or from to the village from nearby town but also is well suited and designed by the transport agriculture raw materials.

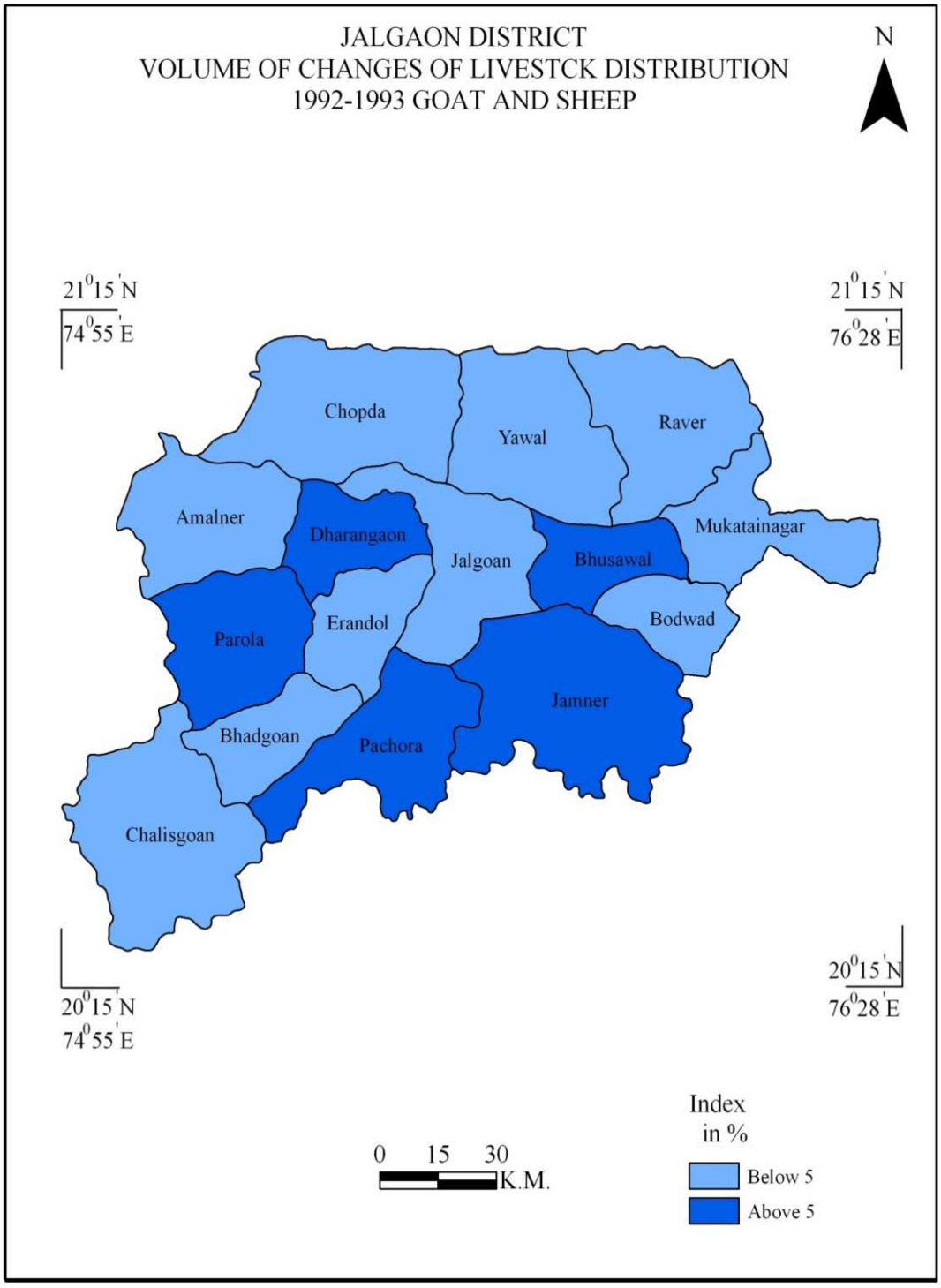
And implements from fields in the study region. In study region observed in agriculture the farmer almost entirely depend on livestock animals. The total cattle found in Jalgaon district in 2003 the number of cow 5, 44, 047 and 1992 the number of cow 2, 99,744 are found in Jalgaon district.

The table shows the percentage and total population of cattle. Where the total livestock of cattle percentage are found in above 50% of Chopda, Yawal, Raver, Muktainagar, Erandol, Parola, Chalisgaon, Pachora and Jamner tehsils & below 50% are found in Jalgaon, Bhusawal and Amalner tehsils in 1992.

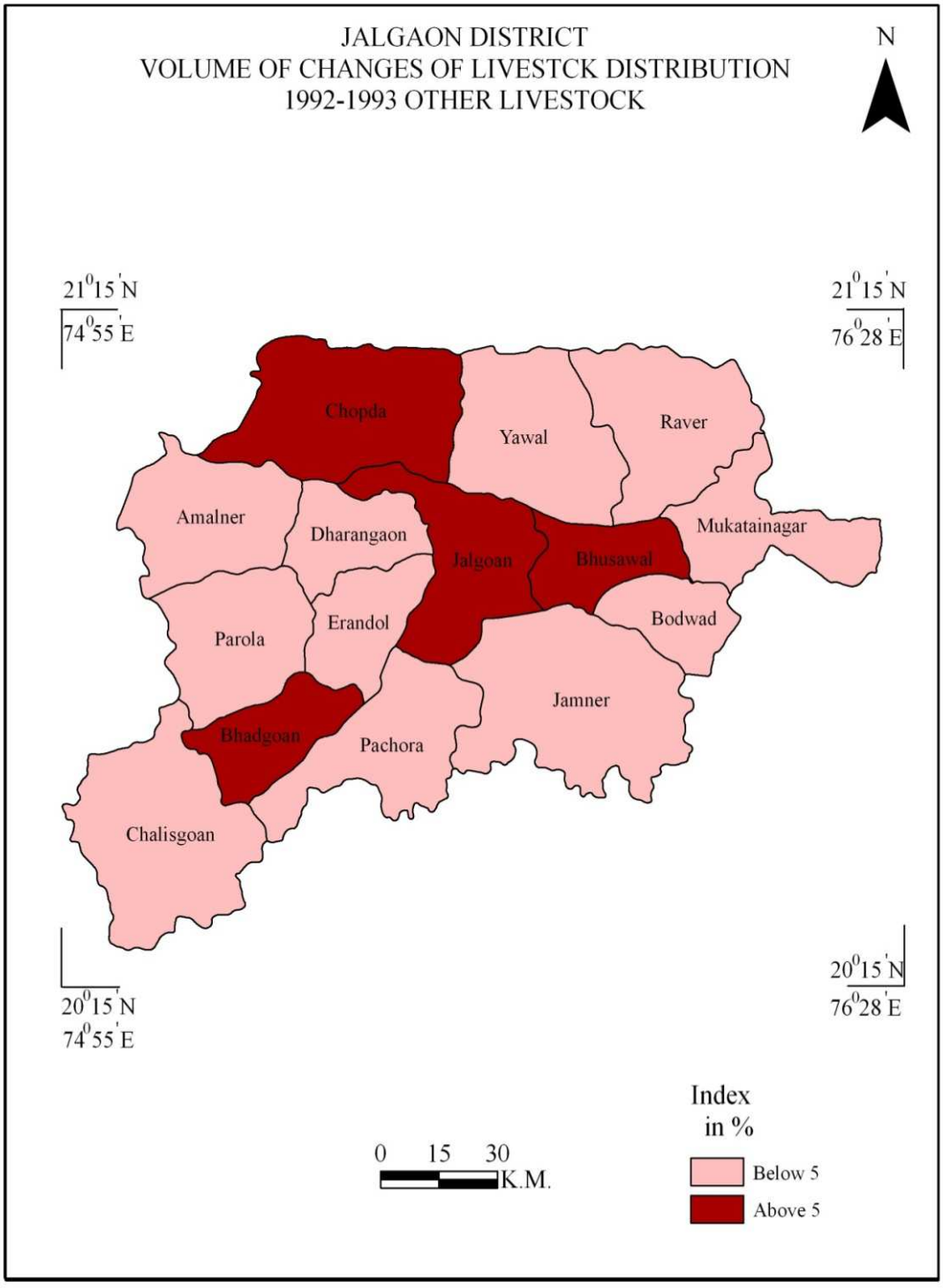
The year of 2003 the total cattle population are found in Jalgaon district, above 50% in Chopda, Raver, Muktainagar, Bodwad, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Parola, Pachora, Bhadgaon, Chalisgaon and Jamner tehsils, below 50% are found in only Yawal tehsils of Jalgaon district. The volume of change is observed in the district the volume of above 10% is observed in Chopda, Yawal, Raver, Muktainagar, Chalisgaon and Pachora tehsils. In volume below 10% are observed in Bodwad, Jalgaon, Erandol, Dharangaon, Parola, Bhadgaon, Amalner and Jamner tehsils.

3. Goat and Sheep:-

Goat and Sheep are very poor man friendly animals because it can be cheaply share to any green grass of poor quality and demand it. It is main purpose the demand of supplier Meat, Milk, Hair and Skin with other usable parts. According to livestock census of 2003 there are 124.36 million Goats and 61.47 million Sheep in the country. About 5 million households in the country are engaged in rearing of a small hard Sheep, Goat, and Rabbit. Goat and Sheep are an integral part of Indian Agriculture Economy. While all the livestock distribution is widely divergent mainly dependent upon the climatic conditions, heavy rainfall areas and greater in low rainfall areas are mostly suitable.


JALGAON DISTRICT
VOLUME OF CHANGES OF LIVESTCK DISTRIBUTION
1992-1993 GOAT AND SHEEP
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Below 5
Above 5

Map No.2.5


JALGAON DISTRICT
VOLUME OF CHANGES OF LIVESTCK DISTRIBUTION
1992-1993 OTHER LIVESTOCK
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Below 5
Above 5

Map No.2.6

During the period of 1992 and 2003 sixteen years all the talukas in Jalgaon district have changes in the case of Goat and Sheep of population. The table no. shows are the total population and volume of change of Goat and Sheep.

The tables shows indicate above 5% are found in Bhusawal, Dharangaon, Parola, Pachora and Jamner tehsils. Below 5% of Goat and Sheep are found in Chopda, Yawal, Raver, Muktainagar, Bodwad, Jalgaon, Erandol, Amalner, Bhadgaon and Chalisgaon tehsils, it shows in map no.2.14

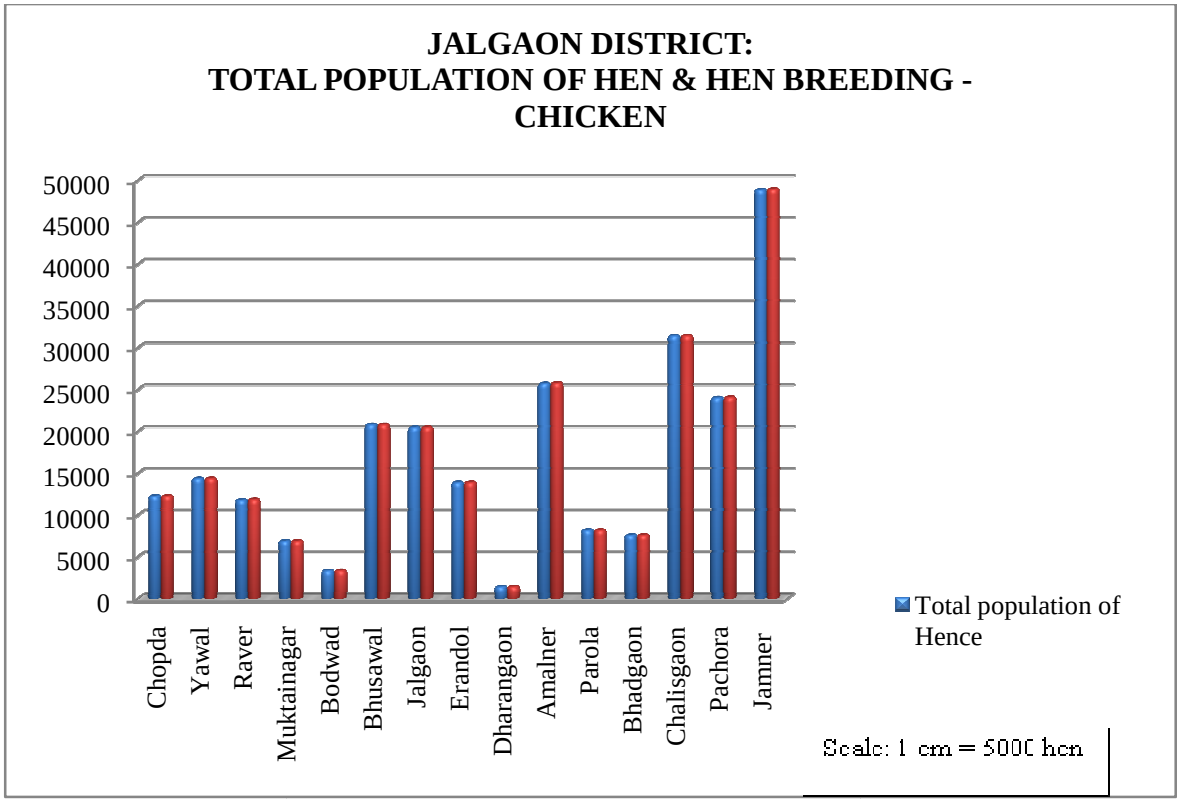
4. Other Livestock Animals:-

In Table No.2.14 that there are great variations in other livestock of population in Jalgaon district. It has increase rapidly from 1992 to 2003 collected census data.

TABLE NO.2.15 TOTAL POPULATION OF HEN & HEN BREEDING FOR CHICKEN, 2005-2006

Sr. No	Tehsils of Jalgaon district	Total population of Hence	Hence for Breeding
1	Chopda	12275	12275
2	Yawal	14377	14380
3	Raver	11789	11851
4	Muktainagar	6887	6887
5	Bodwad	3358	3361
6	Bhusawal	20818	20818
7	Jalgaon	20491	20491
8	Erandol	13888	13888
9	Dharangaon	1415	1415
10	Amalner	25740	25789
11	Parola	8189	8189
12	Bhadgaon	7599	7599
13	Chalisgaon	31432	31432
14	Pachora	24031	24079
15	Jamner	48885	48952
	Total	**251174**	**251406**

Source: Socio-Economic Abstract of Jalgaon District, 2005- 2006



Graph No.2.11

Highest population are found in 2003 and lower population of livestock found in 1992. The volumes of change are observed in Jalgaon district, above 5% in Chopda, Bhusawal, Jalgaon and Bhadgaon tehsils. Other livestock are observed below 5% in Yawal, Raver, Muktainagar, Bodwad, Erandol, Dharangaon, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils.

Another of livestock in Jalgaon district i.e. Poultry agro base farms, it is a Agro-base human loving small business in economic sector, Hen for breeding for Chicken, Egg and Skin for the supply of demand over the district. In district the total populations of Hens are observed for Breeding and Sale. These are all tehsils of Hens population available data shows in Table No.2.9.2

Many variations are observed of total population of Hen in Jalgaon district of all tehsils. Some tehsils the number of Hen Chicken population (2, 51,174) and Hens for Breeding in same at position. But other tehsils are changes in Breeding Hen population where the Yawal, Raver, Bodwad, Amalner, Pachora and Jamner slightly increase the total number (2, 51, 406) of Hens for Breeding in Jalgaon district. Only 232 the number of Hens is increasing for Breeding in Jalgaon district.

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CHAPTER - III

DEVELOPMENT OF IRRIGATION

3.1 INTRODUCTION:-

Irrigation means the artificial application of water supply to the agriculture land, soil, for crop production. It encourages the farmer to adopt scientific techniques and go in for more intensive cropping. An artificial feeding of water to the plants is known as “Irrigation”. Irrigation occupies the most important place in those areas where the economy is entirely depending on agriculture. Irrigation is the most important requirement in the package practices for intensive and efficient cultivation of the high yielding varieties and also for multiple cropping.

Without irrigation, chemical fertilizers, which are closely inputs, cannot be used with an advantage to the farmers. Its results from the high yielding varieties depend critically on controlled application water. It is a fact that Irrigation is indispensable for the success of agriculture region. Irrigation benefits to farms by reducing the risk of crop failure increase the average yields and permitting multiple cropping productions. Irrigation is a science; it is an art too. This science and art is to be taught at different levels. The successfully water requirement of various crops can be met them.

3.2 EVOLUTION OF IRRIGATION:–

Irrigation is an old age as old civilization time. In India it has been practiced since ancient times. The early development of irrigation to place is Valleys of Gages and Indus. The first grand ancient on the canal was built in the second of the Christian period (since, 1974) Modern irrigation may be dated back to 1832 when the eastern Yamuna Canal in Uttar Pradesh was commissioned. The development of irrigation took place in India after 1950-51 with the implementation of five years plans.

Gross area of Maharashtra state is 308 hectares, total cultural area is 223.68 lack hectares. Out of 35 district with parts of 87 taluka have been identified as drought prone by fact finding committee in 1973, the 7000 villages

from 87 taluka are indentified as drought prone. 70 lacks hectares of the cultural land from these villages are affected. This is one third the total cultural land of the state is suffering from the scarcity.

IRRIGATION IN JALGAON DISTRICT:–

Jalgaon District has only one 'Tapi' the large regular and perennial river (160 km flowing through the district) with their small tributaries out of which the Girna (130 km), Waghur (88 km), Anjani (72 km), the Bori (56 km), Agnavati (107 km), More (48 km) other seasonal (tributaries) rivers like, Suki, Bahula, Aner, Hivara and Manyad are considerably supportive to agriculture, Besides well watering and canal watering systems support the irrigations aspects.

Irrigation facilities are being well developed in Jalgaon district, over the last two decades. According to 2004 - 2005 agricultural statistics for taluka comparative figures are available the irrigated area in Jalgaon district was the highest **(27.59 %)** in the whole of Maharashtra **(17.3%),** the net irrigated area however ranks first in the state.

Almost all the dams like Hatnur, Girna and Waghur were built; they go throughout the district especially in Jalgaon, Yawal, Chopda, Amalner, Jamner, Chalisgaon, Bhadgaon, Parola taluka. A detailed review of the progress of irrigation from the past it is difficult, hence an attempt is made here to investigate regional imbalance in irrigation facilities from the plan period onwards with the advent of planning 1951, and many attempts were made to tap the water for irrigation schemes in Jalgaon district. The Government policies encourage the farmer to utilize surface and ground water resources by giving them financial assistance and subsidies.

Sugar factories, which have been established during the last forty years, have given impetus to irrigation by making it special in their commercial areas, apart from these factories rapid rural electrification. The awareness in farmers and increasing trend of education has stimulated irrigation developments.

The growth of irrigation from all the sources in which 2, 19,352 hectares in 2004-2005. It could observe from the figure that well irrigation is prominent in Jalgaon district. At present the total irrigated area 2, 47,506, hectares the

irrigation by well is 2, 39,096 hectares (96.60 percent), by other sources of irrigation surface in 8410 hectares i.e. (3.40 percent.)

3.3 DEVELOPMENT OF IRRIGATION:–

The purpose of irrigation is to counteract drought by making certain that the plants are not deprived of water at any time during their development. It is essential to ensure the crops and their yield especially in the dry lands where dry farming is impossible with 500 to 700 mm rainfall. Irrigation benefits the farmers by reducing the risk of crop failure, increasing the average yields and permitting multiple cropping. It is the intensive and more economic agricultural operations.

The success of agriculture depends to a large extent on how successfully water requirements of various crops can be met. The transformation of agriculture is possible only though irrigation as it is a primary input on which other inputs depend. Due to irrigation, farmers can make additional investment in cattle, farm implements and on more valuable crops like sugarcane, banana, cotton and the total employment of far labourers. Obviously it increased the land value and leads to additional use of land.

Spatial distribution of rainfall is unequal to areas of district, it being high as 1200 mm and above in the eastern part and about 400 mm in the western part. However, the seasonal distribution of rainfall is so imbalanced. Even in the Kharip season, the supplemental irrigation is needed in most of the areas of the district; most of the rabbi crops and perennial crops in the district, it cannot be raised properly.

In view of the growing population and thereby need for food, it urgently felt to enhance the area under irrigation in Jalgaon district. But there are serious difficulties which stand in the way of achieving this goal. First the volume of water in the district is subject to fluctuations, so much so that rivers and streams are reduced to mere trickle from February to May (summer months). Except the Tapi; As a result the mean discharge in the canal irrigation varies and becomes a limiting factor for successful crop production.

The second obstacle is the fluctuation of ground water table, which sinks deeper in summer season, so the wells in the district do not have sufficient water and do not supply water throughout the crop season.

The affect the intensity of irrigation, cropping pattern and the double, cropped area. Thus the heavy variation in canal discharges, great fluctuation in water table are most disconcerting to the farmers, and if these could be adequately predicted the task of farmers can become much easier since in that case they can plan the cropping pattern in advance. In addition there are other difficulties such as literacy, ignorance, and misunderstanding and poverty of the farmers and lack of proper guidance, these are also adversely affect the development of irrigation.

METHODS OF IRRIGATION:-

Where the irrigation water supplied from the different sources to apply by various methods, which vary according to slope, soils salinity, crops growth to be irrigated. The information regarding the methods applied in the region is collected by circulating the questionnaires and supported by interviewing the experienced farmers and experts from agricultural and irrigation departments, which is also supplemented by frequent field visits.

Water application is most important factor in agriculture. Water by irrigation is to supply water to soil, so that moisture will be readily available at all times for crop growth without indiscriminately adding to the water table as well as avoiding influence of soil salinity.

An efficient method of water application i.e. irrigation is that which best suits local conditions such as – Soil characteristics, Crop and its age, Crop rotation, Topographic condition, Available of water flowing underground water table condition and state of soil salinity.

Various irrigation methods are shown in following figure: –

A) Subsurface Irrigation –	a) natural	b) artificial
B) Surface Irrigation –	a) flooding furrow	b) contour farming
C) Overhead Irrigation -	sprinkler irrigation	
D) Drip Irrigation		

A) SUBSURFACE IRRIGATION:–

In subsurface irrigation, water is applied beneath the ground by creating and maintaining an artificial water table at some depth, usually 250 to 650 mm below the ground surface. Moisture moves upwards to towards land surface through capillary action to meet the requirements of crops in plant roots. Water is applied directly to the roof zone of the crop without wetting the soil surface thought open ditches or tile drains. Subsurface irrigation requires filed preparation and labors. It entails minimum evaporation loss the surface waste. The irrigation water is essentially required to be of good quality to prevent excessive soil salinity/ the flow rate in supply ditches is required to be low to prevent water logging of the field.

The favorable condition for the subsurface practice in –

1. The subsoil at reasonable depth (2 to 3 meter) to prevent deep percolation of water or a permanent high water table.

2. Permeable soil such as loam or sandy loam in the root zone of the soil to prevent free and rapid movement of water laterally and vertically.

3. Uniform topographic condition.

4. Moderate slopes.

5. Availability of adequate outlet for drainage of irrigated areas.

6. Good quality irrigation water.

7. Well planned distribution system.

The subsurface irrigation may be classified in to 1) Natural and 2) Artificial subsurface irrigation.

Natural subsurface irrigation is applicable to low lying lands where the water table is high and within capillary reach of root zone of crops. The water table is charged from irrigation canals. It is better controlled to prevent water logging conditions. The method of applicable wherever above the conditions exist most economical means of raising crops. Artificial subsurface irrigation is a very

expensive method. It is use is indicated only under favorable water supply and subsoil conditions for high yielding crops.

Advantages – the advantages of subsurface irrigation are minimum water requirements, suitability for most crops, minimum evaporation and deep percolation losses, high crop yield, most economical view, no wastage of land, no interference in free movement of farm machinery uninterrupted cultivation operations during irrigation period. Disadvantages of subsurface irrigation are suitability of natural conditions, danger of water logging, underground pipes fitting with high cost.

B) SURFACE IRRIGATION:-

It is so far by the most common type of irrigation. Water is applied to the filed in different quantities and at a different times. Water is diverted from a stream from the head of a field into furrows or borders and allowed to flow downward. By subsequent flooding and lateral movement, the soil is restored to its full water holding capacity to a depth that depends on the quantity of water introduced, the duration and rate of stream flow, the gradient and soil structure and texture.

Generally under upon ditch conveyance and surface irrigation methods one half of the water released reaches plants. Highly efficient irrigation can be achieved by an appropriate combination of size of the irrigation stream, uniform application of water, minimum soil erosion, minimum labour requirement, maximum land use, size and shape of field and use of machinery.

Advantage – a) Allows use of machinery for land preparation, cultivation and harvesting. **b)** Helps to store the requirement amount of water in the capillary zone of the soil for supply to the root of zone of plants.

Disadvantage – a) Larger requirements of water due to greater loss of water by surface run off and deep irrigation. **b)** Low efficiency due to imperfect control over the water flow. c) Costly and time consuming preparation of land.

Classification - Surface irrigation classified as flood-furrow method, and contour farming method.

I) FLOOD FURROW METHOD:-

Water is spread over the land, without much control or prior preparation. This method is generally used in inundation irrigation system in which water is forced to spread over vast tracks during season of high stream flow. It is wasteful use of water and is practiced where irrigation water is abundant and inexpensive. It is very much used for row crops like maize, jowar, sugarcane, cotton, ground nut, etc. in this method only one half to one fifth of the surface is welted, and thus evaporation losses are reduced.

In furrow irrigation method water is applied by running small streams laterally to irrigate the areas between the furrows. This methods is adapted to a great variety of land and soil texture and can be used either large or a small streams of irrigation water (Contour, L. M 1967), therefore the method is very commonly use in Jalgaon and Chopda taluka of the region. A furrow method consists of narrow ditch between rows of plants. The length of furrows varies from 3 m or less for to as much 500m for field crops, the common length being 100 to 200 m. it the furrows are of excessive length, deep percolation losses and soil erosion near the upper end of the field may result.

II) CONTOUR FARMING METHOD:–

Contour farming is adapted to hilly areas with steep slopes and quickly falling contours. Here the irrigation water stored higher up in some depressions flows between the bunds. The dimensions of contour bunds are 2.67 to 4.25 m base, width 0.38 to 0.60 m top width, 0.75 to 0.90 m in height, where the various types of soils i.e. shallow, medium and medium deep soils are found this land.

C) OVERHEAD IRRIGATION - means *"SPRINKLER IRRIGATION".*

It is an improvement over conventional surface irrigation. It stimulates natural rain fall to bring down water in the form of rain just when needed and as much needed. This method water application to the soil surface in the form of a spray falling at a uniform pattern and at a rate less than the infiltration rate of the soil so as to avoid surface run off from irrigation. This method is suitable for all types of soil, more particularly coarse, silt, gravelly soils and sandy for most crops like wheat, jowar, cotton, potatoes, tobacco, ground nut, vegetables, etc.

However, it is not recommended for rice, jute, and plantation crops such as coffee, tea, etc. It is particularly suitable for production of high yielding crops or for having continuous and quick growth of valuable crops. Sprinkler irrigation with a dependable supply of water, serves as crop insurance in wet or semi wet regions, while in dry areas, unsuitable for conventional irrigation, it provides economic means of production of crops.

Sprinkler irrigation is widely used in Canada, England, France, and Germany now in India. In India, sprinkler irrigation initially confined to commercial crops like tea, coffee and other plantation crops where the value of product is high price in market of city, state or country. The factors are responsible for the selection of sprinkler irrigation is: –

a) Land of undulating topography where land leveling is either impracticable or uneconomical.

b) Land of excessive slopes and easily eroded soils.

c) Topography is irregular, soil is excessively permeable or impermeable, limited water supply and high cost of water.

SPRINKLER IRRIGATION SYSTEM:–

In this method, water is pumped under pressure, carried through high pressure main line and let out through sprinkler nozzles placed at regular intervals on lateral lines. The sprinkler work at different pressures depending on the type of sprinkler. There are no hard and fast rules for lying out main and lateral lines, being dependant on slope and size of the farm and location of water source. Usually the distance between two laterals is kept as 12 meter as well as the distance between two sprinklers is maintained at 12 meter. The capacity of the pipe system depends on the rate of application of water and the area to be irrigated in one setting.

The maximum rate at which water can be applied without causing paddling; capping or surface runoff is controlled by the nature of the soil, crop grown and the topography of the area to be irrigated. Usually, it varies from 2.5 mm/hour for clay to 55 mm/hour for very light soil. The area to be irrigated in

one setting depends on the type and pattern of sprinkler and operating pressure adopted. The size of droplets comprising spray is limited to avoid damage to the soil. Small nozzles operated at high pressure produce relatively finer spray with small droplets. Roughly a pressure of 0.275 N/mm² is adequate for 3 mm nozzle size and additional 0.035 N/mm² for every 0.75 mm increase in nozzle size.

The equipment used consists of pump, motor, sprinkler nozzle, main pipes of aluminum 75 mm in diameter, lateral pipes of aluminum usually 50 mm in diameter, coupling, values, clamps, take off elbows and other suitable motor for attaining pressure. Fertilizer applicator is added to sprinklers to apply fertilizer easily and effectively. The applicator is automatic and is distributed evenly without waste.

TYPES OF SPRINKLER SYSTEM:–

1) PERMANENT SYSTEM –

It consists of permanently buried main and laterals either of galvanized iron pipes or usually plastic pipes fixed pumping plant and permanent sprinklers located on each river. The purpose is to reduce labour cost by eliminating movement of lateral lines, especially where free foliage is heavy. It is used on permanently irrigated areas.

2) SEMI PERMANENT SYSTEM:–

Here main lines and sub mains are permanent and are usually buried, but laterals lines are portable, by a stationary water source and pumping plant. The nozzles are mounted on risers at suitable intervals.

3) FULL PORTABLE SYSTEM:–

It has portable sprinkler lines, portable main lines and sub mains and a portable pump. It is designed to be moved from field to field or to different pump sites in the same field. When the irrigation in the first position has been completed, water is turned off and lateral pipes are moved to the next position. When the irrigation is complete, the whole equipment can be manually moved to another field and operated. Since, it is more economical and flexible and preferred by farmers.

4) SEMI PORTABLE SYSTEM:–

Here water source and pumping plant are fixed. With an extended main line, the system can be used on more than field.

5) PERFORATED SPRINKLER SYSTEM – (**Perfo – spray- system**):-

It is a simple low cost sprinkler. Here, water carried through the main line is let through lateral pipe lines which have perforations in a specially designed pattern. Water is applied at a relatively high in rate. Water is spread over the crop by hundreds of small gentle sprays. The sprays are directed to both sides is suitable for sandy soils, but is not recommended for bare heavy clay soils. It is adapted to lawns, gardens, and small vegetable fields and other short plants of 50-70 cm height.

Now a day's utilize of new technique of **"Buried Irrigation System" in Irrigation field.**

BURIED IRRIGATION SYSTEM -

It is a substitute of canals by pipe lines. In this system water is delivered by a canal from the source of water supply to the irrigation area and inside, the irrigation area. It is distributed by gravity pressure pipe lines. The distributing pipe lines receive water from the farm pipe line or open canal laid along the contour lines or at a small angle to them. When water supply to field pipe lines is by pumping, they are laid straight and parallel to each other at 400 m spacing which is the optimum distance between them. From distribution pipe lines, water runs to the field pipe lines which in turn discharge into flexible irrigation pipe line.

Water is lifted mechanically to the buried net work when the level in the source of water supply is below the elevation of the area to be irrigated or when the head created by the gradient is a sufficient. Field pipe lines are provided with hydrants, sprinklers or watering machines. High density are polythene pipes are placed at a depth of 0.75 – 1.25 m. depending upon irrigation methods the underground irrigation pipe lines mainly operate under a pressure up to 6 atmosphere.

D) DRIP IRRIGATION:–

It is also called as **"Trickle irrigation".** It is recently developed method of irrigation, and is now recognized as one of the most important agricultural development in this country.

It was first introduced in 'Israel' country and now practiced in USA, Australia, South Africa and India. In India it is yet in infant stage, but is making a positive impression on agriculture. Drip irrigation limits the water supplied for consumptive use of the plant by maintaining minimum soil moisture in the root zone. There by maximizing the water saving. A dripper discharges water directly into the area of the root system. It permits fine control of application of moisture and nutrients at frequencies prescribed for the individual plants.

Drip irrigation involves lateral spread of water (together with fertilizer solution) though these outlets at virtually zero pressure. Irrigation is done through these drippers fitted on small diameter lateral lines. The dripper located at suitable spacing delivers the water to the soil surface near the base of plant. In drip irrigation, water is applied in the form of drops directly to the plants.

3.4 AREA UNDER THE IRRIGATION:–

As we know Irrigation means the artificial application of water to the soil for crop production. It encourages the farmers to adopt scientific techniques and go in for more intensive cropping. Where it has to study the content of the adaptation of high yielding varieties, fertilizers and overall development of agricultural as well in Jalgaon district. Irrigation is an agriculture strategy to new trends to reduce moisture deficiency.

The term of Irrigation means "the application of artificial water to land growing crop is known as 'Irrigation' (Contour, L.M, 1967). Irrigation has the important technological components of progressive agricultural development in the study region, it provides water under the best management on scientific basic and technique has also received the meaning of irrigation system. The area is highly developed in the study region because the irrigation inputs are supply with large quantity with techniques. So the development is highly varied in Jalgaon district.

The main reason in the development of agriculture by irrigation in Jalgaon district; so it main helps for the purpose of agriculture production. First it raises the yield per unit area by including the use of other complementary yield raising inputs viz. High Yielding Varieties of seeds, fertilizers and pesticides. Second, it leads to the expand in the gross cropped area by the making the double and multiple cropping pattern possible in this region, and third is the amount of output by enable farmers to allocate their lands to high yielding and high valued crops in agriculture region.

TABLE NO.3.1 TALUKAWISE DISTRIBUTION OF NET IRRIGATED AREA TO NET SOWN AREA IN JALGAON DISTRICT

(1990-91 AND 2000-01).

Sr. No	Taluka of Jalgaon District	Percentage of Net Irrigated Area to Net Sown Area 1990 - 1991	Percentage of Net Irrigated Area to Net Sown Area to 2000 - 2001	Volume of Change
1	Chopda	15.68	19.46	3.78
2	Yawal	22.60	28.77	6.11
3	Raver	37.28	50.84	13.56
4	Muktainagar	31.56	28.83	-2.73
5	Bodwad	N.A	8.93	8.93
6	Bhusawal	9.85	12.43	2.58
7	Jalgaon	7.27	13.22	5.95
8	Erandol	14.35	29.52	15.17
9	Dharangaon	N.A	11.01	11.01
10	Amalner	12.56	14.90	2.34
11	Parola	7.33	11.69	4.36
12	Bhadgaon	17.69	25.92	8.23
13	Chalisgaon	13.36	9.18	-4.18
14	Pachora	14.57	23.20	8.67
15	Jamner	6.32	5.91	-0.41
	Total District	165.22	293.81	83.37

Source: Agriculture Department & Socio-Economic Abstract of Jalgaon District 1990 – 91, 2000 – 2001, Computed by Researcher

In Jalgaon district the area under of the irrigation has observed in 2004 – 2005 is 2, 39, 096 hectares (96.60%) by other sources of irrigation of surface in 8410 hectares i.e. (3.40%) in an area. But this data has change in 2005 – 2006 according the socio-economic abstract of Jalgaon district.

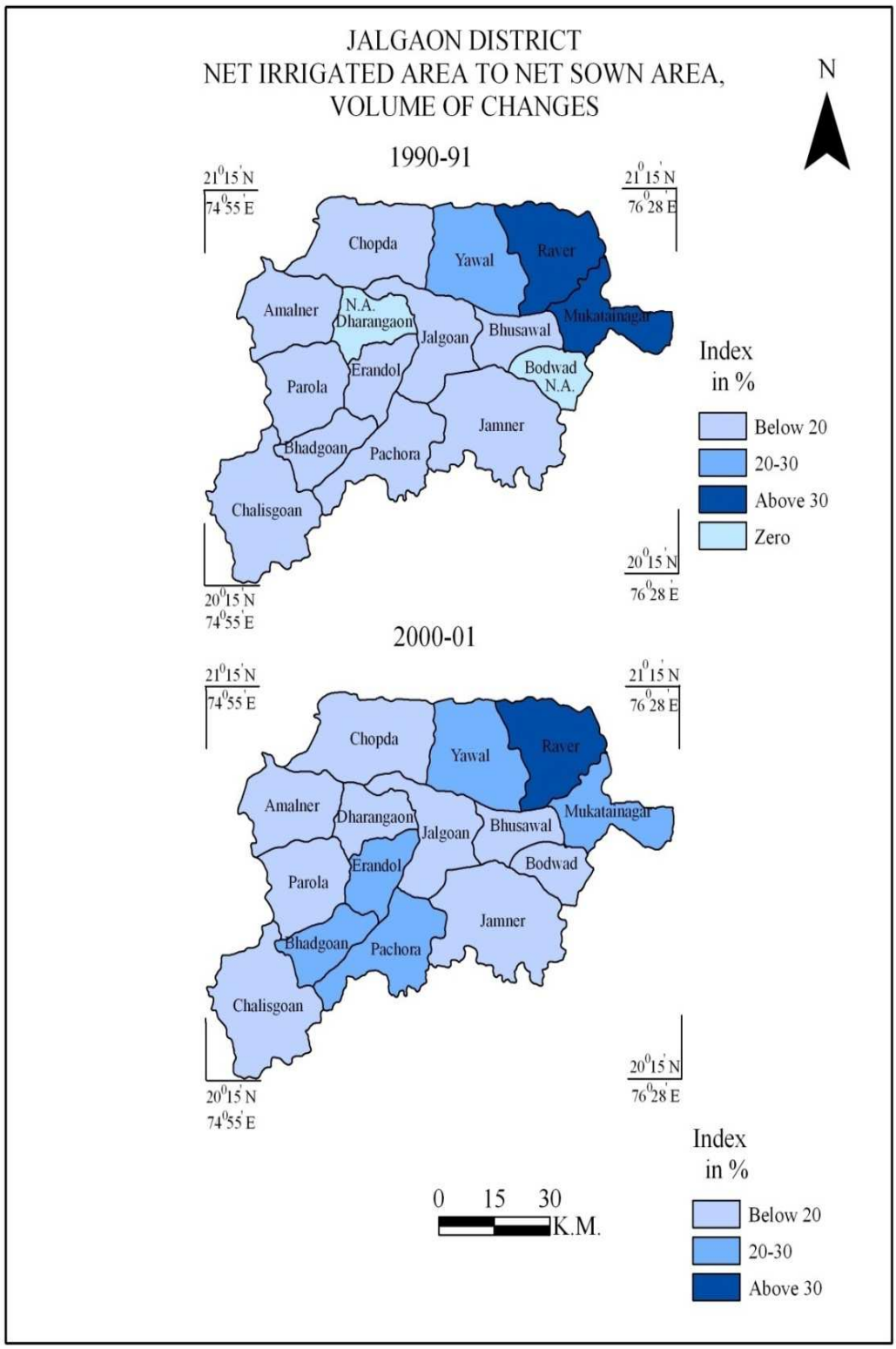
The area are observed in 2005 – 2006 the total area under the irrigation is 95907 hectares by surface irrigation are under the area is 1616 hectares (1.68%) and other area under the well irrigation is 94291 hectares (98.32%) in Jalgaon district. Maximum area under the well irrigation overall the Jalgaon district. All tehsils wise distribution of irrigation in Jalgaon district if net irrigated area to net sown area, the correct values shows in Table No. 3.1

Table no.3.1 shows the reveals that the percentage of net irrigated area to net sown area was observed below 20% found in Chopda (15.68%), Bhusawal (9.85%), Jalgaon (7.27%) Erandol (14.35%), Amalner (12.56%), Parola (7.33%), Bhadgaon (17.69%), Chalisgaon (13.36%), Pachora (14.57%) and Jamner (6.32%) tehsils during the period of 1990 – 91.

Yawal taluka (22.60%) recorded above 20% to below 30% and highest recorded value above 30% to 40% is found in Raver (37.28%) and Muktainagar (31.56) tehsils in Jalgaon district during the period (1990 - 91).

In 2000 – 01 the table value show the percentage below 20% found in Chopda (19.46%), Bodwad (8.93), Bhusawal (12.43%), Jalgaon (13.22%), Dharangaon (11.01%), Amalner (14.90%), Parola (11.69%), Chalisgaon (9.18%) and Jamner (5.91%) taluka during the period 2000-01, where the recorded value above 20% to 30% are observed in Yawal (28.77%), Muktainagar (28.83%),

Erandol (29.52%), Bhadgaon (25.92%) and Pachora (23.20%) talukas, very highest value are found in Raver taluka (50.84%) in Jalgaon district during the period (2000-01). But in the study region a total percentage of cultivated area to net sown irrigated area 18.57% and net cultivated for all crops irrigated area is 12.01%. The highest net irrigated areas are observed in Raver taluka and very low net irrigated areas are observed in Bodwad and similar to Raver talukas in Jalgaon district.


JALGAON DISTRICT
NET IRRIGATED AREA TO NET SOWN AREA,
VOLUME OF CHANGES
N
1990-91
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
in %
Below 20
20-30
Above 30
Zero
2000-01
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
0 15 30
K.M.
Index
in %
Below 20
20-30
Above 30

Map No.3.1

TABLE NO.3.2 PERCENTAGE OF IRRIGATED AREA IN ALL TEHSILS OF JALGAON DISTRICT (1990-91 AND 2000-01)

Sr.No	Percentage of All Tehsils	Number of Tehsils period 1990 – 91	Number of Tehsils period 2000-01
1	Below 20%	Chopda, Bhusawal, Jalgaon, Erandol, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils.	Chopda, Bodwad, Bhusawal, Jalgaon, Dharangaon, Amalner, Parola, Chalisgaon and Jamner
2	Above 20% to below 30%	Yawal	Yawal, Muktainagar, Erandol, Bhadgaon and Pachora
3	Above 30% to 50%.	Raver and Muktainagar	Raver

Source: Computed by Researcher

3.5 SOURCES OF IRRIGATION:–

Natural water is available either as surface water which moves through gravity in rivers, lakes, ponds and canals; or as groundwater which is lifted through dug wells, tube wells using animal power or diesel or electric horse power machine motor. Various sources of irrigation are specific to the physical environment of the region and each one has its own peculiar characteristic. Three major sources of irrigation in this region i.e. – wells irrigation, canals irrigation and tanks irrigation.

3.5.1 WELL IRRIGATION –

Well is a device by means of which water is obtained from the sub-soil. The well irrigation is as old as agriculture. The well irrigation is suitable for poor farmer of the region because it is cheap and easy to operate. The well used for the irrigation purpose are generally circular with a diameter of 2 to 4 meters and depth from 10 meter to 30 meters.

For lifting water in the region oil engines and electric motors are became most dominant for irrigating the field. During the period of 1990 – 1995 about 1,

01, 119 hectares .i.e. 88.00% of total irrigated area was irrigated by wells. In the years 2005-2010 the area irrigated by wells was about 2, 39,096 hectares i.e. 96.60% of total irrigated area was irrigated by wells. i.e. 8.6 percentages well irrigated area increased within two decade.

TABLE NO. 3.3. JALGAON DISTRICT

WELL IRRIGATION AS PERCENTAGE TO TOTAL IRRIGATED AREA (1990-1995 AND 2005 – 2010)

Sr. No	Taluka	Percentage of Irrigated Area by Wells in 1990 -1995	Percentage of Irrigated Area by Wells 2005 - 2010
1	Jalgaon	15.18	17.19
2	Chopda	13.29	21.74
3	Yawal	**26.47**	40.78
4	Raver	**45.13**	**59.39**
5	Muktainagar	16.20	57.11
6	Bhusawal	8.33	17.19
7	Jamner	4.45	38.22
8	Pachora	13.41	40.63
9	Chalisgaon	8.90	38.19
10	Bhadgaon	24.46	48.44
11	Parola	8.01	58.34
12	Erandol	11.37	**58.79**
13	Amalner	7.77	6.25
14	Bodwad	N.A	7.50
15	Dharangaon	N.A	12.46
Total	Percentage irrigated area of the district =	**14.84**	**35.72**

Source: Socio-Economic Abstract of Jalgaon District (1990-95 and 2005-10)

The years 1990-1995 the area of Jalgaon district 15 tehsils are under the well irrigation, the percentage of 15 tehsils a 15 taluka wise – Jalgaon (15.18%), Chopda (13.29%), Yawal (26.47%), Raver (45.13%), Muktainagar (16.20%), Bhusawal (8.33%), Jamner (4.45%), Pachora (13.41%), Chalisgaon (8.90%),

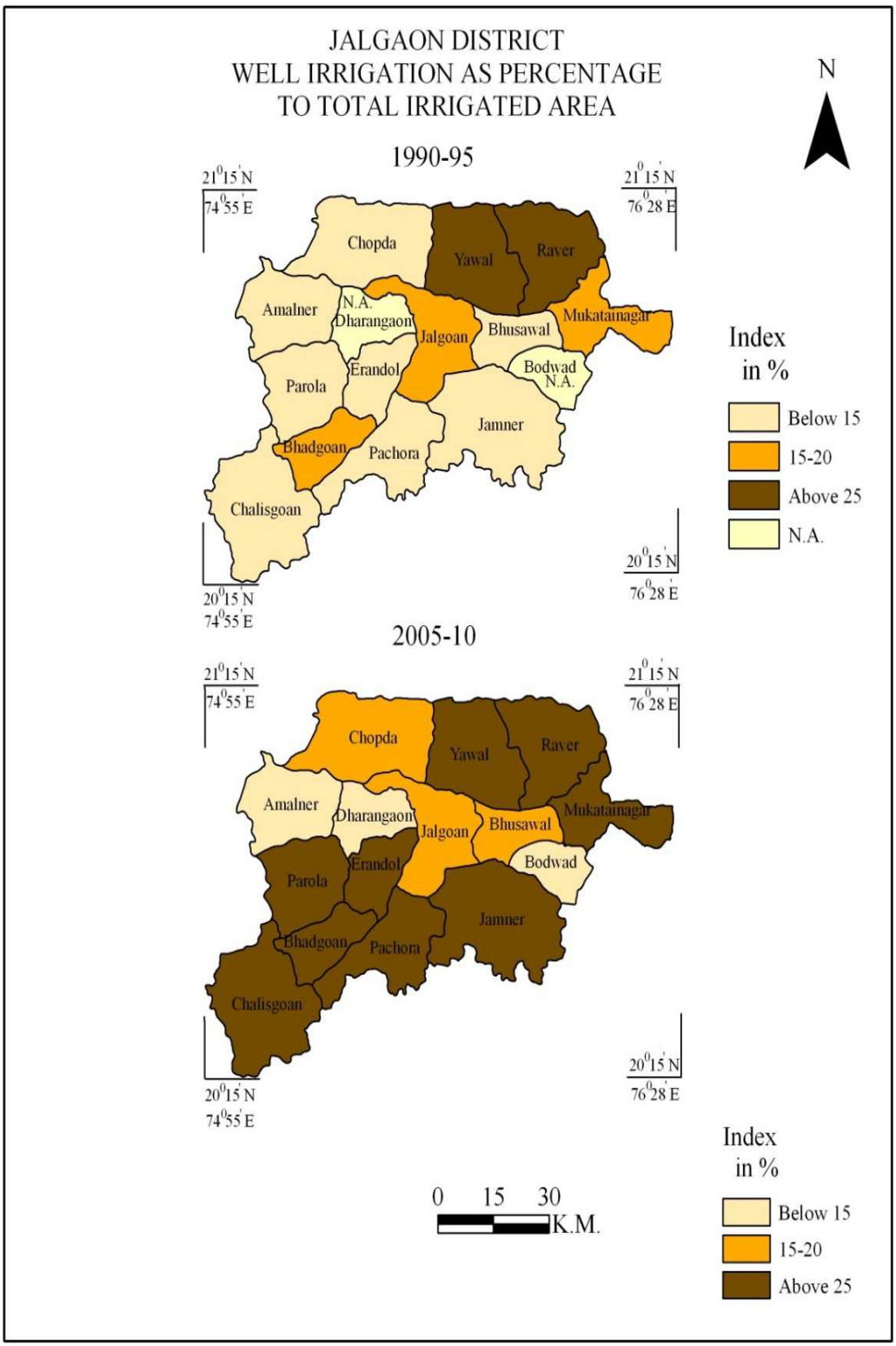
Bhadgaon (24.46%), Parola (8.01%), Erandol (11.37%) & Amalner (7.77%). Bodwad and Dharangaon taluka are separated from Erandol and Bhusawal in 1999. So the data are not available in the year 1990 to 2000.

The total cultivated area under the irrigation in the Jalgaon district is 14.84% And the years 2005-2010 the well irrigation under the district, taluka are maximum percentage cover the agriculture land, the percentage is – Jalgaon (17.19%), Chopda (21.74%), Yawal (4078%), Raver (59.39%), Muktainagar (57.11%), Bodwad (7.50%), Bhusawal (17.19%), Jamner (38.22%), Pachora (40.63%), Bhadgaon (48.44%), Chalisgaon (38.19%), Parola (58.34%), Erandol (58.79%), Dharangaon (12.46%), & Amalner (6.25%). The Total cultivated area under the irrigation in Jalgaon district is 35.72%. So now the last years 2012 the total cultivated area increases the percentage is 20.88% of the Jalgaon district.

Well irrigation is said to be the indigenous form of irrigation in India. It is very well to suit of poor Indian farmer, because it is cheap to build, no elaborate on machinery to work it and does not need to any specialized engineering skill to build it or it work it. It can be dug well at very poor farmer. Here in Jalgaon district well irrigation practiced in the agriculture parts where the canals water cannot reach. In table no. 3.2 shows under the area of well irrigation of agricultural and find out the percentage of every tehsils of Jalgaon district during 1990-95, 2005-10. Drastic impact of well irrigation in 2005-10 in Jalgaon district comparatively to year 1990-95.

Where the percentage of tehsils below 15% are found in Chopda, Bhusawal, Jamner, Pachora, Chalisgaon, Parola, Erandol and Amalner tehsils. The percentages of above 15 to 25% are observed in Jalgaon, Muktainagar and Bhadgaon tehsils. Highest percentages above 25% are found in Yawal and Raver tehsils during 1990-95 it shows in table no.3.2. So the total percentage of well irrigated area of Jalgaon district is 14.84% in this period, it shows in map no.3.2.

Similar to fact that highest percentage value increase during the period of 2005-10. The observations are; values of below 15% well irrigated area are found in Amalner, Bodwad and Dharangaon tehsils. Above 15% to 25% are found in Jalgaon, Chopda and Bhusawal tehsils during 2005-10 it shows in table no.3.2.


JALGAON DISTRICT
WELL IRRIGATION AS PERCENTAGE
TO TOTAL IRRIGATED AREA
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
in %
Below 15
15-20
Above 25
N.A.
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
0 15 30
K.M.
Index
in %
Below 15
15-20
Above 25

Map No.3.2

The highest value above 25% are observed in Yawal, Raver, Muktainagar, Jamner, Pachora, Chalisgaon, Bhadgaon, Parola and Erandol tehsils in 2005-10. The total percentage of well irrigated area of Jalgaon district is 35.72% which is the highest value of the period 1990-95.

a) WELL IRRIGATION INTENSITY:–

Overall Irrigation intensity is under the Well Irrigation and very low percentage of Canal Irrigation in Jalgaon district. The intensity of irrigation is controlled various factors such as source of irrigation, types of crops growing, cropping season, quality and quantity of crop through water supply and density of waters channels.

The benefits of intensity of irrigation are reflected in the cropping pattern, productivity of land, land use efficiency and method of cultivation. In this region other things being equal, intensity of irrigation will increase and decrease of rainfall etc. the intensity of irrigation will always remain low and negligible in the study areas. The intensity of irrigation is calculated by following formula:

Formula:

$$\text{Irrigation Intensity} = \frac{\text{Net Irrigated Area}}{\text{Net Sown Area}} \times 100$$

Intensity of well irrigation – the percentage of the agriculture area under well irrigation to net sown area is considered as the intensity of well irrigation. It is observed very high in (above in 50%) in Raver, Muktainagar, Parola and Erandol; high in Bhadgaon, Yawal, Jamner and Chalisgaon (between 40 to 50 %); where moderate intensity in Jalgaon, Chopda and Bhusawal between (15 to 35%) and low, very low intensity are observed in (below 15%) in Amalner, Bodwad and Dharangaon of well irrigation in Jalgaon district. Percentage of well irrigated area is observed high in years 1990-1995 up to 60% in Yawal and Raver talukas. Moderate percentage (15to 25%) in Jalgaon, Muktainagar, Bhadgaon talukas. And low percentage of irrigation is observed in below 15% in Chopda, Bhusawal, Jamner, Pachora, Chalisgaon, Parola, Erandol and Bodwad.

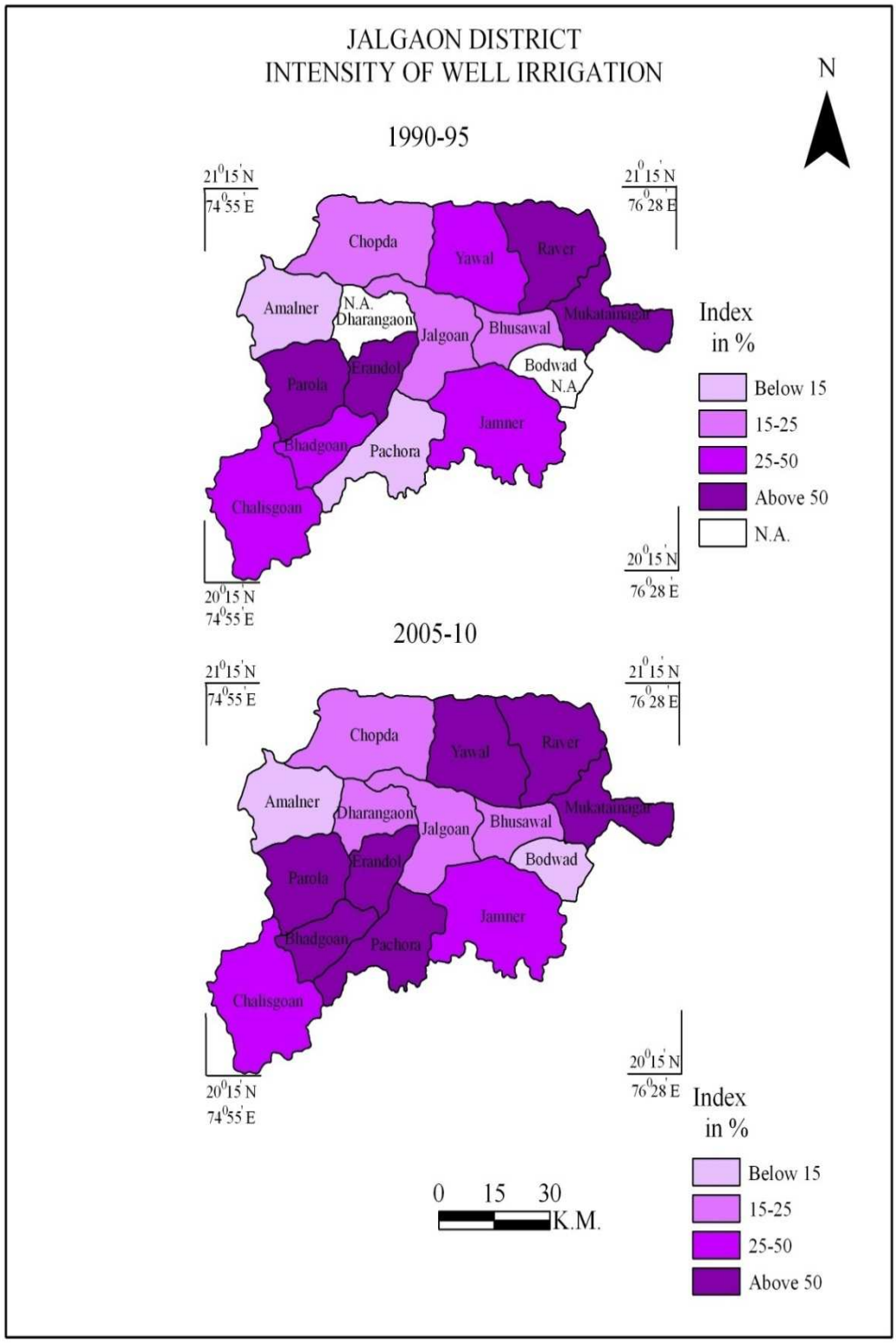
In 2005- 2010 the percentage of well irrigation area are observed is high in up to (40 to 60%) Yawal, Raver, Muktainagar, Pachora, Bhadgaon, Parola and

Erandol. Moderate percentage (30 to 40 %) in Jamner and Chalisgaon. Low percentage of irrigation area is observing below 20% in Jalgaon, Chopda, Bhusawal and Dharangaon talukas. Very low percentage are observed (below 10 %) in Amalner and Bodwad taluka of Jalgaon district.

TABLE NO.3.4. INTENSITY OF WELL IRRIGATION OF ALL TEHSILS IN JALGAON DISTRICT (1990-95 AND 2005-10)

Sr. No	**Percentage Values of Irrigation Intensity**	**Name of Tehsils 1990-95**	**Name of Tehsils 2005-10**
1	Above 50% to 60%	Raver, Muktainagar, Parola and Erandol	Yawal, Raver, Muktainagar, Pachora, Bhadgaon, Parola and Erandol
2	Between 25% to 50%	Bhadgaon, Yawal, Jamner and Chalisgaon	Jamner and Chalisgaon
3	Between 15 to 25%	Jalgaon, Chopda and Bhusawal	Jalgaon, Chopda, Bhusawal and Dharangaon
4	Below 10% to 15%	Amalner, and Pachora	Amalner and Bodwad
	Total 100%	Number of Talukas=13	Number of Talukas = 15

Source: Computed by Researcher


JALGAON DISTRICT
INTENSITY OF WELL IRRIGATION
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 15
15-25
25-50
Above 50
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 15
15-25
25-50
Above 50
0 15 30
K.M.

Map No.3.3

b) VOLUME OF CHANGES IN WELL IRRIGATION INTENSITY –

Last two decades have witnessed the positive as well as negative changes in intensity of well irrigation. The increase of well irrigation are observed more in (above 10%) Yawal, Raver, Muktainagar, Bhadgaon, Chalisgaon and Pachora talukas. Moderate increase well irrigation intensity (between 5 to 10%) in Chopda, Bhusawal, Erandol, Dharangaon and Jamner. Where the low increase well irrigation intensity are observed in Parola and Jalgaon (below 5%). The decrease well irrigation intensity observed (decrease 5%) in Bodwad and Amalner talukas.

TABLE NO.3.5. TOTAL VOLUME OF CHANGE

PERCENTAGE WELL IRRIGATION INTENSITY JALGAON DISTRICT (1990-95 TO 2005- 2010)

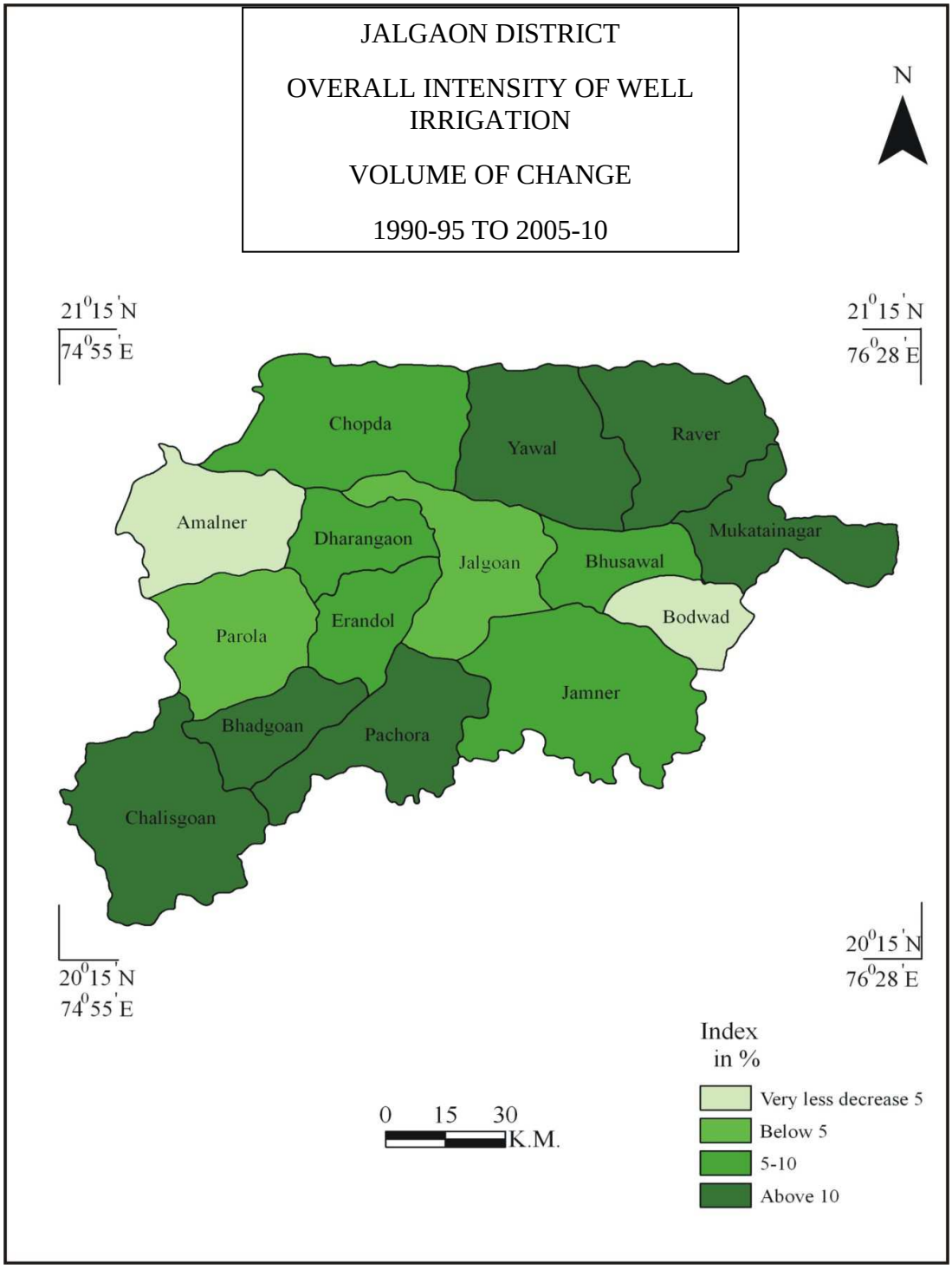
Sr.No	Percentage of Well Irrigation Intensity (1990-95 to 2005-10)	Name of Taluka
1	Above 10%	Yawal, Raver, Muktainagar, Bhadgaon, Chalisgaon and Pachora
2	Between 5% to 10%	Chopda, Bhusawal, Erandol, Dharangaon and Jamner
3	Below 5%	Parola and Jalgaon taluka
4	Very less decrease 5%	Amalner and Bodwad

Source: Computed by Researcher

The increase well irrigation intensity is high in northern and eastern part of district, where the intensity is low percentage in southern and western part of district are observing by personal visit and meet the people and farmers. The increase of well irrigation intensity is described to several physical and social factors like physiographic, drainage pattern, soil texture, availability of water, workers response, climate, Government facilities, Bank loan service for digging of new wells and installation of electric pump sets for lifting water from well.

c) DENSITY OF WELLS –

An attempt is made to find out the density of wells to net sown areas. In general, physical setting of the wells in the district; it is governed by is topography and ground water table.


JALGAON DISTRICT
OVERALL INTENSITY OF WELL IRRIGATION
VOLUME OF CHANGE
1990-95 TO 2005-10
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30 K.M.
Index in %
Very less decrease 5
Below 5
5-10
Above 10

Map No.3.4

The density of wells is calculated as using this formula; the number of wells per 1000 hectares of cultivated area. There are about **1, 18, 527** wells in the Jalgaon district, the number of wells in the district varies from taluka to taluka. Hence the density of wells per 1000 hectares of the cultivated land may give more realistic picture.

High density of wells over 150 wells was seen in Yawal, Raver, Muktainagar, Bhadgaon, Chalisgaon and Pachora talukas; whereas moderate density over 100 to 150 wells was seen in Chopda, Bhusawal, Erandol, Dharangaon and Jamner. Low density wells 50 to 100 are noted in Parola and Jalgaon talukas.

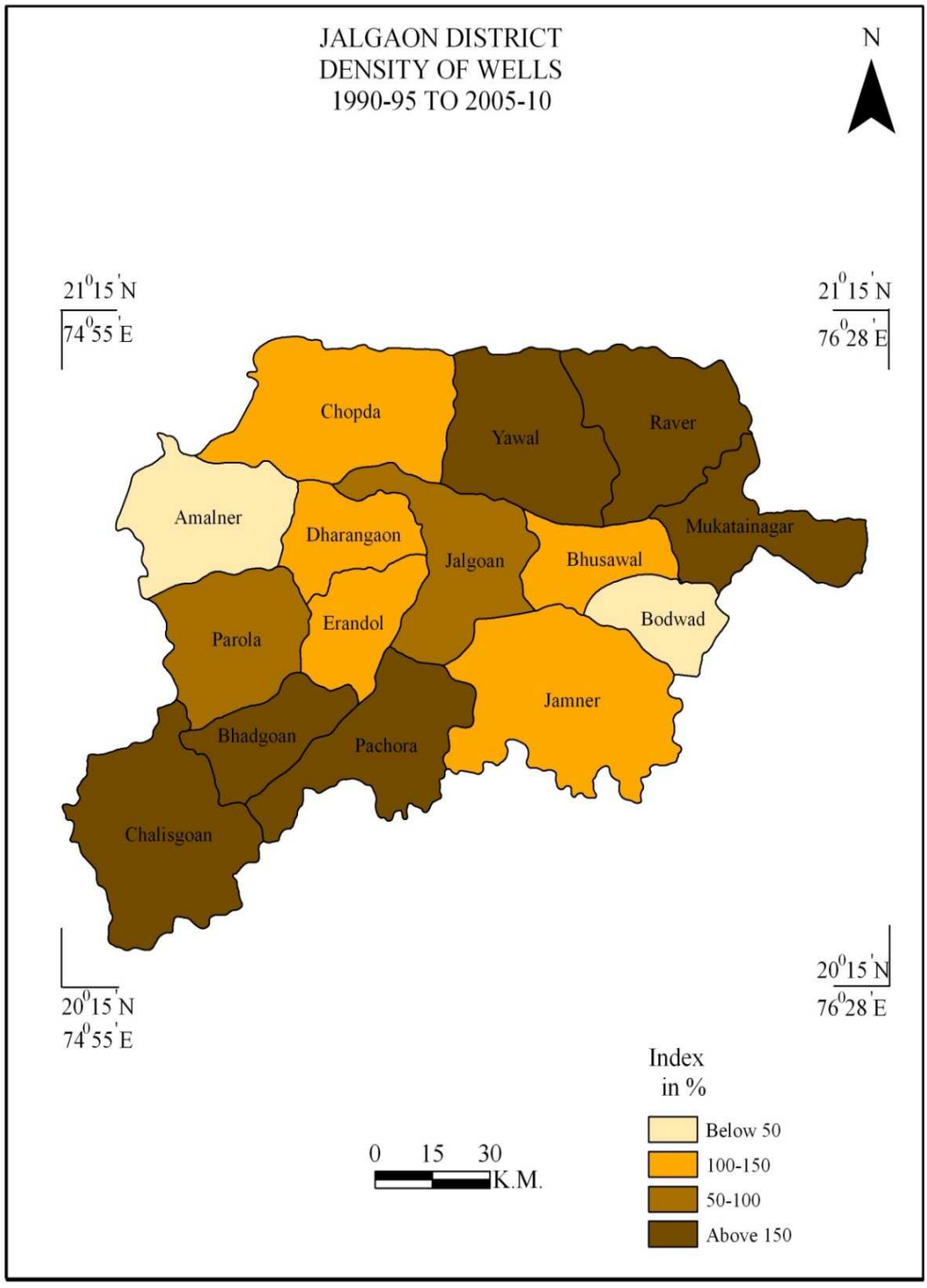
TABLE NO.3.6. DENSITY OF WELLS IRRIGATION IN JALGAON DISTRICT (1990-2010)

Sr.No	Percentage Wells of Density Per 1000 hectors	Name of Tehsils
1	Above 150 wells	Yawal, Raver, Muktainagar, Bhadgaon, Chalisgaon and Pachora talukas
2	100 to 150 Wells	Chopda, Bhusawal, Erandol, Dharangaon and Jamner
3	Over 50 to 100 Wells	Parola and Jalgaon talukas
4	Below 50 Wells	Bodwad and Amalner talukas

Source: Computed by Researcher

But very low density of well below 50 is seen in Bodwad and Amalner talukas. High and moderate density of wells in the district is confined only in those areas where canal irrigation and high level of ground water table in available, while low density of wells may be observed due to surface wash, run-off, steep slopes and low level of ground water surface. The density of wells irrigation shows in Jalgaon district positive and negative changes in the region.

In view of the development of network of canal irrigation and some of the old wells being turned in to non-use, so there seems to be declining trend in number of wells.


JALGAON DISTRICT
DENSITY OF WELLS
1990-95 TO 2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
0 15 30
K.M.
Index
in %
Below 50
100-150
50-100
Above 150

Map No.3.5

3.6 IRRIGATION PROJECT:–

In Jalgaon district the irrigation project are successfully constructed up to 2012 years; with 3 major and 15 medium projects are supply of water to agriculture and non agriculture land.

A) MAJOR IRRIGATION PROJCECT:–

"An irrigation project which covers more than 10,000 hectors the cultivated command area is called a major irrigation project". The major irrigation projects are essential for the development of the agriculture region. Major irrigation projects can also change socio-economic and culture structure of the region. Jalgaon district is getting an irrigational advantage. In Jalgaon taluka only one dam are built in 2001 year, where the name is Waghur major dam. And other 2 major dam and medium, minor dam are constructing in district an each taluka.

The Major Projects in Jalgaon District are as follows–

1) GIRNA DAM MAJOR PROJECT –

The Girna dam major irrigation project was started in 1955 and completed in 1969-70. The dam built across the river Girna a tributary of River Tapi. Though the dam is built in Nandgaon district Nasik, border of Jalgaon and Nasik confluence of Chalisgaon taluka the Jalgaon district. Due to slope of the topography are irregular and rocky. The system irrigated an area of 1065 hectares, but actual cultivated land comes under the project is 57, 209 hectares are impact in agriculture land. Total storage dam water is 732.97 million cubic meter up to regular using of water from this dam is 373.99 million cubic meter.

This dam water to supply of Chalisgaon and Bhadgaon taluka of a district. It has sub four canal flows through this dam supply of water to Jalgaon district talukas. The name is Jamda Left Canal (infected talukas – Bhadgaon, Chalisgaon, Erandol and Parola), Jamda Right Canal (infected talukas – Chalisgaon and Bhadgaon), Nimna Girna Canal (infected talukas – Erandol and Amalner) and Panzan Left Canal (infected in Malegaon, Chalisgaon and Bhadgaon taluka.) And total agriculture land under the cultivated from this dam water is near about 79, 283 hectares.

2) HATNUR DAM MAJOR PROJECT – 'MUKTAISAGAR' DAM -

In 1971 the Hatnur dam built was started and completed in 1982 across the Tapi River, which is also known as '**Muktaisagar**' in Bhusawal taluka, Jalgaon district. This dam construct structure is composite build, and catchment area of near about 2943 hectares. The dam as a got a best natural site for its construction. Its height is 25.5 meters high above the sea level. The water storage capacity of this project is near about 255 million cubic meter. Storage water depends upon the rate of monsoon rainfall. It provides irrigational facilities to 59, 124 hectares but actually 55, 350 hectares land are available for cultivation in the jurisdiction of Hatnur major dam project. This dam water benefitted in Jalgaon (53.35 ha), Bhusawal (3.89 ha), Raver (5.18 ha), Yawal (13.47 ha), Muktainagar (2.27 ha) and Chopda (28.52 ha) talukas.

3) WAGHUR DAM MAJOR PROJECT –

Waghur dam was built in Waghur River, tributaries of River Tapi and Tapi basin. It is situated in Raipur village, taluka Jalgaon of the district. This dam was constructed by a Masonry gated spillway in gorge and N.O.F. masonry dam between R.D. 293m to R.D. 360m and R.D. 657.25m to 719.70m. Earthen dam between RD.150m to RD 293m on left flank and between RD 719.70 m to RD 123.00m on Right Flank.

The total length of the dam is 1080 meter; height of the dam from the sea level is 39.50 meter. It has 20 gates from flowing the water, when the dam water capacity are full; the dams catchment area 2149sq.km, total uses of this dam water in the area of agriculture 38694 hectares, where actual irrigated cultivated land under the dam is 16984 hectares.

The dam water capacity is 258.04 cubic million where the area under the submergence is 4981 hectares. The total water are supply to Jalgaon taluka agriculture land that uses of farmer in Kharip season, rabbi season and hot season from crop cultivation and utilization. The most cultivation of crop in Jalgaon taluka is Wheat after Groundnut, Jowar, Pulses, Gram, Fodder, and Cotton.

Main part of this dam, it has two way of canals which is known as right canal and left canal. The right canal total length of the construct dam is 24 km. where left canal total length of the dam is 16.85 km, some meter was going too

far away it has a new canal which is known as ‘branch canal’, the total length of branch canal is 16.50 km.

The total gross command of area under the agriculture land is 34083 hectares from left canal and right canal is 4611 hectares cultivated. In this right and left canal the farmer uses in agriculture land a cropping pattern technique. They cultivated some vegetables, crops, green chilies, hybrid jowar, Kharip groundnut, pulses and soyabeen etc.

B) MEDIUM IRRIGATION PROJECTS:–

At present there are fifteen medium projects in the Jalgaon district, where the water storage capacity of the medium projects depends upon the rate and distribution of the monsoon rainfall. Sometimes these projects area having very less water due to lack of monsoon rainfall. At that time these projects provides water during the winter season for the agriculture. Even then the projects have changed agricultural structure to the greater extent in their command area.

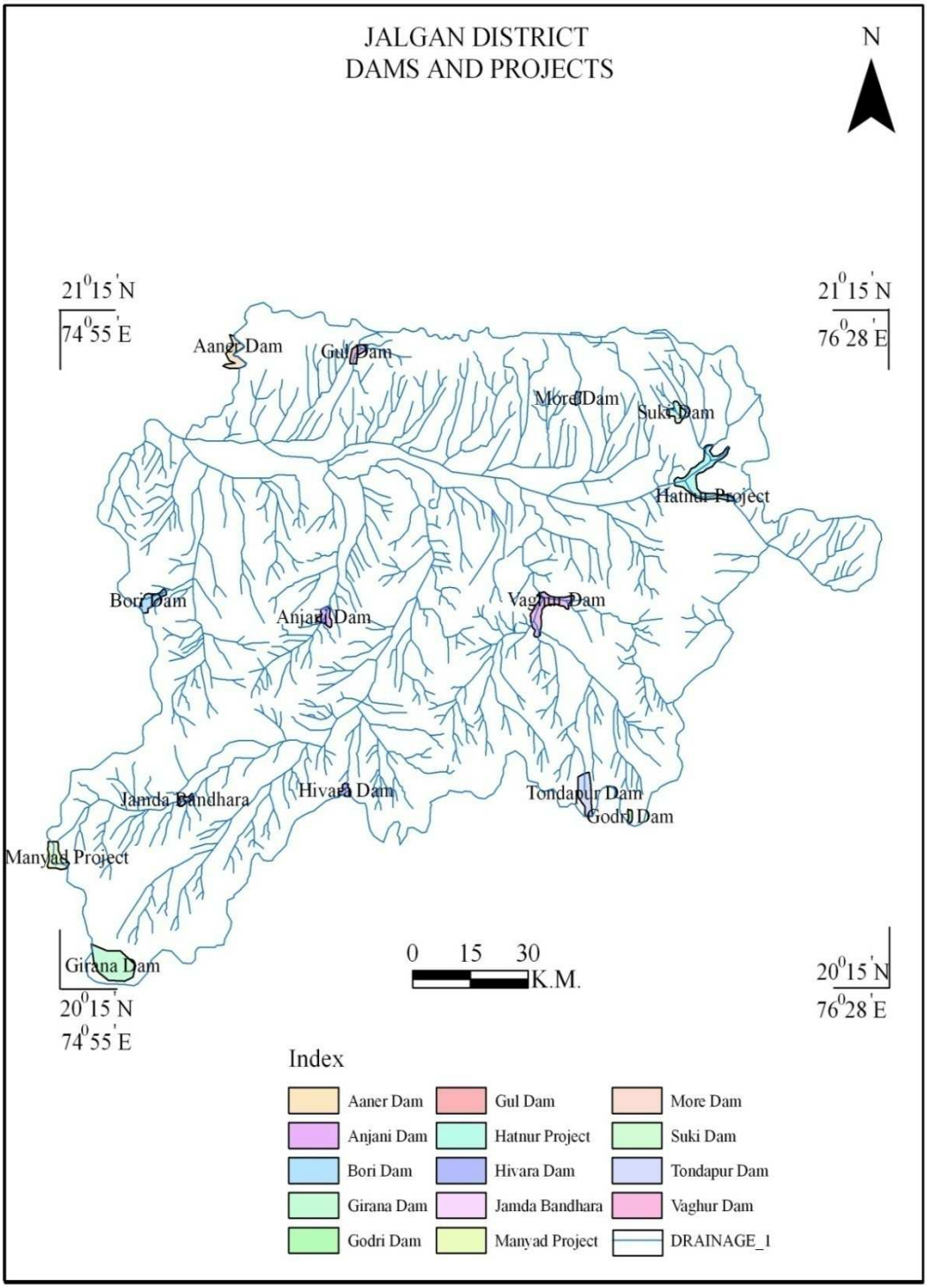
Socio – economic condition of the farmer also improved due to the irrigation facilities provides by these projects.

Medium irrigation is a comparatively small reservoir created by impounding water behind earthen and masonry gated spillway dam constructed across the river or small rivulets to tap their seasonal runoff. A large number of reservoirs were constructed, since historical time in Maharashtra the minor irrigation projects are also built to agriculture of the district.

1) ANER DAM PROJECT –

This dam was constructed in 1965 and completed in 1979 at Ganpur village, taluka Chopda, and district-Jalgaon. This dam was construct in Aner river of left canal, it has a total length of dam is 20 km, and height is 47 meter. Total storage capacity of dam is 103.56 cubic meter. The dam water is full in monsoon season they spread over the 5747 hectares. But actual hectors are under the irrigation is 7045 hectares.

The dam has no canal to provide of water other agriculture land, so water is supply from this reservoir of the dam. The cultivated land under the irrigation of this dam in 1995-96 total 2536 hectares and 2005-06 the total area 3815 hectares the period was 12 month and six month.


JALGAN DISTRICT
DAMS AND PROJECTS
N
21°15'N
74°55'E
21°15'N
76°28'E
Aaner Dam
Gul Dam
More Dam
Suki Dam
Hatnur Project
Bori Dam
Anjani Dam
Vaghur Dam
Jamda Bandhara
Hivara Dam
Tondapur Dam
Godri Dam
Manyad Project
Girana Dam
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E
Index
Aaner Dam
Gul Dam
More Dam
Anjani Dam
Hatnur Project
Suki Dam
Bori Dam
Hivara Dam
Tondapur Dam
Girana Dam
Jamda Bandhara
Vaghur Dam
Godri Dam
Manyad Project
DRAINAGE_1

Map No.3.6

2) MANYAD DAM PROJECT –

Manyad Dam is this project was completed in 1972 at village Nandregaon, taluka- Chalisgaon, district – Jalgaon across the Manyad River. The total dam water storage full in monsoon seasons. The capacity of storage water is 53.95 million cubic meter and length of dam is 20.00 km and height of dam 33.00 meter from sea level.

It has total irrigated area 8135 hectares, cultivated land under the irrigation 4864 hectors. The cultivated land under the irrigation of this dam in 1995- 96 is 1623 hectares and 2005-06 the total area of land is 2032 hectares, the period was 12 month and six month.

3) SUKI DAM PROJECT –

Suki dam project was started from 1972 and completed in 1977 across the Suki River in Raver taluka, Garbardi village, and district - Jalgaon. The total dam water uses in Raver and Jalgaon taluka in many villages for cultivated agricultural land. The dam was constructed by earthen structure. Total catchment area of this dam is near about 36.650 ha, it has also two canals way i.e. right and left canal. Right canal total length of 10.52 km and left canal 5.20 km.

The Dam height is 41.00 meters from above the sea level. The cultivated land under the irrigation is 5128 ha annual. In this area the cropping pattern are using the farmers where the some crops, vegetables, pulses are growing the agriculture land.

The cultivated land under the irrigation of this Suki dam in 1995 – 96 is 1562 ha and 2005- 06 the total area of cultivated land 1004 ha.

4) BORI DAM PROJECT –

The Bori dam project was started from 1973 and completed in 1984 across the Bori River, village Tamaswadi, taluka – Parola, district – Jalgaon. The dam has 15 gates in front of land, it has two canals right canal 21 km, and left canal is 8 km. together have an irrigated 4553 hectares in Parola taluka. So many crops are growing through the under irrigation, which is Green chilies, Cotton,

Groundnut, Pulses etc. The total cultivated land under the irrigation of Bori dam project in 1995 – 96 is 310 ha, and 2005 – 06 the total cultivated area of 238 ha.

5) AGNAVATI DAM PROJECT –

The dam has been started from1984 and complete in 1989 across the Agnavati River, tributaries of River Tapi. The dam has 6.85 km of catchment area. It has only one canal which is right bank canal, total length of canal is 1.12 km.

The total irrigated land under this project is 605 ha. Maximum height of this dam is 14.83 meters above sea level and length is 1.5 km. here the total cultivated land under the irrigation in 1995 – 96 is 40 ha and 2005 – 06 is 36 ha.

6) ABHORA DAM PROJECT –

Abhora dam was constructed in Bokad Nala, which is a part of Tapi basin in City of Raver, Taluka – Raver, District – Jalgaon. This dam project was benefitted in Jalgaon district eastern villages and Raver taluka. The total catchment area of this dam under the irrigation is 8.1 ha, it has only one canal the name is right canal. The total length of this canal is 4.20 km, height of this dam of 27.33 meters.

Irrigated cropping pattern use in Kharip, Rabbi, and Two seasonal, Perennial, Hot weather periods. The total storage water capacity of the dam reservoir 7.44 million cubic meters. The total cultivated land under the irrigation of this project in 1995 – 96 is 204 ha and 2005 – 06 is 310 ha.

7) BHOKARBARI DAM PROJECT –

Bhokarbari dam project was constructed in 1992 – 93 in village Bhokarbari, Taluka – Parola, district - Jalgaon. The height of dam is 23.35 meter above the sea level and length is 110 meter. The total catchment area of the dam is 4.20 km. total storage capacity of this dam is 1.04 million cubic meter, with include the Jamda Left canal, so the total water storage of 9.36 million cubic meter in dam project. It has only one canal going though the dam, the length of this canal is 4.20 km.

Total irrigated area under this project is 1205 hectors in profited of Parola taluka. In 1995 – 96 the cultivated land under the irrigation is 310 ha and 2005 – 06 total irrigated area of 144 ha from this dam project.

8) TONDAPUR DAM PROJECT –

Tondapur water reservoir is built in Khadkinalla, the sub basin of Waghur and main basin of River Tapi from 1982 to 1989 in Tondapur village, Taluka - Jamner, District – Jalgaon. This dam construction structure is earthen dam structure the project was medium level. Dam total length of neat about 5.00 km and height is 15.3 meter above the sea level. The total benefitted with cropped area of the Jamner Taluka and many villages is under the dam.

It has two canals which left canal and right canal; together the total length of the canal is 5.00 km. In Jamner taluka the irrigated cropping pattern following in Kharip, Rabbi, Two Seasonal seasons arranged by farmers. Total water storage in this dam is 6.13 million cubic meter. This Tondapur dam projects of water is depend on only monsoon season so its rainfall catchment is 743 mm.

9) MOR DAM PROJECT –

A dam has been built in 1978 to 2000 across the Mor River near Gondgaon, Taluka – Yawal, District – Jalgaon. The dam has 74.72 sq.km of catchment area. The dam was constructed in bed rock type which is Deccan trap basalt. The portion of dam type is spillway gorge with both sides. Total length of dam is 44.60 meter and height is near about 37 meter from above the sea level.

It has only one canal i.e. right canal separated of this dam, total length of the canal is 11.90 km. total infected irrigation in Yawal taluka and its villages. The irrigation water are using in Kharip, Rabbi and Hot Weather season. Total water storage capacity are 2.05 million cubic meter in the dam. This dam has capacity to irrigate of 2055 hectares in agriculture land in Yawal Taluka.

10) HIVARA DAM PROJECT –

A Hivara dam is built in across the Hivara River, sub basin Girna and basin is Tapi. The dam was started from the year 1980 and complete in 1994. It

has 18.68 sq.km of catchment area. Maximum height of this dam is 15.21 meter above the sea level.

The right bank canal 6.43 and left bank canal are 5.90 km, together having an irrigated area of land, the total area 3323 hectares in Pachora taluka. The farmer use in cropping pattern technique by this dam water for irrigation in Kharip, Rabbi and Two Seasonal seasons.

11) BAHULA DAM PROJECT –

The Bahula dam is built in across the Bahula River near Khedgaon, Pachora Taluka of Jalgaon district. They start from 1978 and complete in 2005. The catchment area of under this dam is 20.30 sq.km. The branch canal length from the dam 9.85 km where the right bank canal length is 13.34 km. the total irrigated area under the Bahula dam is near about 4047 hectors in Pachora taluka.

The farmer using in agriculture land in cropping pattern of Kharip, Rabbi and Two Seasonal seasons. Where the cash crops, some vegetables, fodder, pulses etc are growing this land and use of dam irrigation water.

12) MANGRUL DAM PROJECT –

Mangrul dam project was built in across the Bhokar River, Mangrul village, Taluka – Raver. The dam construction was start from 1978 and complete in 2008. The catchment area of under the irrigation from this dam is 110.46 sq.km. Where the one forth part of taluka are infected from this water reservoir in Raver Taluka. It has only one canal the right bank canal, the length of this canal is near about 4.62 km. irrigated area under this dam of Raver Taluka is 2404 hectares.

13) ANJANI DAM PROJECT –

Dam built across the Anjani River at Palsad village, Erandol Taluka. Year of starting of this dam in 1992 and completion in 2012. Maximum height of this dam is 15.60 meter and length of the dam of top surface is 4.47 meter. The main purpose of this dam is supply of water and irrigation to agriculture land in Erandol Taluka. It has near about 234.34 sq.km catchment area.

Dam construction type is Earthen dam with ogee shape gated spillway. It has two canals flows from the dam, where left bank canal is 14.00 km and right bank canal is 8.75 km. Together having irrigated area of the agriculture land is total 9393 hectares in the Erandol Taluka.

14) GUL DAM PROJECT –

A Gul dam project starting from1996 and completion in 2012 onwards. The dam was built in across the Gul River, near at a Malapur village, Chopda Taluka. The main purpose of this dam to provide of using water and irrigation for agriculture land. Total catchment area of this Gul dam under the irrigation is 115.06 sq.km. It has two canals where left bank canal length of 3.67 km and right bank canal is 4.62 km. The dam irrigates on agriculture land in total land of 3708 hectares areas in Chopda Taluka.

MUKTAINAGAR LIFT IRRIGATION SCHEMES:–

The lift irrigation scheme is constructed on the submerged area of the Hatnur dam, Left bank of Purna River, near Rehabilitated Kund village of right side of Purna River Bridge. The total length and diameter of the lift irrigation scheme is 3580 meter and diameter 1.10 meter. Where the utilization of water is 15.49 million cubic meter. In lift irrigation the height of water lift is 44.40 meter and its width diameter is 52meter. 1500 horsepower use for lift irrigation scheme.

In Muktainagar taluka affected for lift irrigation scheme use in villages i.e. Muktainagar, Kothali, Sathod, Salbardi, Pimpri Karot, Ghodasgaon and Hartale of the distribution of water. The total area under the irrigation of this scheme a total command area 7200 ha, all cultivable command area 4199 ha and irrigated command area is 3360 hectares of the land.

BODWAD LIFT IRRIGATION SCHEME:–

This scheme is constructed on submerged area of the Hatnur dam near Khamkheda Bridge, Bodwad Taluka, and the year of starting 1999 and complete in 2009. The total use of water from this scheme is near about 198.54 million cubic meter. The total irrigated area of the land in Jalgaon district is 26721 acres

and affected villages and taluka are Muktainagar, Jamner, Bodwad, with 101 villages under the irrigation.

LOWER TAPI PROJECT –

The Lower Tapi Project was built in Tapi River near Padalse village, Amalner Taluka in Jalgaon district. The catchment area under of this irrigation project is 49190 sq.km where the gross storage capacity are 420.56 million cubic meter. Height of earthen dam is 15.35 meter and length 1340.85 meter. Lower Tapi Project is successful built up because so many hectares are affected under this project in Jalgaon district.

Total irrigated area of Jalgaon district is 43600 ha, area under the command 63365 ha where submergence area of 7261.26 ha. Many villages are affected in Jalgaon district, the taluka area Amalner, Chopda, Dharangaon, Parola and Shirpur (Dhule district).

SHELGAON BARRAGE –

It is a medium irrigation project of lift irrigation schemes at Jalgaon district, this barrage are built in main Tapi River. It start from 1999 and completed in 2010 approved by planning commission. The cultural command area is 9.589 hectares and total gross command area 11.268 hectares. This irrigation of Shelgaon Barrage of potential maximum 11.318 hectares and all irrigation of water benefited in near Jalgaon and district. This project completed now to supply of water for agriculture land.

C) MINOR IRRIGATION PROJECTS:–

During the rainy season when water collects and forms a pond, it is usually called a tank; this water is used of irrigating the standing crops after the wet seasons. Tank irrigation, therefore needs of much rainfall for later storage and utilization.

A level of water in tanks is solely dependent on the quantum of rainfall of that season. Following table shows that out of total minor irrigation schemes are concentrated in Jamner taluka in 2009 – 2010.

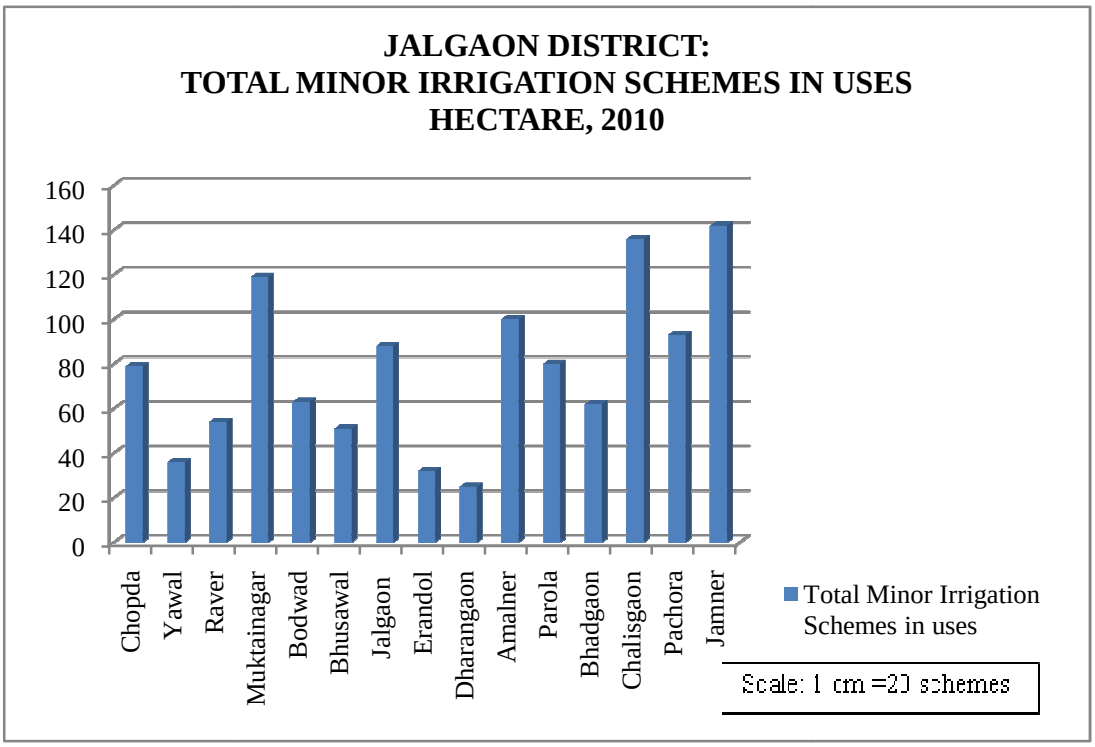
The minor irrigation schemes of Erandol, Amalner, Bhadgaon and Chalisgaon are directly useful for irrigating the land with beneficial to irrigational well which comes under the jurisdiction of minor irrigation schemes in the potentials of Yawal and Raver taluka and minimum potentials of irrigation in Dharangaon and Erandol taluka are found in 2009 – 2010. In 2009 – 2010 actual net irrigated area of minor irrigation schemes was about 3660 hectares. The highest irrigated area was found in Muktainagar taluka while the lowest irrigated area was observed in Jalgaon taluka during 2009 – 2010.

Nil irrigated net area was experienced in Erandol, Amalner, Bhadgaon and Chalisgaon taluka during the 2009 – 2010 periods. Sometimes this minor irrigation schemes role in dry season due to the absence of monsoon rainfall or less distribution of monsoon rainfall in the command area of the minor irrigation schemes. So it is essential to increasing the minor irrigation schemes or project in the study region for the agricultural development.

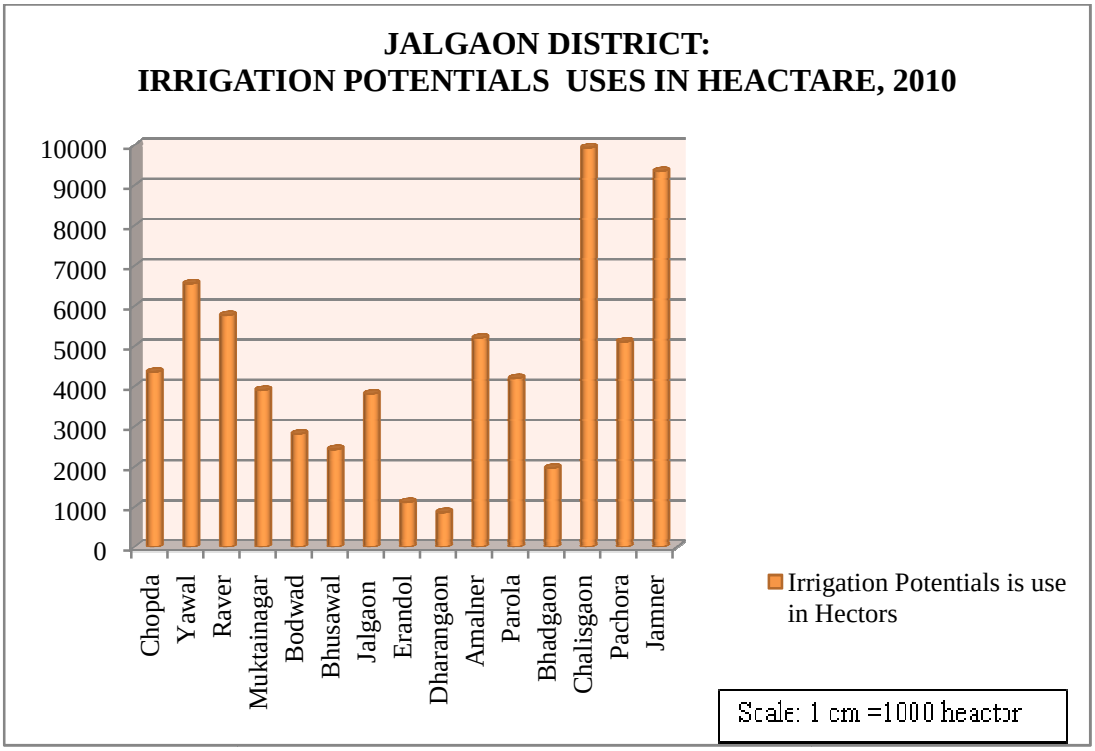
TABLE NO.3.7. TALUKA WISE MINOR IRRIGATION SCHEME AND THEIR IRRIGATION POTENTIALS (APRIL 2010)

Sr. No	Talukas	Total Minor Irrigation Schemes in uses	Irrigation Potentials is use in Hectares	Actual Net Irrigated area in Hectares
1	Chopda	79	4359	513
2	Yawal	36	6556	368
3	Raver	54	5770	186
4	Muktainagar	119	3908	547
5	Bodwad	63	2818	403
6	Bhusawal	51	2435	290
7	Jalgaon	88	3813	65
8	Erandol	32	1120	NA
9	Dharangaon	25	866	120
10	Amalner	100	5206	NA
11	Parola	80	4200	418
12	Bhadgaon	62	1971	NA
13	Chalisgaon	136	9936	NA
14	Pachora	93	5110	373
15	Jamner	142	9354	377
	Total Jalgaon district	1160	67422	3660

Source – Socio – Economic Abstract of Jalgaon District 2009 – 2010



Graph No.3.1



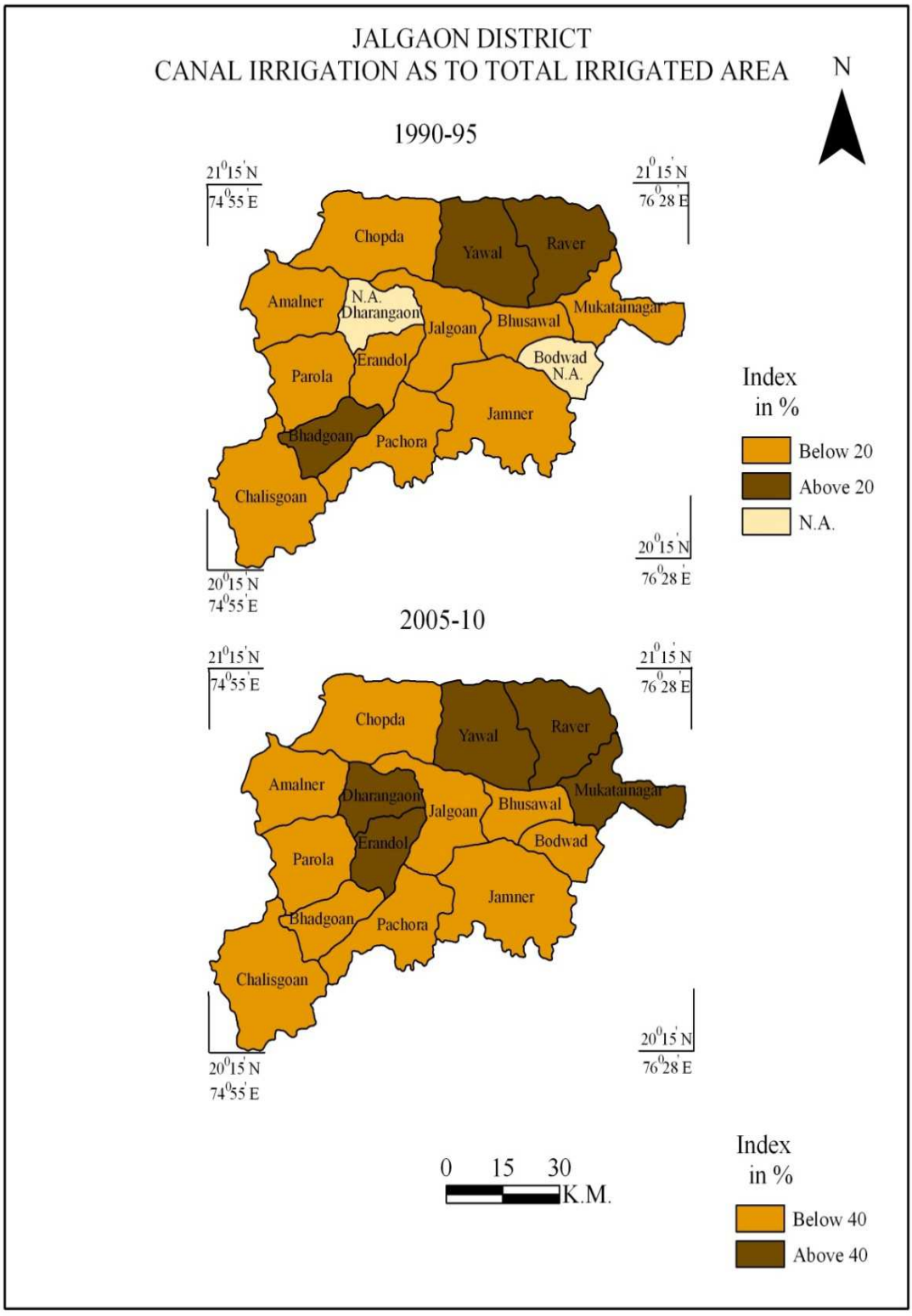
Graph No.3.2

3.7 CANAL IRRIGATION:–

Canal is other important form of irrigation in the region. Canal use the surface water which moves with the force of gravity. Canal irrigation is possible in areas which are extensive plains and are drained by wells distributed perennial rivers, such as plains where the even the distributaries can act as canals. Inundation canals are those which are taken out without construction dams and bunds and get water only; when the main stream is flooded thus they have limited validity. It is required almost plain topography having lesser degree of slopes.

The Tapi basin in the east to west direction of the Jalgaon district, it has comparatively plain surface than Girna basin south west direction. Western and south east part of the district is hilly and undulating. Hilly and undulating nature topography renders the possibility of canal irrigation in western part, while the western part of the district is always under the scarcity condition. Hence perennial streams are not observed. Because of the scarcity conditions of rainfall the major and medium and minor irrigation projects have been implemented in Jalgaon district. The gentle slope of surface topography of Jalgaon district is suitable for surface irrigation. In the period of 1990 – 95 canals forming (2%) to the total irrigated some 1760 hectares of land.

During the year 2005 – 2010 the area irrigated by canals is 5114 hectares (2.33 %) of net irrigated area. The percentage of canal irrigation to the total area irrigated varied in the region shows the percentage of canal irrigation. The percentage of (above 20 %) is confined in Yawal, Raver and Bhadgaon in year 1990 – 95 canal irrigation is noted in other taluka. In 2005 -2010 the percentage of confined (above 40%) in Yawal, Raver, Muktainagar, Erandol and Dharangaon. And Low percentage are observed in Jalgaon district in 1990 – 95 Bhusawal, Parola, Jamner, Chalisgaon and Amalner, where the period of 2005 – 10statistics are observed in Bhadgaon, Parola, Jalgaon and Amalner tehsils.


JALGAON DISTRICT
CANAL IRRIGATION AS TO TOTAL IRRIGATED AREA
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 20
Above 20
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30
K.M.
Index in %
Below 40
Above 40

Map No.3.7

INTENSITY OF CANAL IRRIGATION: –

Intensity of canal irrigation is calculated as percentage to irrigated area to net sown area. It shows varying picture in the district. The intensity (above 20 %) recorded in Yawal, Raver, Bhadgaon and Muktainagar taluka as per data of 1990 – 95 and Bhadgaon, Parola, Jalgaon and Amalner taluka as per data of 2005 – 10 in view of seasonal supply of water moderates canal intensity (10 to 20%) is noted in Chopda, Pachora, Chalisgaon and Erandol talukas during the 1990 – 95 while the 2005 -10 it is noted in Jalgaon, Bhusawal, Dharangaon, Amalner, Parola and Chopda taluka.

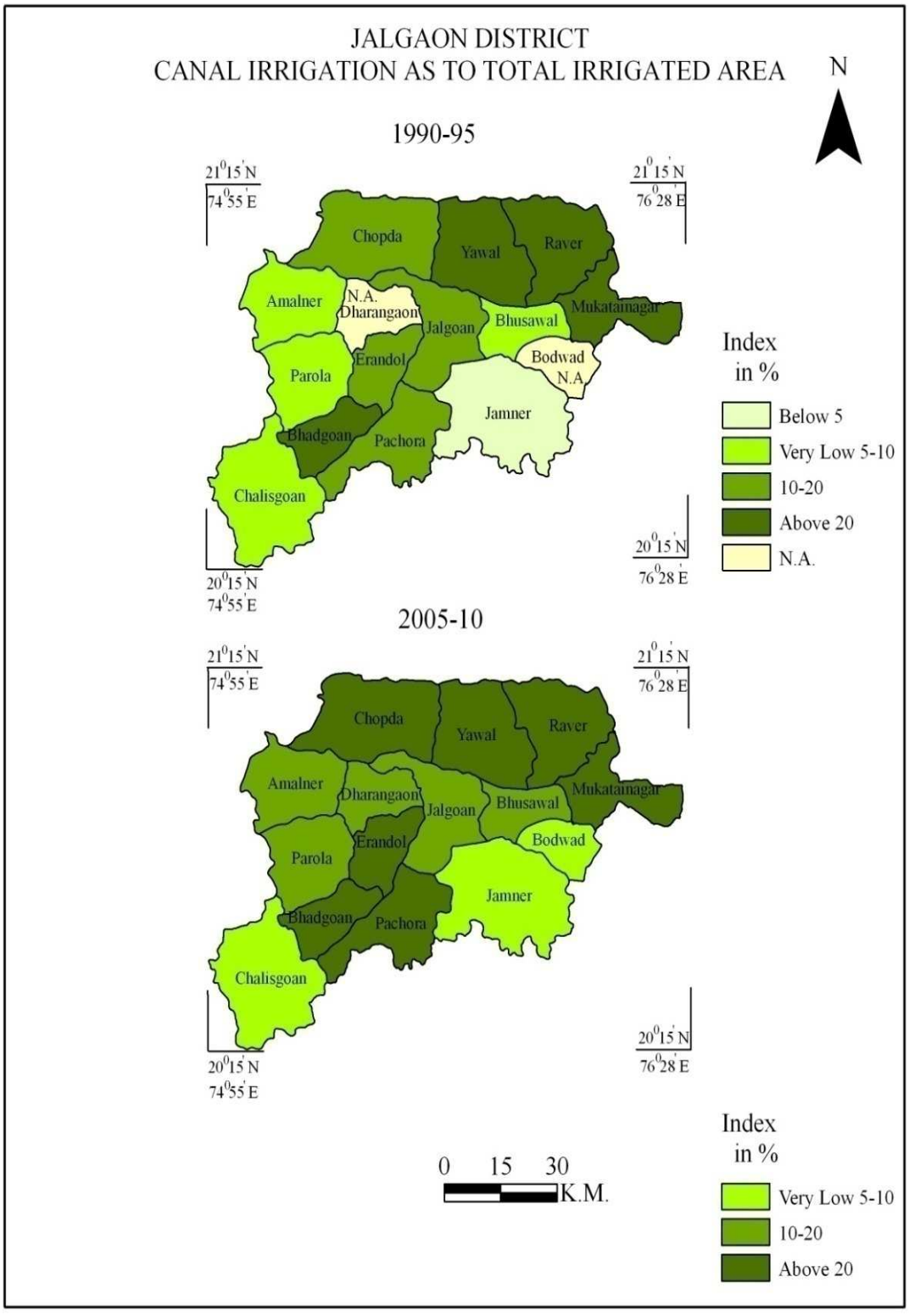
Very low canal intensity (5 to 10%) is noted in Bhusawal, Jamner, Chalisgaon, Parola and Amalner taluka where the period of 2005 – 10 it is observed in Bodwad, Chalisgaon and Jamner taluka. And very low canal irrigation intensity is observed in (below 5%) only Jamner taluka in the year 1990 – 95 and period of 2005 – 10 are observed in only Jamner taluka of low intensity.

CHANGES IN CANAL IRRIGATION INTENSITY: –

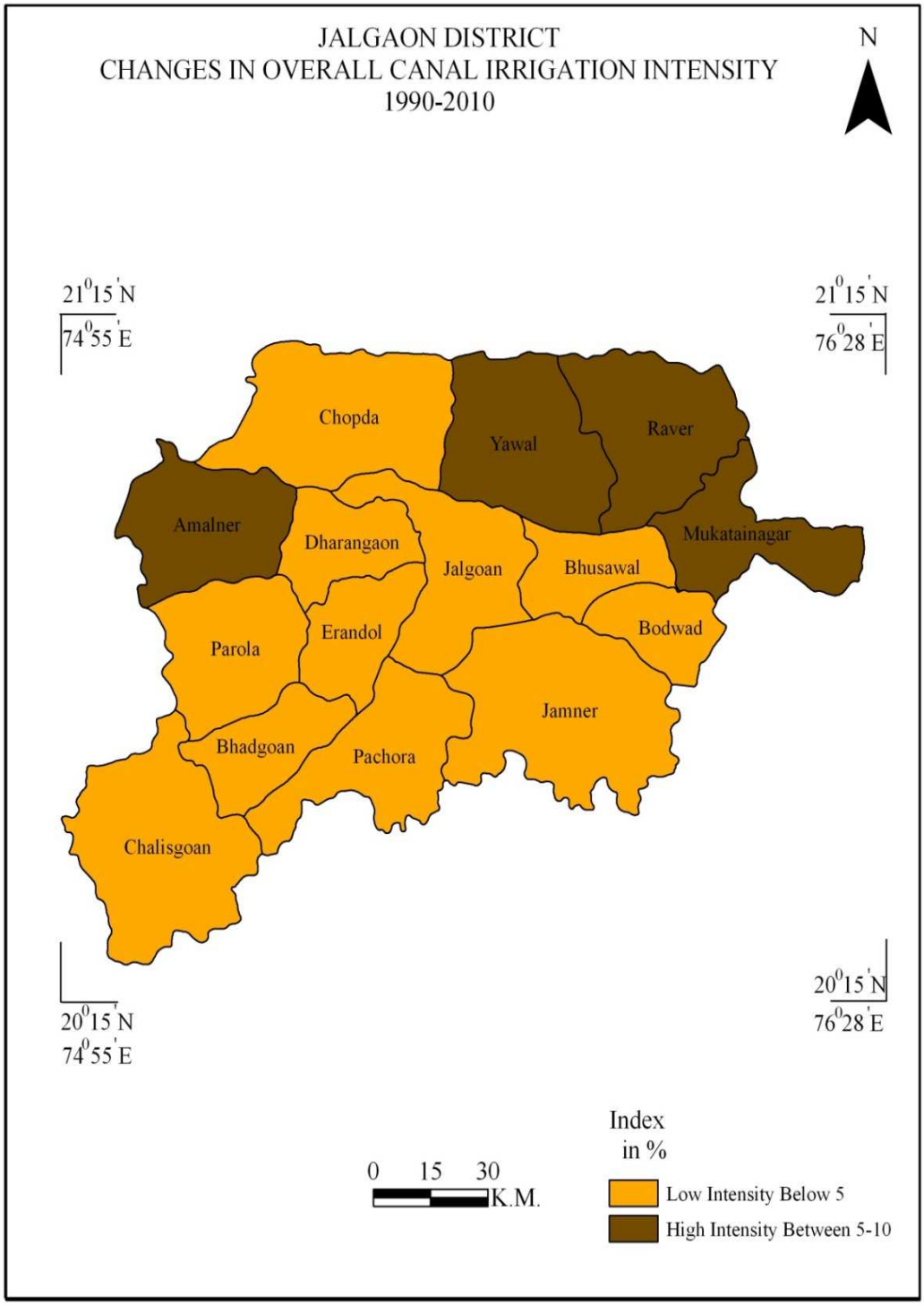
Last two decades have witnessed the positive as well as negative changes in intensity of canal irrigation. The increases of intensity are observed more in Yawal, Raver, Amalner and Muktainagar (5 to 10%), while low increase. Below 5% in Jalgaon, Chopda, Pachora, Jamner and Bhadgaon taluka. In Raver taluka it is observed the most of the talukas have shown increase the intensity of canal irrigation during the investigation period.

3.8 TANK IRRIGATION:–

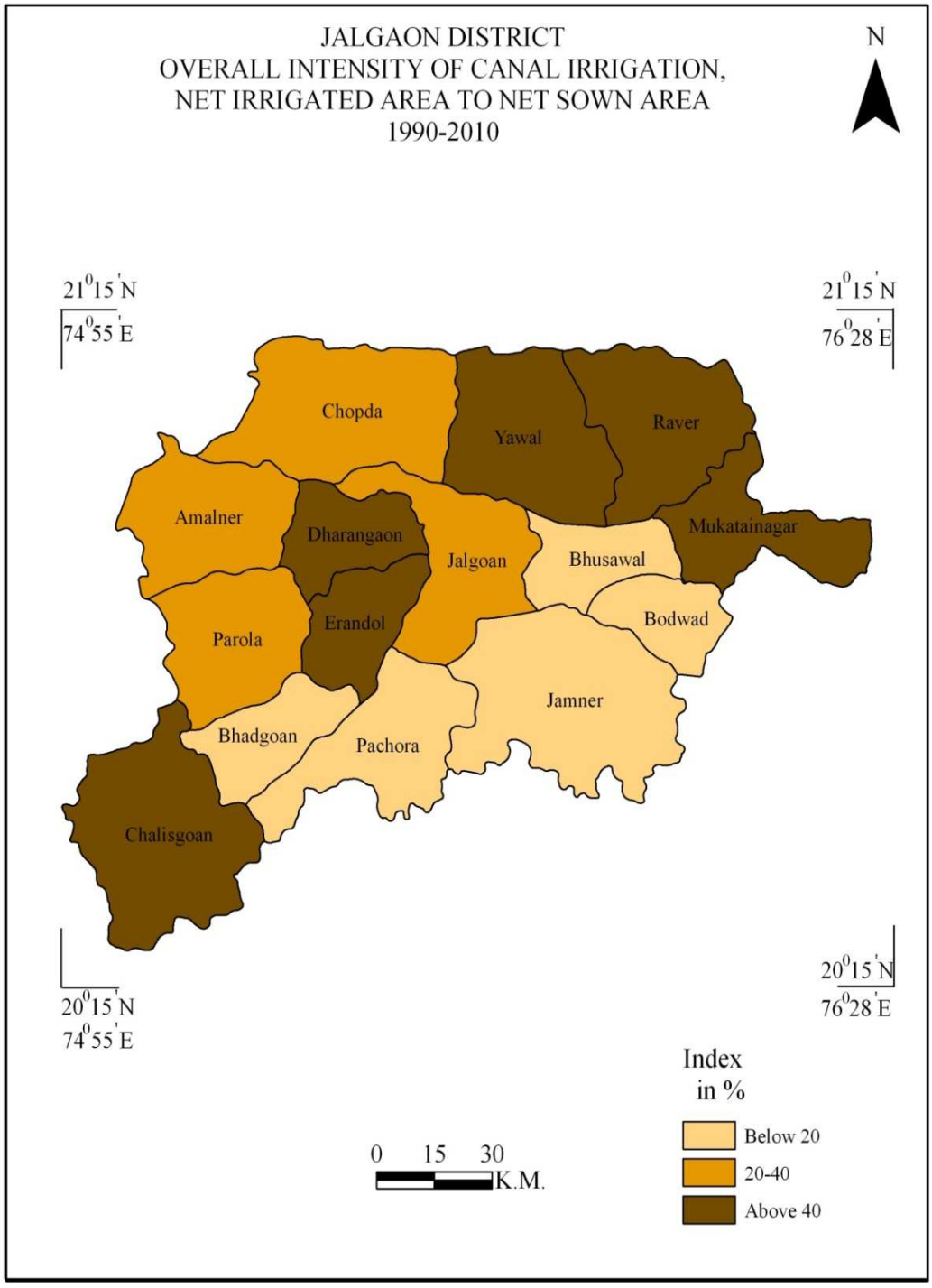
Tank irrigation is other main source of irrigation to supply of water to agriculture land. They are suitable for areas with impermeable rock structure and with slightly undulating topography, where the rainfall is highly or low in seasonal. In Jalgaon district the rainwater is collected in excavated tanks or in natural depressions in central or southern region of the district. Some tanks by construction or bunds, dams small irrigation project or without them. The stored water is then taken to field though the channels during the dry season.


JALGAON DISTRICT
CANAL IRRIGATION AS TO TOTAL IRRIGATED AREA
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A.
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 5
Very Low 5-10
10-20
Above 20
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30
K.M.
Index in %
Very Low 5-10
10-20
Above 20

Map No.3.8


JALGAON DISTRICT
CHANGES IN OVERALL CANAL IRRIGATION INTENSITY
1990-2010
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Low Intensity Below 5
High Intensity Between 5-10

Map No.3.9


JALGAON DISTRICT
OVERALL INTENSITY OF CANAL IRRIGATION,
NET IRRIGATED AREA TO NET SOWN AREA
1990-2010
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Below 20
20-40
Above 40
0 15 30
K.M.

Map No.3.10

TABLE NO.3.8. IRRIGATION TYPES AND LIFT IRRIGATION SCHEMES IN JALGAON DISTRICT

Sr. No	Taluka	Major Irrigation Projects	Medium Irrigation Project	Minor Irrigation Project	Lift Irrigation Schemes	Total Well Irrigation	Pazar Talav or Tank Irrigation
1	Chopda	0	3	1	0	2257	3
2	Yawal	0	1	5	2	635	0
3	Raver	0	2	0	0	1865	1
4	Muktainagar	0	0	1	0	68	0
5	Bodwad	0	0	2	0	43	2
6	Bhusawal	1	0	4	0	187	3
7	Jalgaon	1	0	5	0	135	2
8	Erandol	0	0	1	0	2780	2
9	Dharangaon	0	0	0	0	2704	6
10	Amalner	0	0	0	0	615	1
11	Parola	0	2	1	0	4171	1
12	Bhadgaon	0	0	0	0	4555	0
13	Chalisgaon	0	3	10	0	5048	0
14	Pachora	0	2	26	0	2017	0
15	Jamner	0	1	23	0	936	17
	Total =	2	14	79	2	28016	38

Source- Socio –Economic Abstract 2009 -2010 of Jalgaon District.

TABLE NO.3.9. TOTAL NUMBER OF IRRIGATION IN AGRICULTURE AREA OF JALGAON DISTRICT (AREA IN HECTARES)

Sr. No	Taluka	Total area under the Surface Irrigation	Total area under the Well Irrigation	Total cultivated agriculture area in Irrigation	Percentage of total cultivated to Irrigated area
1	Chopda	1948	12571	14519	21.74
2	Yawal	0	19022	19022	40.78
3	Raver	0	32369	32369	59.49
4	Muktainagar	970	16305	17275	57.11
5	Bodwad	0	637	637	7.50
6	Bhusawal	0	2484	2484	17.19
7	Jalgaon	0	4370	4370	17.19
8	Erandol	2	16979	16981	58.19
9	Dharangaon	0	3145	3145	12.46
10	Amalner	0	3787	3787	6.25
11	Parola	0	30608	30608	58.34
12	Bhadgaon	0	15845	15845	48.44
13	Chalisgaon	0	32420	32420	38.19
14	Pachora	5490	19070	24560	40.63
15	Jamner	0	29484	29484	38.22
16	Total =	8410	239096	247506	35.72

Source – District Agriculture Department, (2005 – 2006)

The tank irrigation system suffers from certain drawbacks – it renders vast fertile land and adjoining the tanks as useless, large and shallow water mass permits and enough evaporation to result in a considerable loss of water. In Jalgaon district it has only 38 storage tanks to support agriculture land for irrigation.

The maximum tank irrigation are support to Jamner taluka, it has 17 tanks and 6 tanks irrigation are found in Dharangaon taluka, minimum 3 tank irrigation in Chopda and Bhusawal taluka, where the lower tanks are observed in 2 tank irrigation in Bodwad, Jalgaon and Erandol taluka, very lower observed in only 1 tank irrigation in Raver, Amalner and Parola taluka.

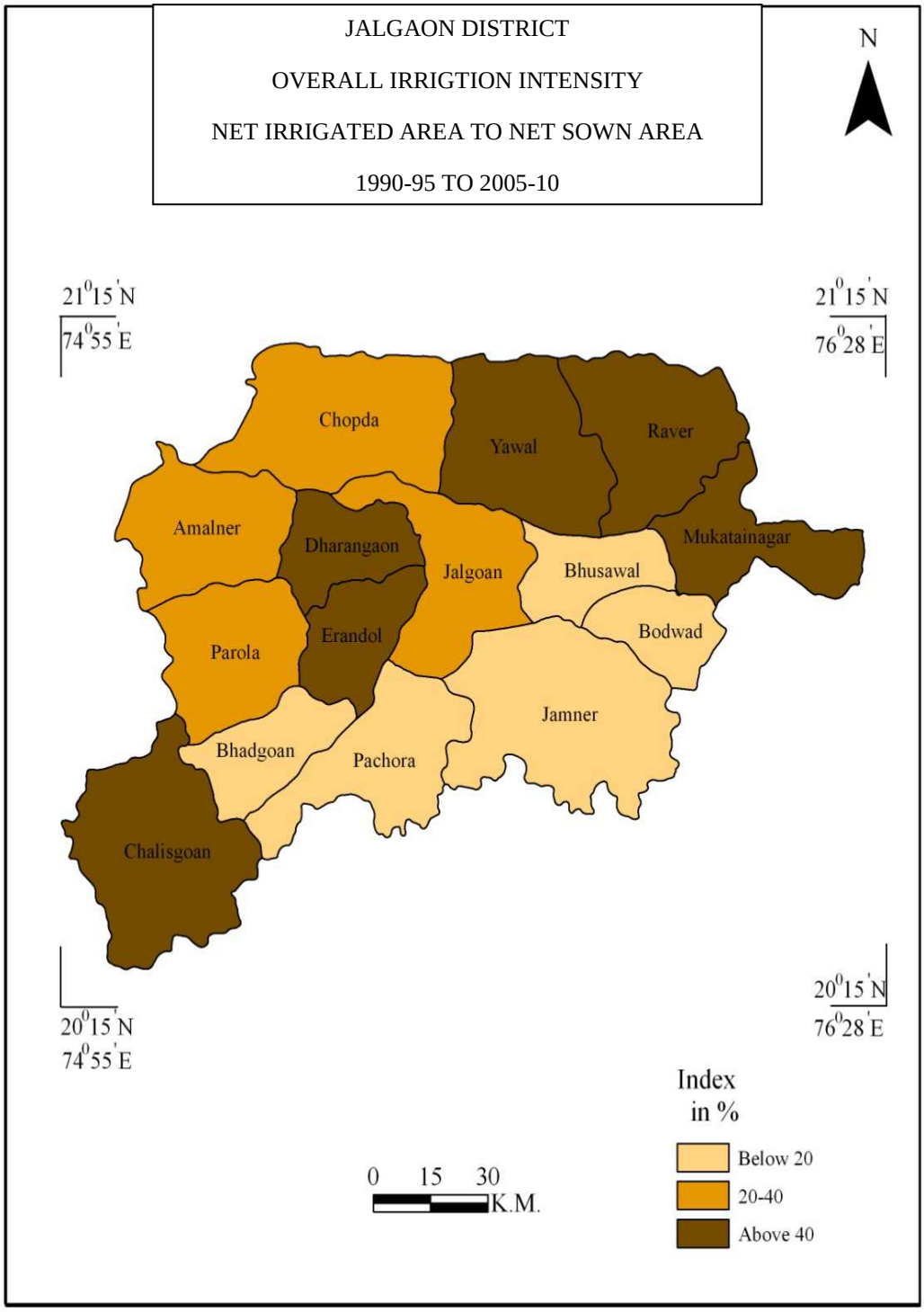
The tank irrigation are not a very dependable source of irrigation like canals and wells, since they depend on rains of water to be stored and are not a perennial source. The importance of tanks, as a source of irrigation is on the decline.

3.9 OVERALL INTENSITY OF IRRIGATION: –

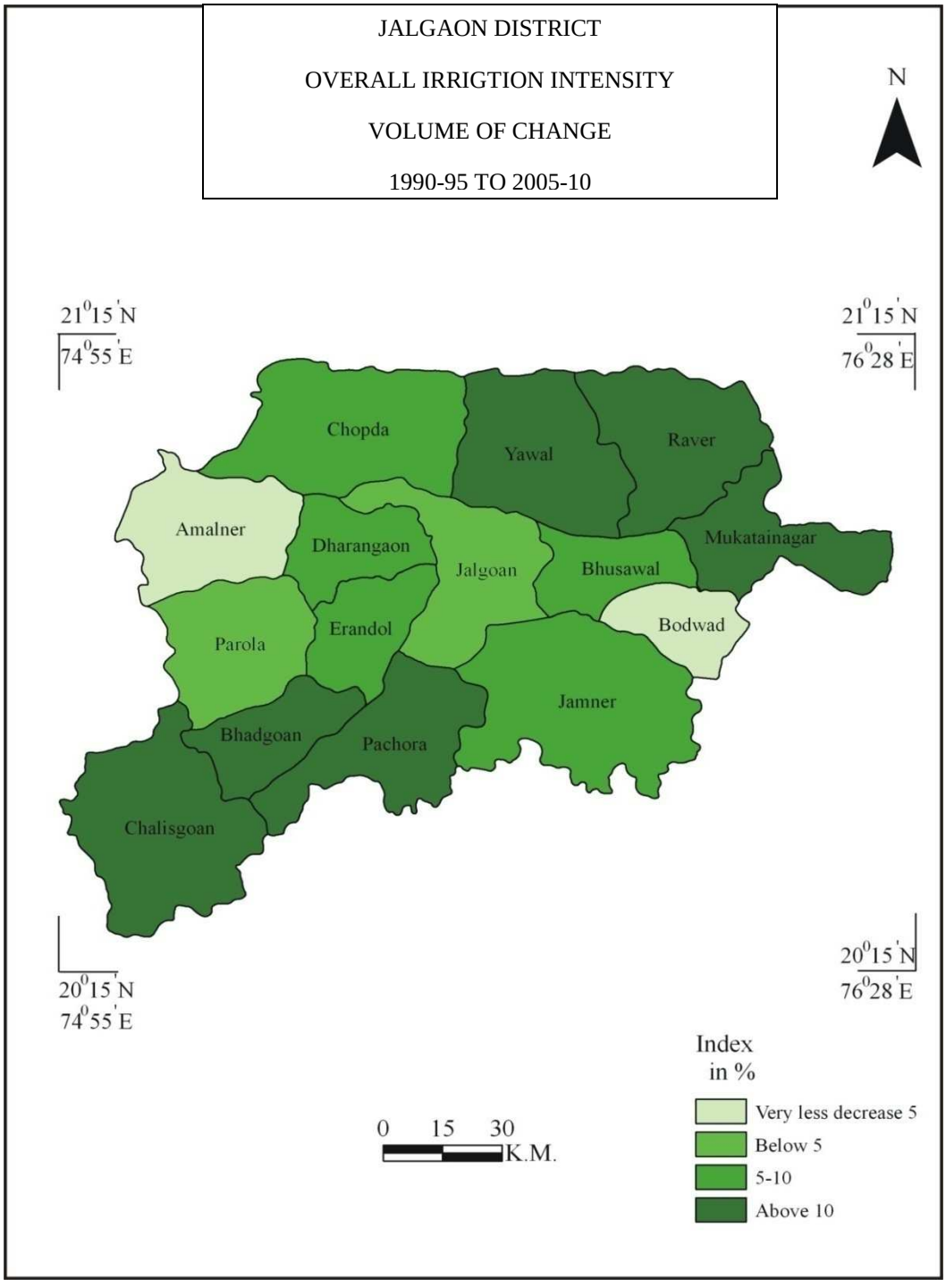
It was seen overall Intensity of irrigation in Jalgaon district, it refers to the irrigated area by all sources to the total area sown; water supply is an absolute necessity in areas where rainfall is above 50 cms. Intensity finding the net irrigated area to net sown area as percentage calculates here. As agriculture in uncertain and production is less.

Therefore irrigation has been identified as decisive factor to improve agricultural production for development per hectors. Even a cursory glance at the statistics of last two decades shows that there is a development in irrigation.

Overall intensity of irrigation to net irrigated area is taken as percentage in relation to net area sown. High intensity of irrigation above 40% is observed in Yawal, Raver, Muktainagar, Chalisgaon, Erandol and Dharangaon. These talukas are supplied water through the Lower Tapi Project, Waghur Project and Hatnur Canal Projects on demanding of supply of water.


JALGAON DISTRICT
OVERALL IRRIGTION INTENSITY
NET IRRIGATED AREA TO NET SOWN AREA
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Below 20
20-40
Above 40
0 15 30
K.M.

Map No.3.11


JALGAON DISTRICT
OVERALL IRRIGTION INTENSITY
VOLUME OF CHANGE
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Very less decrease 5
Below 5
5-10
Above 10
0 15 30
K.M.

Map No.3.12

Medium intensity of irrigation (20 to 30%) is seen in Jalgaon, Chopda, Parola and Amalner taluka. Low and very low intensity of irrigation is observed in major part of the district due to the restricted usable water flow, limited source of ground water and scarcity area, scanty rainfall and undulating topography. All these facilities hence forming in the major part of Jalgaon district; is uncertain of usable and subsistence in nature.

VOLUME OF CHANGES IN OVERALL INTENSITY OF IRRIGATION:-

Last two decades have been seen and note down the positive and negative changes in intensity of irrigation in Jalgaon District. Highest overall intensity increases above 10% observed in half part of study region, whether the taluka is Yawal, Raver, Muktainagar, Chalisgaon, Bhadgaon and Pachora. Moderate changes 5% to 10% observed in Chopda, Dharangaon, Erandol, Bhusawal and Jamner taluka. While below 5% overall intensity change observed Parola and Jalgaon taluka. And very less 5% decrease noted in Amalner and Bodwad taluka during the investigation period of 1990-95 to 2005-10.

3.10 TRADITIONAL AND MECHANICAL INPUTS: –

Relief and climatic conditions largely control the use of agricultural implements and machinery in an area. Where in an addition the quantum of irrigation available, the size of holdings, the degree of intensiveness in farming the subsistence or commercial character of agriculture and present way of life further determine the use of farming implements.

They includes agricultural implements like wooden plough, iron plough, tractors, thrasher, seed drillers, harvesters, they also comprise the sugarcane crashers, sprayers, collection of cotton, dusters, oil engines, electric motor pump etc. however in the present study the major inputs in association with irrigated area are considered. The use of other inputs in the region is insignificant and so they are considered. Other use of inputs in the region is insignificant and so they are omitted in this searching agricultural implements are calculated per 1000 hectares of average irrigated area during the searching period.

A) WOODEN PLOUGH –

Wooden plough is an implement for scratching the soil of the agriculture land. In many countries especially in India's farmers are attachment to the wooden plough an ancient "Soil Scratcher" prevents him from using other means of ploughing. These regions advanced to account for the continuing importance of wooden plough are a) drought force can pull only a light plough, b) a cultivator can carry the light plough on his shoulder to his use wooden plough.

According to period 1990 – 95 the wooden ploughs 63000 practice in agriculture land but in 2005 – 10 the wooden plough are 37000 uses in land. It means the 26000 wooden ploughs are decrease in the year 2005 – 10 of Jalgaon district. The average per 1000 hectares of irrigated area 130 is for scratching the soil.

B) IRON PLOUGH –

Iron plough is an improvement on the wooden plough and farmer can use it without much difficulty. The number of plough in use in the region 49000 according to 1990 – 95 and now 22000 plough in 2005 – 10 year of period. The given statistical data the iron plough which are near about 27000 decreases. Average density of iron plough per 1000 hectares of irrigated area 200 in 1990 – 95 and now in 150 are average in 2005 – 10 i.e. near about 50% decrease in iron plough.

C) OIL ENGINES –

Oil engines are used to lift water from well, river, tank etc, oil engines are play a very significant role in the development of agriculture. The number of oil engines in the district in 1990 – 95 was only 75560 which decrease 3800 in 2005 – 10 i.e. 50% decrease so totaling number of oil engines in 2005 – 10 are 37000.

D) ELECTRIC PUMP –

Other source of mechanical inputs is important factor for the agriculture development. The electric pump plays an important role in agriculture. It is used to lift of water from well, river, tank and other storage of water with fast speed.

Basically it use for irrigation. Every farmer wants to development is fast growing with new variety of crop production. So the electric pumps are use in high quantity, it is observed in 2005 – 10 year of period. But before 2005 – 10 the year, it means last decades the farmers very rarely use of electric pump.

The given statistic data are increase in 2005 – 10 and decrease in the period of 1990 – 95. So the data are found 40454 electric pumps in 2005 – 10 and 31712 electric pumps are observed in 1990 – 95. Total 8742 electric pumps are increase in last ten years of the study region. It means 10% of the average density of electric pumps is required in the Jalgaon district.

E) TRACTORS -

Tractors are also agricultural implements where they are necessary use in land with farmers. It large farm are to be sown more than once as a result of improved to irrigation facility, tractors are used in study area in 2005 – 10 was only 6000 number of tractors. In 1990 – 95 the data are not found in government record so it will not mention. So it is important source of agriculture for development, and farmers are easily use it who knowing the driving.

Thus the forgoing review shows that use of agricultural implements is subject to change on account of changing economic and technical situation. Moreover, the modern implements and irrigation development go hand in hand especially in irrigated of the Jalgaon district.

BIO – CHEMICAL INPUTS:–

Bio – chemical inputs include of chemical fertilizers and High Yielding Varieties. The use of biochemical inputs with assured water supply and for the agriculture productivity.

A) CHEMICAL FERTILIZERS –

The chemical fertilizers are one of the most effective means of increasing crop productivity per unit area. Three types of chemical fertilizers are used in agriculture land which is Phosphate, Nitrogenous and Potassium.

TABLE NO.3.10. DISTRIBUTION OF CHEMICAL FERTILIZERS IN JALGAON DISTRICT 2005 – 10 (M. TONES)

Sr. No	Taluka	Total Kharip + Rabbi (2005-10)	Kharip season (2005 - 10)	Rabbi season (2005 -10)	Total in metric tons (2005 - 10)
1	Chopda	NA	23336	20513	43855
2	Yawal	NA	30793	22696	43991
3	Raver	NA	31747	36066	67813
4	Muktainagar	NA	20339	19340	39679
5	Bodwad	NA	6477	4205	10682
6	Bhusawal	NA	7703	5344	13047
7	Jalgaon	NA	17468	13756	31224
8	Erandol	NA	12018	10869	22887
9	Dharangaon	NA	12993	12178	25171
10	Amalner	NA	19094	11719	30813
11	Parola	NA	16259	9400	25659
12	Bhadgaon	NA	15897	14476	30373
13	Chalisgaon	NA	30752	23373	54125
14	Pachora	NA	21061	15747	36808
15	Jamner	NA	23749	12427	36176
	Total	**360561**	**281574**	**230701**	**512275**

Source: Agriculture Department Office, Jalgaon District (2005-10)

Utilization of improved seeds in area under certain crops as cotton, banana, sugarcane, pulses, oilseeds and vegetables etc. these crops plant use of chemical fertilizers had increased rapidly in the various irrigated tracts of study region.

The spatial pattern of the consumption of fertilizers in relation to the irrigated area is depicted in the consumption of chemical fertilizers per 1000 hectares of irrigated land in the region. In the period of 1990 – 95 fertilizers are using with private and government sector in 3,60,561 metric tons in agriculture land where the quantity of Phosphate is 25,327, Ammonia Nitrogenous is 2,559 and Potassium is 1,48,047m.tonnes. And the period of 2005 – 10 the Ammonia Nitrogenous 5,550, Phosphate is 4, 20,500 and Potassium 86,225 M. Tones.

According to 2005 – 10 data are high numbers chemical fertilizers consumption is using in Kharip and Rabbi Season in most of Raver and Chalisgaon taluka. And very lower using chemical fertilizers in Bodwad and Bhusawal taluka. But moderate consumption is noted in Jalgaon, Muktainagar, Parola, Pachora, Dharangaon, Erandol, Bhadgaon, Chopda, Jamner, Yawal and Amalner talukas.

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CHAPTER – IV

GENERAL AND AGRICULTURAL LANDUSE

4.1 INTRODUCTION

This chapter proposes to investigate the impact of irrigation on general and agricultural land use. In the context of present study the term impact irrigation us viewed as an expression of spatial and temporal change in agricultural land use pattern and change there in are briefly reviewed. This followed by a consideration of spatio-temporal analysis of the general land use and agricultural land use.

Studies on land use pattern have received a good deal of attentions from Indian Geographers in the past and present to continue draw their attention. Presently the land use patterns are being slightly investigations at the regional or micro-regional rather than at national level. In the view of recent extension of Irrigation and other facilities, the North-West India and some parts of middle South India have received comparatively more attention from the research works. In Jalgaon district is one of most important district in Maharashtra, famous for Banana, Cotton and Sugarcane and Vegetables productions in India. In this study regions the variations of general land use of area where the landform diversities, climate and rainfall in the study region.

The Geographers has attracted to study of this problems of land use in the study region of any place with a view to finding out ways and means for scientific utilization of land. A land use and scientific utilization has become important. It possible to only if the whole complex land use is studied at the district, tehsils or any area of village level taking into account the local physical and socio-economic conditions (Ali Mohammad, 1978).

The study of land use in its spatial context is essential to understanding the area of optimum land use and degraded areas, the comprehensive study of land use is immense value to ensure better returns from the land to meet future requirements for food, raw materials and planning for good agricultural growth, urbanization and regional development in the country. Land is important and useful for all human beings and all living things, because it provides mean with

living space with food and raw materials which are used in the satisfactions of what he wants.

The study of land use is important not only agricultural dominated, over populated in developing regions throughout the world because the relationships with different human needs and it's also increased the population pressure and decreasing man and land ratio, increasing the required of food and raw materials as.

Agricultural land use, cropping pattern and agricultural productivity form an important part of the subject of Agricultural Geography, where remarkable changes from period to period as natural result of the influence of physical, cultural, technological and socio-economical factor. An analysis of agricultural land use is essential for a meaningful understanding of agricultural system prevailing in the region. In the earlier part an attempt is made to investigate how far the natural and human conditions have led to the development of irrigation facilities during the period under review. The focus thereafter, is to examine how far these irrigation facilities have influenced the various aspects of agricultural.

Land is basic resource of human society; its utilization shows a reciprocal relationship between the prevailing ecological conditions of a particular region and man. Land is the surface utilization of all developed and vacant land on the specific point, at given time and space. This "Leads one back of village farm and the farmer to the isolated farmstead"! Agricultural Geography deals with the spatial relationship between these aspects and planning. This is because land uses changes to meet the variable demands of the land by society in this new ways and be inspired by technological changes or by a change in the size.

Some variations and changes are short lived whereas other represents a more constant. In this way, utilization of land or the use of land by man as surveyed and mapped in a series of recognized categories. The first primary uses of land are for crops, forest, pasture, mining, transportation, gardening, residential, recreational, industrial, commercial, uncultivable waste and barren and fallow lands etc.

The concept of a land use types varies with the production and consumption factors. The production factors are land, transportation facilities and the stages of technological advancements. The consumption factors include the number of people, consumption of good per person and gross export. The growth of population may change the forest and pasture land into cropland, including residential and industrial land utilization survey made up till now were mostly concerned with the smaller areas of rural and urban sector. The study of land utilization has economic, geographic, and demographic dimensions. The geographic, and aspect consists largely of a survey of the temperature, humidity, topography and soil conditions which influence the utilization of land for crops, pasture or forest.

The main objective is to highlight the spatio temporal variations of irrigation facilities to land use in the study region. The all talukas are considered as a study unit and land use categories are based on the census classification. The present chapter deals with the pattern of general land use and agricultural land use during the period of 1990-95 to 2005-10.

4.2 MEANING AND IMPORTANCE OF LAND USE:-

The land use pattern is to know the relationships between man and natural environment. Land use is an important studied particularly relevant to agricultural geography and economic geography. Land use also related to conservation of land from one major use to another general use. So land use is a geographical concept since it involves many specific areas.

The study of land use forms a significant part of geography and has assumed a placed to pride in the field of geography. According to Symons (1978) the land use study forms the sphere head for the advance of geography in to applied sciences as maps of land use have been recognized as essential tools of regional planning and development.

The difference between land use and land utilization is important. Land use is the clear use actually it made of any parcel of land, house, apartments and industrial location area in land use categories, whereas the term residential, industrial and agricultural refers to a system of land utilization implying roads,

neighborhood retails and service activities as well as location of industries and the carrying of agricultural pursuit in a rural area,

a) Tree crop or row would indentify land use,
b) Where not available for cultivation not available for cultivation.
c) Other uncultivated land excluding fallow land
d) Fallow land and
e) Net sown areas.
f) In India several geographers have risk to attention on different aspects land use studies at regional, micro and district level. Some of the geographer's contributions in land use studies are Shafi (1961), Jasbir Singh (1974) and R.P. Mishra (1990).

The study of land use of land utilization is an immense value in transparency out of the past use of land it future trends. Only the study of past land use utilization able to predict the future use and involve land use planning of a particular region.

LAND USE CLASSIFICATION:-

Land use classification is the systematic arrangement of land on the basis of certain similar characteristics to indentify and knowing their fundamental utilities and effectiveness. The land use pattern is complex and dynamic and it present the pattern of land use is result of total indicates the spatio temporal sequence of area under different uses. It indicates that the net available land cultivation which is an important factor, since it is the base for agricultural development and planning.

The International Geographer's Scenario of World Land Use along with the colour scheme us mainly suitable to local condition.

These types are as follows-

i. Settlement and associated non agricultural land with dark and light red colour.
ii. Horticulture with deep purple colour
iii. Tree and Perennial crop with light purple colour

iv. Crop land and Continental cropping rotation with dark brown and land rotation with light brown colour
v. Improved permanent pasture with light green colour
vi. Unimproved permanent pasture with yellow colour
vii. Wood lands dense with dark green, open wood land with medium green, scrub land with olive green and swampy forest with blue green colour
viii. Swamps and Marshes with blue colour
ix. Unproductive land with grey colour

Land is for a specific use depending mostly on physical characteristics of to its suitability for particular use is related. In Maharashtra state the five categories of land use are observed in the season and crop information which are-

1. Area under forest

2. Land not available for cultivation, it includes-

i. Barren and uncultivated land
ii. Land put to non agriculture uses

3. Other pastures and grazing land, it includes-

i. Cultivable waste land
ii. Permanent pasture land
iii. Land under miscellaneous tree crops and groves

4. Fallow land including-

i. Current fallow
ii. Other fallow

5. Cropped area it includes-

i. Net sown area (NSA)
ii. Area sown more than once (ASMO)
iii. Gross cropped area (GCA)

According to Census of India have classified land utilization arranged in nine categories, but the present study have been grouped into five major land use categories as the percentage of area under individual categories respectively. On

the basis of statistical data collected from the sources of referred of Jalgaon district may be divided into five major land use categories-

1. Area under forest
2. Area not available for cultivation
3. Other uncultivable land excluding fallow land
4. Fallow land
5. Net sown area

4.3 GENERAL LAND USE:-

The general land use gives the idea of the mode of agriculture in the district. An attempt is made here to show general land use and agricultural land use pattern in Jalgaon district with data available for 1990 to 2010 periods. The taluka level statistics are used for analyzing the distribution pattern of general land use, agricultural land use and changes that have been taken 1990-95 to 2005-2010 for which fairly reliable data are available.

Jalgaon district occupies 3.82 percent of the geographical area of the Maharashtra State and number is 9^{th} in position. The net sown area is 63.92 percent of the geographical area, which is more than State's average of 57.33 percent. The area under forest accounts for 17 percent. The other cultivated land 9.33 percent and excluding fallow lands cover 4.47 percent and area not available for cultivation constitute 4.64 percent to the geographical area. The follow area account for 1.89 percent of the total geographical area of Jalgaon district. An analysis of land use and changes during the period of 20 years are given as follows. The general land use pattern of Jalgaon district all taluka wise values, it shows in table no.4.1. Description is as follows:

4.3.1 Area Under Forest:-

Area under the forest including the district of all talukas, administrated as forests in category. Jalgaon district has a large area under the forest occupied over the Maharashtra state as a 17% under the forest of district. The number of three talukas has a large area of forest name as Chopda, Yawal and Raver talukas respectively. Due to investigation period noted that the forest areas were increase

in 2005-10 last decades and average forest area in 1990-95 was observed. All the data shows in table no.5.1 where the general land use pattern of Jalgaon district.

The entire changes pattern in the region under the studying during the period of 1990-95 to 2005-10 represented in table no.5.1. during the period of 1990-95 the forest area were decrease due to some natural causes or population etc; some forest land were converted into agricultural land and some were due to vegetation process and soil processes, it could be observed and seen. Investigation period of 1990-95 there are remarkable variations in all tehsils level.

The highest percentage of under the forest area above 5% to 10% was recorded in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Dharangaon, Erandol, Bhadgaon and Pachora tehsils. Below 5% was recorded in Jalgaon, Amalner, Chalisgaon, Parola and Jamner tehsils. Zero percent was observed in Bodwad tehsils during the period of 1990-95. In 2005-10 investigation period area under the forest above 5% to 10% was recorded in Muktainagar, Bhusawal, Bodwad, Jalgaon, Erandol, Dharangaon, Parola, Amalner and Pachora tehsils.

Below 5% was recorded in Chopda, Yawal, Raver, Chalisgaon, Bhadgaon and Jamner tehsils. Below 5% the forest area were increases in this period so they show in below 5% under the coverage area to total geographical area of entire region.

The volume of change was experienced in each tehsils of positive and negative variations during the period of 1990-95 to 2005-10. Positive change in area under the forest experienced in above 1% in Chopda, Yawal, Raver, Bodwad, Parola and Jamner. Negative variations was recorded in below 1% in Muktainagar, Bhusawal, Bhadgaon, Pachora, and above 2% in Jalgaon, Erandol, Dharangaon, Chalisgaon tehsils, zero percent variations could be noted in only Amalner tehsils during the investigation period.

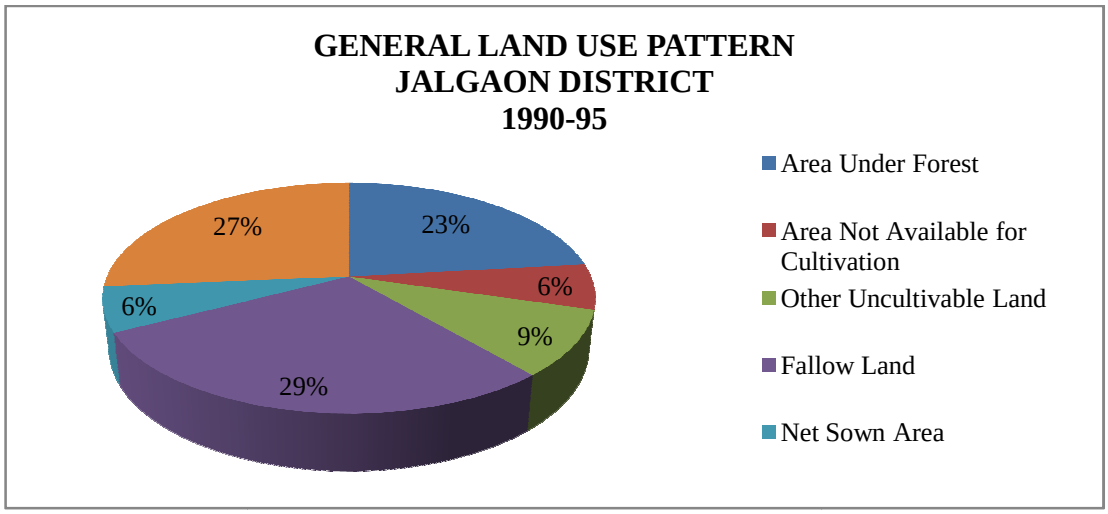


Diagram No.4.1

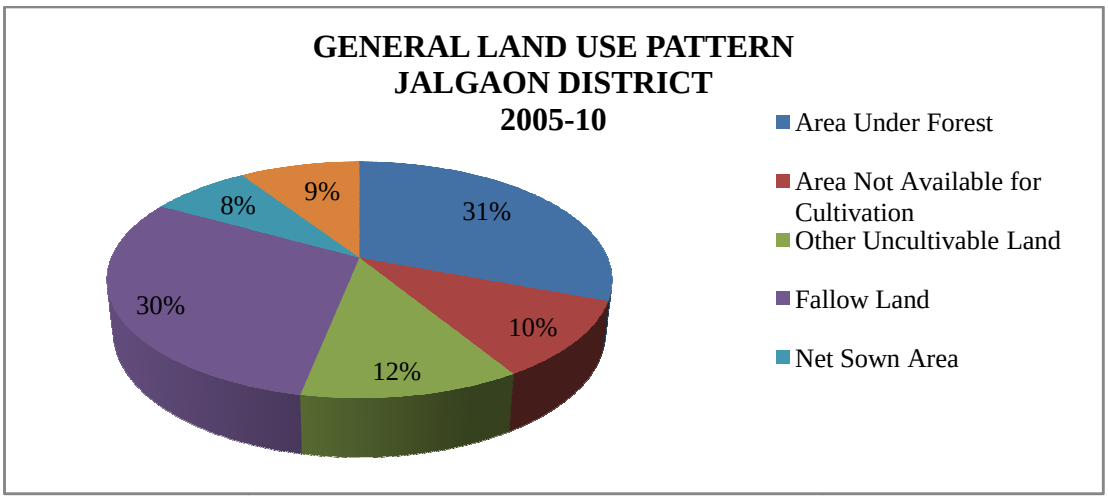


Diagram No.4.2

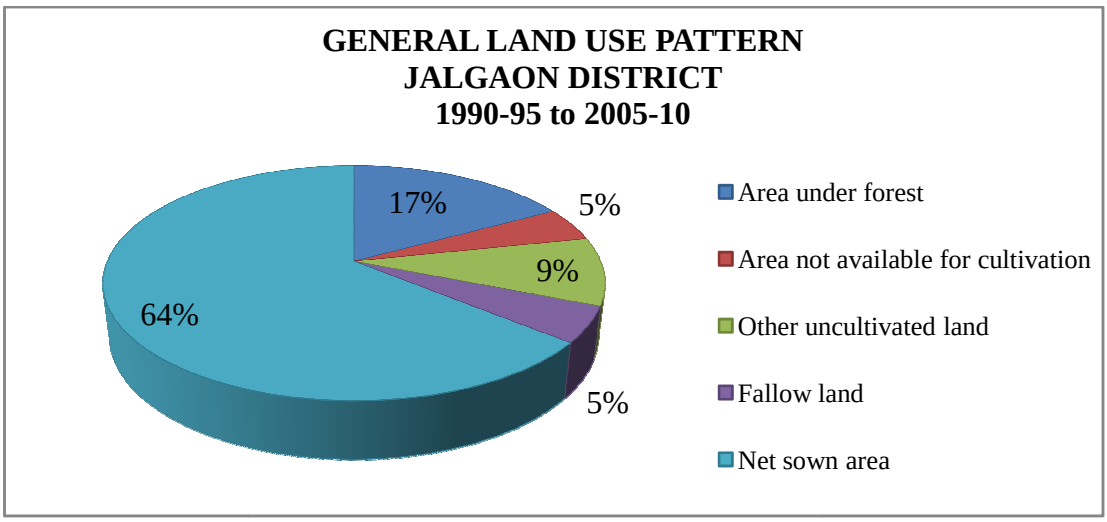
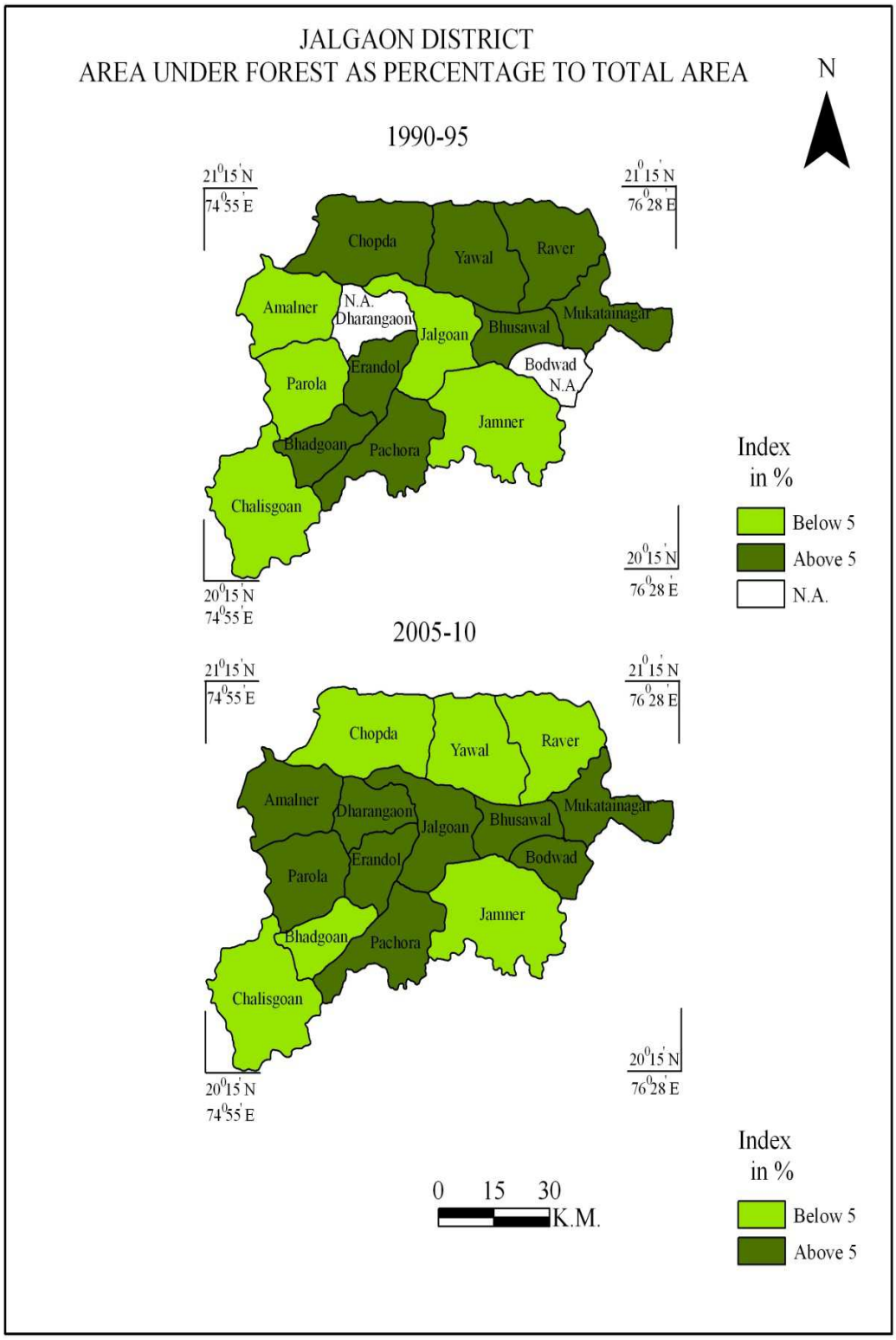
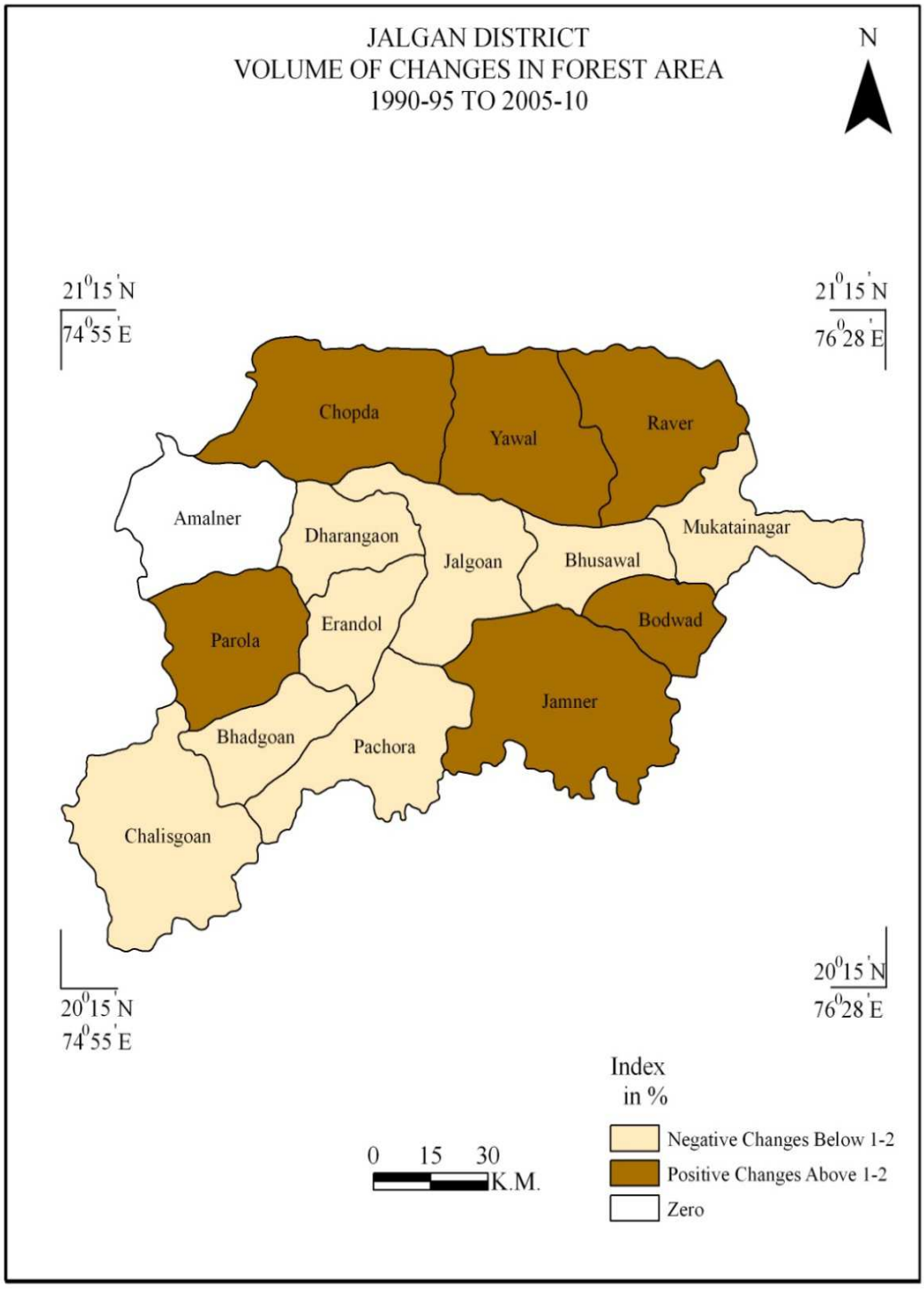


Diagram No.4.3


JALGAON DISTRICT
AREA UNDER FOREST AS PERCENTAGE TO TOTAL AREA
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 5
Above 5
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30 K.M.
Index in %
Below 5
Above 5

Map No.4.1


JALGAN DISTRICT
VOLUME OF CHANGES IN FOREST AREA
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Negative Changes Below 1-2
Positive Changes Above 1-2
Zero
0 15 30
K.M.

Map No.4.2

4.3.2 Area Not Available for Cultivation:-

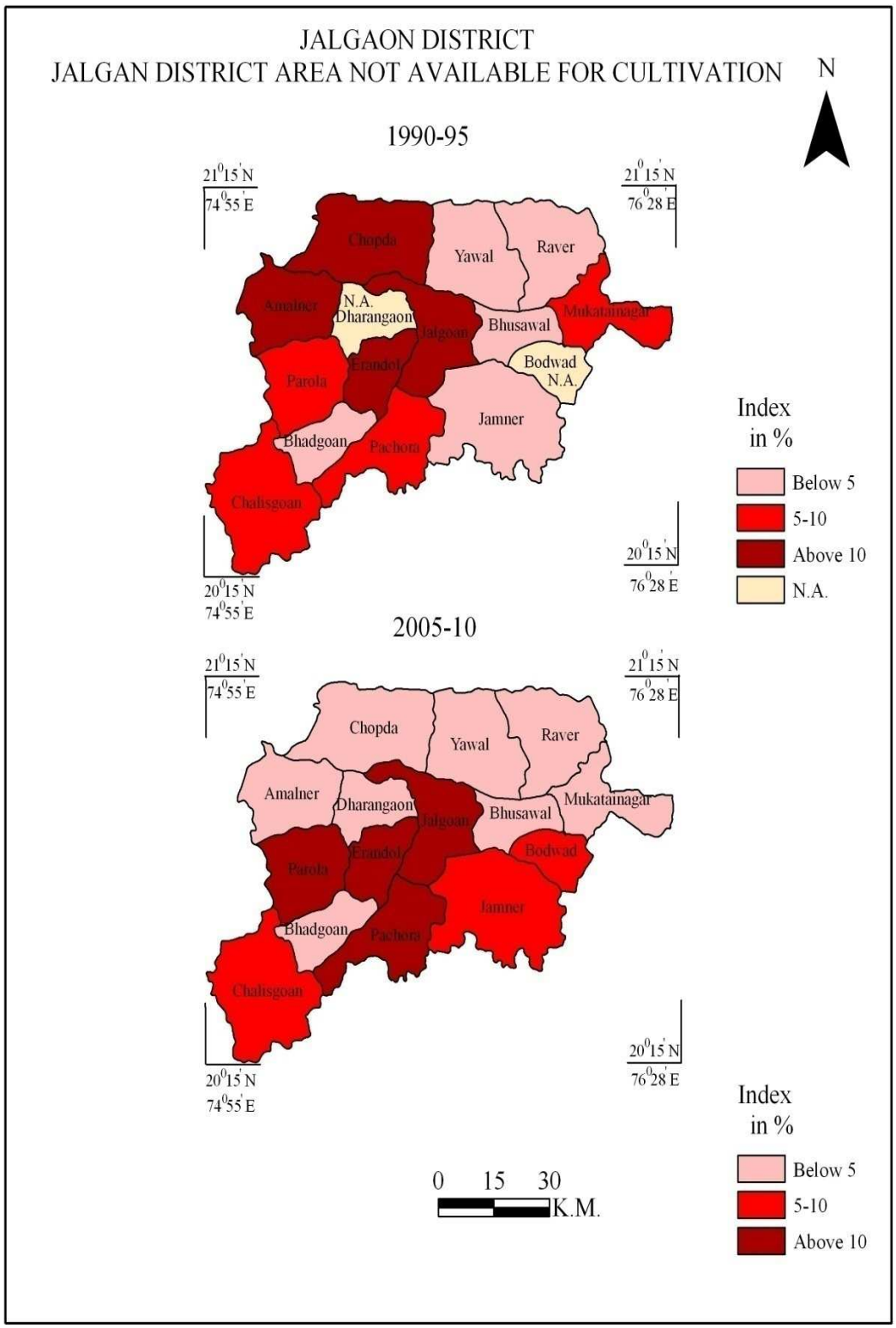
Area not available for cultivation includes all land put to non agricultural uses, barren land, unsuitable and uncultivable land, hill ranges and river beds of these areas. These areas are not available for cultivation of entire region which are not available further crop cultivation and crop production of any condition with the other uncultivated land and net sown areas transferred to this types and it could be happen increasing of population, urbanization, spread of the cities of Jalgaon and around of Jalgaon, Chopda, Dharangaon and Erandol talukas.

The total area under this land use of 7.08 percent area not available for cultivation in Jalgaon district was experienced in changes during the period of 1990-95 to 2005-10 under the investigation. In 1990-95 periods slightly decrease the percentage of above 10% was observed in Jalgaon, Erandol, Amalner and Pachora tehsils.

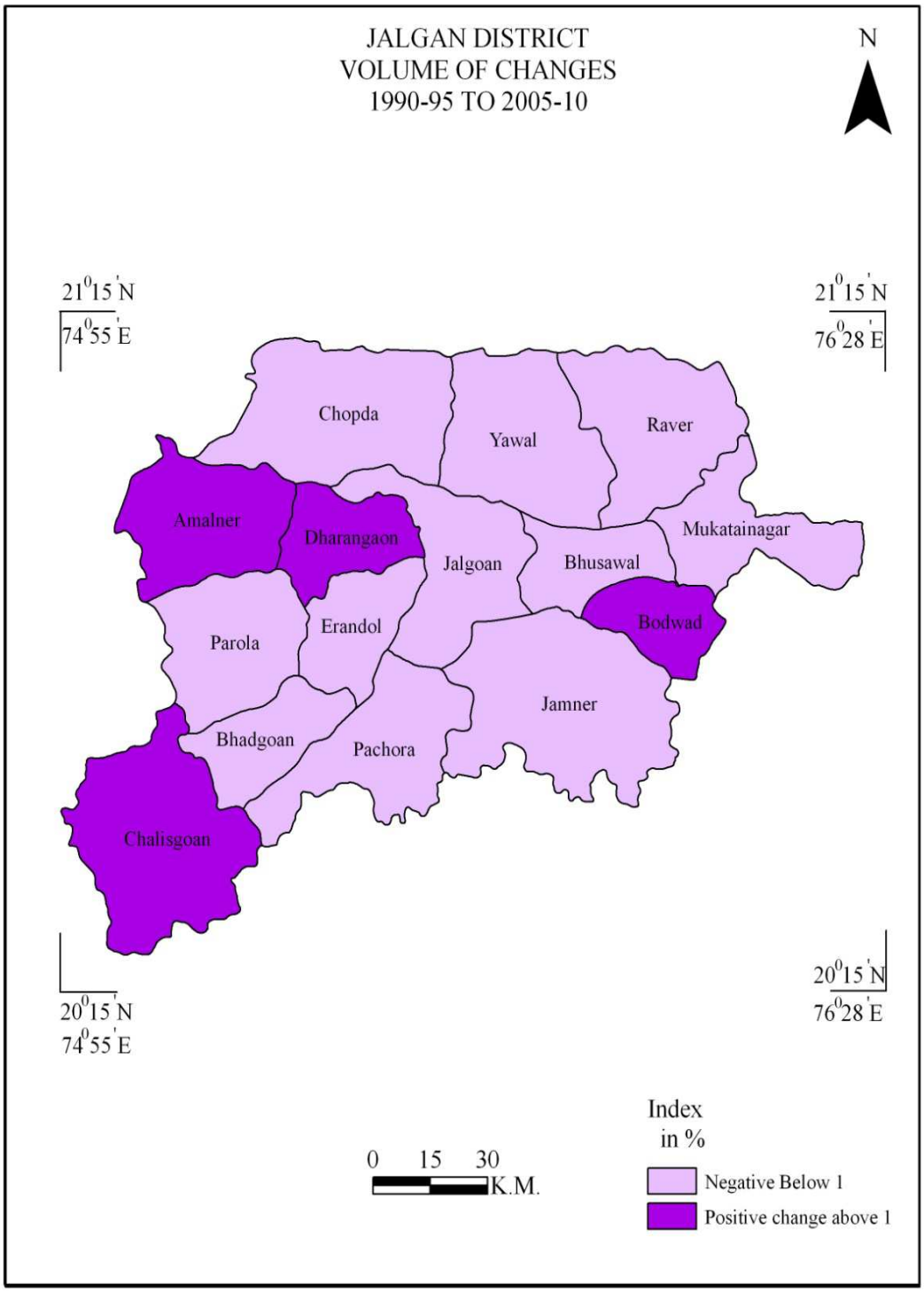
Data 5% to 10% was recorded in district Muktainagar, Parola, Chalisgaon, and Pachora tehsils. Below 5% was noted area not available for cultivation in Chopda, Yawal, Raver, Bhusawal, Bhadgaon, and Jamner tehsils.

Zero percent variations were observed in Bodwad and Dharangaon tehsils during the period of 1990-95 respectively. Period of 2005-10 was observed of area not available for cultivation above10% in Jalgaon, Erandol, Parola and Pachora tehsils.

Below 10% to 5% was noted in Muktainagar, Bodwad, Jalgaon, Chalisgaon tehsils. Below 5% was seen slightly variation in Chopda, Yawal, Raver, Bhusawal, Dharangaon,


JALGAON DISTRICT
JALGAN DISTRICT AREA NOT AVAILABLE FOR CULTIVATION
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Parola
Bodwad N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 5
5-10
Above 10
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30
K.M.
Index in %
Below 5
5-10
Above 10

Map No.4.3


JALGAN DISTRICT
VOLUME OF CHANGES
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
0 15 30
K.M.
Index
in %
Negative Below 1
Positive change above 1

Map No.4.4

TABLE NO.4.1. TALUKA WISE GENERAL LAND USE PATTERN IN JALGAON DISTRICT, 1990-95 TO 2005-10 (00'AREA IN HECTARE)

Sr. No	Taluka	Year	T.G.A	A.U.F	A.N.A.F.C	O.U.LE.F.D	F.L	N.S.A
1	Chopda	1990-95	95436	13271 (7.19)	2912 (2.77)	2192 (3.53)	5104 (18.69)	65131 (46.52)
		2005-10	95436	19629 (4.86)	2805 (3.02)	2192 (3.53)	4510 (21.16)	62064 (53.10)
	Vol. of change		**00**	**+2.33**	**-1.25**	**00**	**-2.47**	**+6.58**
2	Yawal	1990-95	95438	30126 (3.16)	4308 (2.15)	2666 (35.79)	1192 (20.06)	57146 (67.00)
		2005-10	95438	30818 (3.09)	929 (1.27)	7182 (13.28)	510 (18.71)	62216 (53.39)
	Vol. of change		**00**	**+2.07**	**-1.88**	**+22.51**	**-1.35**	**-13.61**
3	Raver	1990-95	93570	26587 (3.51)	4397 (2.28)	5246 (17.83)	1683 (25.59)	64260 (45.61)
		2005-10	93570	33000 (4.83)	3790 (4.68)	1881 (49.74)	820 (11.41)	63763 (46.74)
	Vol. of change		**00**	**+1.68**	**-2.4**	**-31.91**	**-14.18**	**+1.13**
4	Muktainagar	1990-95	64611	13330 (4.84)	11147 (5.79)	8161 (7.91)	3637 (17.76)	34555 (86.98)
		2005-10	64611	12150 (5.31)	9905 (6.52)	3146 (20.53)	160 (4.38)	42556 (88.51)
	Vol. of change		**00**	**-0.47**	**-0.73**	**-12.62**	**-13.38**	**+1.53**
5	Bodwad	1990-95	N.A	N.A	N.A	N.A	N.A	N.A
		2005-10	35545	4046 (8.78)	538 (6.60)	1343 (24.46)	550 (6.46)	28532 (24.57)
	Vol. of change		**00**	**+8.78**	**+6.60**	**+24.46**	**+6.46**	**+24.57**
6	Bhusawal	1990-95	83015	4561 (18.20)	4618 (1.97)	4147 (20.01)	1647 (50.40)	57684 (43.91)
		2005-10	47470	2960 (16.03)	3288 (1.43)	634 (7.48)	3053 (15.54)	30669 (54.10)
	Vol. of change			**-2.17**	**-2.54**	**-12.52**	**+34.86**	**+10.19**

7	Jalgaon	1990-95	82507	22570 (3.65)	8185 (10.08)	2547 (32.39)	554 (14.89)	49238 (67.56)
		2005-10	82507	14264 (5.78)	5594 (14.74)	3013 (27.38)	3311 (24.91)	59898 (77.10)
	Vol. of change			**-2.13**	**-.4.66**	**+5.01**	**+10.02**	**+9.54**
8	Erandol	1990-95	97456	8328 (11.70)	8211 (11.86)	8082 (12.05)	2038 (47.81)	73685 (32.10)
		2005-10	49442	6426 (7.69)	4402 (11.23)	3675 (13.45)	1730 (28.57)	41275 (19.22)
	Vol. of change			**-4.01**	**-0.66**	**-1.40**	**-19.24**	**-12.88**
9	Dharangaon	1990-95	N.A	N.A	N.A	N.A	N.A	N.A
		2005-10	48014	2327 (20.63)	1830 (2.23)	380 (12.63)	417 (11.51)	43857 (1.09)
	Vol. of change			**20.63**	**+2.23**	**+12.63**	**+11.51**	**+1.09**
10	Amalner	1990-95	84415	2704 (31.21)	8195 (10.30)	3693 (22.85)	1642 (51.40)	70231 (20.20)
		2005-10	84415	2704 (31.21)	10 (00)	08 (00)	1777 (47.50)	67940 (24.24)
	Vol. of change			**00**	**+10.30**	**+22.85**	**+3.90**	**+4.04**
11	Parola	1990-95	79121	11866 (6.66)	9937 (7.96)	2403 (32.92)	1119 (70.70)	55906 (41.52)
		2005-10	79121	9859 (8.02)	5468 (14.46)	9002 (8.78)	1069 (74.01)	63013 (56.29)
	Vol. of change			**-1.36**	**-6.5**	**+23.22**	**-3.31**	**+14.77**
12	Bhadgaon	1990-95	48453	7241 (6.69)	3251 (4.90)	2471 (19.60)	1020 (37.50)	36274 (31.10)
		2005-10	48453	7850 (6.17)	2112 (2.94)	6183 (7.83)	488 (9.92)	36339 (33.10)
	Vol. of change			**+0.52**	**-2.04**	**+11.77**	**-27.58**	**+2.00**
13	Chalisgaon	1990-95	121763	28520 (4.26)	4132 (9.46)	3515 (34.60)	1390 (87.59)	87490 (39.20)
		2005-10	121763	16935 (7.19)	7846 (5.51)	3079 (39.54)	4534 (26.85)	96982 (52.25)
	Vol. of change			**-2.93**	**+3.95**	**-4.39**	**+60.74**	**+13.05**

14	Pachora	1990-95	82041	8087 (10.14)	4490 (18.27)	5357 (15.31)	881 (9.31)	67262 (21.97)
		2005-10	82041	7266 (11.29)	3786 (21.66)	2242 (36.59)	2392 (34.29)	66912 (23.65)
	Vol. of change			**-1.15**	**-3.39**	**-21.28**	**+24.98**	**+1.68**
15	Jamner	1990-95	136072	30186 (4.50)	1698 (0.13)	2340 (58.15)	501 (2.16)	102653 (32.55)
		2005-10	136072	31083 (4.37)	1439 (0.56)	2116 (64.30)	1106 (12.30)	133550 (18.88)
	Vol. of change			**+0.13**	**-0.43**	**-6.15**	**+10.14**	**-13.67**
	Total area of Jalgaon district	1990-95	1163898	219806 (5.29)	79832 (14.57)	55432 (20.99)	17859 (65.17)	810485 (43.60)
		2005-10	1163898	155694 (7.47)	53742 (21.65)	52161 (22.31)	22368 (52.03)	877294 (63.32)
	Total Vol. of Change District			**-2.18**	**7.08**	**-1.32**	**+13.14**	**+19.72**

Source: Socio-Economic Abstract of Jalgaon District, 1990 to 2010,

(Figures indicated in brackets as percentage)

Amalner, Bhadgaon and Jamner tehsils. Both positive and negative changes were observed in area not available for cultivation during the period of 1990-95 to 2005-10. Above 1% positive changes was uncultivable land noticed in Bodwad, Dharangaon, Amalner, Chalisgaon tehsils. Below 1% negative changes was observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Jalgaon, Erandol, Parola, Bhadgaon, Pachora and Jamner tehsils during the same period.

4.3.3. Other Uncultivable Land Excluding Fallow Land:

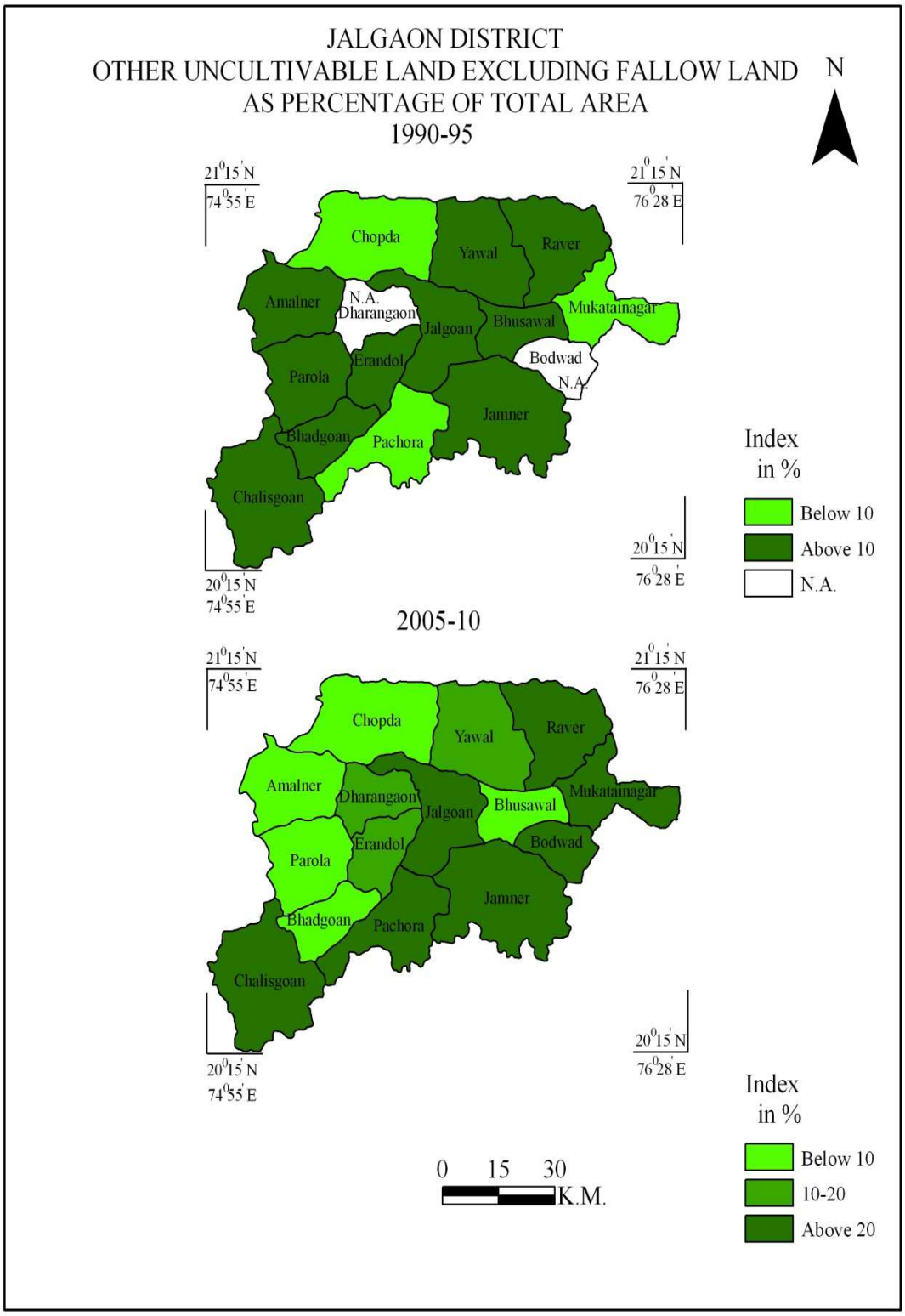
In this study region a characters of other uncultivable land excluding fallow land are consist of cultivable waste, Permanent pasture and grazing land, and land under miscellaneous tree cropping etc. On the way cultivable land includes the land which can be under cultivation but which have been not cultivated for some time and not been cultivated in or more than five years.

The category of miscellaneous tree cropping includes land under the short cactus tree, grass, bamboo, forest tree etc. this region area of land which are put to some agricultural uses but which area extent is not included in the category to net sown area of the region.

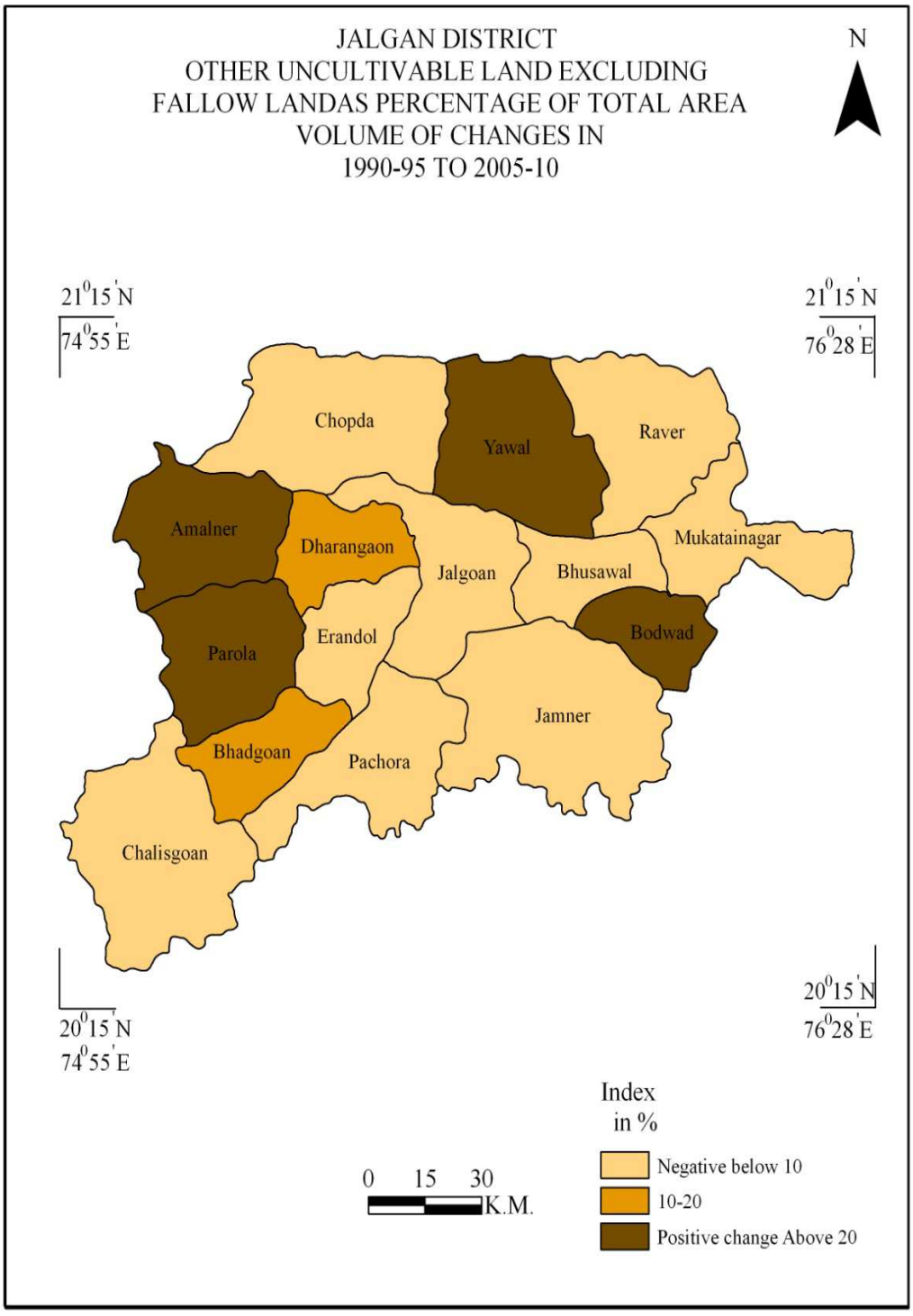
Total area under this land use category 1.32 percent which is very less as compared to Maharashtra average of 7.2 percent in 2001. The land under the category of uncultivated excluding of fallow land has also recorded considerable changes during the investigation period 1990-95 to 2005-10.

The land decrease the period of 2005-10 above 20% was observed in Raver, Muktainagar, Bodwad, Jalgaon, Chalisgaon, Pachora and Jamner tehsils. Below 20% to 10% was noticed in Yawal, Dharangaon and Erandol tehsils. Slightly decrease below 10% was observed in Chopda, Bhusawal, Amalner, Bhadgaon and Parola tehsils during the period of 2005-10.

Increase land under the non cultivable during the period of 1990-95 was observed above 10% in Yawal, Raver, Bhusawal, Jalgaon, Erandol, Amalner, Parola, Bhadgaon, Pachora and Jamner tehsils.


JALGAON DISTRICT
OTHER UNCULTIVABLE LAND EXCLUDING FALLOW LAND
AS PERCENTAGE OF TOTAL AREA
1990-95
N
21°15' N 74°55' E
21°15' N 76°28' E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A.
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N 74°55' E
20°15' N 76°28' E
Index in %
Below 10
Above 10
N.A.
2005-10
21°15' N 74°55' E
21°15' N 76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N 74°55' E
20°15' N 76°28' E
0 15 30
K.M.
Index in %
Below 10
10-20
Above 20

Map No.4.5


JALGAN DISTRICT
OTHER UNCULTIVABLE LAND EXCLUDING
FALLOW LANDAS PERCENTAGE OF TOTAL AREA
VOLUME OF CHANGES IN
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Negative below 10
10-20
Positive change Above 20
0 15 30
K.M.

Map No.4.6

Below 10% was noticed in Chopda, Muktainagar, Bodwad, Dharangaon and Pachora tehsils during same period. Positive and negative changes were observed in area not available for cultivation during the period of 1990-95 to 2005-10. Zero percent land use was observed in only Chopda tehsils in the study region. Most of the tehsils are above 20% was positive experienced in Yawal, Bodwad, Amalner and Parola. Negative changes were observed in Raver and Pachora tehsils. Below 20% to 10% positive changes was noticed in Dharangaon and Bhadgaon.

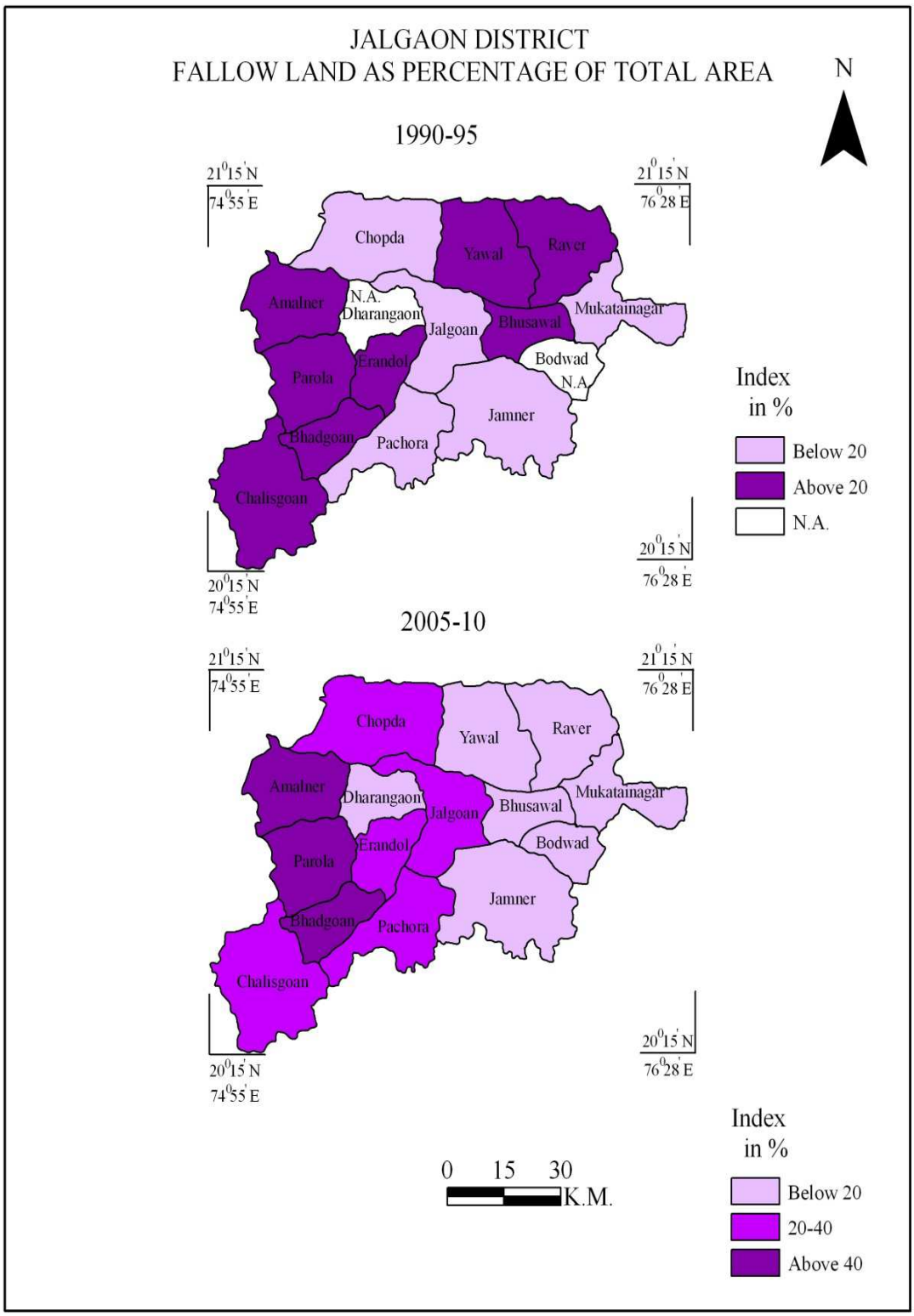
Negative changes were seen in Muktainagar, Bhusawal tehsils. Below 10% was observed in Jalgaon, Erandol, Chalisgaon and Jamner tehsils during the investigation period of 1990-95 to 2005-10. In this period some attributed to several uses of land in the sectors, where the development of housing, industries, agricultural plant of tissue culture and onion powder extract from onion and banana chips from banana for the development of agriculture in this region.

So, it has resulted in the tremendous decline in the land of other cultivable and excluding the fallow land in entire study region.

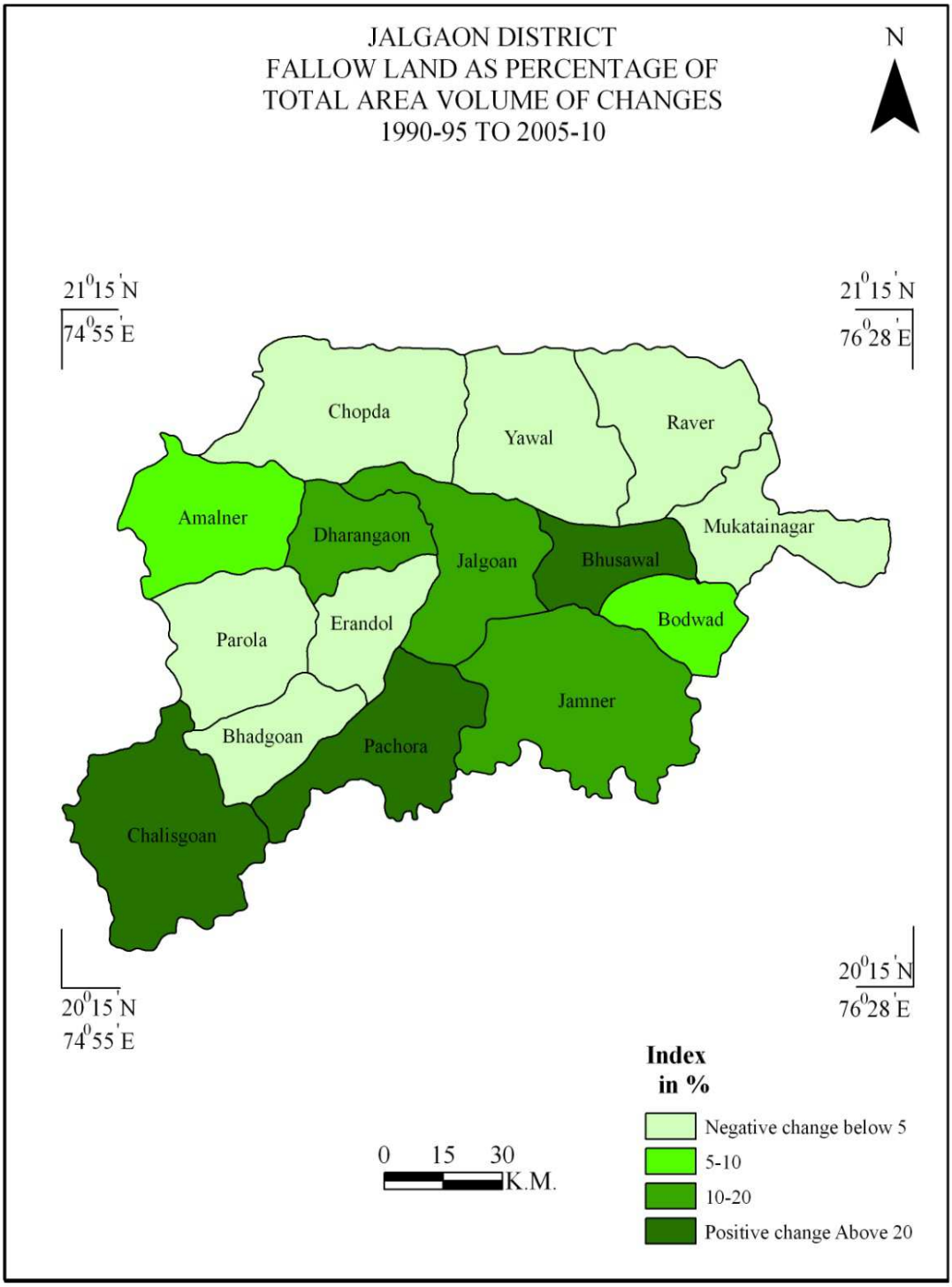
4.3.4 Fallow Land:

The term of fallow land is applied to land not under cultivation at that time, but which had been under cultivation process in the past. Fallow land includes current fallow land and old fallow land which are largely found due to inadequate of water supply, extensive and heavy clay soils difficult at proper time. Fallow land for preserving the fertility and prevent of soil exhaustion.

That, the fallow land system of preserving of fertility and maintaining crop yields. Census of India has divided to two types- land as kept of fallow land during one year is called as current fallow land and when it is kept fallow for more than five years, so it is called as permanent fallow land. Jalgaon district has a substantial proportion of fallow land with an average of 13.14 percent of total geographical area of study region. This is much more than state average of 7.2 percent in 2001.


JALGAON DISTRICT
FALLOW LAND AS PERCENTAGE OF TOTAL AREA
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index in %
Below 20
Above 20
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
0 15 30
K.M.
Index in %
Below 20
20-40
Above 40

Map No.4.7


JALGAON DISTRICT
FALLOW LAND AS PERCENTAGE OF
TOTAL AREA VOLUME OF CHANGES
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Negative change below 5
5-10
10-20
Positive change Above 20
0 15 30
K.M.

Map No.4.8

Last decades the land under the fallow land category consisting increases. There are remarkable variations in the study region regarded as a fallow land. During the period of 2005-10 the highest percentage recorded above 40% in Amalner, Parola and Bhadgaon tehsils. Below 40% to 20% was recorded in Chopda, Jalgaon, Erandol, Chalisgaon and Pachora tehsils. Very low percentage below 20% was observed in Yawal, Raver, Muktainagar, Bhusawal, Bodwad, Dharangaon and Jamner tehsils, during the investigation period of 1990-95.

Other proportionate area of fallow land during the period of 2005-10 land declined by the 20% was recorded in Yawal, Raver, Bhusawal, Erandol, Parola, Amalner, Bhadgaon, Chalisgaon tehsils. Below 20% was observed in Chopda, Muktainagar, Bodwad, Dharangaon, Jalgaon, Pachora and Jamner tehsils during the 1990-95.

Volume of changes was experienced during the period of 1990-95 to 2005-10 under the investigation. Positive and negative changes were observed in Jalgaon district under the area of fallow land. Above 20 percent positive changes was seen in Bhusawal, Chalisgaon and Pachora tehsils. Below 20 percent to 10 percent was observed in Jalgaon, Dharangaon and Jamner tehsils.

Very less found in below 10% was observed in Bodwad and Amalner tehsils. Below 5 percent negative changes were noticed in Chopda, Yawal, Raver, Muktainagar, Erandol, Parola and Bhadgaon tehsils during the same investigation period of Jalgaon district.

4.3.5. Net Sown Area:

The total land area on which crops are grown in a region is called as net sown area. This category includes the extent of cropped land in a region and agricultural region therefore it is vital difference in studies related to agricultural development of Jalgaon district. The net sown area is the same cropped area in that year particular of the study region.

Total area under net sown area of this category is 63.92 percent which is higher than Maharashtra state average of 57.33 percent.

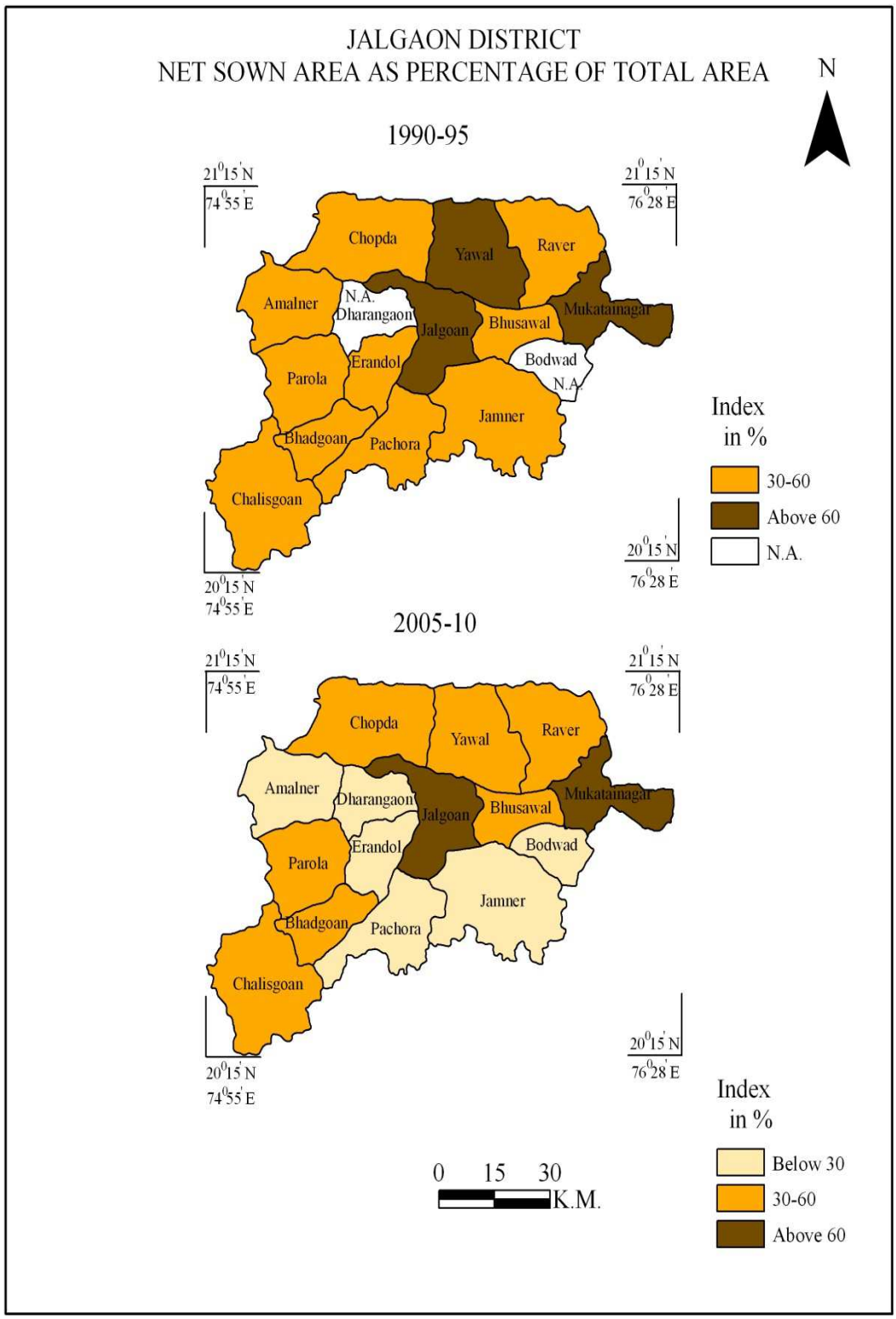
During the period of 1990-95 about 1316803 hectors of land 75.30 percent was under cultivation in the entire region. It was increased up to 1391139 hectors 95.23 percent during 2005-10. It means that about 19.93 positive changes were observed in Jalgaon district. This is clear from the facts that the proportionate of the under net sown area shows in table no.5.1 numerical value.

Maximum percentage more than 60% area under the net sown area is recorded in Yawal, Muktainagar and Jalgaon tehsils. Moderate percentage 30% to 60% was recorded in Chopda, Raver, Bhusawal, Erandol, Parola, Bhadgaon, Amalner, Chalisgaon, Pachora and Jamner tehsils. Low moderate impact below 30% was noted in Bodwad and Dharangaon tehsils during the period of 1990-95 under observation.

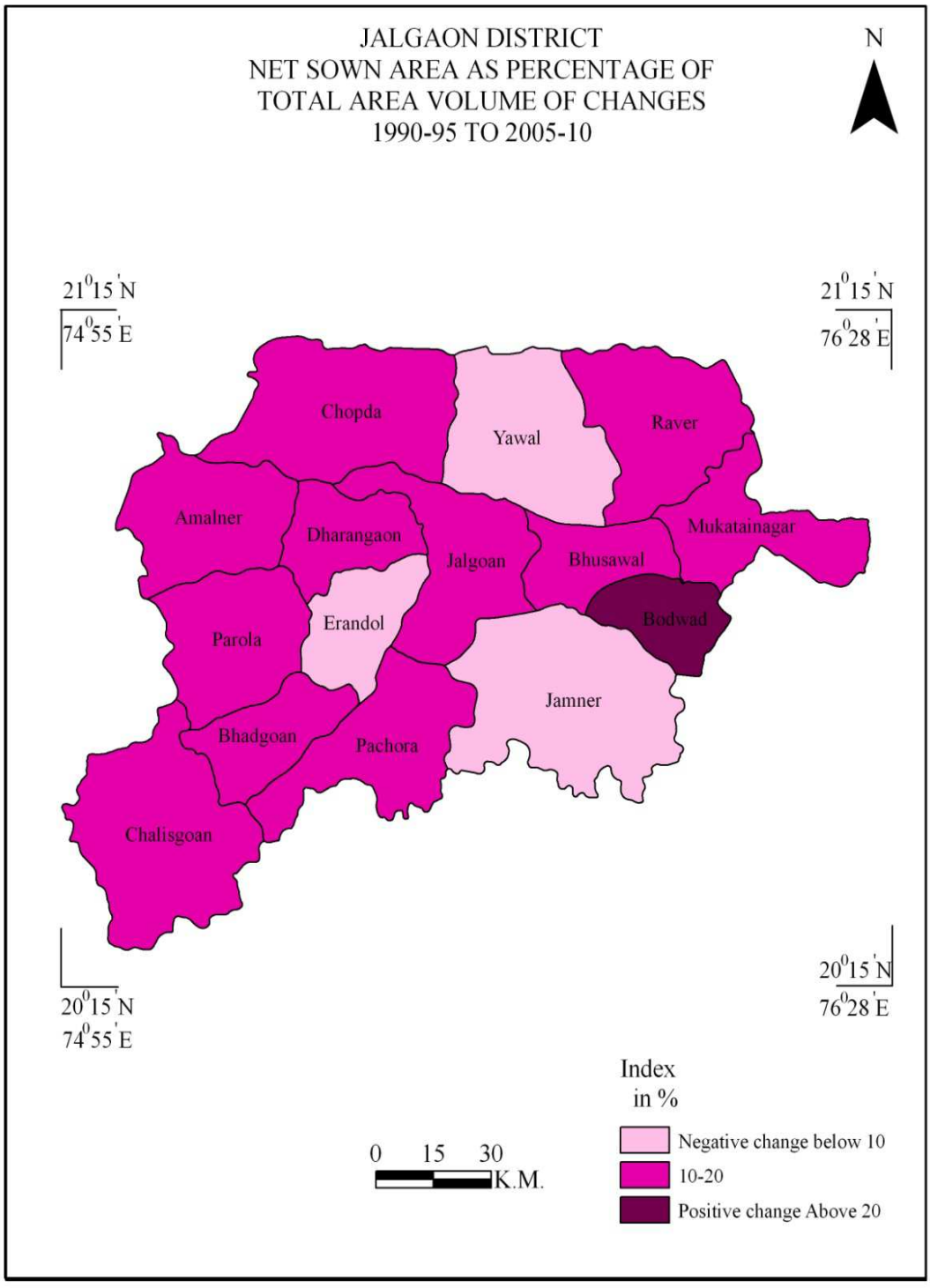
Investigation period 2005-10 area under the net sown area above 60% was recorded in Muktainagar and Jalgaon tehsils. 30% to 60% was noted in Chopda, Yawal, Raver, Bhusawal, Parola, Bhadgaon and Chalisgaon tehsils. Low percentage below 30% was observed in Bodwad, Erandol, Dharangaon, Amalner, Pachora and Jamner tehsils respectively.

Positive and negative change was observed in entire region under the net sown areas where the volume of changes has drastic fluctuate. Positive changes in net sown area were observed above 20% only in Bodwad tehsils. While below 20% in Chopda, Raver, Muktainagar, Dharangaon, Bhusawal, Jalgaon, Parola, Chalisgaon, Bhadgaon, and Pachora tehsils. Above 10% negative changes in net sown area was found in Yawal, Erandol and Jamner tehsils during the investigation period.

Physical and non physical determinants of agricultural factors were responsible for the negative changes in net sown area during the investigation period of 1990-95 to 2005-10.


JALGAON DISTRICT
NET SOWN AREA AS PERCENTAGE OF TOTAL AREA
N
1990-95
21°15' N 74°55' E
21°15' N 76°28' E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N 74°55' E
20°15' N 76°28' E
Index in %
30-60
Above 60
N.A.
2005-10
21°15' N 74°55' E
21°15' N 76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N 74°55' E
20°15' N 76°28' E
0 15 30 K.M.
Index in %
Below 30
30-60
Above 60

Map No.4.9


JALGAON DISTRICT
NET SOWN AREA AS PERCENTAGE OF
TOTAL AREA VOLUME OF CHANGES
1990-95 TO 2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N
74°55'E
20°15'N
76°28'E
Index
in %
Negative change below 10
10-20
Positive change Above 20
0 15 30
K.M.

Map No.4.10

4.4 AGRICULTURAL LAND USE:-

In agricultural land use under irrigation sources an analytical account of individual crops is studied. It is mainly related to variations in agricultural land use over the area. The agricultural use of land is the result of the direct application of efforts to the available land resources. In this region food grains constitute major producer of agricultural land. In this area of the agriculture land the crops are under the maximum irrigation facilities.

The main food grain crops grown in the district area wheat, jowar, bajra, pulses and vegetables. If we include non food crops main cash crop cotton, sugarcane, fruits (banana) and vegetables are also major and important crops of the study area during the investigation. Among the non food crops like oilseeds cover large areas. It could also by fodder crops and other non food crops.

Irrigated crops wheat, jowar, bajra, pulses, vegetables and cotton share 80% of the irrigated land of the Jalgaon district. However the concentration of crops in the district is influenced by the degree of development of water resources (well irrigation, tube well irrigation, surface irrigation, canals and ponds or small lake).

Hence, an attempt is made to correlate and the facilities of irrigation with spatial distribution and changes there in during the period under review by considering percentage occupancy strength of irrigated crops.

1) Rice:

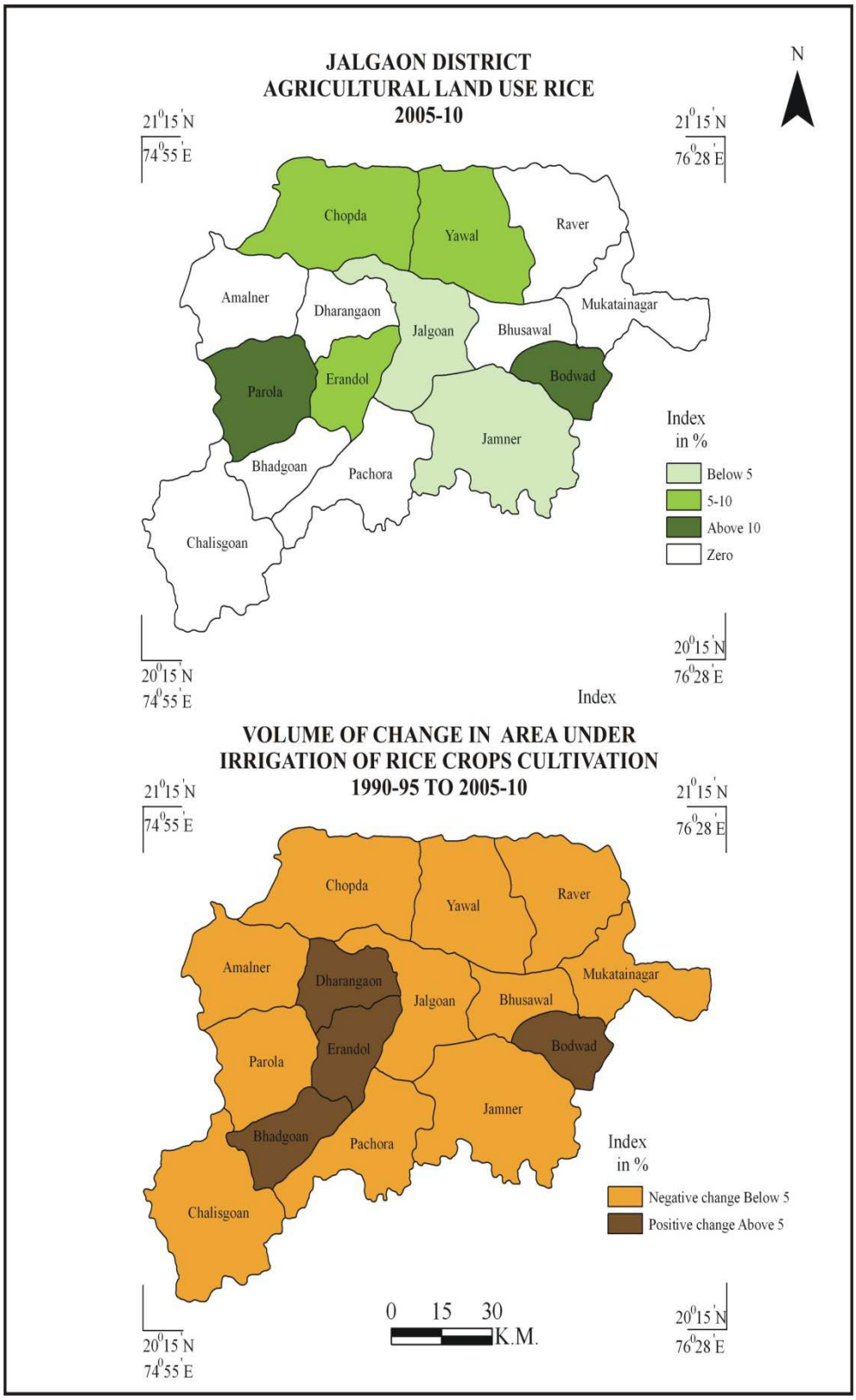
Rice is the staple crop, which is grouped in under food crops. Rice requires hot temperature climate and alluvial loamy soils for its production. The Jalgaon district of a region a hot and dry temperature region under a shadow rainfall area, hence area under the rice cultivation of irrigation and other sources which are moving from 0.45 to 0.01 percent during the investigation period.

Rice cultivation decrease in the period 2005-10 than 1990-95. Very less (one percent) 0.45% a rare production growing in district. 1168 hectors under the rice cropped area during the period 1990-95 and very small area found under irrigation in 2005-10 period 94 hectors, which is decreasing the 0.44 percent to total cropped area under the investigation.

TABLE NO.4.2 TRENDS OF CROPS AREA UNDER IRRIGATION IN JALGAON DISTRICT 1990-95 TO 2005-10

Sr. No	**Crops Area Under Irrigation In Jalgaon District**	**1990-95**		**2005-10**		**Percentage of Cropped Area Volume of Change**
	Crops	Cropped Area	Percentage	Cropped Area	Percentage	%
1	Rice	1168	0.45	94	0.01	-0.44
2	Wheat	22574	8.86	21075	3.98	-4.88
3	Jowar (Kharip + Rabbi)	3946	1.54	10110	1.91	+0.37
4	Bajra	00	00	5237	0.99	+0.99
5	Pulses	8909	3.49	10513	1.99	-1.50
6	Cotton	18171	7.13	304231	45.19	+38.06
7	Sugarcane	18374	7.21	14885	2.81	-4.40
8	Oilseeds	4031	1.58	6681	1.26	-0.32
9	Green chilly	1114	0.43	3199	0.62	+0.19
10	Maize	585	0.22	4305	1.62	+1.40
11	Total food crops	105697	41.51	129662	24.54	-16.97
12	Gram	7909	3.10	10472	1.98	-1.12
13	Tur	703	0.27	00	00	+0.27
14	Fruits & vegetables	46086	8.10	61970	11.73	-6.37
15	Fodder crops	328	0.12	1640	0.31	+0.19
16	Total non food crops	15008	5.89	19660	9.82	4.07
	Total Gross Cropped Area	**254603**	**100**	**528260**	**100**	**00**

Source: Socio-Economic Abstract of Jalgaon District, 1990-95 & 2005-10 & Computed by Researcher


JALGAON DISTRICT
AGRICULTURAL LAND USE RICE
2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-10
Above 10
Zero
20°15' N
74°55' E
20°15' N
76°28' E
Index
VOLUME OF CHANGE IN AREA UNDER
IRRIGATION OF RICE CROPS CULTIVATION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Negative change Below 5
Positive change Above 5
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.4.11

Total area of rice crop cultivation of general land use is 0.066 percent of total gross cropped area. The agriculture land under the rice crop above 10% was registered in Parola and Bhadgaon talukas. Rice under cultivation less than 10% to 5% noted in Chopda, Yawal and Erandol talukas.

A very less below 5% observed in Raver, Muktainagar, Jalgaon and Jamner talukas. Here in the study region climatic condition and physical variation were found in some talukas, because the rice crop production in this talukas a zero percent. Zero percent under the rice crop cultivation noted in Bhusawal, Bodwad, Dharangaon, Amalner, Chalisgaon and Pachora talukas during the investigation period.

The positive and negative changes in area under the rice were found in the study region. Below 5% negative changes in rice area was observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Jalgaon, Amalner, Parola, Chalisgaon, Pachora and Jamner talukas. Above 5% positive changes in rice area was noted in Bodwad, Dharangaon, Erandol and Bhadgaon talukas.

In this region decision of farmers or any agriculture workers and economical factors are the responsible for the positive and negative changes in rice cultivation due to irrigation sources during the investigation period of 1990-95 to 2005-10.

2) Wheat:

Wheat is important crop of Jalgaon district during the investigation period. It is mainly a rabbi crop, requiring in a winter season and low temperature between 10°C to 30°C. Rainfall less in condition with clear and bright sunshine during the ripening and harvesting period were necessary to have been a better quality of grain. It can be grown in the areas where rainfall is less than 500 mm, with the help of impact of irrigation.

As such in the district the monsoon and post monsoon rainfall by itself is not sufficient for optimum production of wheat crop. Therefore the irrigation should be provided to this important crop production to determine its aerial extent and yield capacity.

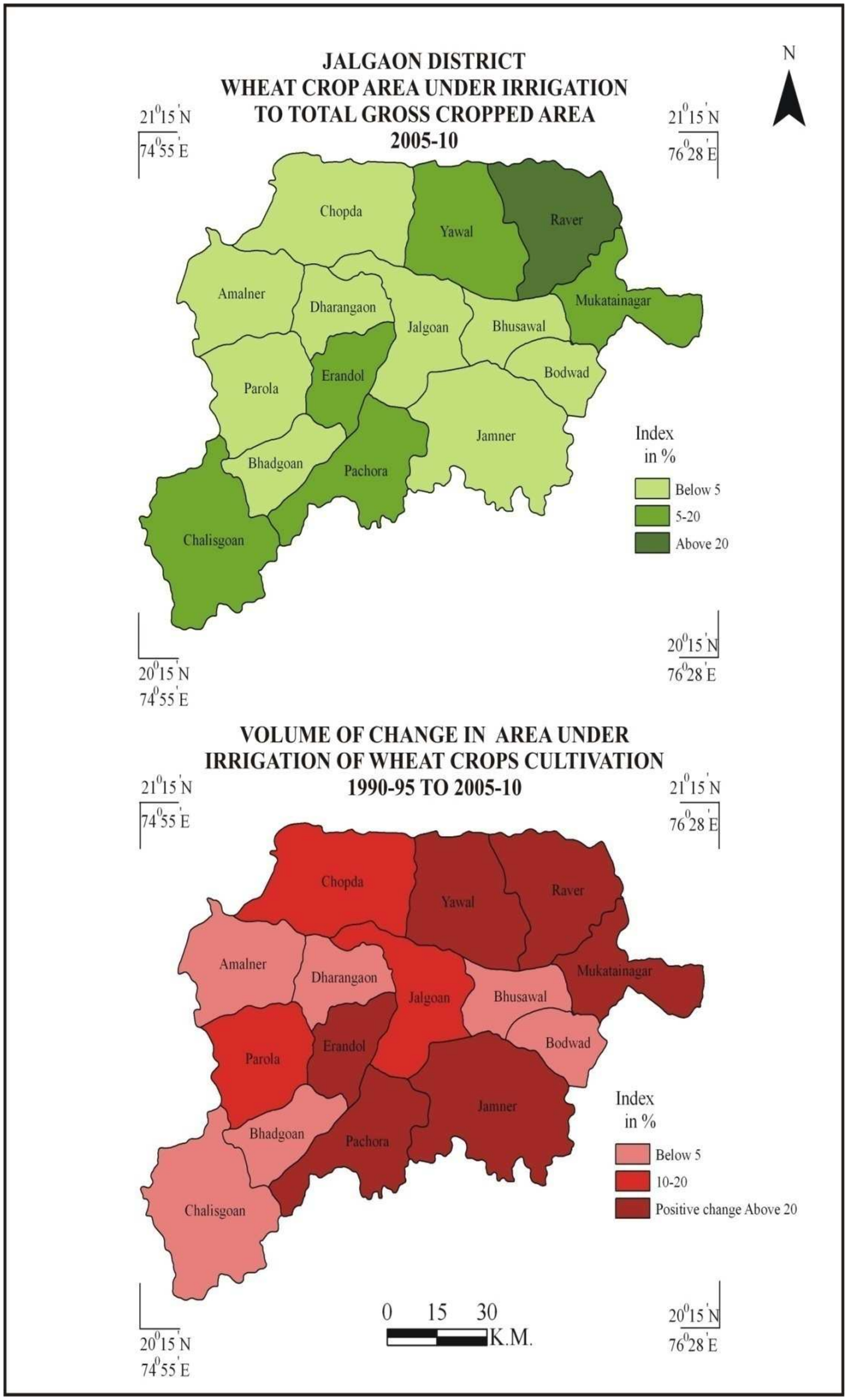
Wheat occupies only 3.98 percent (21075 hectors) of the total cultivated area during the period of 2005-2010. However, its uneven spatial distribution in the district is related to agro-climatic condition. High percentage above 30% under wheat is observed in Chopda, Bhusawal, Bodwad, Jalgaon, Dharangaon, Amalner, Parola and Jamner talukas.

Moderate percentage 20% to 30% is recorded in only Chalisgaon talukas and low percentage below 20% to 10% is noted in Yawal, Raver, Muktainagar, Erandol, Bhadgaon and Pachora talukas. It is clearly observed that those talukas which have maximum facilities of irrigation and they have more percentage of land under wheat.

Although wheat occupies about 8.22 percent of the irrigated area, it has strong relationships with the irrigated area in the district. Relatively maximum percentage of above 20% the irrigated area is found in only Raver talukas.

Moderate percentage 20% to 5% under the irrigated wheat is observed in Yawal, Muktainagar, Erandol, Chalisgaon and Pachora talukas. Low percentage below 5% under irrigated wheat noted in Chopda, Bodwad, Bhusawal, Jalgaon, Dharangaon, Amalner, Parola, Bhadgaon and Jamner talukas. Being the rabbi crop of wheat in this district a substantial area shared by this crop.

The hectors under the wheat have decreased 4.88 percent on this period during the 20 years review. It has shown the agriculture land area 8.86 during the same period. No other crops grown in the district has shown in increase in irrigated crops like wheat.


JALGAON DISTRICT
WHEAT CROP AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-20
Above 20
20°15' N
74°55' E
20°15' N
76°28' E
VOLUME OF CHANGE IN AREA UNDER
IRRIGATION OF WHEAT CROPS CULTIVATION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
10-20
Positive change Above 20
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.4.12

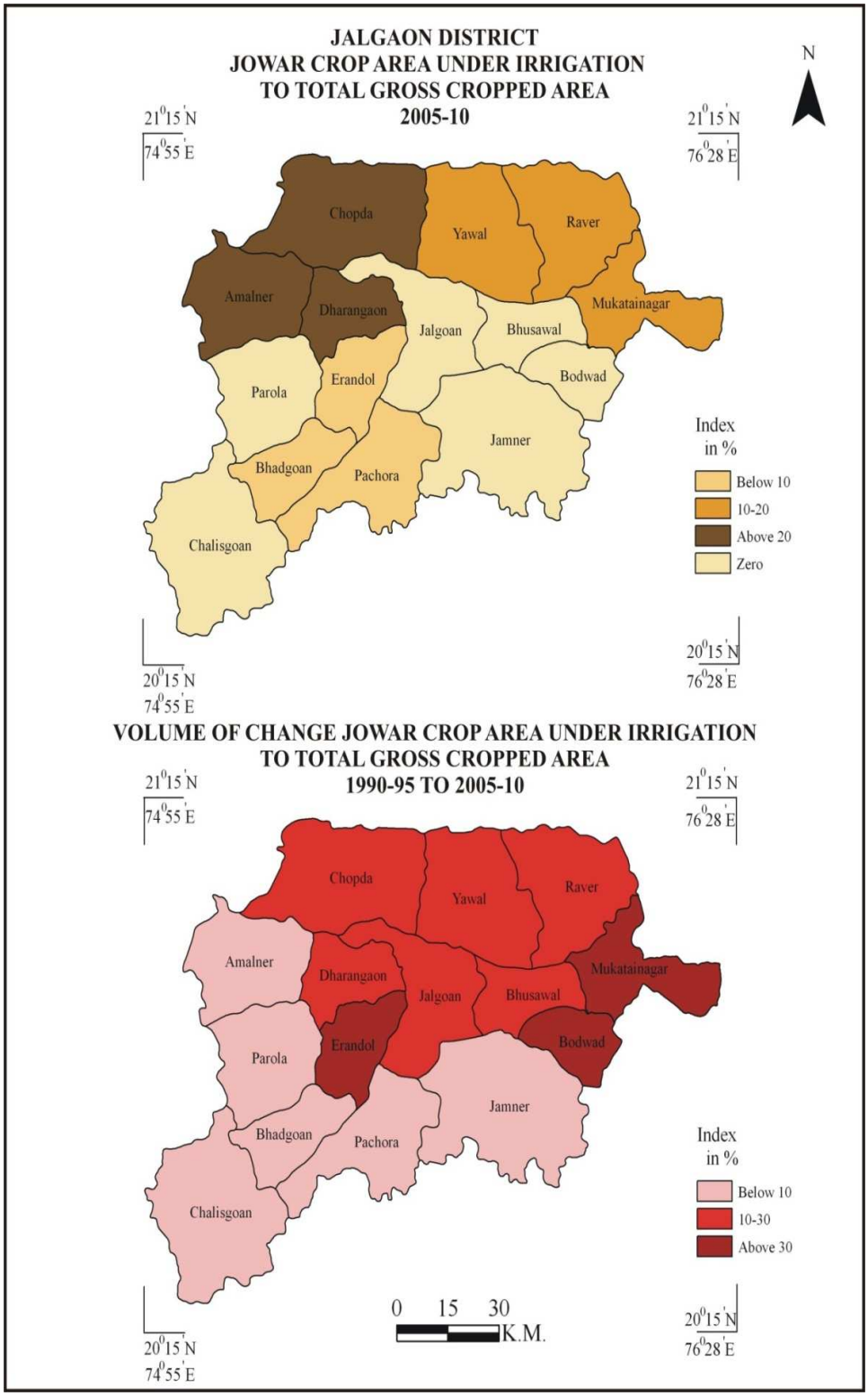
Significant increase over the 20% is observed in Yawal, Raver, Muktainagar, Erandol, Pachora and Jamner talukas 20% to 10% was noted in Chopda, Jalgaon, Parola and Jamner talukas. Very low below 10% was observed in Bodwad, Bhusawal, Dharangaon, Amalner and Bhadgaon talukas. Irrigated area under the wheat crop has increased or not decreased and changes were observed during the investigation period of 1990-95 to 2005-10

3) Jowar:

Jowar is the staple food and main fodder crops of the Jalgaon district. Jowar crop grown almost in all the talukas of the district. Jowar occupying about 23.98 percent of the total cropped area of land use agriculture shows in table no.4.1 the cultivated area under the jowar has decreased to increase during the period of investigation. Under the irrigation jowar occupies only 1.91 percent of total irrigated cropped area.

A comparatively high percentage of under jowar irrigated crops above 20% is recorded in Chopda, and Amalner talukas. Moderated percentage of under jowar crops noted 10% to 20% in Yawal and Dharangaon talukas. Low moderated percentage below 10% ware found in Raver, Muktainagar, Erandol, Bhadgaon and Pachora talukas. Zero percentage under jowar was observed in Bodwad, Bhusawal, Jalgaon, Parola, and Chalisgaon talukas under the investigation period of 1990-95 same as 2005-2010.

The volume of change in irrigated jowar, a comparatively high percentage above 30% was noted in Muktainagar, Bodwad and Erandol talukas. Moderate percentage of volume of change between 10% to 30% observed in Chopda, Yawal, Raver, Bhusawal, Jalgaon and Dharangaon talukas. Very low percentage below 10% were found in Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner talukas under the irrigation during the investigation period 2005-10 as compared to 1990-95.


JALGAON DISTRICT
JOWAR CROP AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
Zero
20°15' N
74°55' E
20°15' N
76°28' E
VOLUME OF CHANGE JOWAR CROP AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-30
Above 30
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.4.13

4) Bajra:

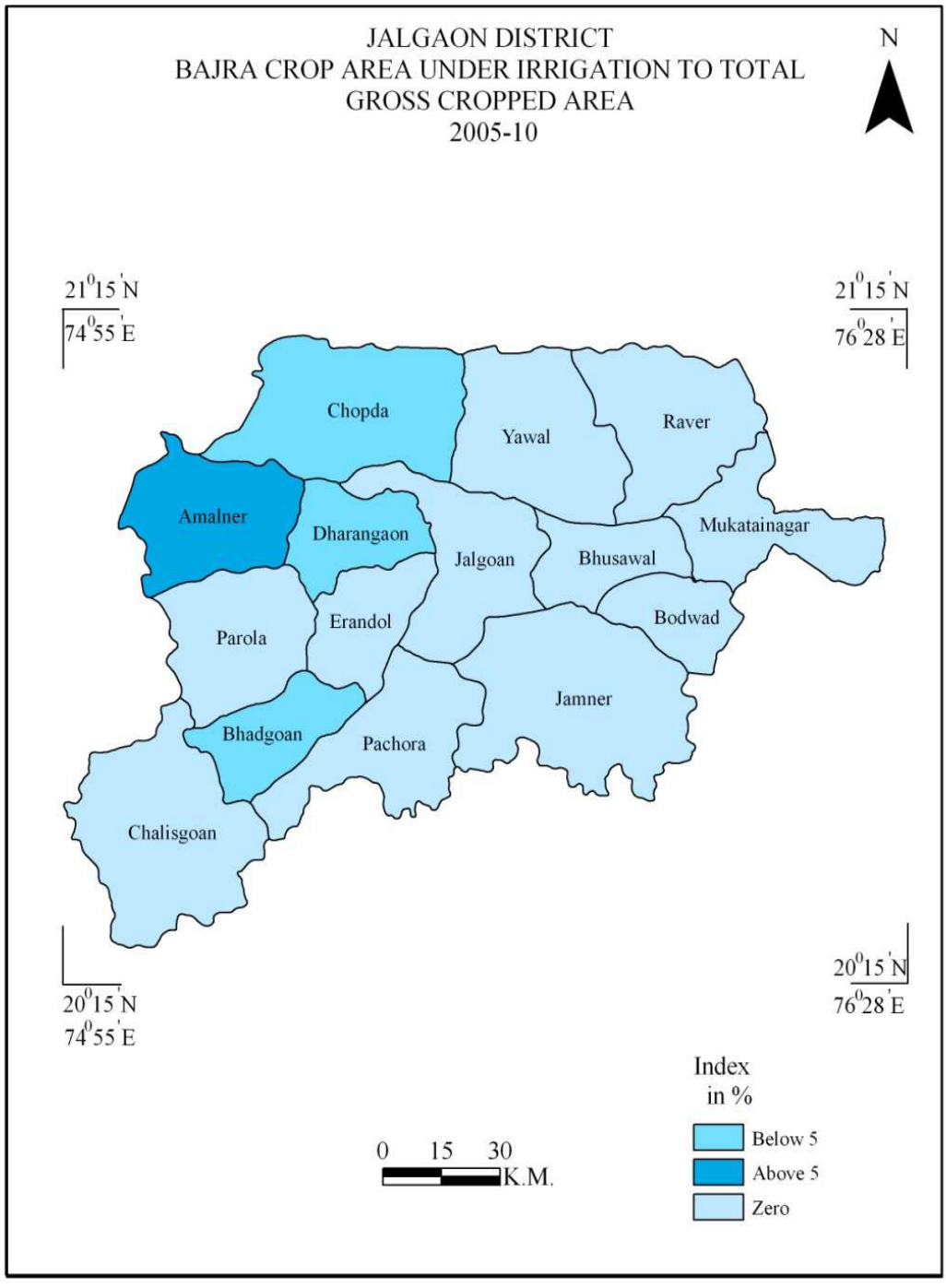
Bajra shares 2.03 percent of total cultivated area along with food grains grown in the district during the period of 2005-10. It occupies 0.99 percent (5237 hectors) irrigated area under the bajra in Jalgaon district. The agriculture land under the use of bajra crop maximum area cultivated in Amalner taluka. Total 97.42 percent bajra cultivated to total cropped area in Jalgaon district with very high percentage. Very low percentage was found in Chopda (0.97), Dharangaon (0.45), and Bhadgaon (1.14) talukas respectively.

Here comparatively high increases in above in 40 percent increase in Amalner talukas. Low increases in below 10% in Chopda, Bhadgaon and Dharangaon talukas. The period of 1990-95 the bajra zero percent cultivated and 2005-10 the crop was highest cultivated in this talukas during the investigation period. Other talukas have been noted in zero percent of crops cultivated because irrigation does not support to this part of crops. Volume of change does not occur and noted in the period of 1990-95 to 2005-10 during the investigation.

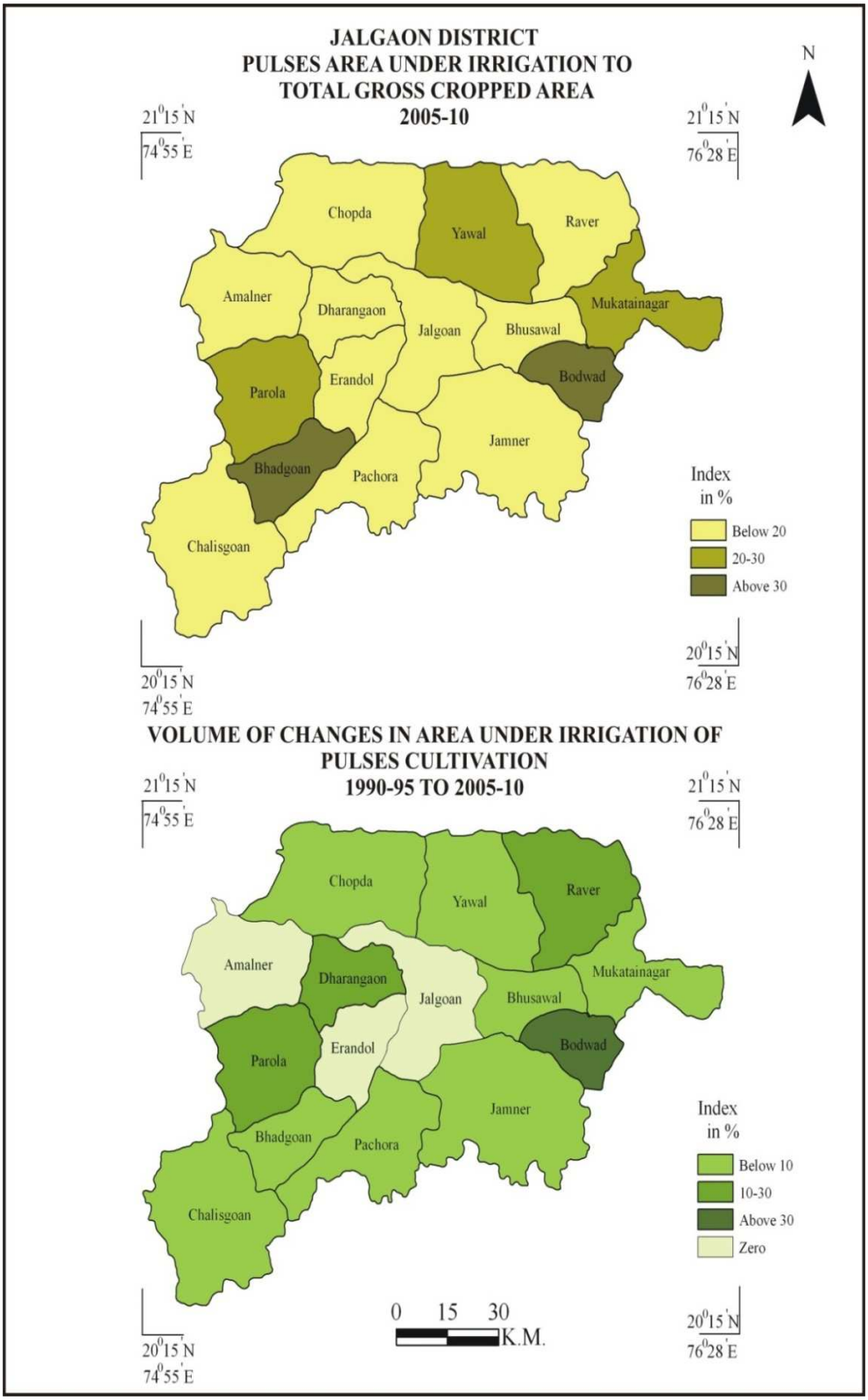
5) Pulses:

Pulses occupy an important crop in position in the agrarian economy of Jalgaon district. Pulses serve as an excellent nutrition food which is grown in Kharip and Rabbi Season of crops. The proportion area of under the pulses in the regions is 12.96 percent to total cultivated area of the district during the period of 2005-10. The irrigated area occupy under the pulses in Jalgaon district 1.99 percent under the investigation.

The regional variation in the cultivation of pulses is influenced by agro-climatic conditions. The high percentage above 30% was noted in Bodwad and Bhadgaon talukas. Moderate percentage between 20% to 30% found in Raver, Muktainagar and Parola talukas. The percentage very low below 20% to 10% observed in Chopda, Yawal, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Chalisgaon, Pachora and Jamner talukas.


JALGAON DISTRICT
BAJRA CROP AREA UNDER IRRIGATION TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index in %
Below 5
Above 5
Zero
0 15 30
K.M.

Map No.4.16


JALGAON DISTRICT
PULSES AREA UNDER IRRIGATION TO
TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 20
20-30
Above 30
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGES IN AREA UNDER IRRIGATION OF
PULSES CULTIVATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-30
Above 30
Zero
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.4.17

The volume of changes under the irrigation of pulses crops, the spatial variations found in all talukas. Above 30% were found under the pulses only in Bodwad talukas. Moderate percentages 30% to 10% were found in Raver, Dharangaon and Parola talukas. Very low percentage below 10% under the pulses of Jalgaon district noted in Chopda, Yawal, Muktainagar, Bhusawal, Bhadgaon, Chalisgaon, Pachora and Jamner talukas during the investigation period of 2005-10.

Pulses production due to impact of irrigation increase in 3.19 percent 2005-10 with 10513 hectors. In the period of 1990-95 the pulses were cultivated in cropped area 8909 hectors, because so many techniques or idea were not useful and not working. So the agriculture land increases due to support of irrigation sources obviously the production were high in 2005-10 during the investigation.

6) Cotton:

The Tapi basin of water in Jalgaon district is known for the Cotton of Maharashtra. Jalgaon district one of the leading and well known markets of Cotton crops production in Maharashtra is located in it. The cotton is very useful and important principal crops in Jalgaon district. It is used both for edible and industrial purposes.

Cotton is mostly grown in black soil, so it is well known as black cotton soil in this region. Jalgaon district soil is most suitable for the cotton crops production with high quantity. In this district total percentage of cotton crop to total cultivated area more than 304231 hector on the land under cotton crops which is 45.19 percent to total cropped area.

Cotton is an important crop, group of cash crops under the area of agriculture land use. It is observed in 7.13 percent in period of 1990-95 and 35 percent increase in the period of 2005-10. Cotton crops under the irrigation sources of land of agriculture the high percentage above 20% were found in Dharangaon and Jamner talukas. Moderate percentage between 10% to 20% Chopda, Amalner, Chalisgaon and Pachora talukas.

Very low percentage below 10% were noted in Yawal, Raver, Muktainagar, Bodwad, Bhusawal, Jalgaon, Erandol, Parola and Bhadgaon talukas.

During the investigation period cotton crops under the irrigation the volume of change have clearly variations shows in the district.

The volume of change above 20% noted in Bodwad, Erandol, Dharangaon, Amalner and Chalisgaon talukas. Between 10% to 20% observed in Muktainagar, Bhusawal, Parola, Bhadgaon, Pachora and Jamner talukas. The inadequate and unreliable seasonal resources of water have been responsible for this situation.

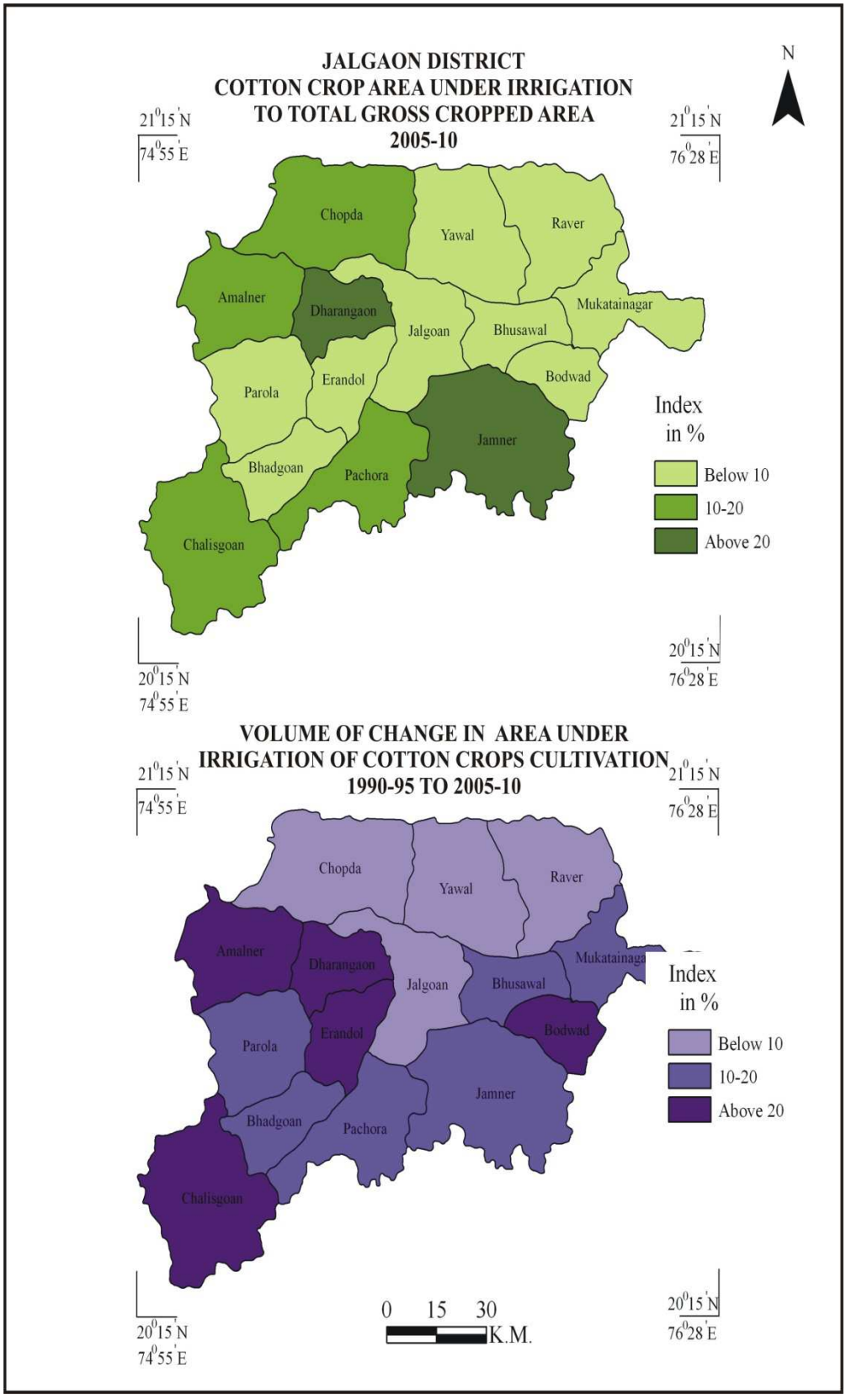
Low percentages below 10% were found in Chopda, Yawal, Raver and Jalgaon talukas during the investigation period of 2005-10. Mostly these crops taken by farmer through the irrigation and surface irrigation in the district.

This is a spatial variations were observed in Jalgaon district. Cotton crops famous in the Jalgaon district, every year the production of cotton will be high and high due to irrigation facilities. Pachora and Jamner talukas which is highest cotton crop production recorded in the Jalgaon district during the investigation of same period.

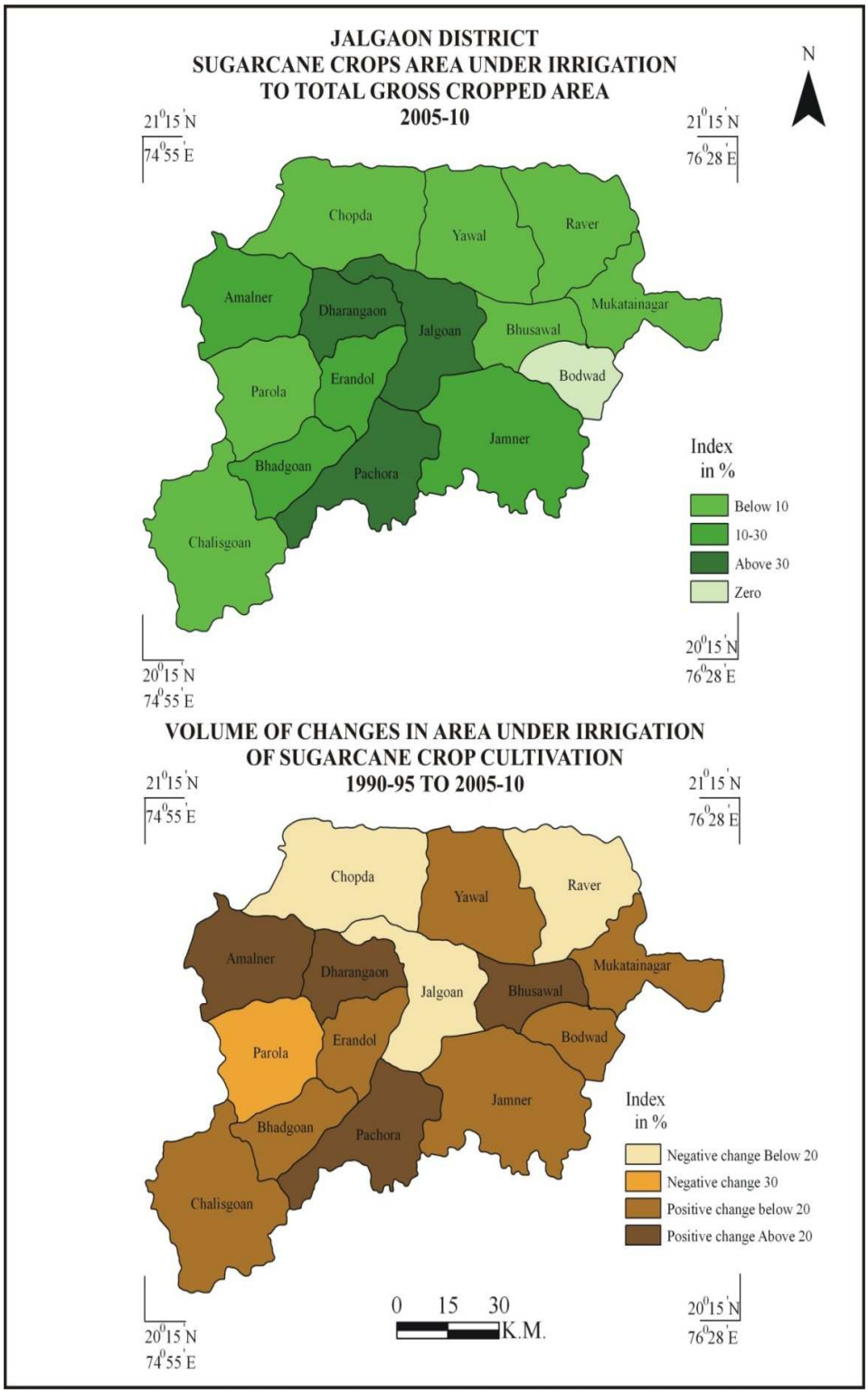
7) Sugarcane:

Sugarcane is also important cash crops grown in the study region. The cultivation of sugarcane has been decrease because sugar factories have many economical and political problems and issues. The factory will closed due to some problems so the production decreases of sugarcane in study region during the investigation period.

4.40 percent decrease to total cropped area of sugarcane production under the irrigation sources during the period of 2005-10 but period 1990-95 the sugarcane production was high than the period of 2005-10 area under sugarcane which is 18147 hectors it means 7.21 percent to total cropped area under this crops. Sugarcane crop under irrigation occupies 4.40 percent (14885 hectors) of the total cultivated area during the period of 2005-2010.


JALGAON DISTRICT
COTTON CROP AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE IN AREA UNDER
IRRIGATION OF COTTON CROPS CULTIVATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.4.19


JALGAON DISTRICT
SUGARCANE CROPS AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-30
Above 30
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGES IN AREA UNDER IRRIGATION
OF SUGARCANE CROP CULTIVATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Negative change Below 20
Negative change 30
Positive change below 20
Positive change Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.4.21

Sugarcane alone claims the major portion of the irrigated land. Its spatial distribution however is uneven and controlled by the physiographic conditions, suitable climate, nature and mode of irrigation and human response to high sugarcane production.

The proportion of sugarcane is irrigated cropping is found in Jalgaon district. High percentage above 30% was noted in Jalgaon, Dharangaon and Pachora talukas. Moderate percentage between 10% to 30% was observed in Erandol, Amalner, Bhadgaon and Jamner talukas. While low percentage below 10% of the irrigated area under the sugarcane is found in Chopda, Yawal, Raver, Muktainagar, Bhusawal and Chalisgaon talukas. Only zero percentage was seen in Bodwad talukas during the investigation period.

The period under investigation has witnessed the areas under sugarcane which positive and negative volume of changes. During this period irrigated land under sugarcane positive volume of changes above 20% was noted in Bhusawal, Dharangaon, Amalner and Pachora talukas. Below 20% negative changes was observed in Chopda, Raver and Jalgaon talukas. Highest negative change above 30% noted in Parola talukas. Below 20% positive changes observed in Yawal, Muktainagar, Bodwad, Chalisgaon, Bhadgaon, Erandol and Jamner talukas during the investigation period.

8) Oilseeds:

Oilseeds in the district includes groundnut, castor, sunflower, till, kardai seeds under irrigation which together share in 6681 hectors (1.26%) of the total cultivated area of the Jalgaon district. out of the total area agriculture land use under groundnut, sunflower, soya bean, kardai crops and till occupies about 17130 hectors (1.95%) during the 2005-10 investigation period. However the spatial distribution is uneven. It occupies a small percentage in different talukas of the Jalgaon district. The high percentage above 20% noted in Jalgaon, Parola, Bhadgaon, Pachora and Jamner talukas. However, there is a large scope for an aerial extension of this crop in the district, if the farmers adopt HYV seeds and resort to summer cultivation. As an irrigated summer crops groundnut and soya bean give much higher yield than as monsoon crop oilseeds production.

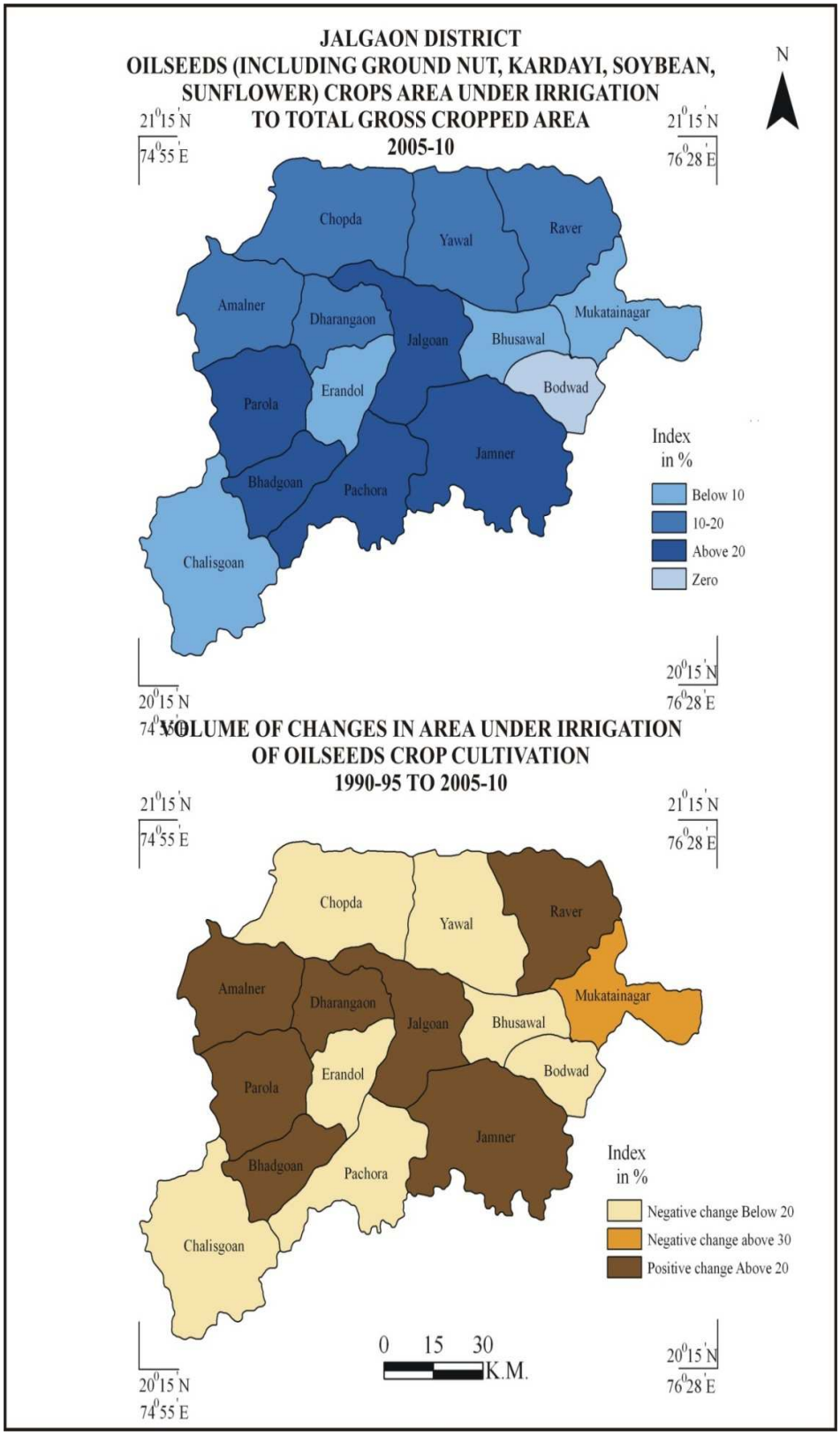
Where the moderate percentage between 10% to 20% observed in Chopda, Yawal, Raver, Dharangaon and Amalner talukas. While low percentage below 10% was very low concentration noted in Muktainagar, Bhusawal, Erandol and Chalisgaon talukas. Only zero percent found in Bodwad taluka, because oilseeds crops have not grown in this area during the investigation period because climatic and economical condition not suitable for this crop production.

The volume of change all oilseeds crops is exhibited in all talukas. Some talukas should have increased or decreased of oilseeds. The negative change below 20% was observed in Chopda, Yawal, Bhusawal, Erandol, Pachora, Bhadgaon and Chalisgaon talukas. Positive changes above 20% noted in Raver, Bodwad, Jalgaon, Dharangaon, Amalner, Parola and Jamner talukas.

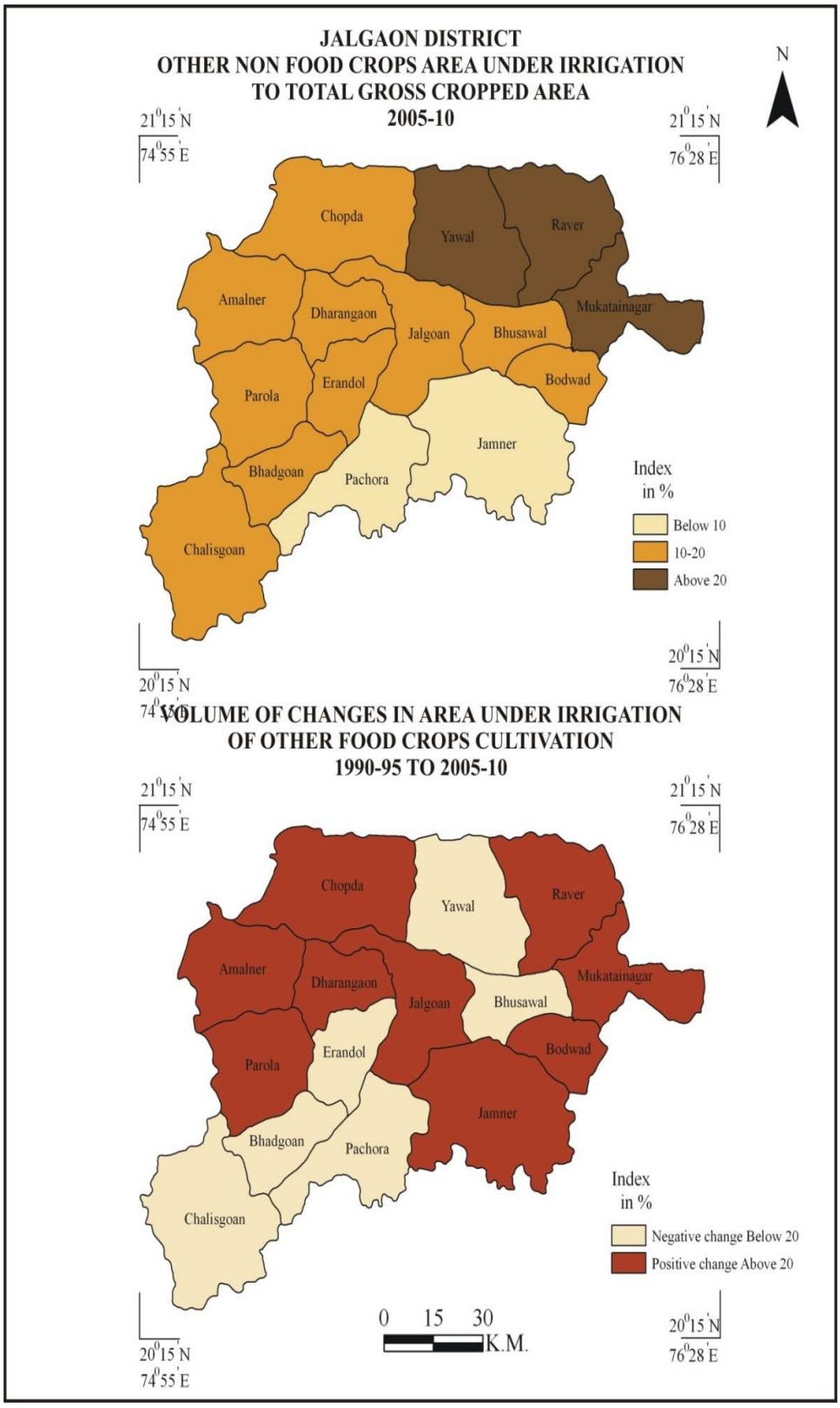
Highest negative changes 52.22 percent were found in only Muktainagar talukas. These are all crops in the proportionate area under oilseeds to total cropped area and recorded it during the investigation period of 1990-95 to 2005-10.

9) Other Non Food Crops:

Other non foods crops include are minor green chilly, maize and tur crops. The proportion area under non food crops to the gross cropped area has been increased 2.84 percent (24952 hectors) during the period 2005-10. Thus the agriculture land uses development and facility of irrigation to support and impact them to food crops cultivation. So the agriculture development (crop production) till high to total gross cropped area during the investigation period of 1990-95 to 2005-10.


JALGAON DISTRICT
OILSEEDS (INCLUDING GROUND NUT, KARDAYI, SOYBEAN, SUNFLOWER) CROPS AREA UNDER IRRIGATION TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 10
10-20
Above 20
Zero
20°15'N 74°55'E
20°15'N 76°28'E
VOLUME OF CHANGES IN AREA UNDER IRRIGATION OF OILSEEDS CROP CULTIVATION
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Negative change Below 20
Negative change above 30
Positive change Above 20
0 15 30 K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.4.23


JALGAON DISTRICT
OTHER NON FOOD CROPS AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGES IN AREA UNDER IRRIGATION
OF OTHER FOOD CROPS CULTIVATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Negative change Below 20
Positive change Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.4.25

10) Fruits & Vegetables:

In study region a varieties of fruits and green vegetables are grown in the district. These occupy a significant portion of the total cultivated are 62022 hectors 7.07 percent. Since 1990-95 the district shows 8.10 percent increase in the area under fruits and vegetables. Fruits and vegetables share 11.73 percent of the irrigated land to total gross cropped area. It shows increase by area in the district during the period of 2005-10 as compared to 1990-95. Percentage of these crops differs from taluka to talukas.

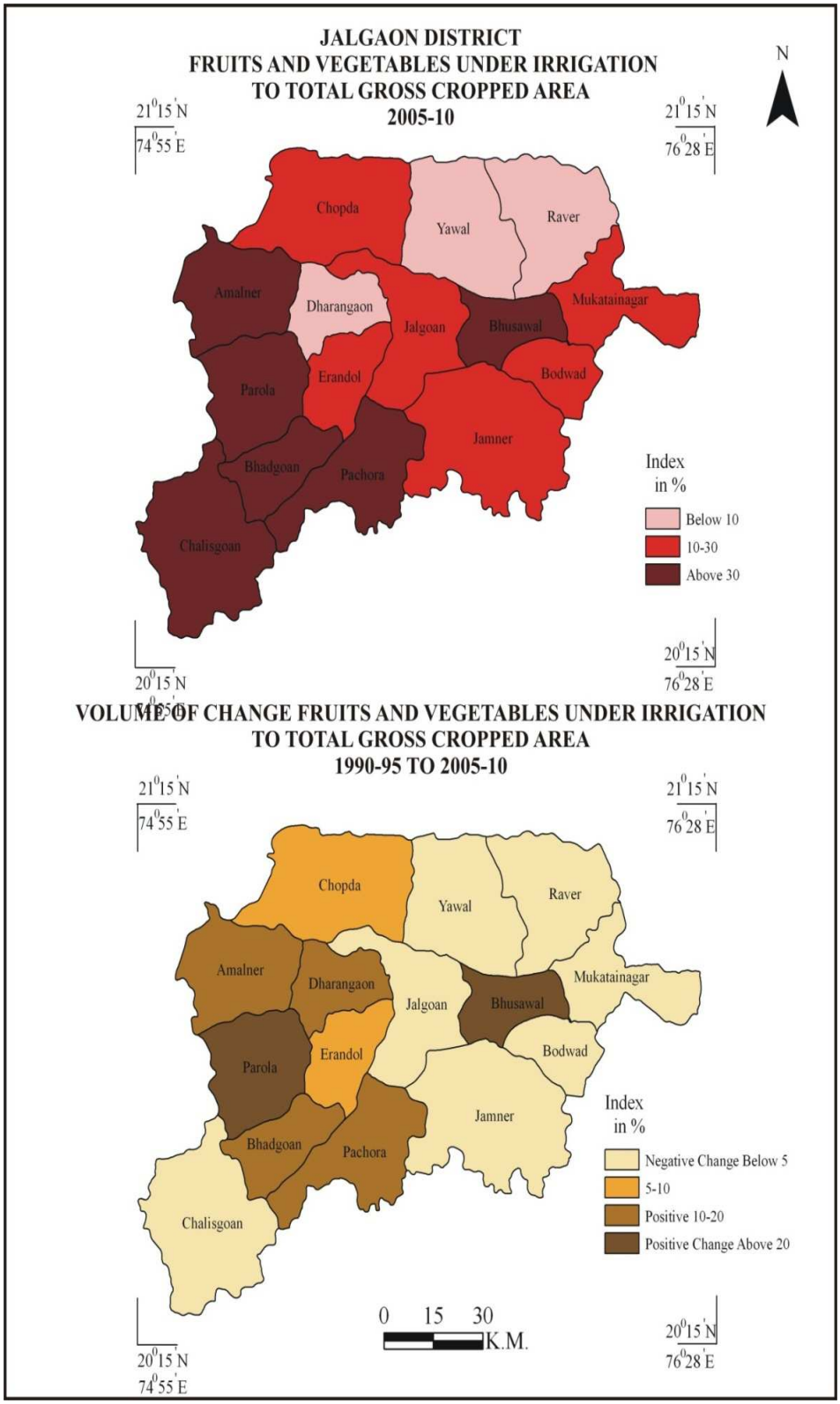
Considerable high percentage above 30% noted in Bhusawal, Amalner, Parola, Bhadgaon, Chalisgaon and Pachora talukas. Moderate percentage between 10% to 30% observed in Chopda, Muktainagar, Bodwad, Jalgaon, Erandol and Jamner talukas. While low percentage below 10% noted in Yawal, Raver and Dharangaon talukas during the investigation period of 2005-10.

A comparatively area under fruits and vegetables has increased from 46086 hectors (8.10) to 61970 hectors (11.73) during the twenty years under review. Volume of changes positive and negative was observed in Jalgaon district between 1990-95 to 2005-10. Changes in the irrigated area under these crops also differ from taluka to taluka.

Considerable change in positive changes above 20% noted in Bhusawal and Parola talukas. Between 10% to 20% were observed in Dharangaon, Amalner, Bhadgaon and Pachora talukas. Low percentage below 5% to 10% found in Chopda, Erandol and Dharangaon talukas.

This may due to the impact of industry and small areas in Jalgaon city and nearness of Nasik and Dhule cities. Truck/tempo and small auto 3- wheeler transport plays an important role in increase of land under these crops. Most of the talukas in the district have shown declining trends in these crops.

Jain hills (7k.m) located near Jalgaon city; it has made efforts to bring maximum area under irrigated as well as dry land under fruits and vegetables. Jain hills are basically working on tissue culture technique in agriculture development, work on the banana, onion, mango and vegetables.


JALGAON DISTRICT
FRUITS AND VEGETABLES UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 10
10-30
Above 30
20°15'N 74°55'E
20°15'N 76°28'E
VOLUME OF CHANGE FRUITS AND VEGETABLES UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Negative Change Below 5
5-10
Positive 10-20
Positive Change Above 20
0 15 30 K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.4.27

It is very good for every farmer in Jalgaon district the tissue culture seed taken and maximum production produce in agriculture land. Still there is large scope for growing Banana, Mango, Lemon, Sweet Limes, and Papaya. While negative changes less than 5% observed in Yawal, Raver, Muktainagar, Jalgaon, Chalisgaon and Jamner talukas a very low percentage was observed during the investigation period.

11) Total Non Food Crops:

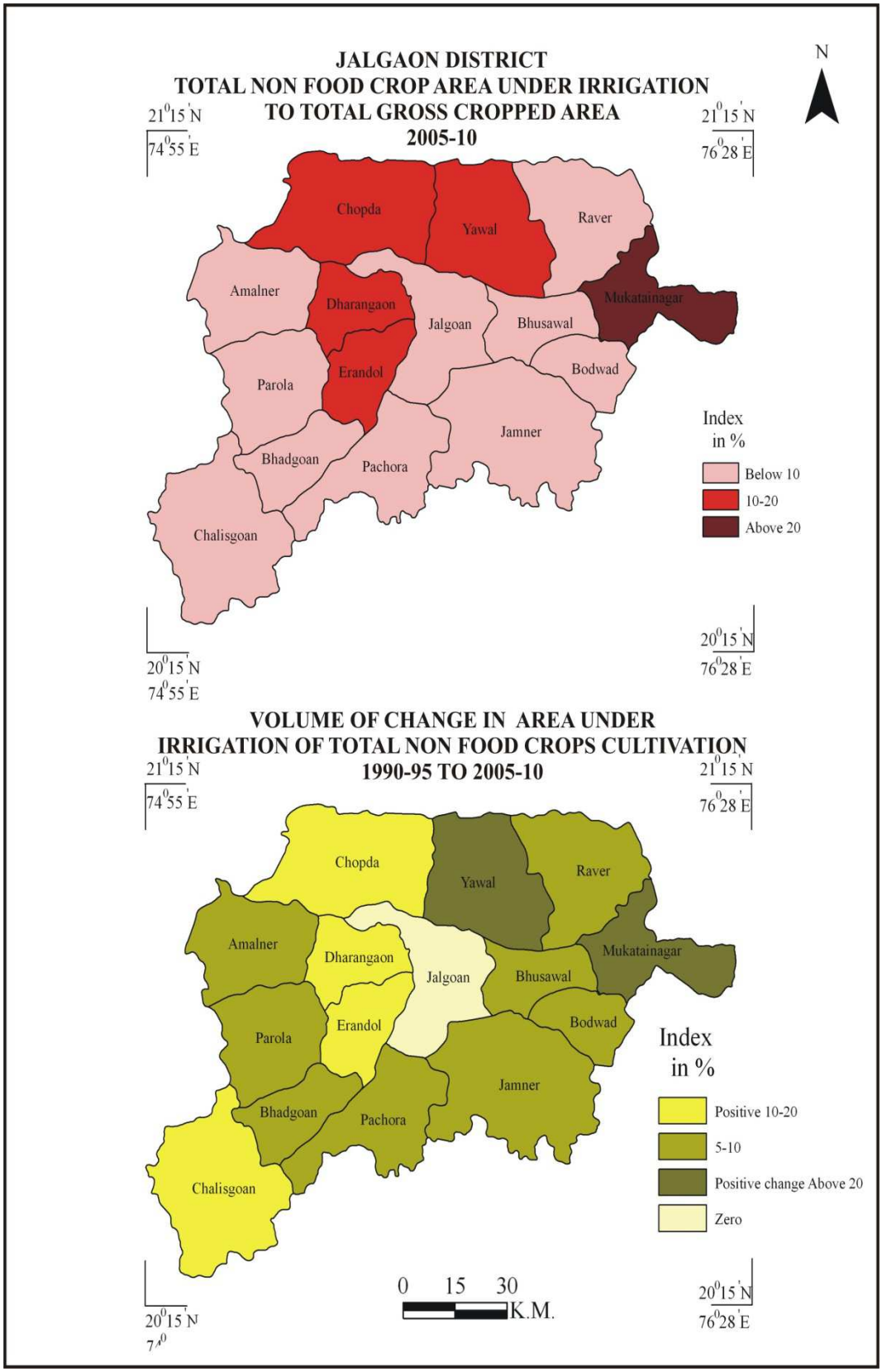
Total non food crops group includes food grains, non food grains, ginger, onion, turmeric, spices all crops are considered. It is forms a medium area shares in the total harvested area. The area under all non food crops increased from 15008 hectors to 19660 (5.89%) hectors (9.82%) during the investigation period.

A comparatively increase recorded in above crops. The area under total non food crops of irrigated area increase in twenty years. Total 4.07 percent occupy under of this non food crops irrigation.

In this period the irrigation has been well developed and well using to the farmers, that why they got the benefit from his land. It means the agriculture development also increases on this period during the investigation.

The irrigated land area under total non food crops increases, above 20% recorded only in Muktainagar talukas. Moderate percentage between 10% to 20% was observed in Chopda, Yawal, Erandol and Dharangaon talukas. While very low percentage below 10% noted Raver, Bodwad, Bhusawal, Jalgaon, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner talukas.

All talukas agriculture land under the irrigation has been increases with 1% to 2% share during the investigation period.


JALGAON DISTRICT
TOTAL NON FOOD CROP AREA UNDER IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE IN AREA UNDER
IRRIGATION OF TOTAL NON FOOD CROPS CULTIVATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Positive 10-20
5-10
Positive change Above 20
Zero
0 15 30
K.M.
20°15'N
74°0
20°15'N
76°28'E

Map No.4.29

The volume of changes in irrigated to all non food crops in Jalgaon district. A positive changes comparatively high percentage above 20% recorded in Muktainagar and Yawal talukas. Moderate percentage 10% to 20% noted in Chopda, Erandol, Dharangaon and Chalisgaon talukas.

While negative changes observed in Jalgaon district during the investigation, in this period negative changes below 5% recorded in Raver, Bodwad, Bhusawal, Amalner, Parola, Bhadgaon, Pachora and Jamner talukas. No changes have been observed in Jalgaon talukas during the investigation period of 1990-95 to 2005-10.

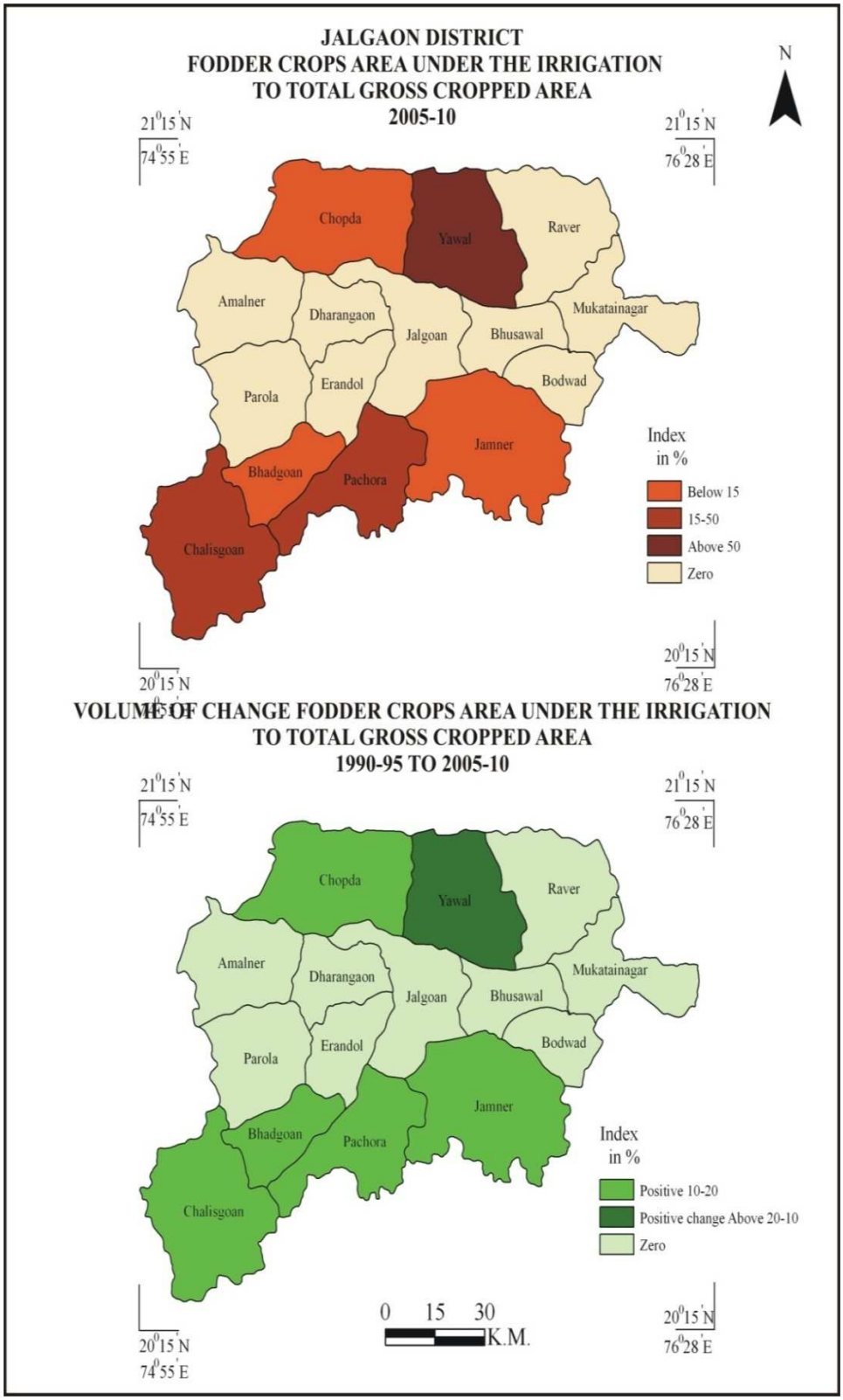
12) Fodder crops:

Fodder crops are most important for live stock animals and farmers for edible and usable. All local animal like buffalo, cow, goat, sheep, bullock are total depend on fodder crops in this study region. Mostly local animal eating the fodder going outside of the village or in agriculture land for green fodder or dry fodder. Total fodder crops under the agriculture land are only 0.20 percent to total gross cropped area.

Very small area shares to this land under the fodder crops during the investigation period. In twenty years period the fodder crops has been increase only 0.31 percent. Total fodder crops under the irrigation occupy 0.19 percent in the Jalgaon district.

During the investigation period the area under irrigation has increase only in Chopda, Yawal, Bhadgaon, Chalisgaon, Pachora and Jamner talukas. High percentage recorded in Yawal taluka 50%. Moderate percentage between 15% to 50% noted in Chalisgaon (36.36%), Pachora (11.34%) talukas. Very low percentage below 5% found in Chopda (0.97%), Bhadgaon (0.48%) and Jamner (1.21%) talukas.

While zero percent area under irrigation of total non food crops recorded in Raver, Muktainagar, Bodwad, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner and Parola talukas, because it has not strong relationship with the irrigated area to the district for this fodder crops during the investigation period.


JALGAON DISTRICT
FODDER CROPS AREA UNDER THE IRRIGATION
TO TOTAL GROSS CROPPED AREA
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 15
15-50
Above 50
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE FODDER CROPS AREA UNDER THE IRRIGATION
TO TOTAL GROSS CROPPED AREA
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Positive 10-20
Positive change Above 20-10
Zero
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.4.31

The volume of change recorded only those talukas where the land under irrigation sources. Area under fodder crops has been recorded positive changes during the investigation. Positions 10% to 30% were recorded in Yawal and Jamner talukas.

Very low percentage below 10% noted in Chopda, Bhadgaon, Chalisgaon, Pachora and Jamner talukas. While remaining all talukas shows a zero percent value, so the negative changes have been recorded in this talukas during the investigation period 1990-95 to 2005-10 of Jalgaon district.

Note: Bodwad and Dharangaon taluka has not recorded the land use efficiency because the data was not available during the period of 1990 to 2010 from the statistics and agriculture department of Jalgaon district, so the value put in zero percent for land use efficiency, it shows in table no.5.3

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CHAPTER - V

AGRICULTURAL PRODUCTIVITY

5.1 INTRODUCTION:

In present day ‘Agriculture Geography’ is a matter of considerable debate among the professional geographers. Scientifically agricultural geography deals with the art and science of domestication of plants and animals. Its definitions are numerous which have changed over the period of time.

Agriculture geography has been defined as the study of spatial variations in agricultural activity, involving both the description of such variations, changes and attempts to explain them. Hillman (1911), Bernhard (1915), Reed (1964), Andreae (1981), Coppock (1969) and Symons (1970) these are all scientists defined the meaningful agriculture geography.

We can also explain ‘agriculture geography’ defined as the science which deals with the regional or spatial variations in the distribution of agricultural entities and to explain the causes of such variations.

In main focus of agricultural geography is on the spatial variations of agricultural phenomena in modern agricultural geography the major thrust of geographers is investigate the spatial variability of agricultural activity. Land use is the most important variables and much effort has gone into describing the classifying land uses (in crop combinations, crop concentrations, crop diversification, agricultural efficiency, agricultural productivity. etc.) In the explanations of land uses, other farming variables such as land tenure, field size, size holdings and labour supply must be taken into consideration along with the physical variables i.e. relief surface, temperature, moisture, soils etc.

Economic variables i.e. irrigation facility, chemical fertilizers, pesticides and use of new technology etc. and the values of outputs. For a comprehensive study in agriculture geography of a unified approach based on physical, socio-economical, cultural, and infrastructural variables has to be adopted.

5.2 MEANING OF AGRICULTURAL PRODUCTIVITY:

"The measurement of production and inputs required for the production of that output is known as Agricultural Productivity". In other words it is an input & output ratio. In traditional measurement of agricultural productivity the geographers and economists used to take into account the inputs like labour and capital and see them as costs which are incurred in the production of agricultural produce. The traditional approach of measurement of agricultural productivity, however does not take into account of social and environmental costs which are also incurred in the production of crops and raising livestock.

At present situation in the measurement of agricultural productivity, the question of sustainability of soil, health of ecosystem and social acceptability have become increasingly important it. Agricultural productivity is a function of interplay of physical and cultural variables and it manifests itself thought per hector productivity and the total production. Where the measurement of agricultural productivity helps in knowing the areas are performing rather less efficiently in comparison to the neighboring areas.

By delimiting the areas of low, medium and high productivity, agricultural plans may be formulated to remove and minimize the regional inequalities. It also provides an opportunity to ascertain the ground reality, the real cause of agricultural backwardness of area or region. Agriculture productivity is the most important indicator to show the spatial pattern of agriculture development of study region.

The recent decade researcher or geographers and economists have developed the tools and techniques to determine the agricultural productivity. Some techniques developed and used for the measurement of agricultural productivity and agricultural efficiency per unit area, these are given below –

1) Output per unit area
2) Production per unit of farm labour
3) To assess agricultural production as grain equivalents
4) Input output ratio
5) Ranking coefficient method (Kendall, 1939; Stamp, 1960 and Shafi, 1990)

5.3 CROPPING PATTERN:

5.3.1 **Concept:-**

In Agriculture development of any region is most important factor of ‘cropping pattern’. Cropping pattern are followed the important role in agriculture sector industries. Various cropping pattern taken by farmers in agriculture region in Maharashtra well as India. Maximum benefits with minimum sources can be uses by farmers and his technique in agriculture region. In any season many crops have taken in agriculture land and farms with huge benefits; so they has to be use ‘cropping pattern’ technique in a land for his good satisfaction.

Cropping pattern is the equal of area under the various crops in agriculture land at a point changes over space and time. According to Mazid Husain, (1996) the cropping patterns of a region are closely influenced by geo-climatic, socio-economic and political factors, pattern of crops, land use of region are manifestations of combined influence physical and human environment. Cropping pattern is depending on terrain, topography, relief, slope, soils and water for irrigation etc.

In this technique, cropping pattern of the Jalgaon district study region is outlined and discussion of the study area under the crops. Cropping pattern section attempt to make by study at district and tehsils levels in the study region. Cropping pattern gives the volume of changes during the period of 1990-95 to 2005-10 during investigation.

Cropping Pattern At District Levels:-

Cropping pattern of district and tehsils levels it taking into consideration of ‘variations’ of selected crops in the study region. During this period under the study area of selected crops are investigated. Rice, Wheat, Jowar, Bajra, Pulses, Cotton, Sugarcane, Oilseeds, Green Chilly, Total Food Crops, Maize, Gram, Tur and Fruits & Vegetables are considered for selected crops.

A) Rice:

Rice is a rarely investigate crops are found in Jalgaon district. This food growing for domestic and general purpose by farmers.

TABLE NO. 5.1. VARIATIONS OF SELECTED CROPS IN JALGAON DISTRICT 1990-95 TO 2005-10

Sr. No	Selected Crops	Years 1990-95(hectares)	Years 2005-10 (hectares)	Volume of Change	Percentage (%)
1	Rice	938	1382	444	2.11
2	Wheat	1457	1846	389	3.74
3	Jowar	1535	1722	187	8.20
4	Bajra	669	737	68	9.83
5	Pulses	511	670	159	3.21
6	Cotton	192	261	69	2.78
7	Sugarcane	84	65	-19	4.42
8	Oilseeds	1825	1159	-666	2.74
9	Green Chilly	1116	1120	4	2.79
10	Maize	1605	2873	1268	1.26
11	Total Food Crops	1318	1752	434	3.03
12	Gram	1428	1696	268	5.32
13	Tur	703	697	-6	2.34
14	Fruits & Vegetables	5250	6585	1335	3.93
15	Fodder Crops	2347	4625	2278	1.03

Source: Socio-Economic Abstract of Jalgaon District 1990 to 2010

It taken in Kharip and Rabbi Season; in area of agriculture the productions of rice are increases in 2005-10 years. After 1990-95 to 2000 the production was increases with the volume 444 and percentage of rice production is 2.11 are raised. While the lowest decrease the rice production in 1990-95 years 938 hectares during the period of under the study region.

B) Wheat:

Wheat is the most important crops in Jalgaon district; area under the 2005-10 was increase the value of 1846 hectors, where the decrease the value of 1990-95 are 1457 hectors during this period. The highest production and volume of change are investigated during the period of 2005-10 study regions. The percentage of per

hectors are 3.74 and the total production of wheat percentage is 2.16 are low to the percentage of hectors.

c) Jowar:

Jowar is also important crops productions were found in study region. These crops are generally taken by every farmer in agriculture land of Jalgaon district. Where the most dominant food are using in Jalgaon district during the period and under the observation. Every village farmers has taken these crops in Kharip and Rabbi Season of every year. The variations of these selected crops are highest increasing during the period of 2005-10 and lowest found in 1990-95 years under the study region.

The production of volume change is the percentage 8.20 and total production of Jowar is near about 5 percent are observed in investigation period. The highest productions of Jowar are taken in Jalgaon district by farmers. The total hectors of production of Jowar is 3828 and 3057 metric tons are observed in 1990-95 to 2005-10 years.

D) Bajra:

Bajra is also important crops in study region during the investigation period of 1990-95 to 2005-10. The highest value of production Bajra was found in 737 per hectors in 2005-10 totals production in metric tons are 443 this value are low in 1990-95 years 611 metric tons are highest production in Jalgaon district. The Bajra use for every farmer and every rural and urban people for domestic food in study region.

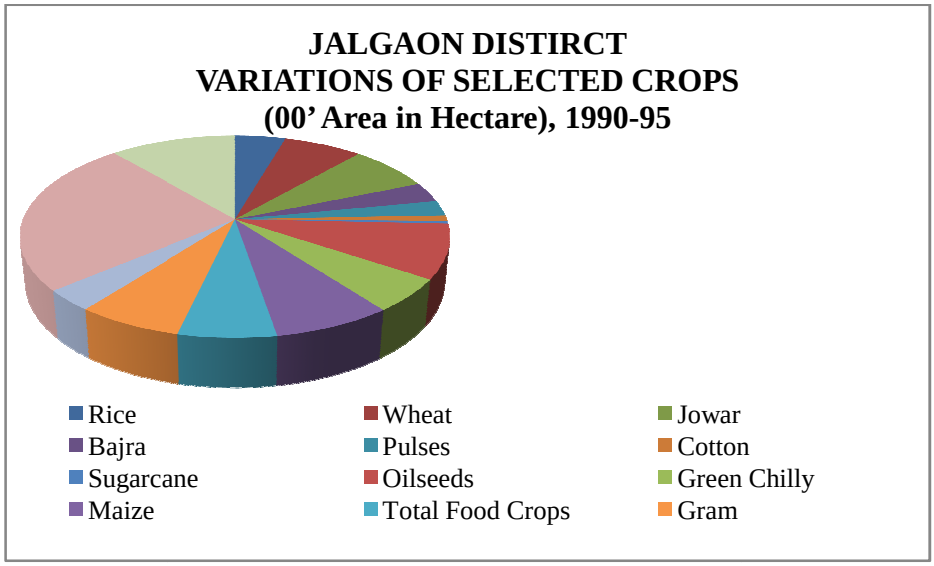


Diagram No.5.1

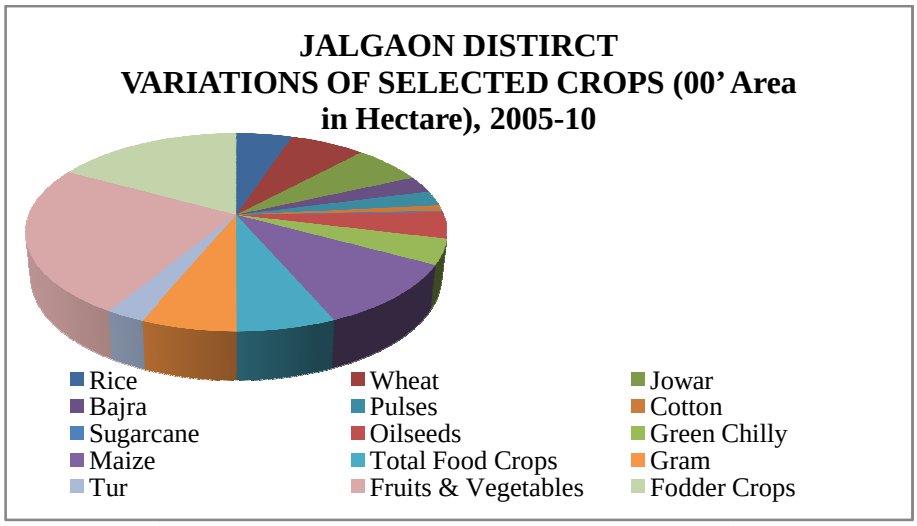


Diagram No.5.2

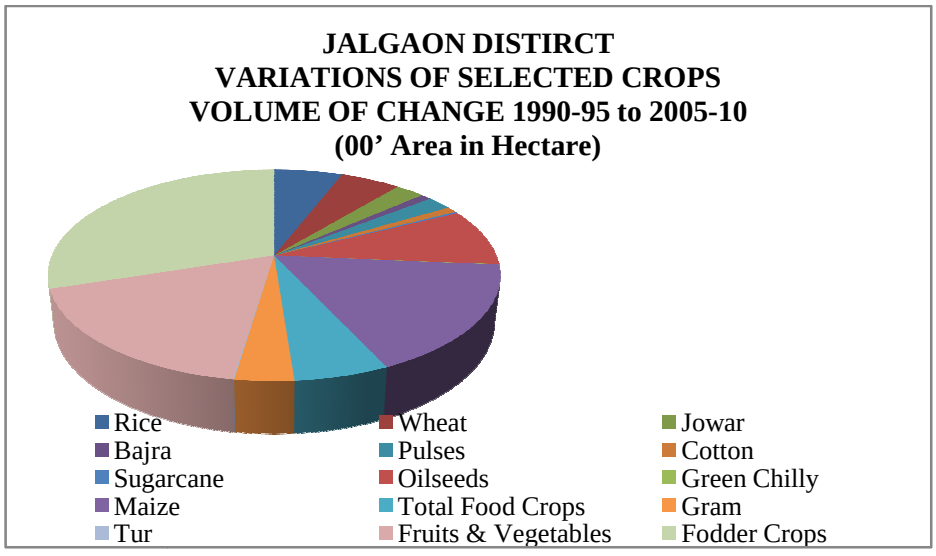


Diagram No.5.3

TABLE NO.5.2. TOTAL PRODUCTION OF SELECTED CROPS IN JALGAON DISTRICT 1990-95 TO 2005-10 (00' M. TONE)

Sr. No	Selected Crops	Total Production 1990-95 (M. Tonne)	Total Production 2005-10 (M. Tonne)	Volume of Change	Percentage
1	Rice	15	3	-12	1.25
2	Wheat	453	662	209	2.16
3	Jowar	3828	3057	-771	4.96
4	Bajra	611	443	-168	3.63
5	Pulses	5053	6459	1426	3.54
6	Cotton	3143	6042	2899	1.08
7	Sugarcane	15006	10990	-4016	3.73
8	Oilseeds	346	122	-224	1.54
9	Green Chilly	48	48	00	00
10	Maize	130	946	816	0.15
11	Total Food Crops	844	1027	183	4.61
12	Gram	627	823	196	3.19
13	Tur	180	204	24	7.5
14	Fruits & Vegetables	340	296	-44	7.27
15	Fodder Crops	N.A	N.A	N/A	N.A

Source: Socio-Economic Abstract of Jalgaon District 1990 to 2010

E) Pulses:

Pulses are raised in Kharip and Rabbi most dominant food taken by farmers in season. Due to farmers activity changes the pulses showed in during the period of 1990-95 and 2005-10. Highest pulses production is taken in the period of 2005-10 and very lowest production are taken in 1990-95 period of years. Total productions in metric tons are high in 2005-10 years than the 1990-95. Percentage of pulses of crop production is highest of total production of 3.54 % than the total production per hectors in 3.21% are observed in study region.

F) Cotton:

Cotton is a ‘life of crop’ of every farmer in Jalgaon district during the investigation period. Cotton is a most important cash crops and most valuable crops for farmer in agriculture sectors. This crop has given to the government price, value so that the farmers are happy and satisfaction to take this production with hard works in agriculture.

The maximum productions of cotton are taken in 2005-10 of 26100 hectors and 6042 metric tons are produce the cotton crops in Jalgaon district in agriculture land. Highest percentage of cotton crops are 2.78 and 1.08 very low value than the total production in hectors during the period of 1990-95 and 2005-10.

G) Sugarcane:

The main purpose of sugarcane production is for sugar and ‘Gul’. It is a popular crop taken in the study region during the observation and field work. Sugarcane increase in 1990-95 years 84 hector and 65 hectors decrease during the period of 2005-10 years. Main reason of these crops has a government value, government given to the farmers low price so un satisfy and the production was decrease during the period of study region.

H) Oilseeds:

Oilseeds include (Ground nut, Kardai, Soyabeen, Sunflower and Sesamum) are concentrate production in Jalgaon district. Maximum hectors under the oilseeds production are found in 1990-95 which is 1825 hectors in agriculture land area where the lowest production in study region are found in 2005-10 years an 1159 hectors during this period.

High volume of change is negative found in total production and negative change is found in total production in metric tons during the study region. Farmers they have taken more production of ground nut well as kardai, and sesamum for extract usable oil and edible oil for all of us.

Ground nut production was highest in 1990-95 and also 2005-10, the production will increase last five hears. So oilseeds are important included all crops in investigation during the study region.

I) Green Chilly:

Jalgaon district is famous for hot and spicy chilly production. Lots of production taken under the chilly crops in study area. These chilly are sale inside and outside of the District and States, so it is very valuable crops are taken to the farmers. Chilly are growing to the maximum area of hectors in the district where the last decades chilly production are constant which is 48 metric tones are found in 1990-95 to 2005-10 years during the investigation period. Because this valuable product are constantly growing and taking to the farmers in study region.

J) Maize:

Maize is important crops taken in Jalgaon district. Total crop production in land hectors seen in investigation during the period of 2005-10 the maize crop production are highest of 2873 hectors and lowest in area the hectors of 1605 during the period of 1990-95. Last ten years the productions are increasing and many farmers are taking these crops in two crops combination with production after cotton crop. Percentage of crop in hectors are very high and less percentage found of total production of maize 1.26% found during the period of 2005-10.

K) Total Nuts:

Total Nuts are important crop production in study region, the farmers these crop production taken side by side with main crops in agriculture land of study region. High percentage of total production and hectors of under the area of these crops are increase in 2005-10 it is a high concentration and low area are found in 1990-95 with moderate concentration investigations of during this period.

L) Tur:

Tur is important crops where the farmer was taken the high price with value of these crops. Tur production are highest value are observed in 2005-10 years and low percentage are observed in during the period of 1990-95 but low production are taken in 2005-10 years per hectors and high production taken in 1990-95 investigate during the period of study region. High percentage of tur are observed in total production in metric tons and low percentage in an hectors area of Jalgaon district during the period 1990-95 to 2005-10

M) Fruits & Vegetables:

Jalgaon district famous for fruits production and natural green vegetables with Banana, Bore and Papaya cultivation. The most important character about area under the fruits and vegetables is that continuous increased and great impact of irrigation, simultaneously it was recorded from during the period of investigation.

The highest increase in the area of fruits and vegetables was recorded 2005-10 years, where the lowest increase area under these crops was seen in 1990-95 years. The volume of change negative observed in total production and positive change are found in the area under the total hectors of a land.

There is a tremendous increase in area under this crop due to attitude and scope of farmers as well as supportive schemes followed by the state government. The physical and non-physical factors are responsible for the increase in area under the fruits and vegetables crop production in the study region during the period of investigation.

These fruits crops and some vegetables have more demand in out of state and country (International Market), so the good awareness of farmers is also responsible for the increase in area under the fruits and vegetables crops.

N) Fodders Crops:

Fodder crops play important role in this region, so these are important crops for all type of living things survive in surface and useful for agriculture with related jobs. Useful for animal, domestic and wild animals are depend on the fodders crops. Area under fodder crops increasing the highest of the area found in 2005-10, 4625 hectors where decreasing in 1990-95 the area of 2347 hectors during the period of investigation. All physical factors and climatic condition are responsible to the fodder crops which is increasing and decreasing of the study region**.**

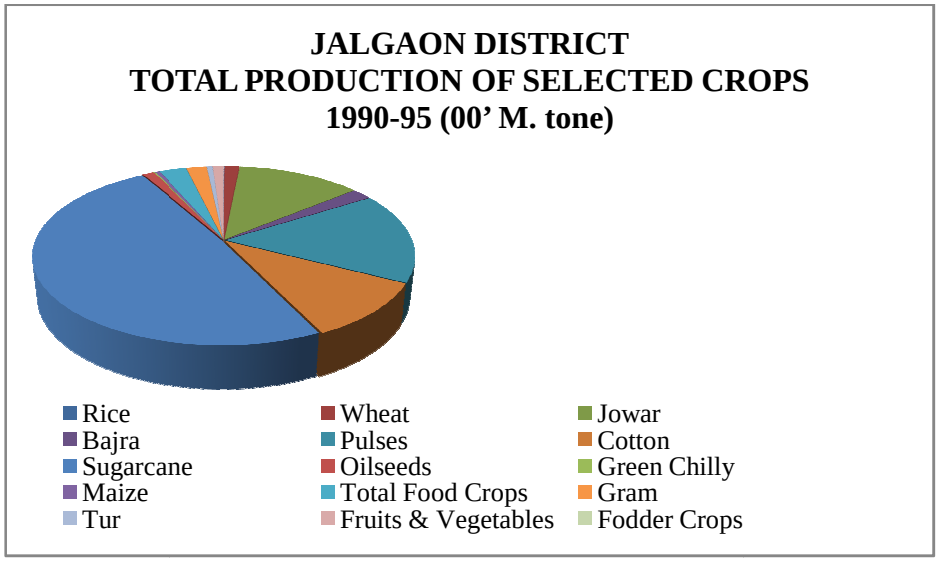


Diagram No.5.4

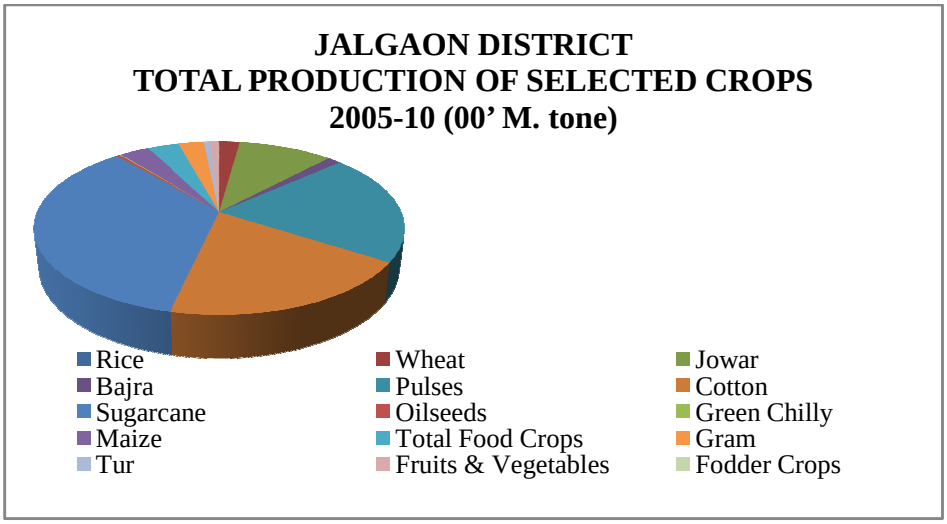


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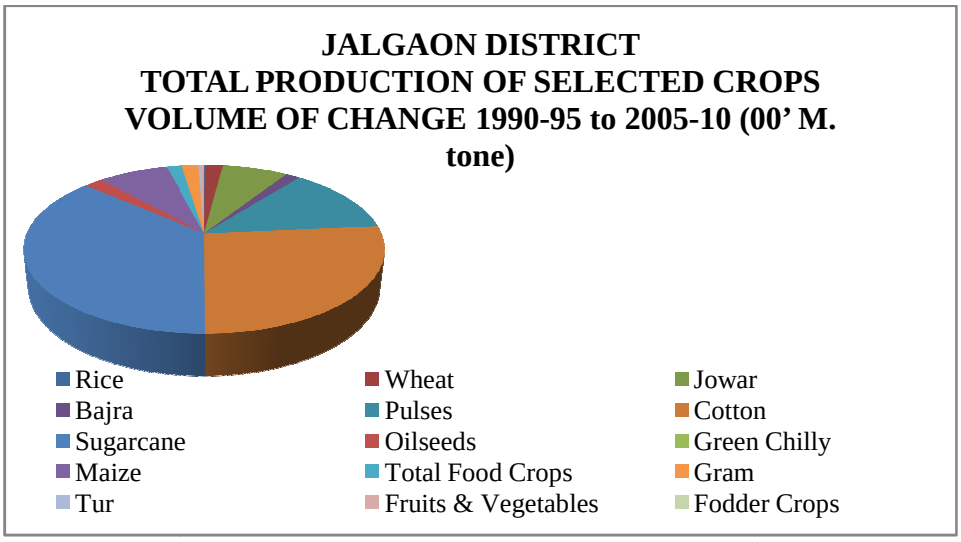


Diagram No.5.6

5.4 CROP COMBINATION:

In geographically research in order to have an intensive structure of agriculture production with development of the study of crop combination analysis. A crop combination analysis plays a major role in agriculture development and agriculture planning of an area or region. This crop combination analysis method is useful to delineate to agricultural region. It is base in development and planning of cropping pattern of a region.

The concept of crops combination is a scientific device to study the existing spatial relationship of crops in association with each other in agriculture geography and land utilization. Such study is necessary in orders to have a more comprehensive view of geographical regions. It measures the area dominance of crops, which are closely related and which occur together in varying strength. This idea of crops combination could be best utilized in understanding the existing agricultural situations, the land use patterns of a regions and planning of crops of the future.

It is only an attempt to review some of the methods already worked out and applied to assess their accuracy and usefulness. The purpose of the present study of Jalgaon district therefore is two ways a) to demarcate the set of those crops which play a dominant role in each taluka and b) to find out areas crops cultivation is more specialized and where is not.

So for a general understanding of the particular combination of crops and relative importance of each in an area can be very helpful in interpreting some aspects of agriculture geography of Jalgaon district. Therefore, here an attempt is made to find out crops combination regions in Jalgaon district applying Weaver's Method is applied.

The crop combination analysis was originally use and invent into geographical research by Weaver (1954) in his successful study of crop combination in United States. The purpose of procedure is to develop and designate crop combination which is established by the actual resemblance to the crop percentages of distribution.

Weaver using a more reliable statistical, scientific approach of standard deviation in his study of crop combination regions at district and tehsils levels in Middle West. Thomas (1963) and Coppock (1964) used a modified version of Weavers method produced not only crop combination but also combinations of recognized the leading crops. Singh (1974) and Doi (1959) and many others have modified this technique involving the observation of cropland occupancy by various crops with the help of standard deviation method. Here, Weaver's technique is mathematically sound and it requires much calculation work. He himself use that this technique occasionally tends to show the lowest deviation from a crop combination which includes a crop occupying as much as 1% of the total cropland.

In his approach he considered all those crops occupying one or above one percent of the total cropped area. Weaver defined the crop combination method in the following way-

1) It provides an adequate understanding of individual crop geography.
2) It provides a sound and scientific basis for agriculture regionalization.
3) It is useful for constructing structure of valid agriculture regions.
4) An used may be to evaluate whether existing crop combination is dietary adequate or inadequate
5) Crop combination technique useful for future planning and development
6) Crop combination region itself integrative reality that demands of definition and distribution of analysis.
7) Such a region is concentration essential that must be available if one wishes to build more complex structure of viable agriculture region

Therefore, the main objective of this part is to group of crops into crop combination regions based on only Weaver's method (1954). Here, highlight to the significance of crop combination regions of Jalgaon district.

Different statistical methods such as quartile Standard deviation method (Nelson, 1955), minimum standard deviation method (Weaver, 1954), least square deviation method (Thomas, 1963), maximum positive deviation method (Rafiullah, 1965) etc, have been adopted by researchers for establishing crop combinations.

Minimum (least) standard deviation method introduced by Weaver's is more famous and widely accepted by many researchers. He used this method for studying the crop combination regions in the Middle West of USA in 1954. He took into consideration the percentage of crops area to total cropped area of a region. Arranged them in the decreasing order and compare with its theoretical standard distribution.

The theoretical distribution is 100 percent of the gross cropped area. Cropped area for monoculture; 50 percent for two crop combination; 33.33 percent for three crop combination; 25 percent for four crop combination and so on. Formula used by Weaver for the determination of minimum deviation for each component is as follows:

$$S.D = \sum d^2/n$$

However, Weaver has point out that, only the relative rank of the amount of deviation among the several possible combinations was desired and hence (√) square root was not extracted in accordance with the standard deviation formula to save work and used the square of standard deviation;

$$S.D = \sum d^2/n$$

Weaver's method appears to be simple, but in practice it requires a lot of calculations. Occasionally, it also tends to produce highly generalized results in areas of large variants or as admitted by Weaver himself, in an area where the first ranking crop is very large but not large enough to justify of monoculture and the remaining crops are comparatively small.

The result tends to show the lowest deviation for a crop combination that includes every crop occupying as much as 1% of the total cropped area. Here an attempt to has been made in the present study to demarcate the crop combination regions of Jalgaon district by applying only one method for crop combination i.e. Minimum Standard Deviation of Weaver's Method (1954).

Crop Combination Regions at District and Taluka Level:-

Crop combination regions are derived from 13 crops namely as Rice, Wheat, Jowar (Kharip & rabbi), Bajra, Maize, Pulses, Cotton, Sugarcane, Oilseeds, Gram (harbara), Tur, Fruits and Vegetables and Fodder Crops.

Table No.5.3 that crops combination for all selected crops under the irrigation which way these crops are irrigated so the crops area rice, wheat, jowar, bajra, maize, pulses (kharip & rabbi), oilseeds (ground nut, kardai, sunflower, Soyabeen, sesamum), cotton, sugarcane, tur, gram (harbara), fruits and vegetables (fruits include banana, mango, sitaphal, papaya etc & vegetables includes all green herbs vegetables) and fodder crops.

TABLE NO.5.3. CROP COMBINATION REGIONS IN JALGAON DISTRICT

1990-95 TO 2005-10

Sr. No	**Jalgaon District**	**Weavers Combination 1990-95**	**Number of Crops 2005-10**
1	Chopda	6 (WHPF/VSO)	7 (WHPF/VJOC)
2	Yawal	6 (OHPCWMF/V)	8 (JHPCSOWF/V)
3	Raver	6 (SCWHPF/V)	4 (WSCH)
4	Muktainagar	3 (PHF/V)	3 (WHJ)
5	Bhusawal	6 (SF/VWPHM)	3 (WHC)
6	Bodwad	N.A	3 (SCFC)
7	Jalgaon	4 (WF/VHO)	3 (WCH)
8	Erandol	8 (F/VWSMHOCR)	6 (F/VHSCOP)
9	Dharangaon	N.A	4 (HCWF/V)
10	Amalner	5 (F/VSHWC)	3 (COH)
11	Parola	5 (F/VOWCH)	6 (F/VSHCJO)
12	Bhadgaon	8 (MWF/VRHSFO)	6 (WHJSCF/V)
13	Chalisgaon	5 (WOPSMFC)	3 (CHW)
14	Pachora	5 (CSF/VOW)	4 (WOCS)
15	Jamner	3 (WF/VR)	3 (CMH)
	Total average Jalgaon District	5 (WCHF/VO)	5 (WCHJO)

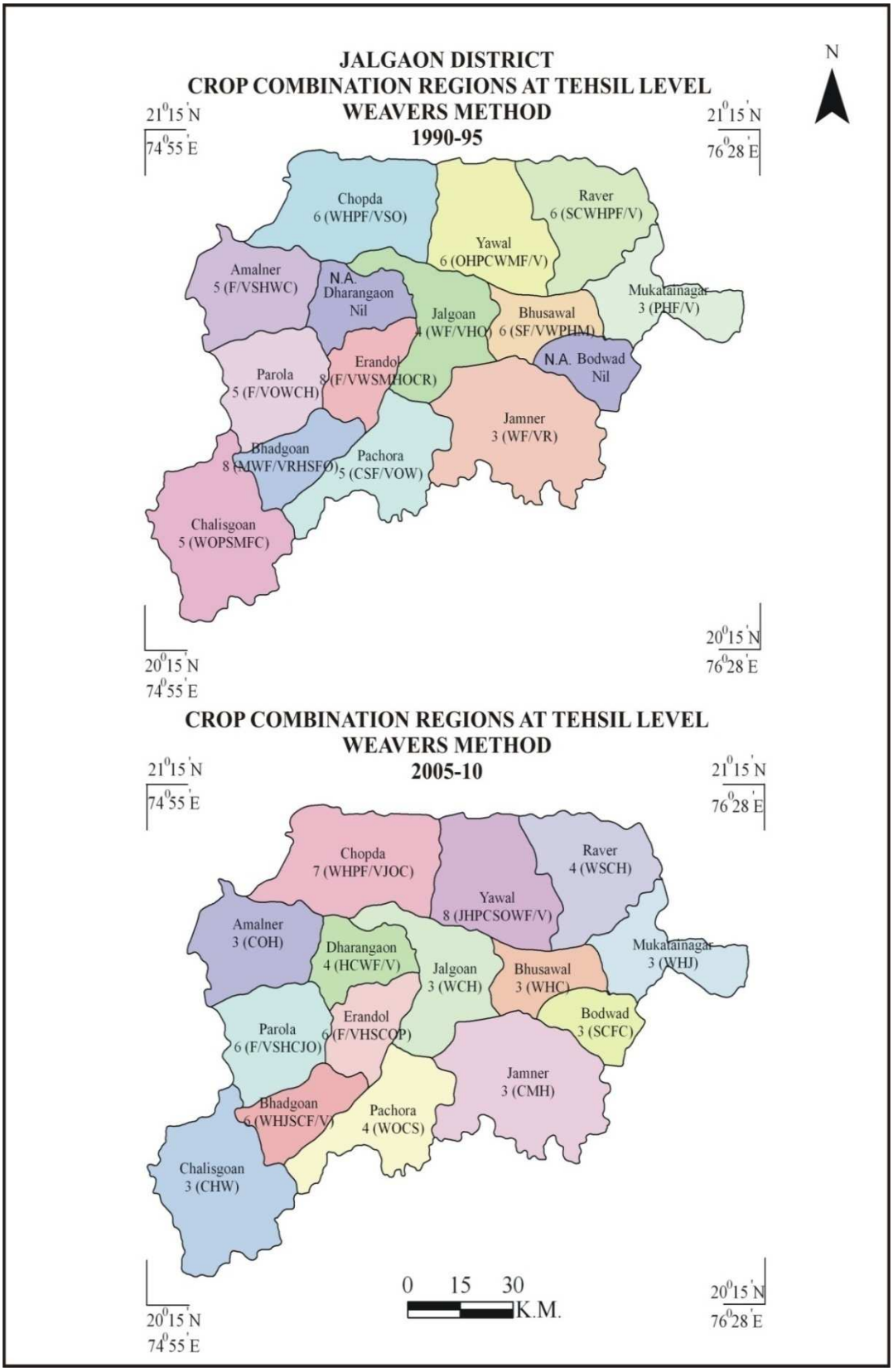
Source: Computed by Researcher

(**Abbreviations:** R (rice), W (wheat), J (jowar), B (bajra), M (maize), P (pulses), O (oilseeds include groundnut, kardai, sunflower, Soyabeen, sesamum), C (cotton), S (sugarcane), T (tur), H (harbhara – gram), F/V (fruits and vegetables) and FC (fodder crops etc).

Here, crops combination regions at Jalgaon district and tehsils level the monoculture and two crop combination zones are disappeared in Jalgaon district. Cotton and Wheat is the principal crops combining with Jowar, Oilseed (ground nut), Harbara and fruits (include Banana fruit crops) & vegetables (green vegetables). Three crops combination zone has observed in Muktainagar and Jamner talukas. Four crop combination noted only in Jalgaon talukas. Five crops combination includes Amalner, Parola, Chalisgaon and Pachora talukas. where the Six crops combination were observed in Chopda, Yawal, Raver, and Bhusawal talukas, Last of Eight crops combination noted in only in Erandol talukas during the investigation period.

During the period 2005-10 average five crop combinations observed in the district as a whole Analysis of tehsilwise crop combination during the 2005-10 shows great variations in irrigated crops. The crops variance in irrigated area has changed during the year of 2005-10. The monoculture and two crops combination zones has disappeared in Jalgaon district. Whereas the three crops combination zones includes Muktainagar, Bhusawal, Bodwad and Jalgaon talukas. The four crops combination zone comprises Raver, Dharangaon and Pachora talukas. Five crops combination zone was not confined in Jalgaon district. Six crop combination observed in Erandol, Parola and Bhadgaon talukas. Seven crops combinations were observed in Chopda taluka and eight crop combinations were noted only in Yawal taluka.

The total average crop combination of Jalgaon district was five crop combinations were calculated and confined it. The extension of irrigational facilities through the wells, canals, lift irrigation and surface irrigation may impact on the farmers to grow few crops or more number of crops depending upon the need of crops and their demand and prices in the market areas. According to my knowledge areas having more intensity of irrigation should have more crops in combination.


JALGAON DISTRICT
CROP COMBINATION REGIONS AT TEHSIL LEVEL
WEAVERS METHOD
1990-95
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
6 (WHPF/VSO)
Raver
6 (SCWHPF/V)
Yawal
6 (OHPCWMF/V)
Amalner
5 (F/VSHWC)
N.A.
Dharangaon
Nil
Mukatainagar
3 (PHF/V)
Jalgoan
4 (WF/VHO)
Bhusawal
6 (SF/VWPHM)
N.A. Bodwad
Nil
Parola
5 (F/VOWCH)
Erandol
8 (F/VWSMHOCR)
Jamner
3 (WF/VR)
Bhadgoan
8 (MWF/VRHSFO)
Pachora
5 (CSF/VOW)
Chalisgoan
5 (WOPSMFC)
20°15' N
74°55' E
20°15' N
76°28' E
CROP COMBINATION REGIONS AT TEHSIL LEVEL
WEAVERS METHOD
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
7 (WHPF/VJOC)
Raver
4 (WSCH)
Yawal
8 (JHPCSOWF/V)
Amalner
3 (COH)
Dharangaon
4 (HCWF/V)
Jalgoan
3 (WCH)
Mukatainagar
3 (WHJ)
Bhusawal
3 (WHC)
Bodwad
3 (SCFC)
Parola
6 (F/VSHCJO)
Erandol
6 (F/VHSCOP)
Jamner
3 (CMH)
Bhadgoan
6 (WHJSCF/V)
Pachora
4 (WOCS)
Chalisgoan
3 (CHW)
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.5.1

Jalgaon district talukas having tough topography, semi dry climate and irregular rainfall are also included in two crops combination. Actually, such talukas of Jalgaon district show monoculture combination very less percent but the talukas having good facilities of irrigation have shown crops combination in this region.

5.5 CROP CONCENTRATION:

The crops concentration pattern in a region has been considered to be most useful in the agricultural land use planning. The term crops concentration refers the variation in the density of individual crops in a given region at a point of time. Crops, livestock or agricultural enterprise concentration means that different crops, livestock or agricultural enterprises when viewed together by superimposition reveal areas where in their regional concentration do not overlap.

The regional concentration of an enterprise (crops or livestock) can b quantified with the help of location quotient or by co-efficient of localization. In these techniques was primarily devised to stay industrial locations. Florence (1948) compared the share of an enterprise or a region with that of the entire nation with the help of a location quotient method. Chisholm (1962) made an attempt to measures the relative regional concentration with the help of co-efficient of localization and comparisons are made between enterprises by calculating the differences between local and national proportions of the area under a given enterprise

In order to determine the regional concentration of crops, Jasbir Singh (1976), method is used for calculation of location quotient values are to be transferred. The following formula is used for concentration of crops:

$$Ci = \frac{Pae}{Par} \times 100$$

It shows,

Ci = Crop concentration index,

Pae = % of the crops ‘a’ to the total harvested area in an enumeration unit

Par = % of the crops ‘a’ to the total harvested area in the entire region or state

The techniques of identifying crops concentration are a largely comparable the methods employed by some urban geographers like Pawnall (1953), Webb (1959) etc. for determining is functional character of urban area. Such techniques are also considered valuable for a meaningful geographical analysis by industrial geographers like Alexander especially for measuring the location of manufacturing. But in agricultural geography these techniques came to be applied rather late i.e. by the middle of the sixties years. However, the results are so far reaching as to give us an idea of the level of crop concentration.

Crop Concentration at Taluka Level in Jalgaon District:-

(1990-95 to 2005-10)

In the further study during the investigation period, the pattern of concentration for different crops under consideration has been worked out by using above mentioned formula. The indices of individual crops in each tehsils are calculated for the two periods, i.e.1990-95 and 2005-10. The obtained results are reported shows in the table and the indices of crop concentration showed the mentioned in table no. the crop concentration levels of taluka level certain crops are shown in maps. The concentration is grouped under four levels - i.e.

1) High Concentration (Above 1% to 2%)

2) Moderate Concentration (0.50% to 1%)

3) Low Concentration (Below 0.50%)

4) Nil (Zero Percent)

1) Rice:

During the investigation period in Jalgaon district a Bhadgaon taluka has registered high degree of concentration under rice crops during the 1990-95 and 2005-10, while other all talukas in Jalgaon district have low degree of rice crop concentration; because all talukas region has less rainfall and unsuitable climate responsible for low concentration of above mentioned all talukas except Bhadgaon, main reason was that; the taluka have get maximum rainfall i.e. 600 mm receiving a high rainfall in Bhadgaon taluka in Jalgaon district during the investigation period of 1990-95 to 2005-10.

TABLE NO.5.4. INDICES OF CROP CONCENTRATION OF TALUKA LEVEL, JALGAON DISTRICT (1990-95 TO 2005-10)

Sr. No	**Crops**	**1990-95**			**2005-10**		
	➔Talukas	Chopda	Yawal	Raver	Chopda	Yawal	Raver
1	Rice	0.13	0.17	0.24	0.06	0.18	00
2	Wheat	1.28	0.75	1.25	0.01	0.20	0.33
3	Jowar (K/ R)	0.61	0.59	0.66	1.05	0.04	0.75
4	Bajra	0.40	0.00	0.00	0.07	0.03	00
5	Pulses	0.90	0.10	0.04	0.65	0.07	0.05
6	Cotton	1.12	0.50	0.40	1.09	0.60	0.40
7	Sugarcane	0.17	0.22	0.07	0.07	0.25	0.15
8	Oilseeds	0.47	0.90	0.90	0.16	0.94	0.90
9	Green Chilly	0.52	0.01	0.08	0.70	0.02	0.05
10	Maize	0.58	0.40	0.45	00	0.13	0.01
11	Total Food Crops	0.64	0.60	0.58	0.77	0.70	0.82
12	Gram	0.34	0.40	0.45	0.20	0.60	0.84
13	Tur	0.33	0.06	0.70	0.18	0.07	0.78
14	Fruits & Vegetables	0.69	0.14	1.32	0.12	1.40	0.30
15	Fodder Crops	00	0.38	0.24	00	00	0.70

Sr. No	**Crops**	**1990-95**				**2005-10**		
#	Dist/Talukas	M’nagar	Bhusawal	Bodwad	Jalgaon	M’nagar	Bhusawal	Bodwad
1	Rice	00	0.40	N.A	00	00	00	00
2	Wheat	0.11	0.45	N.A	0.50	0.28	0.11	00
3	Jowar (K/ R)	0.58	0.76	N.A	0.60	00	00	00
4	Bajra	00	0.10	N.A	0.15	00	00	00
5	Pulses	0.30	0.80	N.A	1.38	1.27	0.24	0.04
6	Cotton	0.70	0.76	N.A	0.68	0.02	0.50	0.70

7	Sugarcane	00	0.30	N.A	0.31	00	00	0.60
8	Oilseeds	0.20	0.54	N.A	0.25	00	00	00
9	Green Chilly	0.40	0.79	N.A	0.23	0.50	0.55	0.68
10	Maize	00	00	N.A	00	0.15	00	00
11	Total Food Crops	0.43	0.65	N.A	0.75	0.60	0.14	0.10
12	Gram	0.12	0.50	N.A	0.15	1.27	0.25	00
13	Tur	0.72	0.68	N.A	0.40	0.60	0.88	0.35
14	Fruits & Vegetables	0.70	0.40	N.A	0.65	0.63	0.33	0.14
15	Fodder Crops	00	00	N.A	00	00	0.20	0.45

Sr. No	**Crops**	**1990-95**	**1990-95**			**2005-10**		
	➔Taluka	Erandol	Dhrangaon	Amalner	Parola	Erandol	Dharangaon	Amalner
1	Rice	0.03	N.A	00	00	0.65	00	00
2	Wheat	0.90	N.A	0.45	0.40	0.22	0.10	00
3	Jowar (K/R)	1.12	N.A	1.00	0.80	0.80	0.90	0.90
4	Bajra	0.75	N.A	1.00	0.13	0.67	0.25	00
5	Pulses	0.10	N.A	0.60	0.40	0.80	0.71	0.95
6	Cotton	1.50	N.A	0.80	0.50	0.80	0.85	0.80
7	Sugarcane	0.96	N.A	0.30	0.30	0.66	0.15	0.14
8	Oilseeds	0.96	N.A	0.68	0.80	1.14	0.63	0.80
9	Green	0.10	N.A	0.75	0.30	0.30	0.35	0.28

	Chilly							
10	Maize	00	N.A	00	00	0.90	00	0.75
11	Total Food Crops	1.02	N.A	0.90	0.76	0.88	0.65	0.67
12	Gram	1.43	N.A	1.34	0.50	0.95	0.65	1.15
13	Tur	0.10	N.A	0.05	0.98	0.93	0.18	0.70
14	Fruits & Vegetables	0.43	N.A	0.16	0.15	0.23	0.12	00
15	Fodder Crops	00	N.A	00	00	0.50	0.90	0.30

Sr. No	**Crops**	**1990-95**			**2005-10**		
	➔Talukas	Bhadgaon	Pachora	40gaon	Parola	Bhadgaon	Pachora
1	Rice	00	0.50	0.16	0.62	1.75	00
2	Wheat	0.48	0.90	0.48	0.30	0.18	0.90
3	Jowar (K/ R)	0.30	1.28	1.20	0.55	0.25	0.75
4	Bajra	0.55	1.03	0.35	0.18	1.35	0.23
5	Pulses	0.20	0.50	1.00	0.60	0.26	0.44
6	Cotton	0.60	0.80	0.10	0.80	0.41	0.37
7	Sugarcane	0.90	0.50	1.80	0.21	0.66	0.20
8	Oilseeds	0.33	0.50	1.30	1.10	0.11	1.20
9	Green Chilly	0.10	0.45	0.75	0.25	0.25	0.21
10	Maize	00	00	00	0.25	00	0.66
11	Total Food Crops	0.38	0.75	1.55	0.70	0.46	0.80
12	Gram	0.53	1.34	0.46	0.76	0.40	0.64
13	Tur	0.30	0.10	1.00	0.85	0.25	0.60
14	Fruits & Vegetables	0.58	0.55	0.32	0.17	1.20	0.16
15	Fodder Crops	0.21	0.12	00	0.80	0.18	00

Sr. No	Crops	1990-95	2005-10	
	➔Talukas	Jamner	40gaon	Jamner
1	Rice	0.10	00	00
2	Wheat	0.42	0.90	00
3	Jowar (K/ R)	1.05	1.15	0.12
4	Bajra	0.58	1.20	00
5	Pulses	0.94	0.80	1.20
6	Cotton	1.90	1.50	1.90
7	Sugarcane	00	1.26	0.23
8	Oilseeds	0.57	0.83	1.11
9	Green Chilly	0.98	0.40	0.70
10	Maize	0.76	0.66	00
11	Total Food Crops	0.95	1.07	0.40
12	Gram	0.70	0.75	0.76
13	Tur	0.15	1.22	1.80
14	Fruits & Vegetables	0.60	0.43	0.66
15	Fodder Crops	00	0.70	0.55

Source: Computed by Researcher

(Note - Dharangaon and Bodwad taluka data are not available during the period of 1990-95, so these two taluka showed a N.A (not available) in Table no.5.4 and other data showed that all taluka calculated level of crops concentration resulted given of Jalgaon district during the investigation period 1990-95 and 2005-10).

2) Wheat:

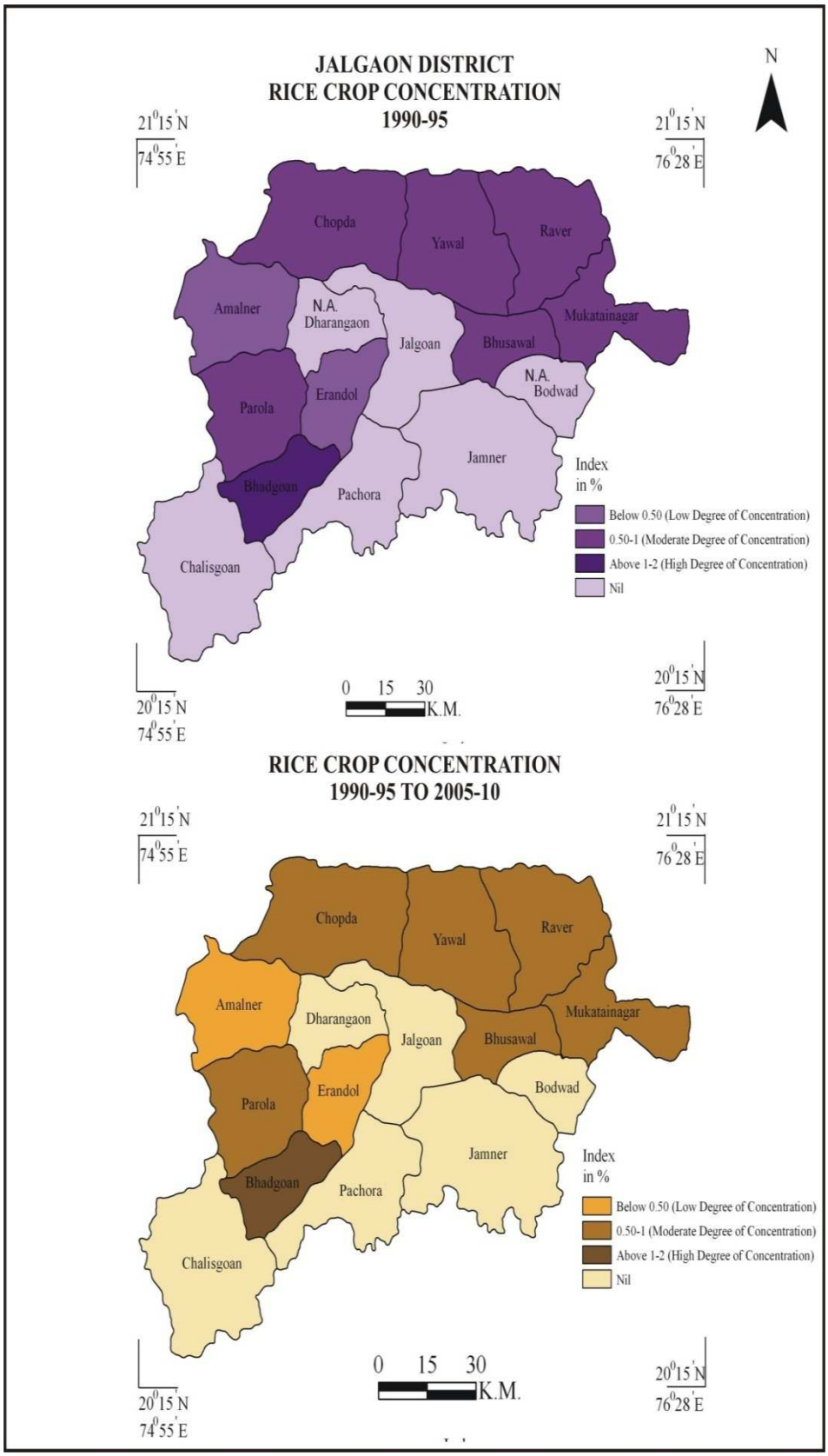
Wheat important crops in Jalgaon district, where the high degree of wheat concentration was registered in Chopda and Raver talukas where as Yawal, Erandol and Pachora showed a moderate degree of wheat concentration, low concentration was observed in Bhusawal, Jalgaon, Amalner, Parola, Bhadgaon, Chalisgaon and Jamner talukas in Jalgaon district during the period of 1990-95. Other side during

investigation the period of 1990-95 to 2005-10 Chopda, Bhusawal, Bodwad, Dharangaon, Amalner and Jamner talukas did not any change or concentration of wheat crops. Moderate to high concentration shift was observed in Pachora and Chalisgaon talukas, and Yawal, Raver, Muktainagar, Parola and Bhadgaon is shifted from low to moderate degree of wheat concentration during the investigation period. Rest of the talukas has not any changes from to low degree of concentration in Jalgaon district.

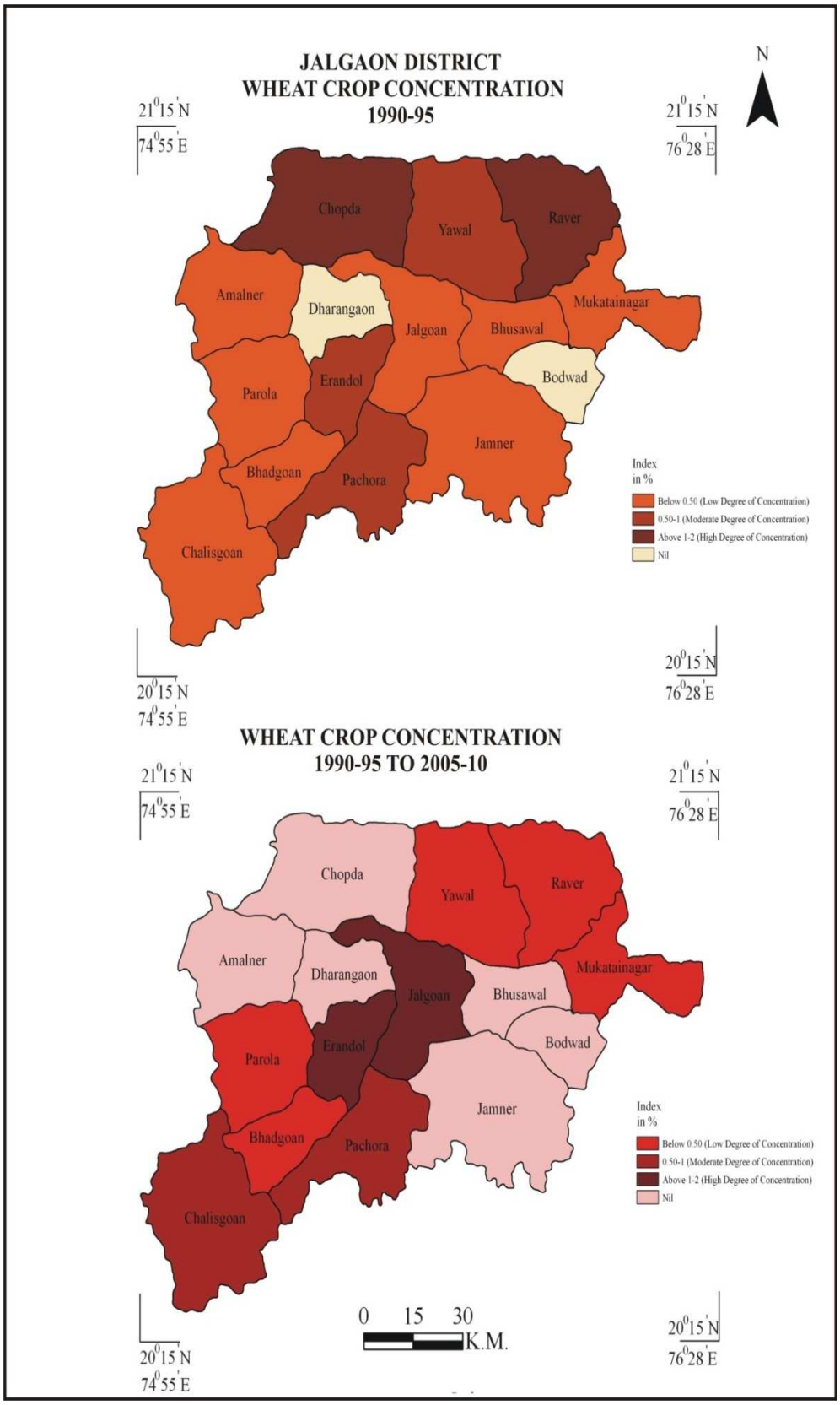
3) Jowar:

Jowar growing in (Kharip and Rabbi) season and important crops were observed in Jalgaon district during the investigation period 1990-95 to 2005-10. High degree of jowar concentration was observed in Bhusawal, Pachora, Chalisgaon and Jamner talukas.

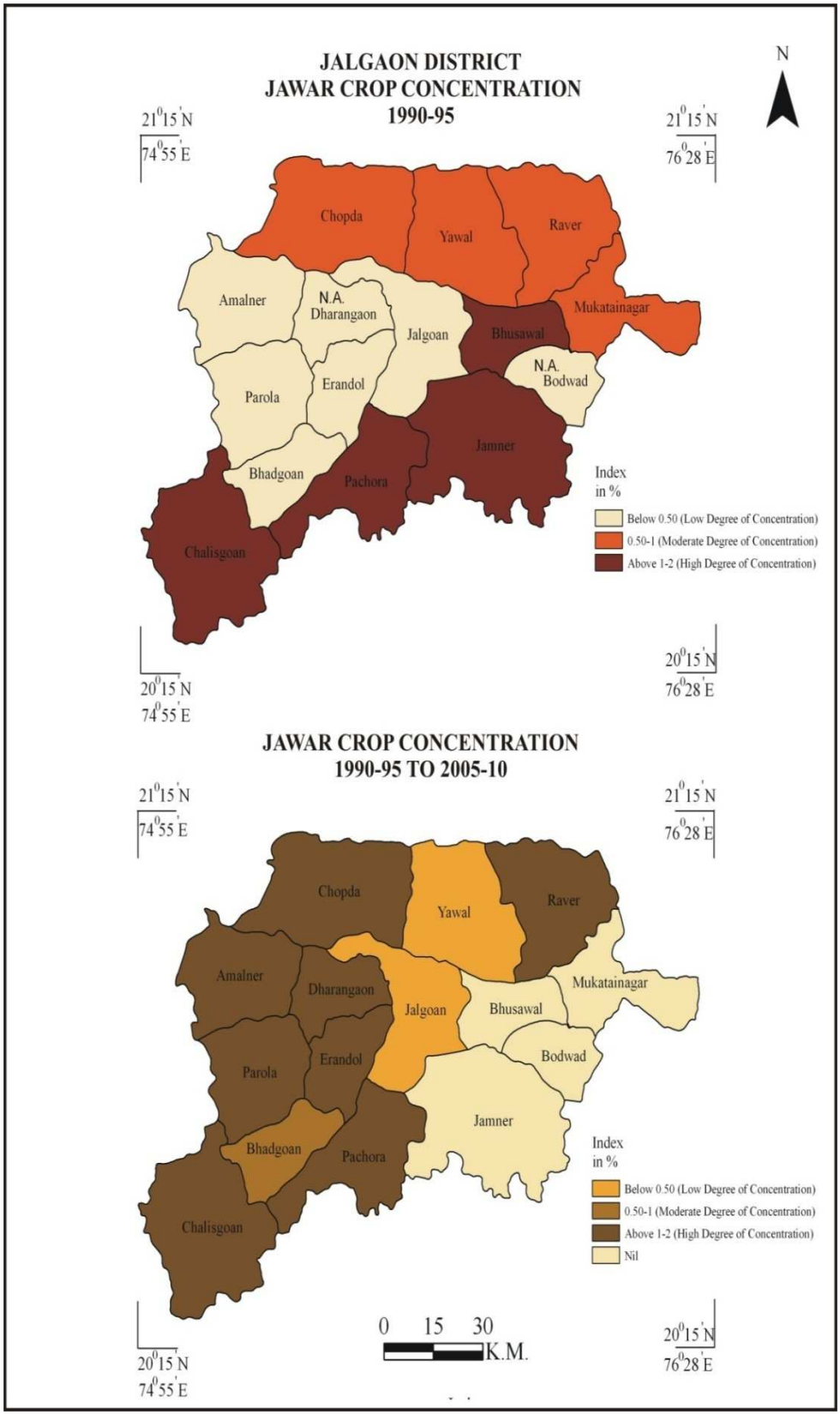
While moderate degree of jowar concentration was noted in Chopda, Yawal, Raver, Muktainagar, Jalgaon and Parola talukas. While low degree of jowar concentration recorded in all talukas in Jalgaon district during the investigation period of 1990-95. Changes during the period of 1990-95 to 2005-10 the degree of jowar high concentration was observed in Chopda, Raver, Erandol, Dharangaon, Amalner, Parola, Pachora and Chalisgaon talukas. Whereas the moderate degree of jowar concentration was noted only in Bhadgaon talukas. While low degree of jowar concentration was recorded in Yawal and Jalgaon talukas. No change of degree of jowar concentration was observed in Muktainagar, Bhusawal, Bodwad and Jamner talukas during the investigation period in Jalgaon district.


JALGAON DISTRICT
RICE CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
N.A. Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N
74°55'E
0 15 30
K.M.
20°15'N
76°28'E
RICE CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.2


JALGAON DISTRICT
WHEAT CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
WHEAT CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.3


JALGAON DISTRICT
JAWAR CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
20°15'N
74°55'E
20°15'N
76°28'E
JAWAR CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.4

4) Bajra:

High degree of concentration was recorded in Amalner and Pachora talukas. While moderate degree of Bajra concentration was found in Erandol, Bhadgaon and Jamner talukas. Low concentration was noticed in all talukas except no changes seen in Jalgaon district, whereas no changes (nil) were observed in Yawal, Raver, Muktainagar, Bodwad and Dharangaon talukas during the investigation period of 1990-95. Period of 2005-10 the concentration was observed in those areas in Jalgaon district where the high degree shift was noted in Bhadgaon and Chalisgaon talukas.

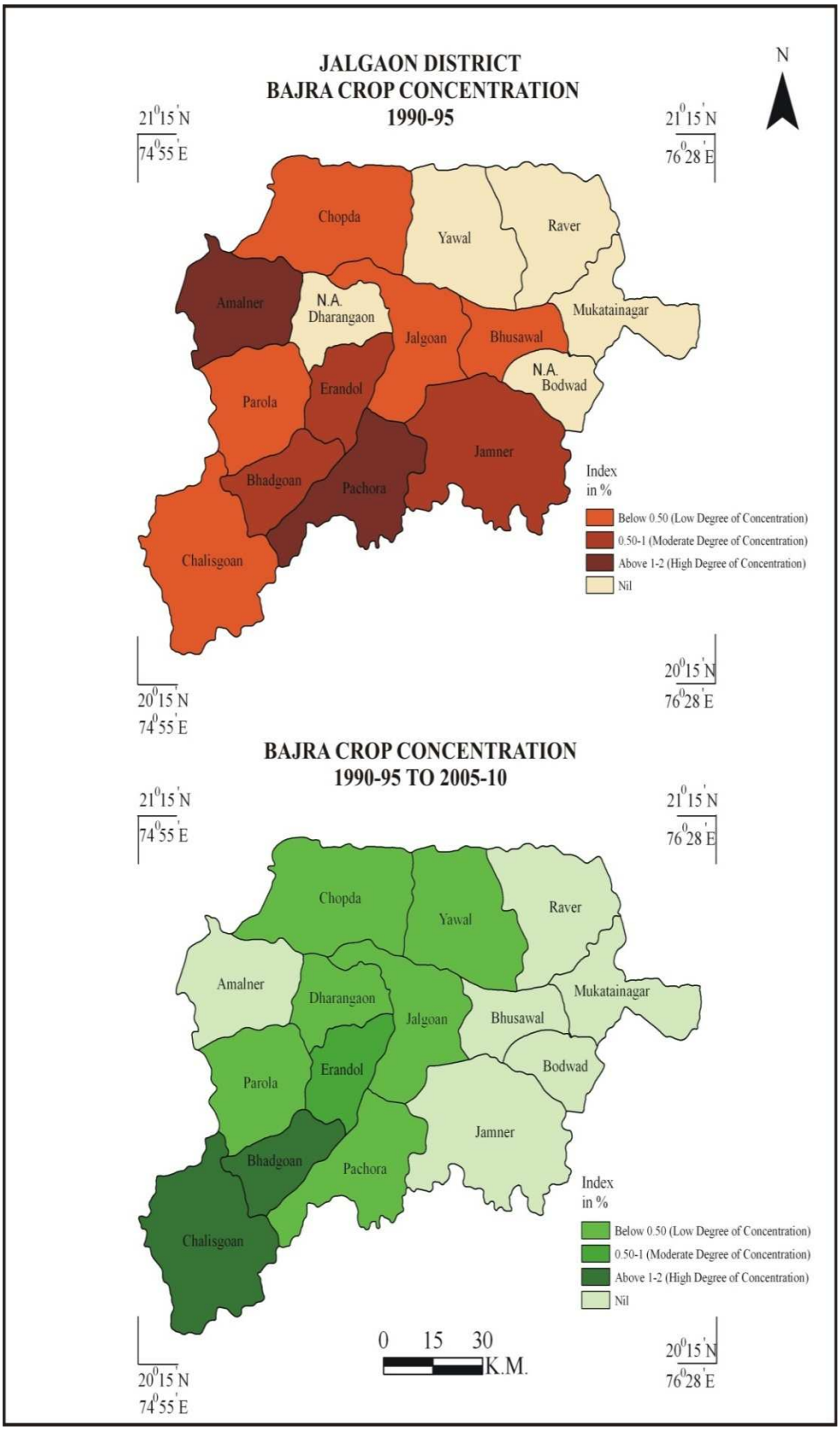
Erandol talukas has been observed from low to moderate degree at concentration while low degree concentration recorded in Chopda, Yawal, Jalgaon, Parola, Dharangaon and Pachora talukas, etc. But no changes were found in Raver, Muktainagar, Bhusawal, Bodwad, Amalner and Jamner talukas during the investigation period.

5) Pulses:

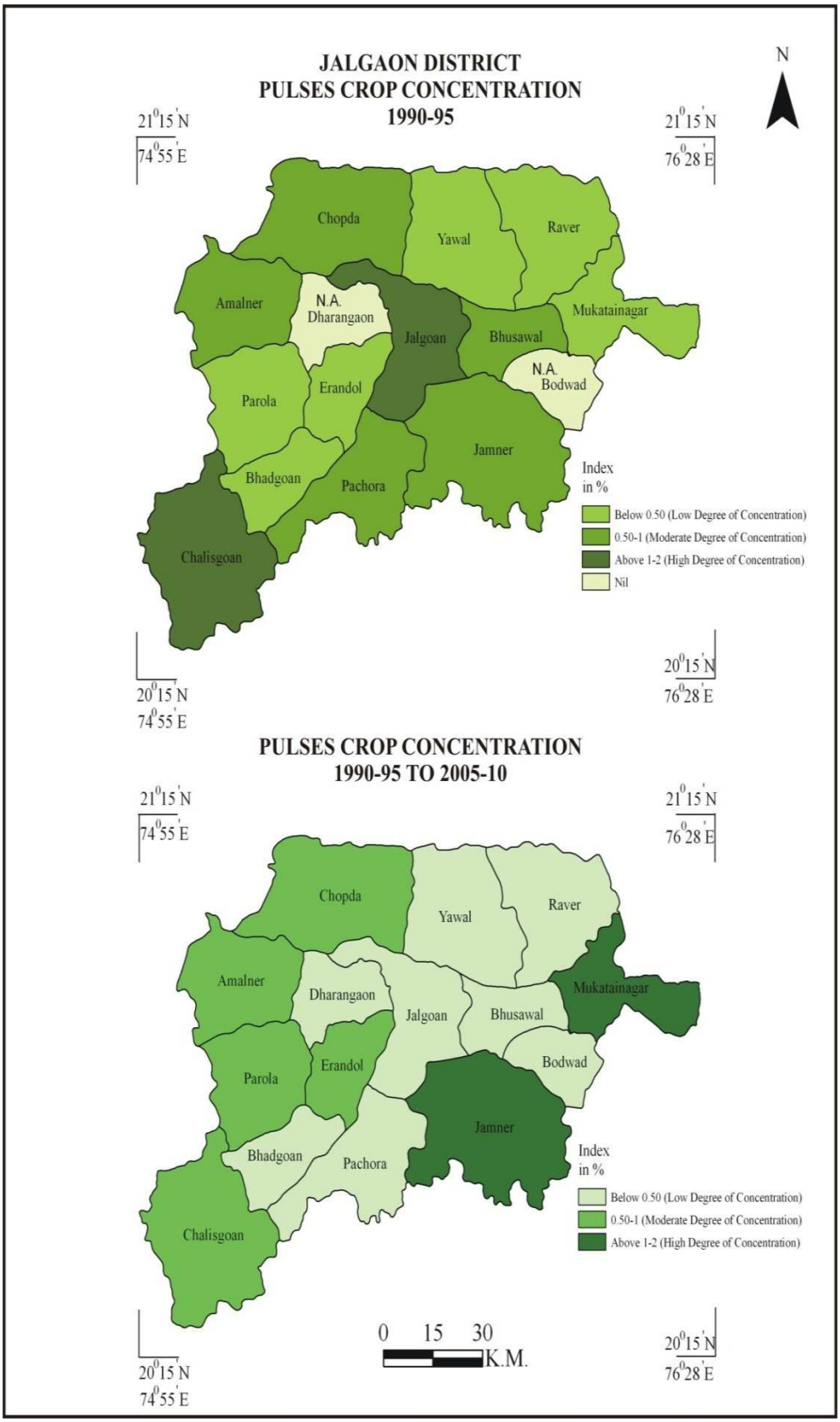
A total pulses overall Jalgaon district varies from moderate degree crops concentration to high degree concentration was noted in Jalgaon and Chalisgaon talukas.

Moderate degree of concentration recorded in Chopda, Bhusawal, Amalner, Pachora and Jamner talukas. While moderate to low degree of concentration was observed in Jalgaon district were all remaining talukas and obviously no changes reason was noted in Bodwad and Dharangaon talukas during the investigation period of 1990-95.

During the investigation period of 2005-10 total pulses was recorded in high degree of concentration noted Muktainagar and Jamner talukas. Moderate degree of concentration widely impact of irrigation of Jalgaon district was observed in Chopda, Erandol, Amalner, Parola and Chalisgaon talukas. While low degree of concentration was recorded in all remaining talukas overall the Jalgaon district during the investigation period.


JALGAON DISTRICT
BAJRA CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A.
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
BAJRA CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.5


JALGAON DISTRICT
PULSES CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A.
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
PULSES CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.6

6) Cotton:

Important cash crops and major crops of Jalgaon district, it was observed during the both investigation period. This crops money for values of all farmers, so widely impact of the region these cash crops. Cotton was refereed with high degree of concentration observed in Chopda, Erandol and Jamner talukas. Moderate degree of crop concentration widely impact during the investigation period it has been recorded in all talukas of Jalgaon district except Bodwad and Dharangaon talukas during the investigation of 1990-95. During the investigation period of 1990-95 to 2005-10 low changes of degree of concentration was observed in Raver, Muktainagar, Bhadgaon, Erandol and Pachora talukas. Yawal, Bhusawal, Bodwad, Jalgaon, Dharangaon, Amalner and Parola shifted from high degree to moderated degree of concentration.

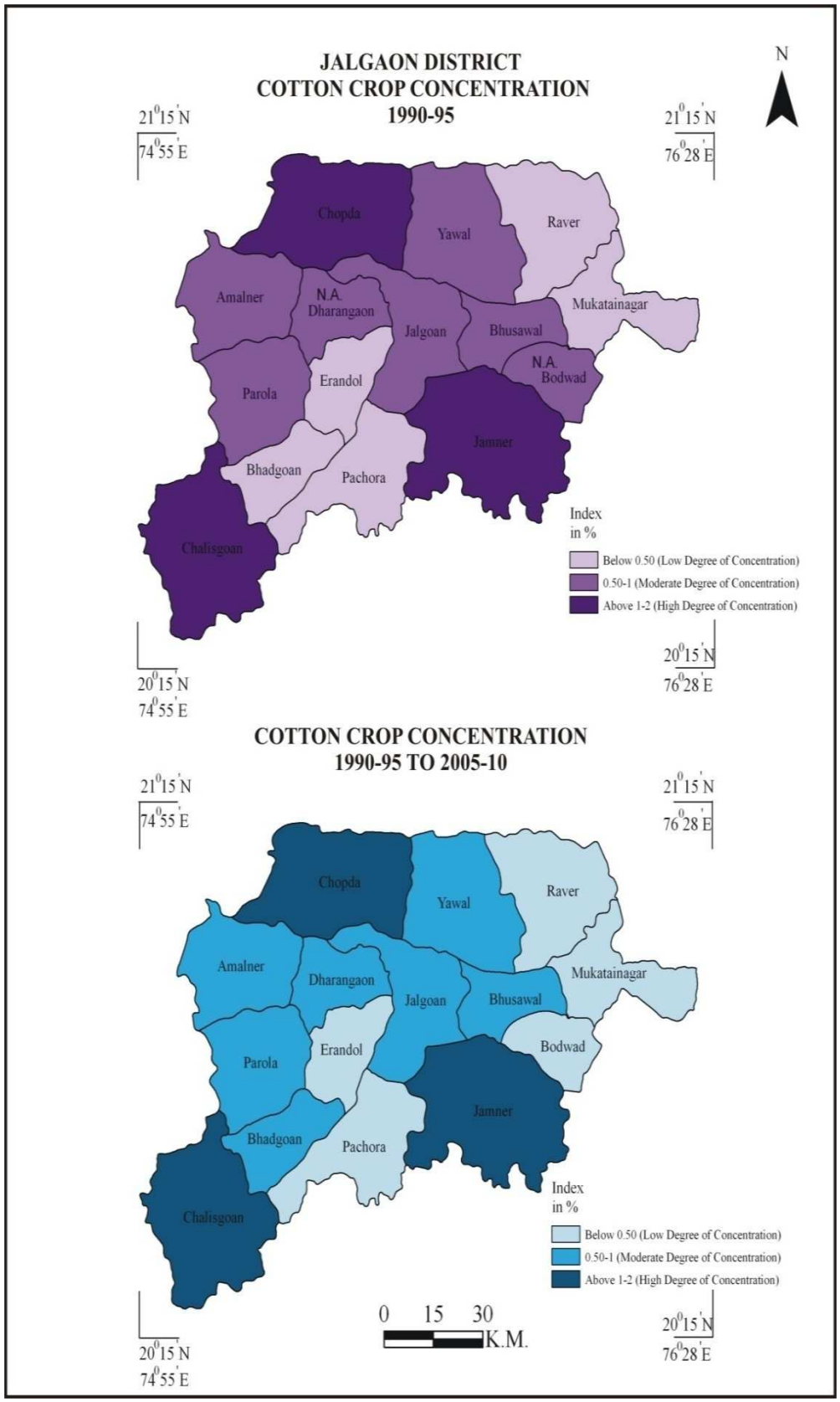
While Chopda, Chalisgaon and Jamner talukas was observed for high degree of concentration in Jalgaon district during the investigation period.

7) Sugarcane:

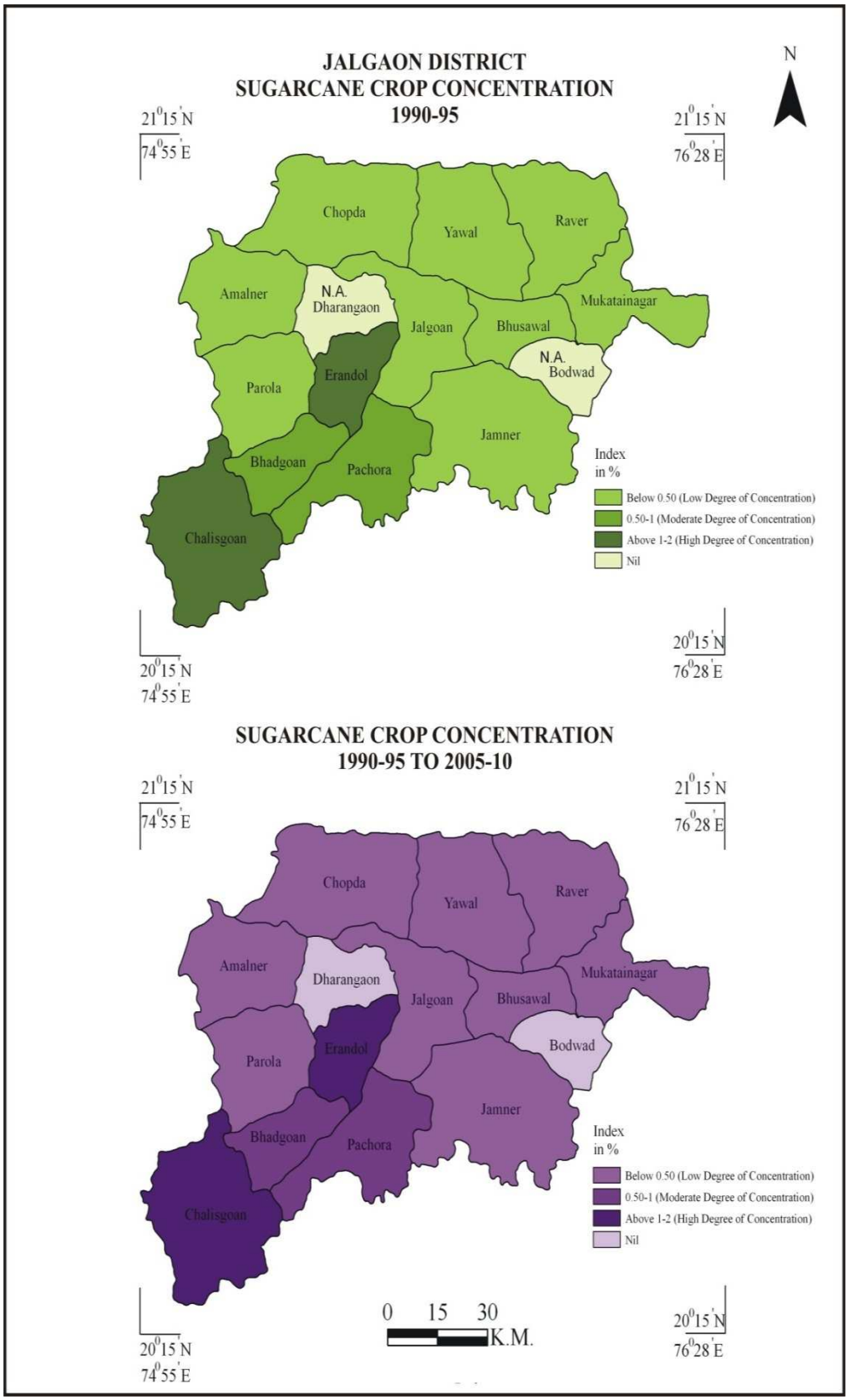
High concentration of sugarcane was recorded in Erandol and Chalisgaon talukas. Such as moderate concentration noted in Bhadgaon and Pachora talukas. Chopda, Yawal, Raver, Muktainagar, Amalner, Bhusawal, Jalgaon, Parola and Jamner talukas shifted from low to moderate concentration, while no changes observed i.e. zero percent noted in Bodwad and Dharangaon talukas during the investigation period of 1990-95. In 2005-10 period was noted in same impact of degree of crop concentration mention above talukas in Jalgaon district.

8) Oilseeds:

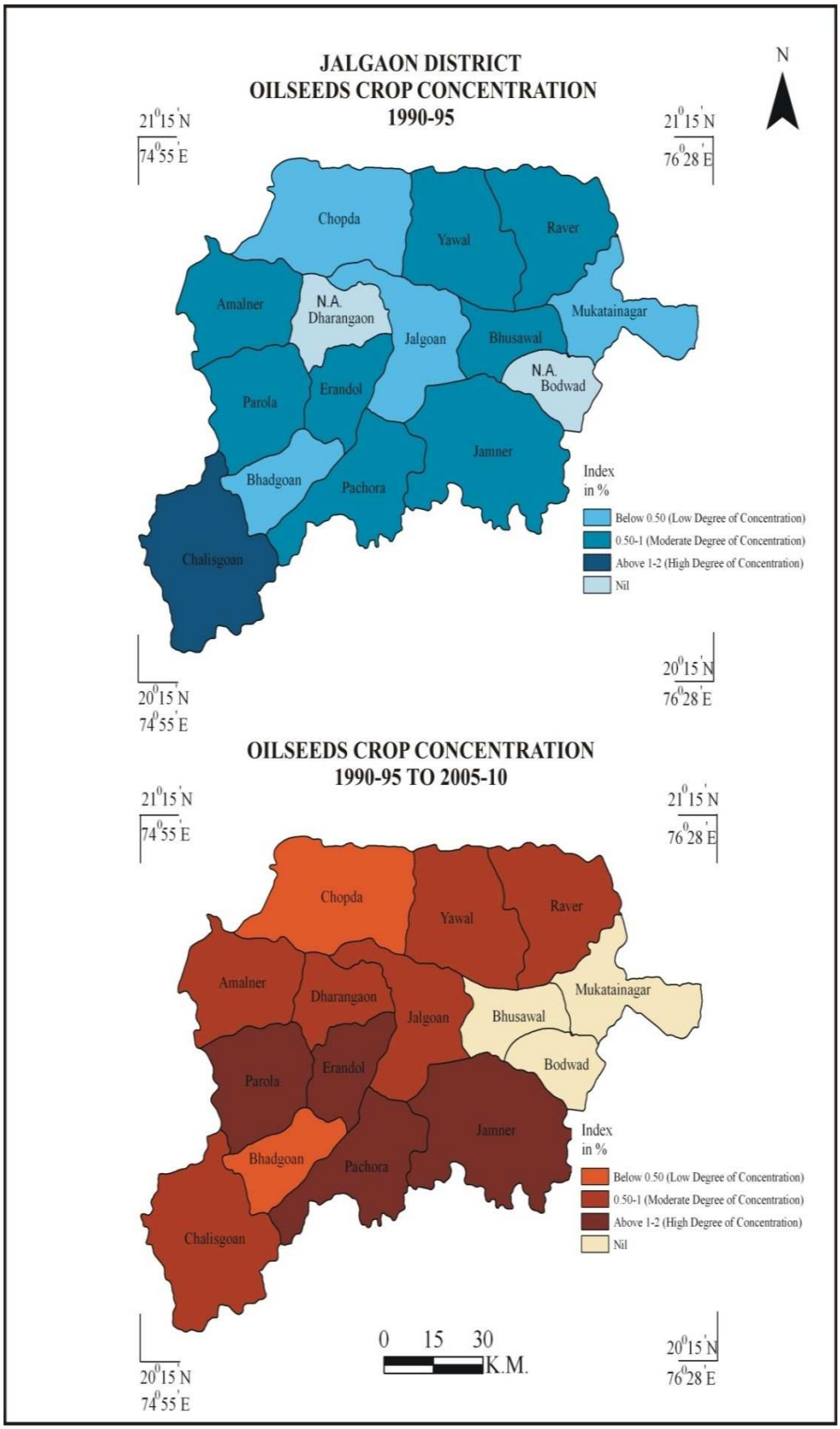
Oilseeds play an important role in Jalgaon district and it was observed during the investigation period of 1990-95 and 2005-10. High concentration was found in this region only Chalisgaon taluka. Moderate concentration recorded in Yawal, Raver, Bhusawal, Erandol, Amalner, Parola, Pachora and Jamner talukas. Chopda, Bhadgaon talukas shifted from moderate to low concentration during the investigation period and no change found in Bodwad and Dharangaon talukas in Jalgaon district in 1990-95.


JALGAON DISTRICT
COTTON CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A.
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
20°15'N
74°55'E
20°15'N
76°28'E
COTTON CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.7


JALGAON DISTRICT
SUGARCANE CROP CONCENTRATION
1990-95
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15' N
74°55' E
20°15' N
76°28' E
SUGARCANE CROP CONCENTRATION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.5.8


JALGAON DISTRICT
OILSEEDS CROP CONCENTRATION
1990-95
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N 74°55'E
20°15'N 76°28'E
OILSEEDS CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.5.9

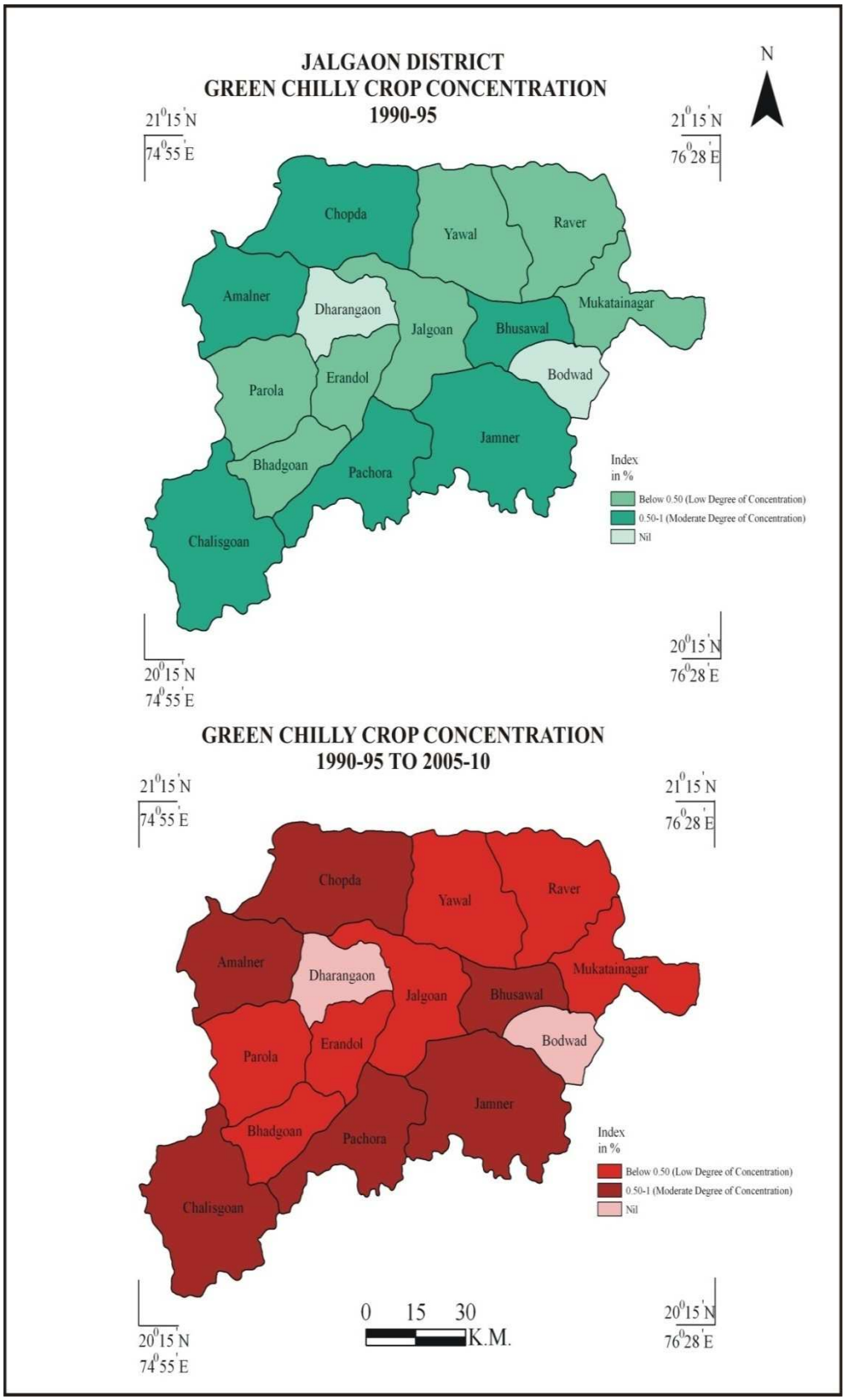
Period of 2005-10 high degree of concentration was observed in Erandol, Parola, Pachora and Jamner talukas. Shifted from high to moderate degree of concentration noted in Yawal, Raver, Dharangaon, Amalner and Chalisgaon talukas. Low degree of concentration was found only in Chopda and Bhadgaon talukas. Whereas zero percent degree of concentration was recorded in Muktainagar, Bhusawal and Bodwad talukas during the investigation period of 2005-10 in Jalgaon district.

9) Green Chilly:

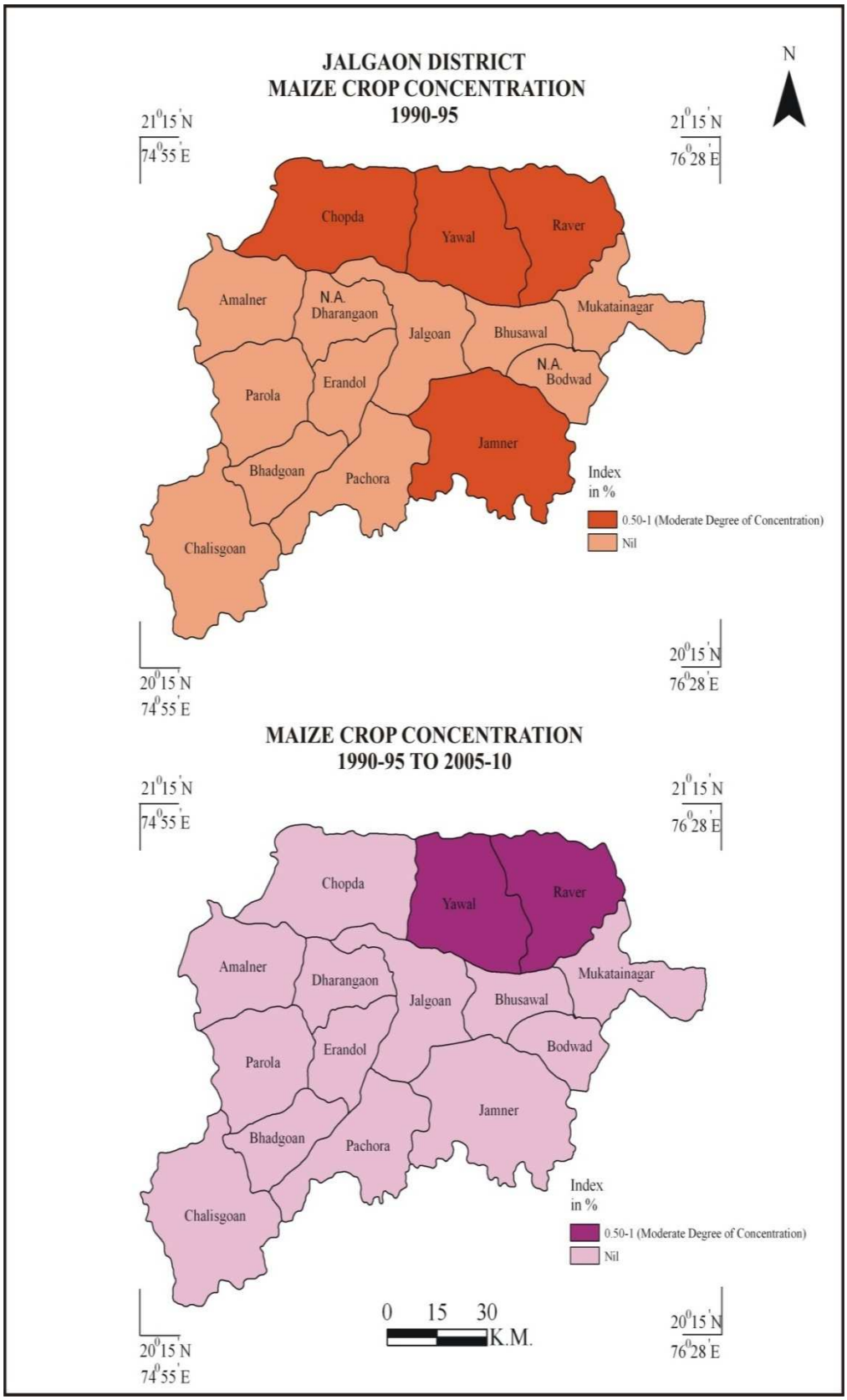
Green chilly includes in green vegetables in agriculture and maximum found in Jalgaon district during the investigation period 1990-95 and 2005-10. High degree of concentration was not found in Jalgaon district but moderate concentration was noted in Chopda, Bhusawal, Amalner, Pachora, Chalisgaon and Jamner talukas. Low degree of concentration recorded in Yawal, Raver, Muktainagar, Jalgaon, Erandol, Parola and Bhadgaon talukas. No changes were found in Bodwad and Dharangaon talukas period of 1990-95. During the investigation period of 2005-10 same as above degree of crop concentration was found in Jalgaon district.

10) Maize:

Maize is also food crops in a region. High concentration and low degree of concentration was not found in all tehsils in Jalgaon district, but moderate degree of concentration was observed in Chopda, Yawal, Raver and Jamner talukas, it was a great impact and effect of productivity to this crops, so zero percent degree of concentration was noticed in Muktainagar, Bhusawal, Jalgaon, Erandol, Amalner, Parola, Bhadgaon, Pachora and Chalisgaon talukas with Bodwad and Dharangaon talukas during the investigation period 1990-95. High degree and low degree of crops concentration was not found in 2005-10 same as 1990-95 in region. Moderate concentration was recorded in all in Jalgaon district except zero percent degree of concentration was noticed in Chopda, Dharangaon, Bhadgaon and Jamner talukas during the above same investigation period.


JALGAON DISTRICT
GREEN CHILLY CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
GREEN CHILLY CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.10


JALGAON DISTRICT
MAIZE CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A.
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
0.50-1 (Moderate Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
MAIZE CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
0.50-1 (Moderate Degree of Concentration)
Nil
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.11

11) Total Food Crops:

Total food crops include all root vegetables, food grains and spices and condiment are important in this region during the investigation period. High degree of concentration was observed in Erandol and Chalisgaon talukas. Moderate degree of concentration recorded in Chopda, Yawal and Raver. Muktainagar, Bhusawal, Jalgaon, Amalner, Parola, Pachora and Jamner talukas. While low degree of concentration note only in Bhadgaon taluka. No Changes was found in Bodwad and Dharangaon talukas during the investigation period of 1990-95. In 2005-10 the degree of high concentration was observed only in Chalisgaon taluka. Chopda, Yawal, Raver, Muktainagar, Erandol, Dharangaon, Amalner, Parola, Pachora and Bhadgaon talukas shifted from moderate to low degree of concentration, whereas low degree of concentration was recorded in Bhusawal, Bodwad, Bhadgaon and Jamner talukas during the investigation period of 2005-10.

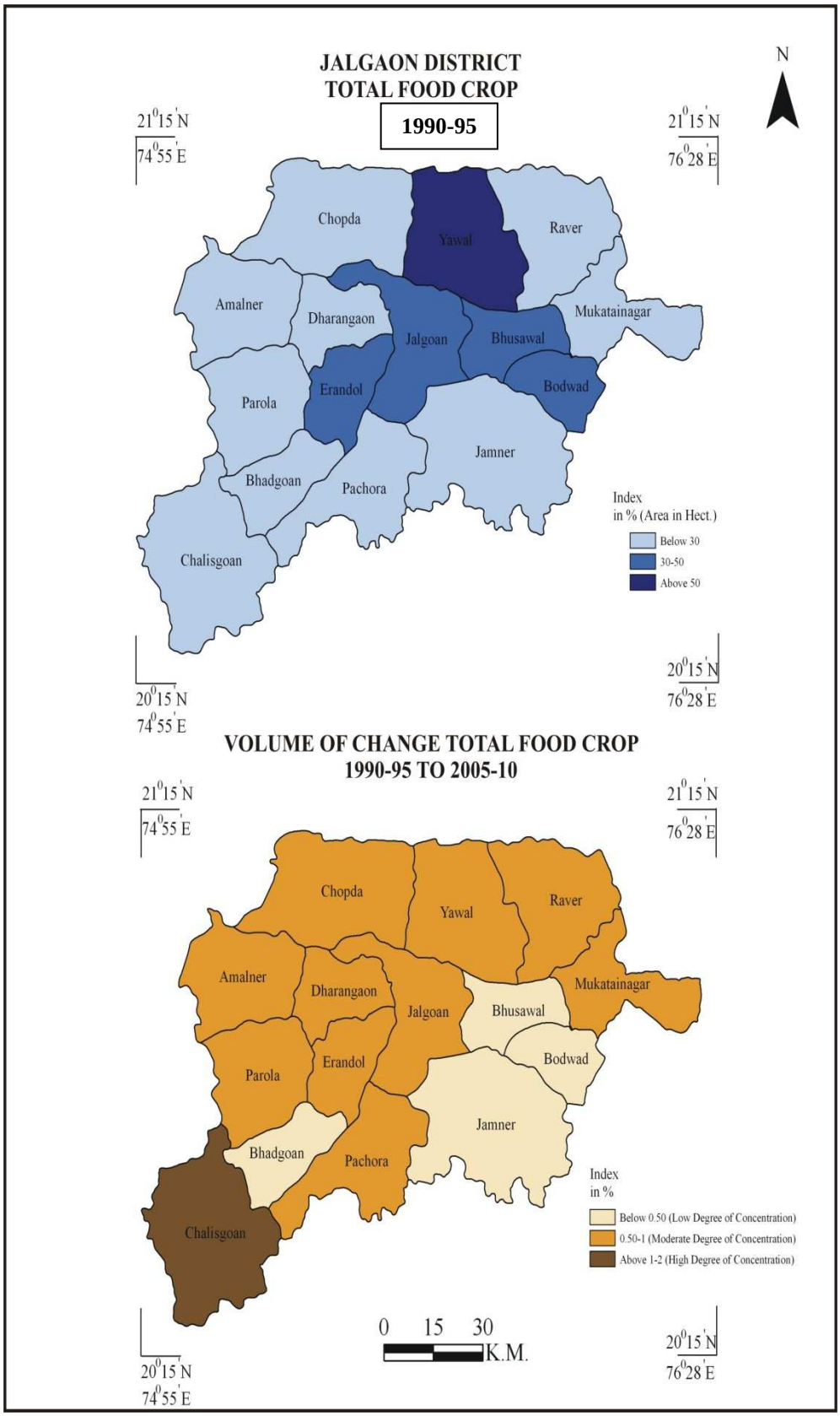
12) Gram:

High degree of gram concentration was recorded in Erandol, Amalner and Pachora talukas. While moderate degree of gram concentration was found in Bhusawal, Parola, Bhadgaon and Jamner talukas. Low degree of concentration was recorded in Chopda, Yawal, Raver, Muktainagar, Jalgaon and Chalisgaon talukas during the 1990-95 periods.

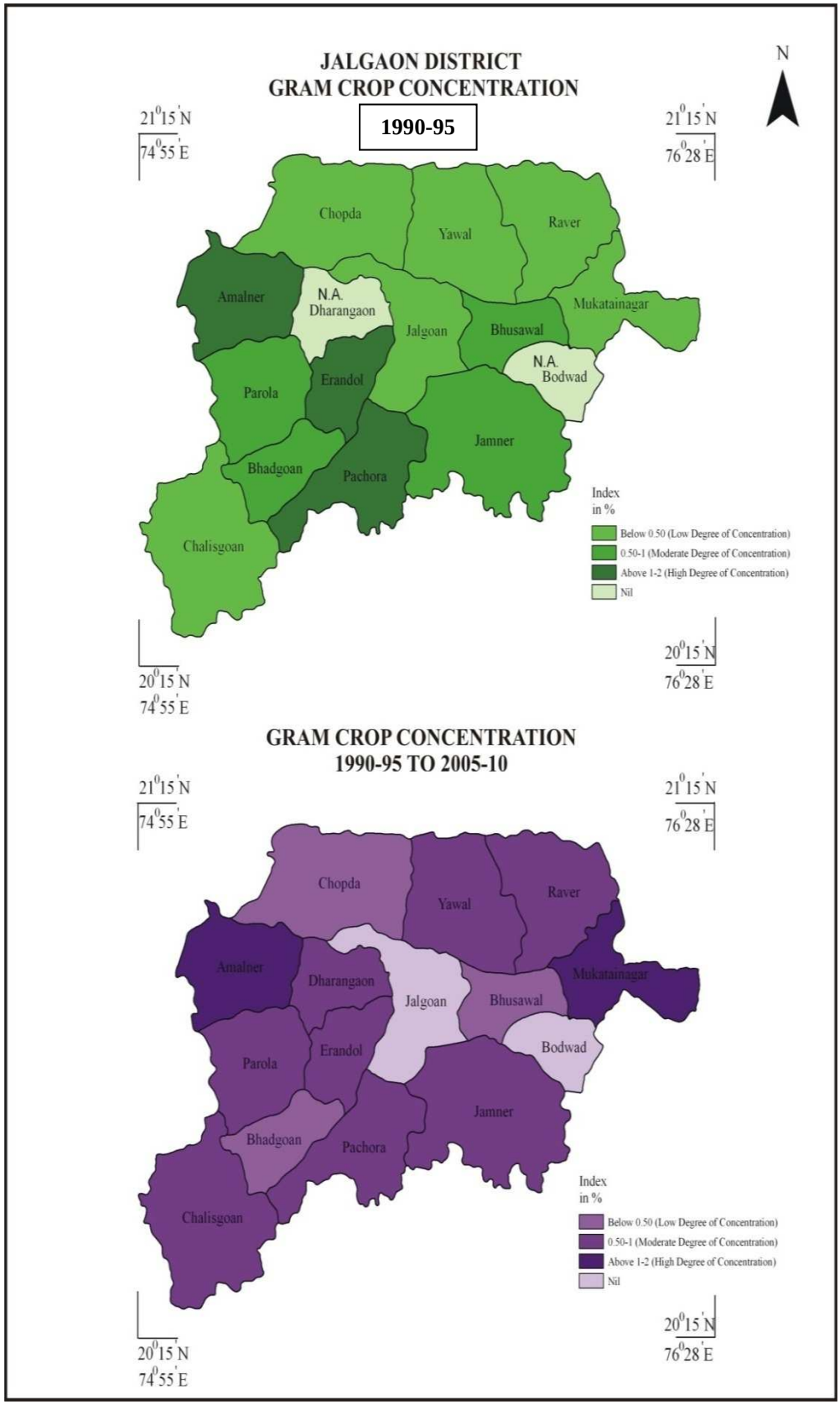
Moderate to high degree of gram concentration shifted was found in Muktainagar and Amalner talukas. while moderate to low shifting also found in Yawal, Raver, Erandol, Dharangaon, Parola, Pachora, Chalisgaon and Jamner talukas. Low degree of concentration was observed in Chopda, Bhusawal, and Bhadgaon talukas during the investigation period 2005-10 of Jalgaon district.

13) Tur:

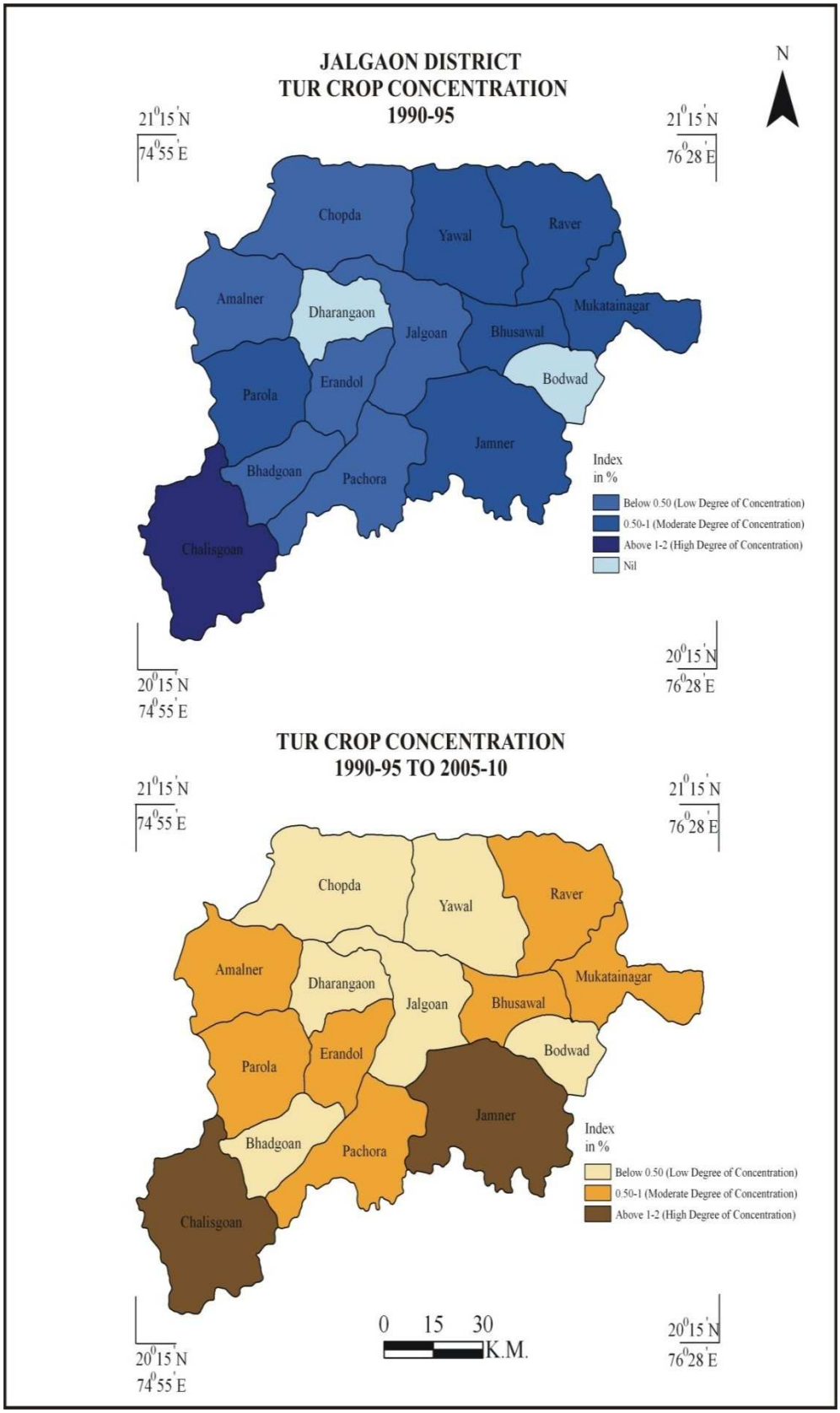
Tur is also important crop was observed in Jalgaon district during the investigation periods. High degree of tur crop concentration was found only in Chalisgaon taluka. Moderate degree of concentration was observed in Yawal, Raver, Muktainagar, Bhusawal, Parola and Jamner talukas.


JALGAON DISTRICT
TOTAL FOOD CROP
1990-95
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in % (Area in Hect.)
Below 30
30-50
Above 50
20°15'N 74°55'E
20°15'N 76°28'E
VOLUME OF CHANGE TOTAL FOOD CROP
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
0 15 30
K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.5.12


JALGAON DISTRICT
GRAM CROP CONCENTRATION
1990-95
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N 74°55'E
20°15'N 76°28'E
GRAM CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N 74°55'E
20°15'N 76°28'E

Map No.5.13


JALGAON DISTRICT
TUR CROP CONCENTRATION
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15'N
74°55'E
20°15'N
76°28'E
TUR CROP CONCENTRATION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.14

Low degree of concentration was noted in Chopda, Yawal, Jalgaon, Erandol, Amalner, Bhadgaon, Pachora and Jamner talukas during the period of 1990-95.

High degree of tur concentration was found in Chalisgaon and Jamner talukas. Whereas moderate degree of concentration was found in Raver, Muktainagar, Bhusawal, Erandol, Amalner, Parola and Pachora talukas. Low degree of concentration was noted in Chopda, Yawal, Raver, Bodwad, Dharangaon and Bhadgaon talukas during the investigation period of 2005-10 in Jalgaon district.

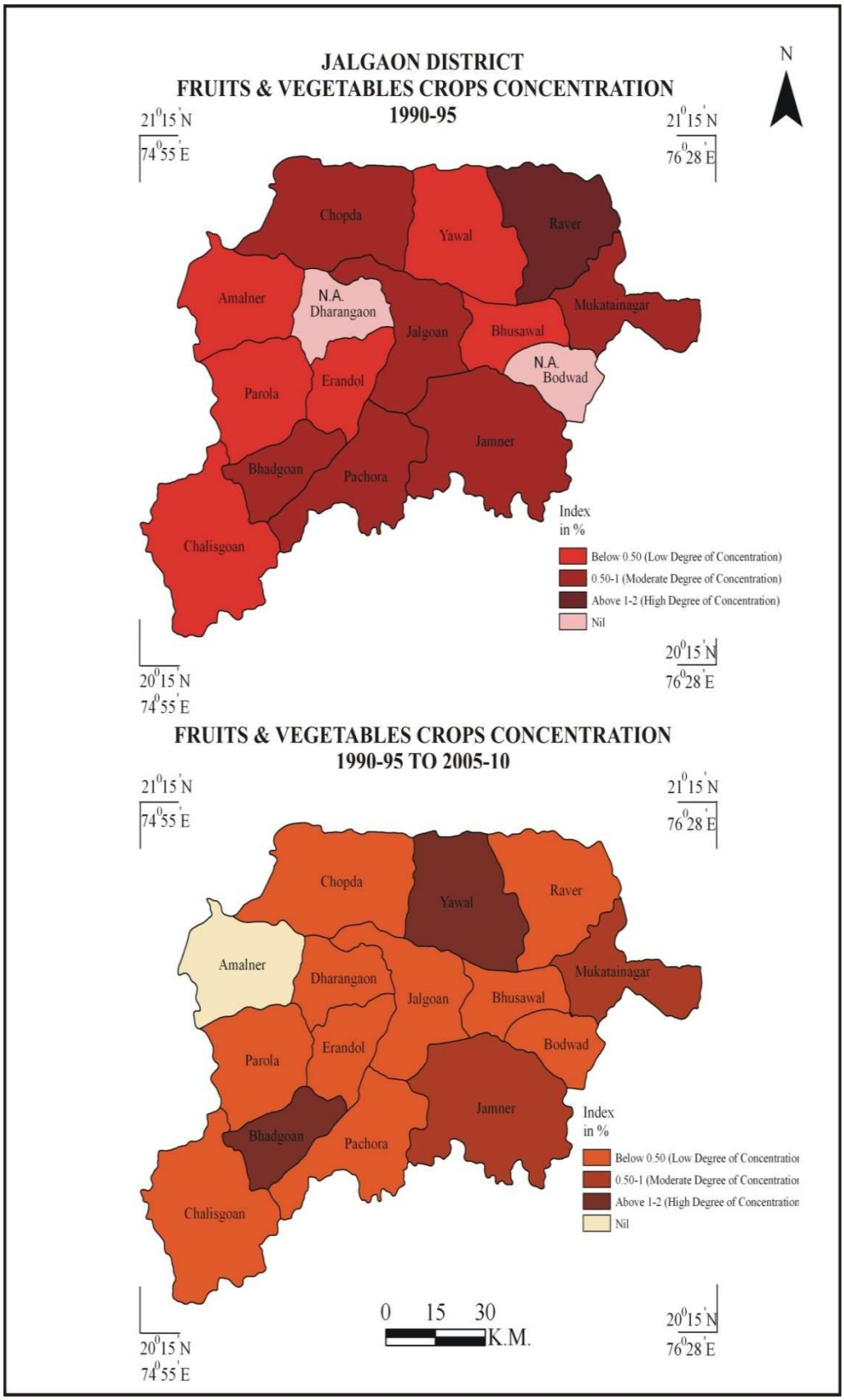
14) Fruits & Vegetables:

Fruits and vegetables cultivated widely in Jalgaon district during the investigation period. It was concentrated and observed in all tehsils of the region. Whereas high degree of crop concentration was observed only in Raver taluka. Moderate degree of concentration was noted in Chopda, Muktainagar, Jalgaon, Bhadgaon, Pachora and Jamner talukas. While shifted from low to moderate degree of concentration was noted in Yawal, Bhusawal, Amalner, Parola and Chalisgaon talukas during the period of 1990-95.

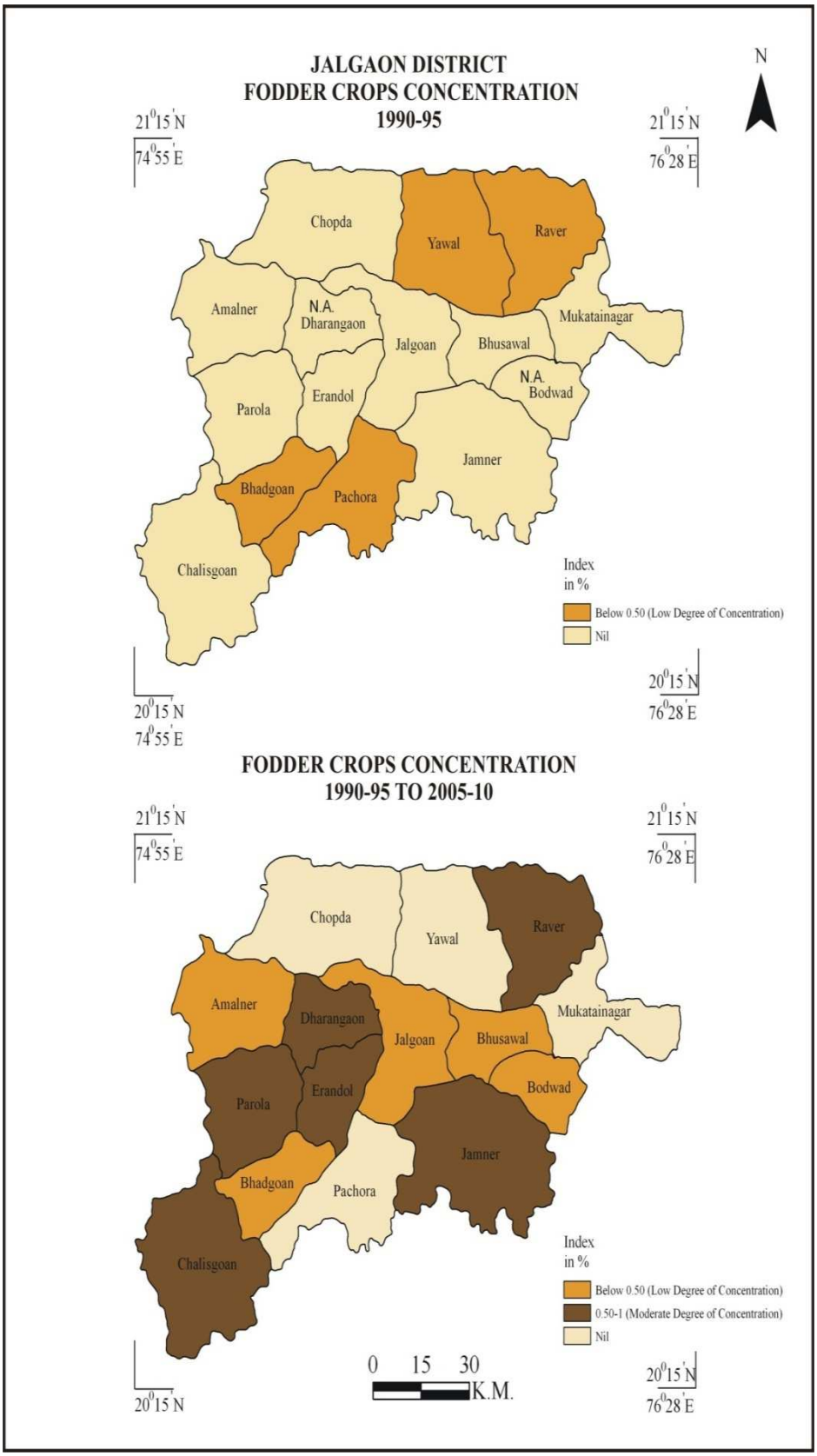
High degree of concentration was noticed in Yawal and Bhadgaon talukas in a region. While moderate degree of concentration was observed in Muktainagar and Jamner talukas. Whereas low degree of concentration was found in Chopda, Raver, Bhusawal, Bodwad, Erandol, Dharangaon, Parola, Pachora and Chalisgaon talukas. Zero percent of degree of concentration was recorded only in Amalner taluka during the investigation period 2005-10 of Jalgaon district.

15) Fodder Crops:

Fodder is important crops and useful for all livestock and domestic animals in Jalgaon district during the investigation period of 1990-95 and 2005-10. High degree of concentration was not found in both period of a region. while moderate degree of concentration was not found in all tehsils whereas low degree of concentration was noticed in Yawal, Raver, Bhadgaon and Pachora talukas.


JALGAON DISTRICT
FRUITS & VEGETABLES CROPS CONCENTRATION
1990-95
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Above 1-2 (High Degree of Concentration)
Nil
20°15' N
74°55' E
20°15' N
76°28' E
FRUITS & VEGETABLES CROPS CONCENTRATION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration
0.50-1 (Moderate Degree of Concentration
Above 1-2 (High Degree of Concentration
Nil
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.5.15


JALGAON DISTRICT
FODDER CROPS CONCENTRATION
1990-95
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A. Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A. Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
Nil
20°15' N
74°55' E
20°15' N
76°28' E
FODDER CROPS CONCENTRATION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 0.50 (Low Degree of Concentration)
0.50-1 (Moderate Degree of Concentration)
Nil
0 15 30
K.M.
20°15' N
76°28' E
20°15' N

Map No.5.16

Zero percent degree of Concentration was observed in Chopda, Muktainagar, Bhusawal, Jalgaon, Bodwad, Dharangaon, Erandol, Amalner, Parola, Chalisgaon and Jamner talukas during the investigation period in 1990-95.

Moderate degree of concentration was found in Raver, Erandol, Dharangaon, Parola, Chalisgaon and Jamner talukas. Low degree of concentration was recorded in Bhusawal, Bodwad, Amalner and Bhadgaon talukas. While zero percent degree of concentration was noticed in Chopda, Yawal, Muktainagar and Pachora talukas during the investigation period in 2005-10.

5.6 CROP DIVERSIFICATION:

The main advantage of the study of crops diversification region lies in the fact that it enables us to understand the impact of geo-climatic and socio-economic conditions and technological development on the agricultural region. Moreover, it helps us in knowing the contemporary competition amongst crops for area, for rotation and effect and total production and per hector productivity.

Variations in relief, soil, climatic conditions and socio-economic conditions within the region lead to crop diversification. The traditional subsistent farming systems the farmers grow crops to meet the family requirements in such areas one may find a high degree of crops diversification.

Crops diversification in the regions is beneficial by many ways. It minimizes the risks due to crop failures. It enhances nutrient in the soil and replenishes the soil fertility. The diversification of crops generates more employment. Diversification can be designed of poverty alleviation, employment planning and environmental conservation now and future. In view of the importance of study of crop diversification, many geographers have attempted to measure and map of crops diversification. It is obvious that greater the number of crops in combination, the greater is the degree of diversification. For the measurement of crop diversification, Bhatia (1965) developed a following formula based on the gross cropped area: formula-

$$\text{Index of Crop Diversification} = \frac{\text{Percentage of sown area under 'X' crops}}{\text{Number of 'X' crops}}$$

'X' crops shows are those crops that individually occupy 10% or more of the gross cropped area in a component unit.

Jasbir Singh (1976) slightly modified this formula as follows:

$$\text{Index of Crop Diversification} = \frac{\text{Percentage of harvested area under 'n' crops}}{\text{Number of 'n' crops}}$$

'n' crops shows are those which individually occupy 5% or more the total harvested area.

In the present study, indices of crops diversification for different parts of the study region are calculated by using Jasbir Singh (1976) formula. The lower the value of index the more is the diversification in cropping pattern in a region.

Crop Diversification at District and Taluka Level:

The crop diversification indices at district and tehsils level for the calculated and mapped they reveal spatial pattern of crops diversification at two points of time i.e. the period of 1990-95 and 2005-10 are mentioned in the table no. respectively. It shows regional grouped into four categories viz.

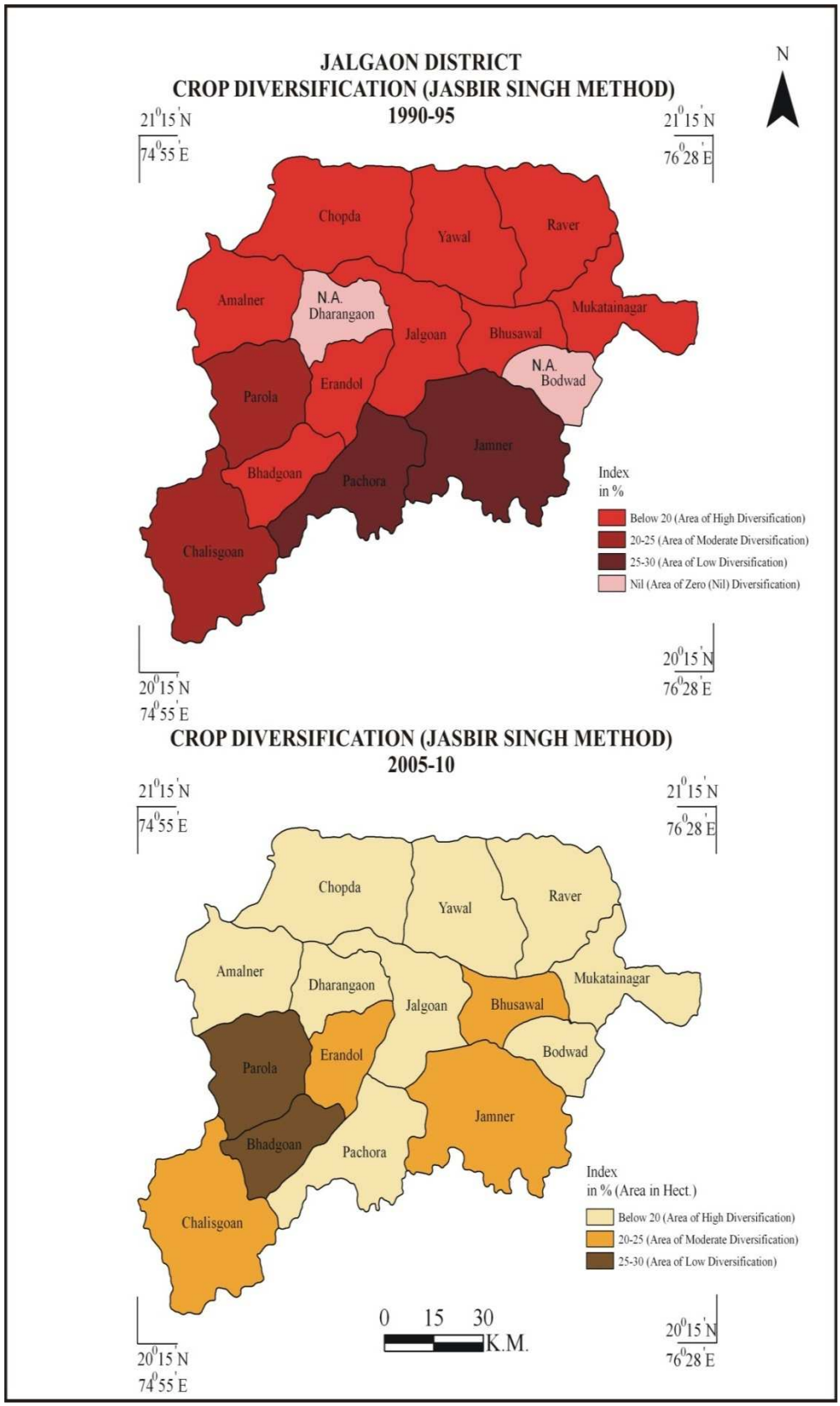
a) Area of High Diversification below 20%
b) Area of Moderate Diversification 20% to 25%
c) Area of Low Diversification 25% to 30%

In Jalgaon district the crop diversification was calculated and showed in table no. during the investigation period of 1990-95 to 2005-10. Here, areas of high diversification below 20% were observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Amalner and Bhadgaon talukas.

TABLE NO.5.5. CROPS DIVERSIFICATION INDICES OF JALGAON DISTRICT, ACCORDING TO JASBIR SINGH METHOD, (1976)

Sr. No	Jalgaon District	1990-95			2005-10		
	Tehsils	No. of crops	Area in %	Index of Diversification	No. of crops	Area in %	Index of Diversification
1	Chopda	08	61.77	7.72	07	73.50	10.50
2	Yawal	06	64.29	10.71	04	69.30	17.32
3	Raver	05	69.09	13.81	06	72.40	12.06
4	Muktainagar	05	64.23	12.84	03	69.55	17.38
5	Bhusawal	06	64.49	12.50	04	8943	22.35
6	Bodwad	N.A	N.A	N.A	04	67.09	16.77
7	Jalgaon	05	54.95	10.80	05	62.50	12.50
8	Erandol	04	51.33	12.75	04	86.45	22.00
9	Dharangaon	N.A	N.A	N.A	04	72.89	14.22
10	Amalner	05	75.50	15.14	05	73.24	14.70
11	Parola	03	65.30	21.76	03	74.40	24.80
12	Bhadgaon	04	52.66	13.16	03	89.01	29.66
13	Chalisgaon	04	86.43	21.06	04	86.15	21.60
14	Pachora	03	88.90	30.00	04	68.74	17.18
15	Jamner	03	80.61	26.66	04	86.80	21.45
	Dist Average	04	78.58	17.00	04	65.01	16.25

Source: Socio-Economic Abstract of Jalgaon District 1990-95 & 2005-10, and Computed by Researcher


JALGAON DISTRICT
CROP DIVERSIFICATION (JASBIR SINGH METHOD)
1990-95
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
N.A.
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 20 (Area of High Diversification)
20-25 (Area of Moderate Diversification)
25-30 (Area of Low Diversification)
Nil (Area of Zero (Nil) Diversification)
20°15'N
74°55'E
20°15'N
76°28'E
CROP DIVERSIFICATION (JASBIR SINGH METHOD)
2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20 (Area of High Diversification)
20-25 (Area of Moderate Diversification)
25-30 (Area of Low Diversification)
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.17

While moderate crop diversification 20% to 25% was noted in Parola, Chalisgaon and Jamner talukas. Where low diversification 25% to 30% was seen in Pachora taluka and no change of crop diversification was observed in Bodwad and Dharangaon talukas during the period of 1990-95. The investigation period of 2005-10, area of high diversification was found in Chopda, Yawal, Raver, Muktainagar, Bodwad, Jalgaon, Dharangaon, Amalner, and Pachora talukas.

Whereas moderate diversification in Bhusawal, Erandol, Parola, Jamner, Chalisgaon talukas. Low diversification was recorded in Bhadgaon talukas because in there are limited irrigation facilities, so also these areas receive very scanty rainfall and have rugged topography and poor soil.

Therefore, mainly food grains are grown in these talukas of middle and northern part of Jalgaon district observed high diversification is mostly due to extension of wells and tube well and canal irrigation so the farmers of these talukas have changed their attention from food grain to cash crops. Cotton, Banana, Jowar, Sugarcane, Oilseeds (ground nut) and fruits & vegetables have increased their percentage in these talukas.

5.7 TRENDS ARE PRODUCTION OF SELECTED AGRICULTURAL CROPS:

Studies of cropping pattern bring out the total proportionate of area under different crops at that time in the study region during investigation. Great remarkable features of tehsils wise cropping pattern in Jalgaon district was the presents of food crops and non food crops shows in table no 5.6; a tehsils wise area under the different major crops during 1990 to 1995 and 2005 to 2010.

The data figures contained in table no.5.6 may be divided in to two categorizes viz; food crops and non food crops. Food crops and non food crops are evident in the study region are more important of commercial crops i.e. cash crops as they accounted in Jalgaon district of the total cropped area, it shows in table no.5.6 shows all the values of trends are production of selected agricultural crops in Jalgaon district.

TABLE NO.5.6. TRENDS ARE PRODUCTION OF SELECTED AGRICULTURAL CROPS

Sr. No	**Selected Crops**	**1990-95 & 2005-10**	**Taluka Of Jalgaon District**				
			Chopda	Yawal	Raver	Muktainagar	Bhusawal
		1990 – 95	33	33	46	403	90
		%	7.84	7.84	4.05	4.37	11.11
1	Rice	2005 – 10	36	23	15	190	00
		%	6.25	5.41	1.90	3.07	00
		Vol. of Change	**-1.59**	**-2.43**	**-3.15**	**-1.03**	**11.11**
		1990-95	643	1708	5900	2641	1235
		%	35.10	13.21	3.82	8.54	18.27
2	Wheat	2005-10	816	2597	14689	1970	598
		%	35.82	11.72	2.07	15.45	50.91
		Vol. of Change	**0.72**	**-1.49**	**-1.75**	**6.91**	**32.64**
		1990-95	14340	13850	15339	13581	17679
		%	16.13	16.70	15.08	17.03	13.08
3	Jowar (Kharip + Rabbi)	2005-10	10098	1754	149	4970	7281
		%	26.76	1.54	1.83	54.38	37.12
		Vol. of Change	**10.63**	**-15.16**	**-13.25**	**37.35**	**24.04**
		1990-95	3736	216	131	07	832
		%	21.76	37.64	62.07	11.61	97.74
4	Bajra	2005-10	1296	416	00	3090	391
		%	22.64	70.51	00	94.93	75.02
		Vol. of Change	**0.88**	**32.87**	**00**	**83.32**	**-22.72**

		1990-95	15345	15443	10324	7328	11230
		%	7.80	7.75	11.60	16.34	10.66
5	Pulses	2005-10	11208	9640	5228	5055	6431
		%	10.14	11.79	21.74	22.49	17.68
		Vol. of Change	**2.34**	**4.04**	**10.14**	**6.15**	**7.02**
		1990-95	25225	11930	9170	16584	17143
		%	8.90	18.83	24.50	13.54	13.10
6	Cotton	2005-10	30998	18005	12896	9580	00
		%	9.81	19.89	33.59	31.75	00
		Vol. of Change	**0.91**	**1.94**	**10.91**	**18.21**	**13.10**
		1990-95	3268	4072	1407	10	541
		%	5.62	4.51	13.05	00	33.96
7	Sugarcane	2005-10	4453	2484	654	1515	270
		%	3.34	5.99	2.76	9.82	5.51
		Vol. of Change	**-2.28**	**1.48**	**-10.29**	**9.82**	**28.45**
		1990-95	5051	3060	2072	1461	7418
		%	16.28	26.87	39.68	56.28	11.08
8	Oilseeds	2005-10	1342	1100	1156	4210	15
		%	12.76	15.57	14.81	4.06	1.14
		Vol. of Change	**-3.52**	**-11.3**	**24.87**	**-52.22**	**-9.94**
		1990-95	210	56	34	174	320
		%	19.05	7.14	11.76	22.29	12.50
9	Green Chilly	2005-10	253	66	60	290	129
		%	12.64	4.84	5.33	11.03	24.79
		Vol. of Change	**-6.41**	**-2.03**	**-6.43**	**11.26**	**12.29**

		1990-95	141	102	42	12	53
		%	17.01	23.51	57.11	19.99	42.26
10	Maize	2005-10	928	1037	115	1555	10
		%	10.12	90.46	81.73	60.44	93.99
		Vol. of Change	**-6.89**	**66.95**	**24.62**	**40.45**	**51.73**
		1990-95	25518	15972	18930	9423	17439
		%	13.30	21.26	17.94	36.04	19.47
11	Total Food Crops	2005-10	13156	5830	14953	11775	8280
		%	25.85	58.34	22.74	28.93	41.07
		Vol. of Change	**12.55**	**37.08**	**4.8**	**-7.11**	**21.6**
		1990-95	13562	13300	7941	4762	8935
		%	6.72	6.86	11.49	19.16	10.21
12	Gram	2005-10	10704	8041	4512	2945	5795
		%	8.78	11.69	20.84	31.93	16.22
		Vol. of Change	**2.06**	**4.83**	**9.35**	**12.77**	**6.01**
		1990-95	669	1040	1184	1207	1142
		%	24.32	16.03	14.05	13.81	14.60
13	Tur	2005-10	423	786	709	1190	580
		%	29.20	15.71	17.42	10.38	21.03
		Vol. of Change	**4.88**	**-0.32**	**3.37**	**-3.43**	**6.4**
		1990-95	3624	7561	17195	4061	2188
		%	14.48	6.94	3.05	12.92	23.99
14	Fruits & Vegetables	2005-10	5868	9759	22363	4555	1238
		%	15.60	6.35	2.77	13.61	50.09

		Vol. of Change	**1.12**	**-0.59**	**-0.28**	**0.69**	**26.1**
		1990-95	00	137	448	00	00
		%	00	17.13	5.23	00	00
15	Fodder Crop	2005-10	00	819	00	00	00
		%	00	2.17	5.23	00	00
		Vol. of Change	**00**	**-14.96**	**5.23**	**00**	**00**

TABLE NO.5.6 TRENDS ARE PRODUCTION OF SELECTED CROPS

Sr. No	**Selected Crops**	**1990-95 and 2005-10**	**Taluka**	**Of**	**Jalgaon**	**District**	
			Bodwad	Jalgaon	Erandol	Dharangaon	Amalner
		1990 – 95	N.A	33	63	N.A	7
		%	N.A	5.8	3.03	N.A	2.72
1	Rice	2005 – 10	N.A	23	70	N.A	00
		%	N.A	2.54	8.35	N.A	00
		Vol. of Change	N.A	**-3.26**	**5.32**	N.A	**2.72**
		1990-95	N.A	1136	2132	N.A	1012
		%	N.A	19.87	10.58	N.A	22.30
2	Wheat	2005-10	408	458	1740	605	674
		%	74.63	66.38	17.74	50.25	45.11
		Vol. of Change	**74.63**	**46.51**	**7.16**	**50.25**	**22.81**
		1990-95	N.A	15280	25967	N.A	21358
		%	N.A	15.14	8.90	N.A	10.83
3	Jowar (Kharip + Rabbi)	2005-10	6744	8033	6650	10499	164190
		%	40.07	33.64	40.64	25.74	11.64

		Vol. of Change	**40.07**	**18.5**	**31.74**	**25.74**	**9.19**
		1990-95	N.A	1301	6161	N.A	11519
		%	N.A	62.50	13.19	N.A	7.05
4	Bajra	2005-10	N.A	449	930	490	9056
		%	N.A	65.37	31.56	59.90	3.24
		Vol. of Change	N.A	**2.87**	**18.37**	**59.90**	**-3.81**
		1990-95	N.A	16635	12801	N.A	8093
		%	N.A	7.20	9.35	N.A	14.80
5	Pulses	2005-10	2662	20743	6470	9482	9152
		%	42.70	5.56	17.57	12.00	12.42
		Vol. of Change	**42.70**	**-1.64**	**8.22**	**12.00**	**-2.38**
		1990-95	N.A	15315	23608	N.A	18072
		%	N.A	13.67	9.51	N.A	42.43
6	Cotton	2005-10	14077	23210	7481	22077	26715
		%	21.61	14.10	40.66	23.78	71.38
		Vol. of Change	**21.61**	**1.57**	**31.15**	**23.78**	**28.95**
		1990-95	N.A	586	1766	N.A	536
		%	N.A	31.35	10.40	N.A	34.27
7	Sugar cane	2005-10	N.A	482	920	371	101
		%	N.A	30.88	16.18	40.12	14.3
		Vol. of Change	N.A	**-0.47**	**5.78**	**40.12**	**-19.97**
		1990-95	N.A	7266	8559	N.A	9950
		%	N.A	11.31	9.60	N.A	8.26
8	Oilseeds	2005-10	N.A	7870	2190	147	1090
		%	N.A	21.66	7.82	11.65	15.71
		Vol. of	N.A	**10.35**	**-1.78**	**11.65**	**7.45**

		Change					
		1990-95	N.A	94	419	N.A	1103
		%	N.A	42.56	9.54	N.A	3.62
9	Green Chilly	2005-10	313	118	180	71	840
		%	10.22	27.11	17.77	4.50	3.80
		Vol. of Change	**10.22**	**-15.46**	**8.23**	**4.50**	**0.18**
		1990-95	N.A	33	120	N.A	6
		%	N.A	72.69	19.99	N.A	39.98
10	Maize	2005-10	584	935	1790	106	1042
		%	16.09	10.05	5.25	88.66	90.20
		Vol. of Change	**16.09**	**-62.64**	**-14.74**	**88.66**	**50.22**
		1990-95	N.A	17783	34444	N.A	33904
		%	N.A	19.09	9.86	N.A	10.01
11	Total Food Crops	2005-10	7736	9898	11180	11700	174994
		%	43.96	34.36	30.42	29.07	22.34
		Vol. of Change	**43.96**	**15.27**	**20.56**	**29.07**	**18.67**
		1990-95	N.A	15686	10830	N.A	7061
		%	N.A	5.81	8.42	N.A	12.92
12	Gram	2005-10	1922	20118	4160	8876	8170
		%	48.92	4.67	22.60	10.60	11.51
		Vol. of Change	**48.92**	**-1.14**	**14.18**	**10.60**	**-1.41**
		1990-95	N.A	726	1669	N.A	887
		%	N.A	22.97	9.99	N.A	18.80
13	Tur	2005-10	469	450	1630	443	674
		%	26.34	27.45	7.57	27.88	18.32

		Vol. of Change	**26.34**	**4.48**	**-2.42**	**27.88**	**-0.48**
		1990-95	N.A	3287	2302	N.A	844
		%	N.A	15.97	22.80	N.A	62.20
14	Fruits & Vegetables	2005-10	356	3804	2600	631	893
		%	17.42	16.30	23.85	9.82	69.45
		Vol. of Change	**17.42**	**0.33**	**1.05**	**9.82**	**7.25**
		1990-95	N.A	260	12	N.A	16
		%	N.A	9.02	19.55	N.A	14.66
15	Fodder Crops	2005-10	N.A	310	00	N.A	N.A
		%	N.A	5.75	00	N.A	N.A
		Vol. of Change	N.A	**-3.27**	**19.55**	N.A	**14.66**

TABLE NO.5.6 TRENDS ARE PRODUCTION OF SELECTED AGRICULTURAL CROPS

Sr. No	**Selected Crops**	**1990-95 and 2005-10**	**Taluka Of Jalgaon District**				
			Parola	Bhadgaon	Chalisgaon	Pachora	Jamner
		1990 – 95	21	745	525	1138	765
		%	9.90	2.56	3.63	1.67	2.49
1	Rice	2005 – 10	5	40	00	00	217
		%	11.70	14.62	00	00	2.69
		Vol. of Change	**1.80**	**12.06**	**3.63**	**1.67**	**0.20**
		1990-95	917	1070	1080	2147	953

		%	24.61	21.09	20.90	10.51	23.68
2	Wheat	2005-10	383	1919	1364	1631	588
		%	79.50	15.86	22.32	18.66	51.78
		Vol. of Change	**54.89**	**-5.23**	**1.42**	**8.15**	**28.10**
		1990-95	16450	8347	29617	14890	24665
		%	14.06	27.71	7.81	15.53	9.38
3	Jowar (Khari p + Rabbi)	2005-10	11349	8320	00	12776	17470
		%	23.81	32.48	00	21.15	15.47
		Vol. of Change	**9.75**	**4.77**	**7.81**	**5.62**	**6.09**
		1990-95	11304	4395	28527	8455	4737
		%	7.19	18.50	2.85	9.61	17.16
4	Bajra	2005-10	639	4561	00	5852	2183
		%	45.93	6.43	00	5.01	13.44
		Vol. of Change	**38.74**	**-12.07**	**2.85**	**-4.60**	**-3.72**
			Parola	Bhadgaon	Chalisgaon	Pachora	Jamner
		1990-95	6593	3121	12069	6337	11267
		%	18.17	38.38	9.92	18.90	10.63
5	Pulses	2005-10	4030	2580	925	5856	14242
		%	28.21	44.07	12.29	19.41	7.98
		Vol. of Change	**10.04**	**5.69**	**2.37**	**0.51**	**-2.65**
		1990-95	11233	13827	3449	16526	42591
		%	20.00	16.24	10.82	53.59	55.27
6	Cotton	2005-10	8339	8684	28115	33058	60946
		%	36.48	35.03	65.14	69.20	74.99
		Vol. of	**16.48**	**18.79**	**54.32**	**15.61**	**19.72**

		Change					
		1990-95	336	1536	3364	940	12
		%	54.68	11.96	5.46	19.54	15.31
7	Sugarcane	2005-10	57	1038	2160	314	86
		%	26.11	14.34	6.89	47.41	17.31
		Vol. of Change	**-28.57**	**2.38**	**1.43**	**27.87**	**2.00**
		1990-95	6077	2038	8321	8550	12500
		%	13.53	40.35	9.88	9.61	6.57
8	Oilseeds	2005-10	58	578	2920	347	741
		%	29.53	29.63	5.86	49.36	23.11
		Vol. of Change	**16.00**	**-10.72**	**-4.02**	**39.75**	**16.54**
		1990-95	643	75	304	181	338
		%	6.22	3.34	13.16	22.10	11.83
9	Green Chilly	2005-10	143	75	291	107	317
		%	22.37	0.42	10.99	29.89	10.09
		Vol. of Change	**16.15**	**-2.92**	**-2.17**	**7.79**	**-1.74**
		1990-95	23	24	58	25	1830
		%	10.43	9.99	41.36	5.96	1.31
10	Maize	2005-10	176	33	00	1088	00
		%	53.40	28.48	00	8.63	00
		Vol. of Change	**42.97**	**18.49**	**41.36**	**2.73**	**1.31**
		1990-95	28735	13930	59553	26614	32307
		%	11.81	24.38	5.70	12.76	10.51
11	Total Food	2005-10	12572	14883	1364	21347	20458

	Crops						
		%	27.05	22.85	24.93	15.93	16.62
		Vol. of Change	**15.24**	**-1.53**	**19.23**	**2.63**	**6.11**
		1990-95	4251	2088	5868	3902	6066
		%	21.46	43.70	15.55	23.38	15.04
12	Gram	2005-10	3097	1907	925	4586	8280
		%	30.36	49.31	10.16	20.50	11.35
		Vol. of Change	**8.90**	**5.61**	**-5.39**	**-2.88**	**-3.69**
		1990-95	1641	506	1712	1680	2614
		%	10.16	32.95	9.74	9.92	6.37
13	Tur	2005-10	725	621	00	812	2842
		%	17.04	19.89	00	15.21	4.34
		Vol. of Change	**6.88**	**-13.06**	**9.74**	**5.29**	**-2.03**
		1990-95	769	3018	1699	2890	3124
		%	68.27	17.39	30.99	16.66	16.80
14	Fruits & Vegetables	2005-10	689	2030	1845	1857	3634
		%	90.01	30.55	33.61	33.39	17.07
		Vol. of Change	**21.74**	**13.16**	**2.62**	**16.73**	**0.27**
		1990-95	00	50	282	00	20
		%	00	46.94	8.32	00	11.73
15	Fodder Crops	2005-10	00	45	591	186	20
		%	00	39.62	2.98	9.58	59.15
		Vol. of Change	**00**	**-6.32**	**-5.34**	**9.58**	**47.42**

			Chopda	Yawal	Raver	Muktainagar	Bhusawal
16	**Total**	**1990-95**	**111365**	**88480**	**90163**	**61654**	**86245**
	Cropped	**%**	100	100	100	100	100
	Area	**2005-10**	**91579**	**62357**	**77499**	**52890**	**31018**
		%	100	100	100	100	100
			Bodwad	Jalgaon	Erandol	Dharangaon	Amalner
17	**Total**	**1990-95**	N.A	**95421**	**130853**	N.A	**114368**
	Cropped	**%**	100	100	100	100	100
	Area	**2005-10**	**35271**	**96901**	**47991**	**46484**	**397561**
		%	100	100	100	100	100
			Parola	Bhadgaon	Chalisgaon	Pachora	Jamner
18	**Total**	**1990-95**	**88993**	**54770**	**156428**	**94275**	**143789**
	Cropped	**%**	100	100	100	100	100
	Area	**2005-10**	**42262**	**47314**	**40500**	**89817**	**131695**
		%	100	100	100	100	100
19	**Total**	**1990-95**	**1316803**				
	District	**%**	100	**Difference =**			
	Area	**2005-10**	**1391139**	**74336**			

Source: Socio-Economic Abstract of Jalgaon District 1990-95 to 2005-10, Computed by Researcher

1) Rice:

Rice is a very rare and poor quality food crop worthless fodder that taken on alluvial loamy soils or hilly base lands area in cultivation in Jalgaon district. Rice crop cultivation was practices in hot humid climatic conditions for its production, but it has been slightly fluctuating in percentage during the period of 1990-95 to 2005-10. Where the above 10 percent of the gross cropped area was under this crop in Parola and Bhadgaon tehsils. While it was 5 percent to 10 percent in Chopda, Yawal tehsils during the period of 1990 to 95 in table no. 6.5. Below 5

percent of total gross cropped area was noted under the rice in Raver, Muktainagar, Bhusawal, Jalgaon, Erandol, Amalner, Chalisgaon, Pachora and Jamner tehsils in the same period.

In Jalgaon district during the period of under investigation where less than 5% decrease in rice was found in Chopda, Yawal, Raver, Muktainagar and Jalgaon tehsils from 1990-95 to 2005-10. Where the increase of 5% in Bhusawal, and Erandol tehsils. Below less than 5% increase in Parola, Bhadgaon, Chalisgaon, Pachora, Jamner and Amalner tehsils under the investigation period. The highest positive change in rice area i.e. above 10% was noted in Bhadgaon tehsils from 1990-95 to 2005-10 and very lowest negative change was found in Jamner tehsils during the same period of investigation.

2) Wheat:

Wheat is properly cultivated in the Jalgaon district. The local names of wheat are called as ‘Gahu’. In the study region the farmers was taken two varieties of wheat; the local name of variety is ‘147’ wheat and ‘Lokwan’ wheat. 147 wheat was popular in Jalgaon district and maximum people were using this wheat variety. Because in the wheat a high calcium and proteins content included. So the wheat crops are important crops for eat and fodder crops.

The production of wheat is due to favorable climatic conditions and black soils and maximum support under the well irrigation in Jalgaon district. Out of the total gross cropped area in the district was under the wheat of cropped area, where about the 60% in found in Bodwad, Jalgaon and Parola tehsils and below 50% to 60% are noted in Bhusawal, Dharangaon and Jamner taluka; below 40% to 50% was found in Amalner tehsils.

Below very less 40% was observed in Chopda, Yawal, Raver, Muktainagar, Erandol, Bhadgaon, Chalisgaon and Pachora tehsils during the period of 2005-10 under the investigation. In period of 1990-95 of total gross cropped area under the wheat cropped area in the district was found in above 30% in only Chopda tehsils, where below 20% to 30% was noted in Amalner, Parola, Bhadgaon, Chalisgaon and Jamner tehsils.

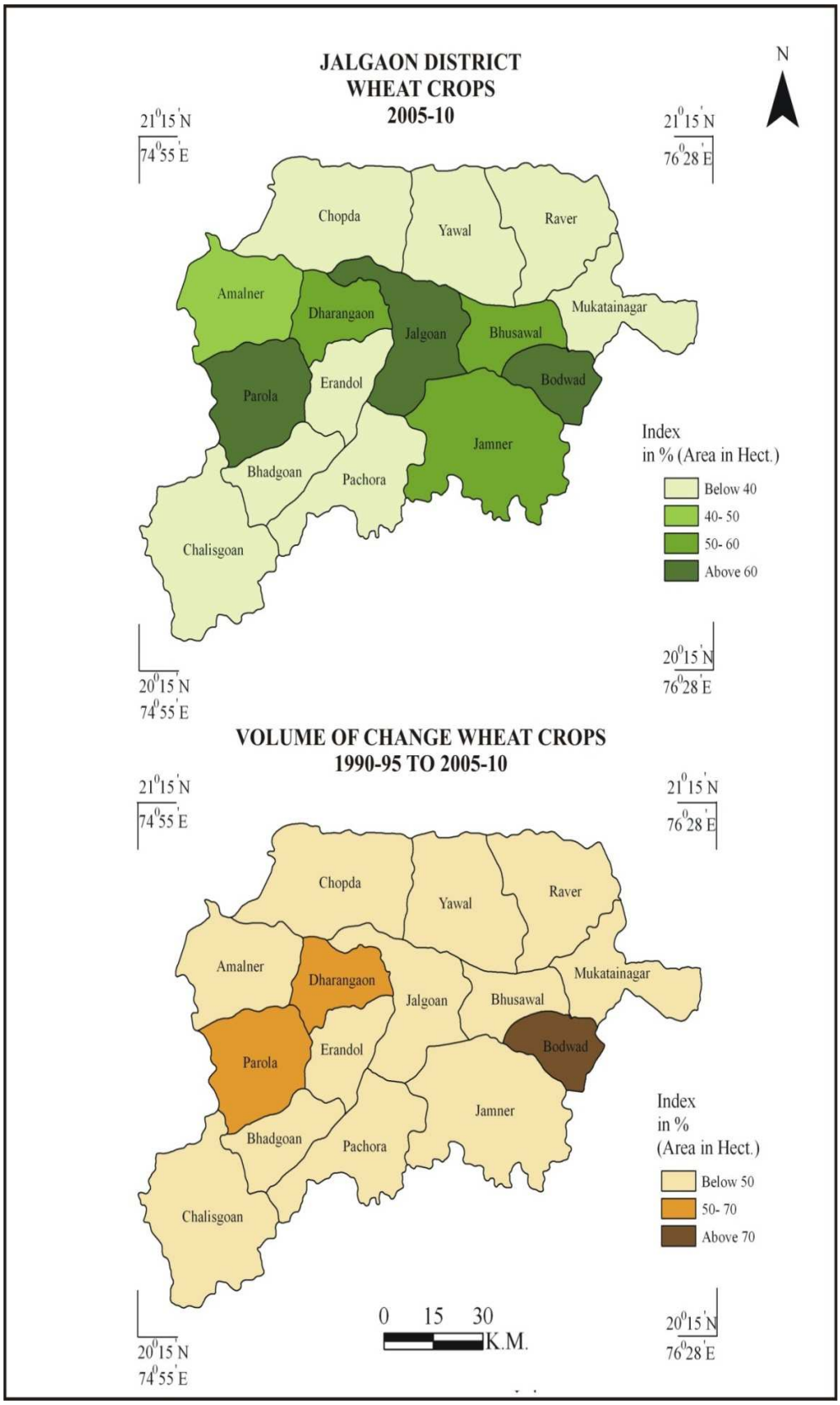
Below 20% very less was observed in Muktainagar, Bhusawal, Jalgaon, Erandol, Dharangaon and Pachora tehsils. Under the investigation period of 1990-95 to 2005-10 the highest positive change was observed above 70% in Bodwad tehsils, and 50% to 70% was observed in Dharangaon and Parola tehsils. A very less below 50% was noted in Chopda, Muktainagar, Bhusawal, Jalgaon, Erandol, Amalner, Chalisgaon, Pachora and Jamner tehsils; during the investigation period of negative change was found in Yawal, Raver and Bhadgaon tehsils in 1990-95 to 2005-10.

3) Jowar:

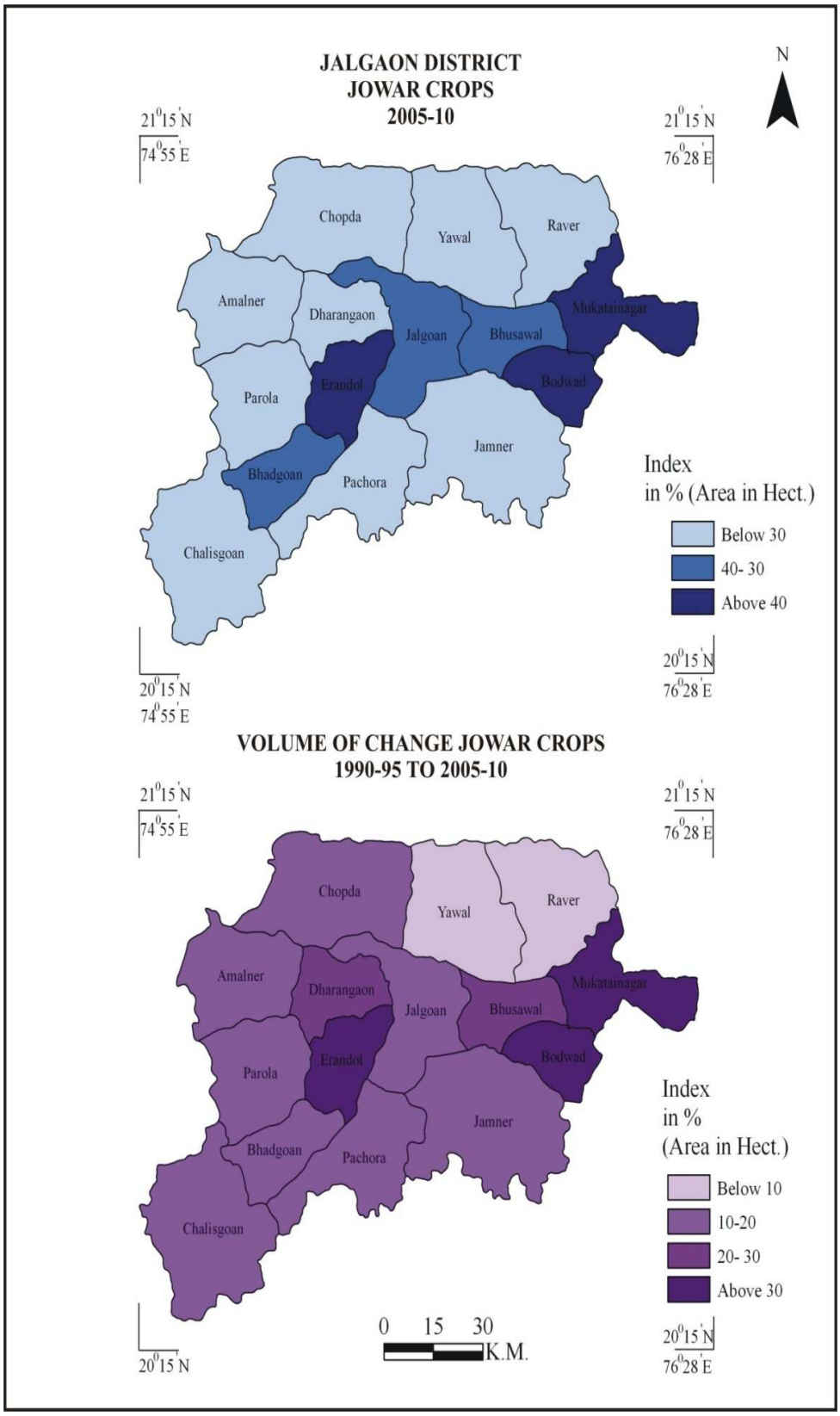
Jowar is an important crop in the study region under the investigation period of 1990-95 to 2005-10. Jowar is cultivated in good climatic conditions, environment, it provides not only fodder for people but also fodder for live stocks animal which has friend of farmers. Jowar was cultivated in both Kharip and Rabbi Season in the study region. Jowar is the second most important crops was taken in Jalgaon district due to favorable climatic conditions, black soil and most suitable and drastic impact of irrigation facilities to growing up jowar crops.

Gross cropped area under the jowar crop cultivation area was above 20% found in only Bhadgaon tehsils, between 10% to 20% was observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Jalgaon, Amalner, Parola and Pachora tehsils. While below 10% was seen in Erandol, Chalisgaon and Jamner tehsils during the investigation period of 1990-95. Tehsils was recorded above 40% to 50% in Muktainagar, Bodwad and Erandol tehsils.

Below 40% to 30% was observed in Bhusawal, Jalgaon and Bhadgaon tehsils. Where the percentage of below 30% was recorded in Chopda, Yawal, Raver, Dharangaon, Amalner, Parola, Pachora and Jamner tehsils during the period of 2005-10 in study region.


JALGAON DISTRICT
WHEAT CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 40
40- 50
50- 60
Above 60
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE WHEAT CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 50
50- 70
Above 70
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.18


JALGAON DISTRICT
JOWAR CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 30
40- 30
Above 40
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE JOWAR CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
10-20
20- 30
Above 30
0 15 30
K.M.
20°15'N
76°28'E
20°15'N

Map No.5.19

Highest positive change in Jowar crop areas i.e. above 30% was recorded in Muktainagar, Bodwad and Erandol tehsils. Between 20% to 30% was seen in Bhusawal and Dharangaon tehsils, it is very comprise to jowar crops area was observed below 20% in Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils. The lowest negative changes was noted in Jalgaon district only two tehsils namely as Yawal and Raver tehsils under the investigation period of 1990-95 to 2005-10.

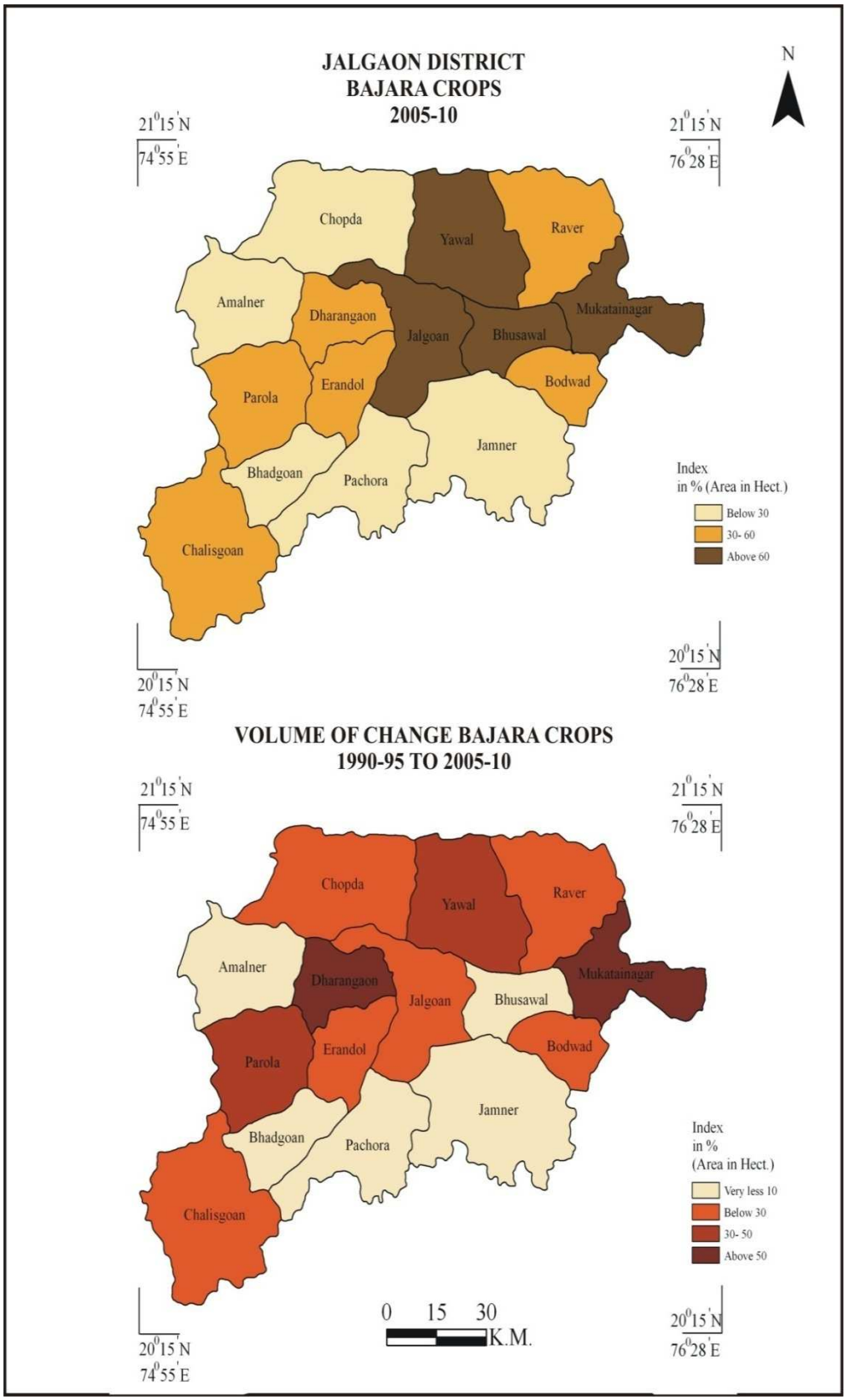
4) Bajra:

Bajra is a food grain grown in the study region. It was taken in Kharip season almost after the rainy season. Due to climatic condition hot and dry temperature and suitable for soil conditions which was responsible for higher to average land under the crop of bajra cultivation during the investigation period of 1990-95 to 2005-10.

The spatial and temporal variation of bajra was seen in all tehsils, it is grown in all tehsils in Jalgaon district. Period of 1990-95 under the bajra crop cultivation above 60% was observed in Raver, Bhusawal and Jalgaon tehsils. Between 30% to 60% was noted in Yawal tehsils. Below 30% was observed in Chopda, Muktainagar, Erandol, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils during the searching period.

Investigation period of 2005-10 under the bajra crop cultivation was observed above 60% in Yawal, Muktainagar, Bhusawal and Jalgaon tehsils. Between 30% to 60% was seen in Erandol, Dharangaon and Parola tehsils. Below 30% was noted bajra crop cultivation in Chopda, Amalner, Bhadgaon, Pachora and Jamner tehsils period of 2005-10. Certainly bajra was popular and favorite fodder crops in study region, so it was the highest positive changes and negative changes.

Highest positive changes were observed in above 50% in Muktainagar and Dharangaon tehsils. 30% to 50% was noted in Yawal and Parola tehsils. Below 30% was observed in Chopda, Bodwad, Jalgaon, Erandol and Chalisgaon.


JALGAON DISTRICT
BAJARA CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 30
30- 60
Above 60
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE BAJARA CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Very less 10
Below 30
30- 50
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.20

Lowest negative changes was noted below 30% in Bhusawal, Amalner, Bhadgaon, Pachora and Jamner tehsils during the same investigation period.

5) Pulses:

Pulses are occupying an important stable crop in Jalgaon district at the economy sector position. Udid, Val, Moong etc, are various pulses were grown in the study region. These are nutritional food which is taken in Kharip and Rabi season. The proportion of area under the pulses in the study regions is 38% during the 1990-95 and 45% in 2005-10 under the investigation period. Table No.6.5 shows the percentage of variations in all tehsils in Jalgaon district, ranging from the high to low.

The pulses growing in all tehsils of study region, where the period of 1990-95 above 20% was found in Bhadgaon tehsils, between 10% to 20% was observed in Raver, Muktainagar, Bhusawal, Amalner, Parola, Pachora and Jamner tehsils. Very low percentage below10% was seen in Chopda, Yawal, Raver, Jalgaon, Bodwad, Dharangaon, Erandol and Chalisgaon tehsils.

Investigation period of 2005-10 under the investigation area under these crops in study region above 40% were seen in Bodwad and Bhadgaon tehsils. 20% to 40% was observed in Raver, Muktainagar and Parola tehsils. Very low percentage below 20% was noted in Chopda, Yawal, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Chalisgaon, Pachora and Jamner tehsils.

Overall positive changes are increasing the negative changes are decreasing in an area during the period of investigations. Only three tehsils has shown decrease in the area where the negative changes was there. Jalgaon, Amalner and Jamner tehsils shows below 3% negative change in these areas.

The positive changes pulses areas was observed above 10% in Raver, Dharangaon and Parola tehsils and very low positive changes means some areas were increase below 10% was noted in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Erandol, Bhadgaon, Chalisgaon and Pachora tehsils between the period of 1990-95 to 2005-10 overall in Jalgaon district.

6) Cotton:

The cotton is important cash crops and principal crops require considerable amount of water to supply of irrigation water. The cotton crop areas confined mainly to the irrigated sources of the study region. Maximum well irrigation of water are supply to cotton crops in near about all tehsils, some areas water can supply through surface and canal irrigation, so the maximum impact on the agriculture production well as development of Jalgaon district.

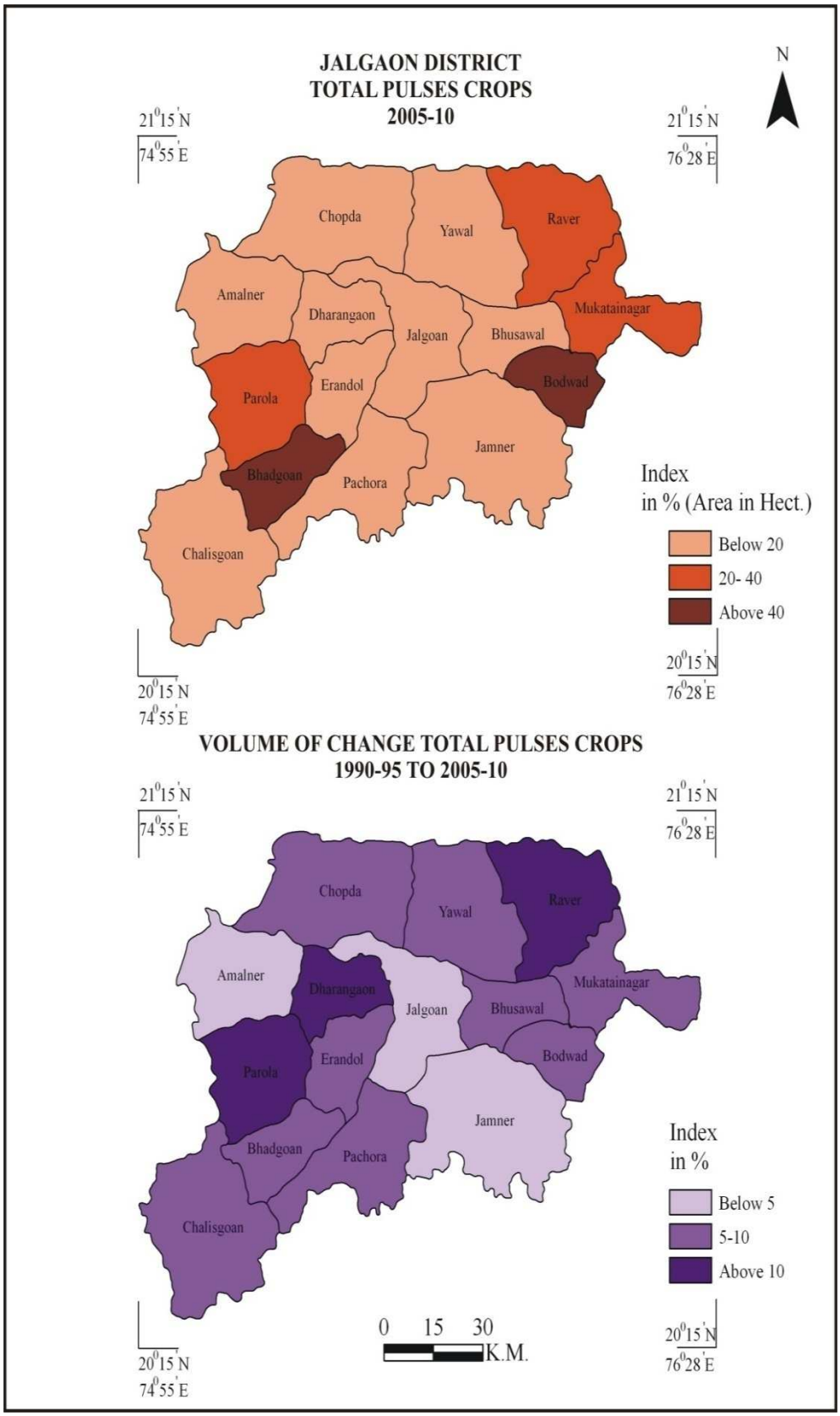
Cotton production in study region in a proportionate above 80% cropped area. Suitable humid climatic condition, black soils, temperature, chemical fertilizers, green manure and farmer hard work is essential.

Soil and irrigation most important factor to growth of cotton production. Because in this region soil is 100% suitable for cotton in all season, so in this region soil is called ‘black cotton soils’ and irrigation sources are available in each tehsils to grown cotton crop production..

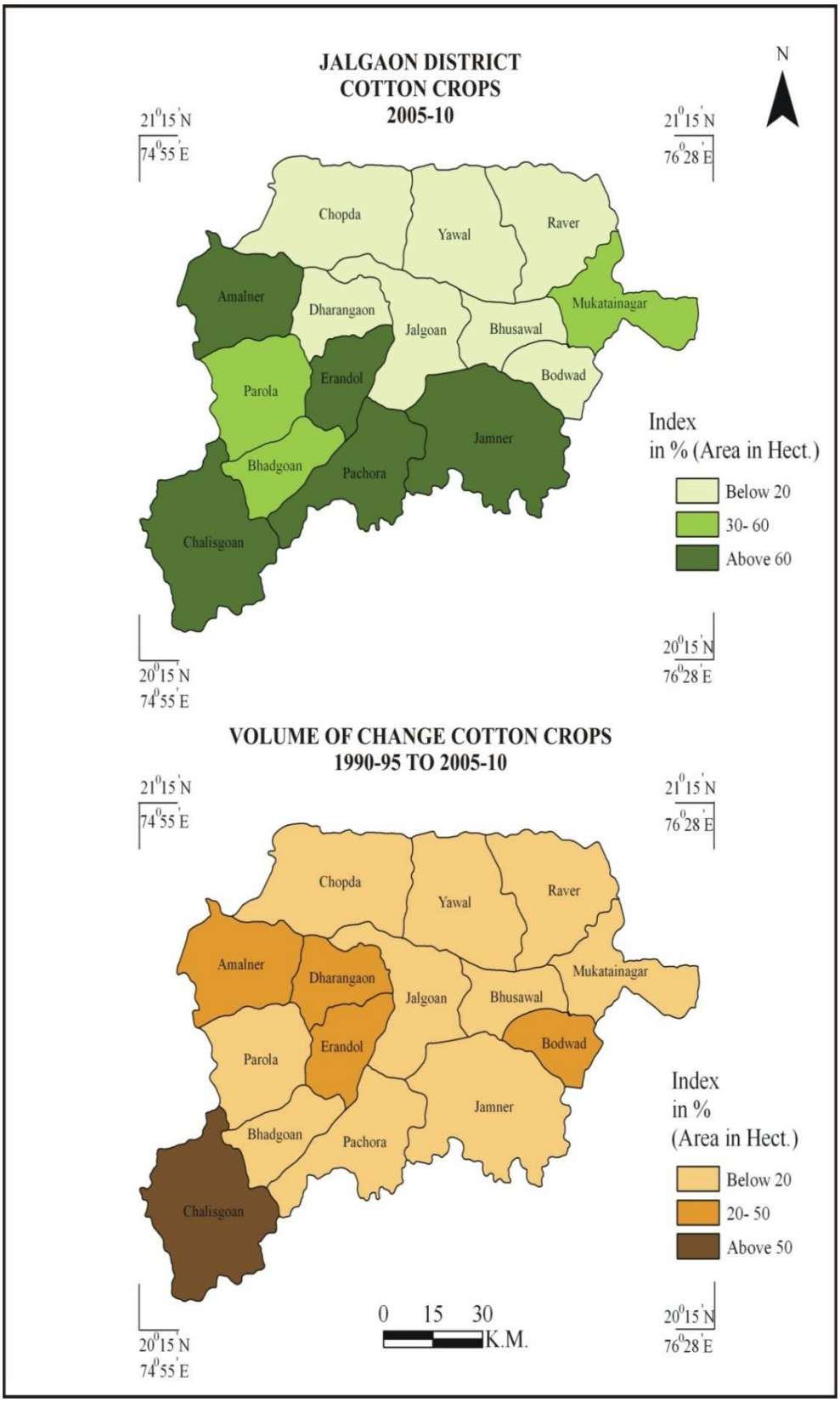
Cotton cash crops has spatio-temporal variations in all tehsils shows in table no.6.5, no negative changes was found in all tehsils so the area were not decrease in an cotton cropped areas. It is good significant to shows overall positive changes in each tehsils of cotton cropped areas.

All areas are under the cotton crops after jowar and bajra crops during the investigation period. The period of 1990-95 the percentage of cotton crops in each tehsils was observed above 40% in Amalner, Pachora and Jamner tehsils, between 20% to 40% was noted in Raver and Parola tehsils. Below 20% was seen in Chopda, Yawal, Muktainagar, Bhusawal, Bodwad, Jalgaon, Erandol, Dharangaon, Bhadgaon and Chalisgaon tehsils during the investigation period of 1990-95.

During the investigation period of 2005-10 the percentage of above 60% was observed in Amalner, Chalisgaon, Pachora and Jamner tehsils; during the same period of cotton cropped area between 30% to 60% was noted in Muktainagar, Parola and Bhadgaon tehsils.


JALGAON DISTRICT
TOTAL PULSES CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
20- 40
Above 40
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE TOTAL PULSES CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-10
Above 10
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.21


JALGAON DISTRICT
COTTON CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
30- 60
Above 60
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE COTTON CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 20
20- 50
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.22

Below 30% was seen in Chopda, Yawal, Raver, Bhusawal, Bodwad, Jalgaon and Dharangaon tehsils. Highest positive change in all tehsils of Jalgaon district, it could be not less and not low changes. The highest value of positive changes of cotton crops above 50% were found in only Chalisgaon tehsils, between 20% to 50% positive change was observed in Bodwad, Erandol, Dharangaon and Amalner tehsils. Below 20% was noted in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Jalgaon, Parola, Bhadgaon, Pachora and Jamner tehsils.

7) Sugarcane:

The sugarcane crop is a long duration cash crop grown in the study region. It is confined to irrigation sources (well irrigation, canal irrigation, surface irrigation) amount of water way to the study region. The sugarcane crop has been steadily average increasing and decreasing of the study region. These cash crops are mainly depends on sugar factories. If sugar factory well started and well in condition, government policies to support them, or were involved then surrounding areas was start to grown of sugarcane crop production.

These crops are only irrigated crop and are grown all over the district in deep black soils. Pachora and Chalisgaon tehsils occupies of sugarcane productions limited. The production of sugarcane and its hector share is negligible in the study region. It has maximum water to supply, high temperature, moisture and irrigation facilities. The regional pattern of sugarcane area is affected by lack of human worker, factories strikes, government policies, government very low rate to given the farmers and political problem so the factory should not continue; there is a major problem seen in the study region.

During the period of 1990-95 under the sugarcane cropped areas above 30% was observed in Bhusawal, Jalgaon, Amalner and Parola tehsils. Between 10% to 30% was noted in Raver, Erandol, Bhadgaon, Pachora and Jamner tehsils. Below 10% was seen in Chopda, Yawal, Muktainagar, Bodwad, Dharangaon and Chalisgaon tehsils during the period of 1990-95.

Under the investigation period of 2005-10 above 30% was observed in Jalgaon, Dharangaon and Pachora tehsils. Between the 10% to 30% was noted in Erandol, Amalner, Bhadgaon and Jamner tehsils. Below 10% very low percentage

value was observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Bodwad and Chalisgaon tehsils. During the period of 1990-95 to 2005-10 under the investigation the positive and negative changes in the sugarcane cropped area of each tehsils.

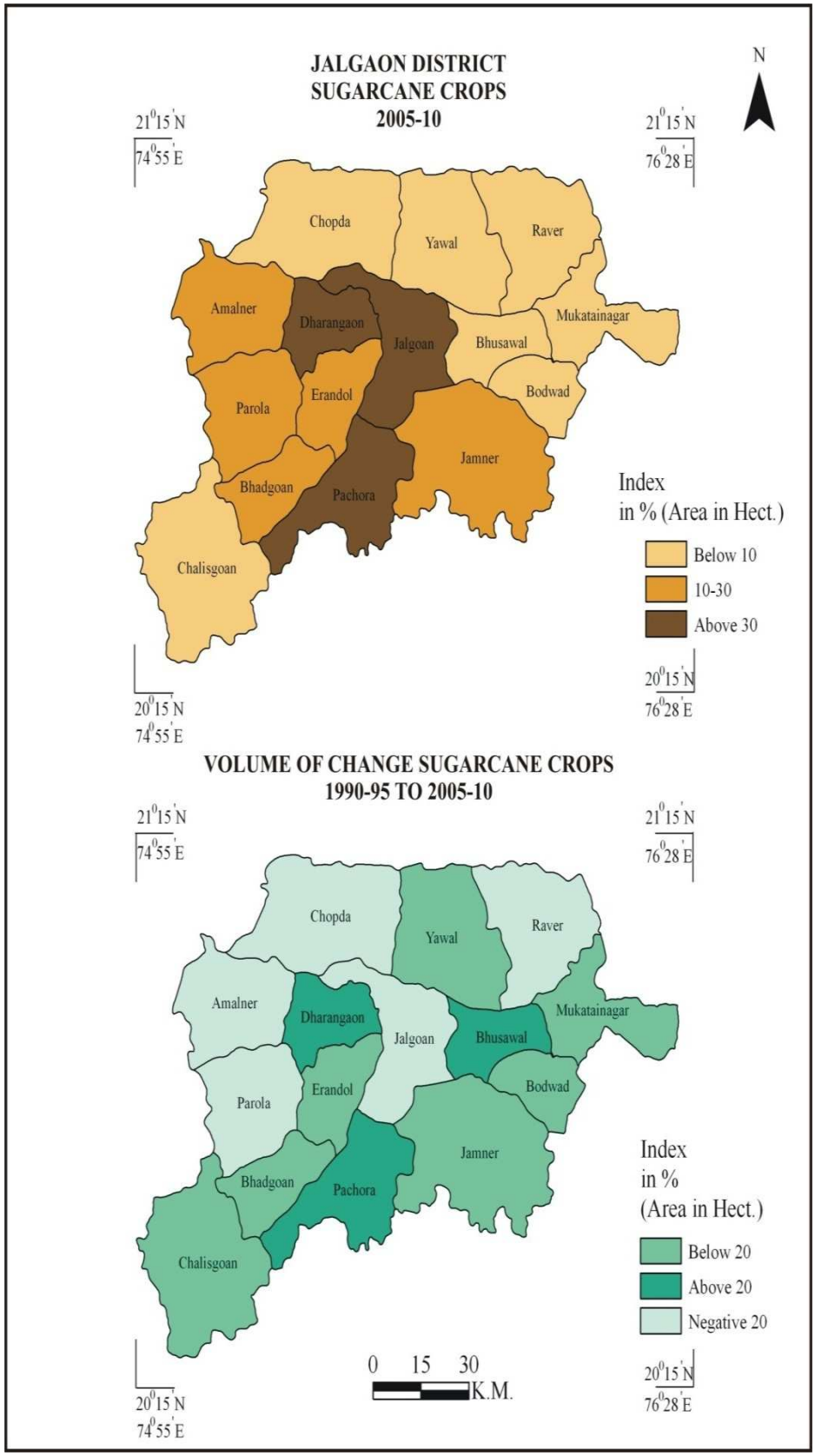
The positive changes above 20% in Bhusawal, Dharangaon and Pachora tehsils, below 20% was observed in Yawal, Muktainagar, Bodwad, Erandol, Bhadgaon, Chalisgaon and Jamner tehsils. In other part of negative changes was found in four tehsils, below 20% namely is Chopda, Raver, Jalgaon, Amalner and Parola tehsils decreasing area under this crop was investigation period of 1990-95 to 2005-10.

8) Oilseeds:

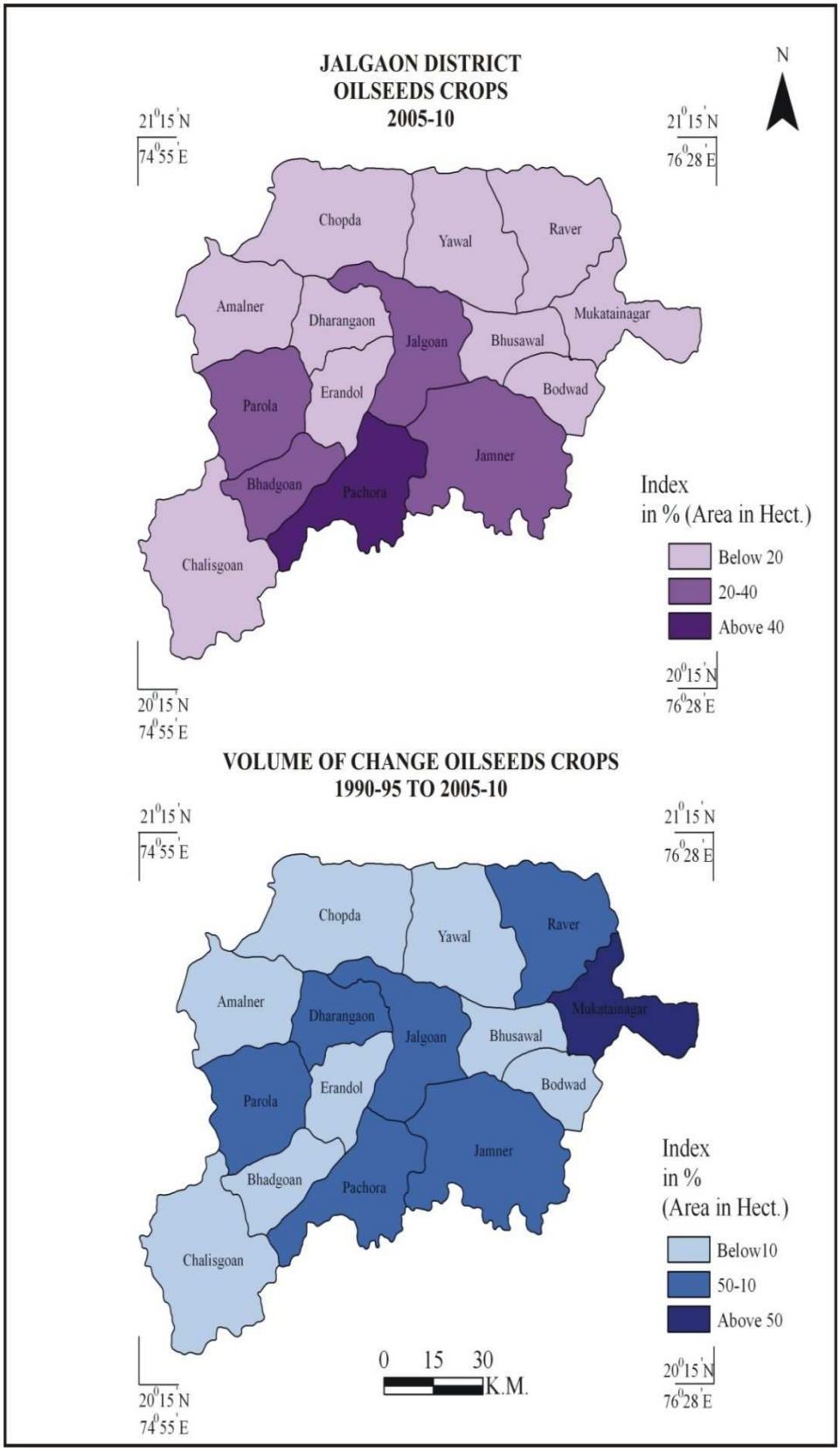
The major crops like ground nut, sesames, sunflower, soyabean these are treated under oilseeds in the present study region. All oilseeds crops which is mostly grown in rain fed area. It is grown in both Kharip and Rabi season and black soil of good depth, climatic conditions and support of irrigation water. Out of these crops the statistics for individual oilseeds being in a significant and as the data available for variations, it has been exhibited and shows in table no.5.6.

It is clear from the table no.6.5 that areas great spatio-temporal variation in the oilseeds cropped area. In the period of 1990-95 oilseeds was highest production above 50% of land areas; but the period of 2005-10 the oilseeds crops cultivation was decreasing, it takes below 50% because farmers moved to maximum benefit of crop production like cotton, jowar, bajra, vegetables etc.

Spatio-temporal variations and changes in oilseeds of each tehsils clearly shows in table no.5.6. About 40% area under oilseeds was observed in Muktainagar and Bhadgaon tehsils. The percentage value of 30% to 40% gross cropped area was experienced under the oilseeds only in Raver tehsils in Jalgaon district.


JALGAON DISTRICT
SUGARCANE CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 10
10-30
Above 30
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE SUGARCANE CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 20
Above 20
Negative 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.23


JALGAON DISTRICT
OILSEEDS CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
20-40
Above 40
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE OILSEEDS CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below10
50-10
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.24

Very low percent below 30% was noted in Chopda, Yawal, Bhusawal, Bodwad, Dharangaon, Jalgaon, Erandol, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils during the period of 1990-95. Above 40% was observed in Pachora tehsils, between 20% to 40% was noted in Jalgaon, Parola, Bhadgaon and Jamner tehsils.

Below 20% was seen in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Bodwad, Erandol, Dharangaon, Amalner and Chalisgaon tehsils during the investigation period of 2005-10. Table no.6.5 is exhibit of volume of change in the area of oilseeds. There has been remarkable increase of decrease in the area under oilseeds in the study region during the same period of investigation. Increase in the area under oilseeds in easily noticeable.

As per positive changes above 10% increase in oilseeds area was recorded Raver, Jalgaon, Dharangaon, Parola, Pachora and Jamner tehsils. Below 10% changes was observed in Bodwad and Amalner tehsils. Where the negative response shift in oilseeds area was experienced above 50% in Muktainagar tehsils and below 50% was observed in Chopda, Yawal, Bhusawal, Erandol, Bhadgaon and Chalisgaon tehsils during the period of 1990-95 to 2005-10.

9) Green Chilly:

Chilly is a non food crop and important crops was observed in study region in 1990-95 to 2005-10. Chilly has two types, green and red; but highest production of green chilly has average experienced in the Jalgaon district, very small areas percentage was increase and decrease under the chilly cropped area. This crop has taken into green vegetables farming the cultivation of other crops.

Chilly is depend on hot or some little bit hot and size of chilly is long 10 cm and short 5cm. Short chilly using in fast food material and long chilly use in dinner and lunch for prepared a ‘spicy green vegetables’ with ‘roti’ in study region. Dry chilly powder it means red chatni popular in this region, it can be use in maximum quantity with dinner and lunch.

The percentage above 20% area under the green chilly was observed in Muktainagar, Jalgaon and Pachora tehsils. Below 20% to 10% was noted in Chopda, Raver, Bhusawal, Chalisgaon and Jamner tehsils.

Very low percentage observed below 10% in Yawal, Erandol, Amalner, Parola and Bhadgaon tehsils during the period of 1990-95. A percentage area under the chilly production above 20% was observed in Bhusawal, Jalgaon, Parola and Pachora tehsils. Between 10% to 20% was noted in Chopda, Muktainagar, Chalisgaon and Jamner tehsils. Where the below 10% was notice in Yawal, Raver, Dharangaon, Amalner and Bhadgaon tehsils during the period of 2005-10.

Volume of change was experienced in study region, a positive and negative changes has been recorded shows in table no.5.6; in Jalgaon district shows that there has been a small ratio shift was areas in pattern.

Positive changes was observed in above 10% Muktainagar, Bhusawal, Bodwad, Erandol, Dharangaon, Amalner, Parola and Pachora tehsils. Negative changes below 10% was noted in Chopda, Yawal, Raver, Jalgaon, Bhadgaon, Chalisgaon and Jamner tehsils investigation period of 1990-95 to 2005-10 in Jalgaon district.

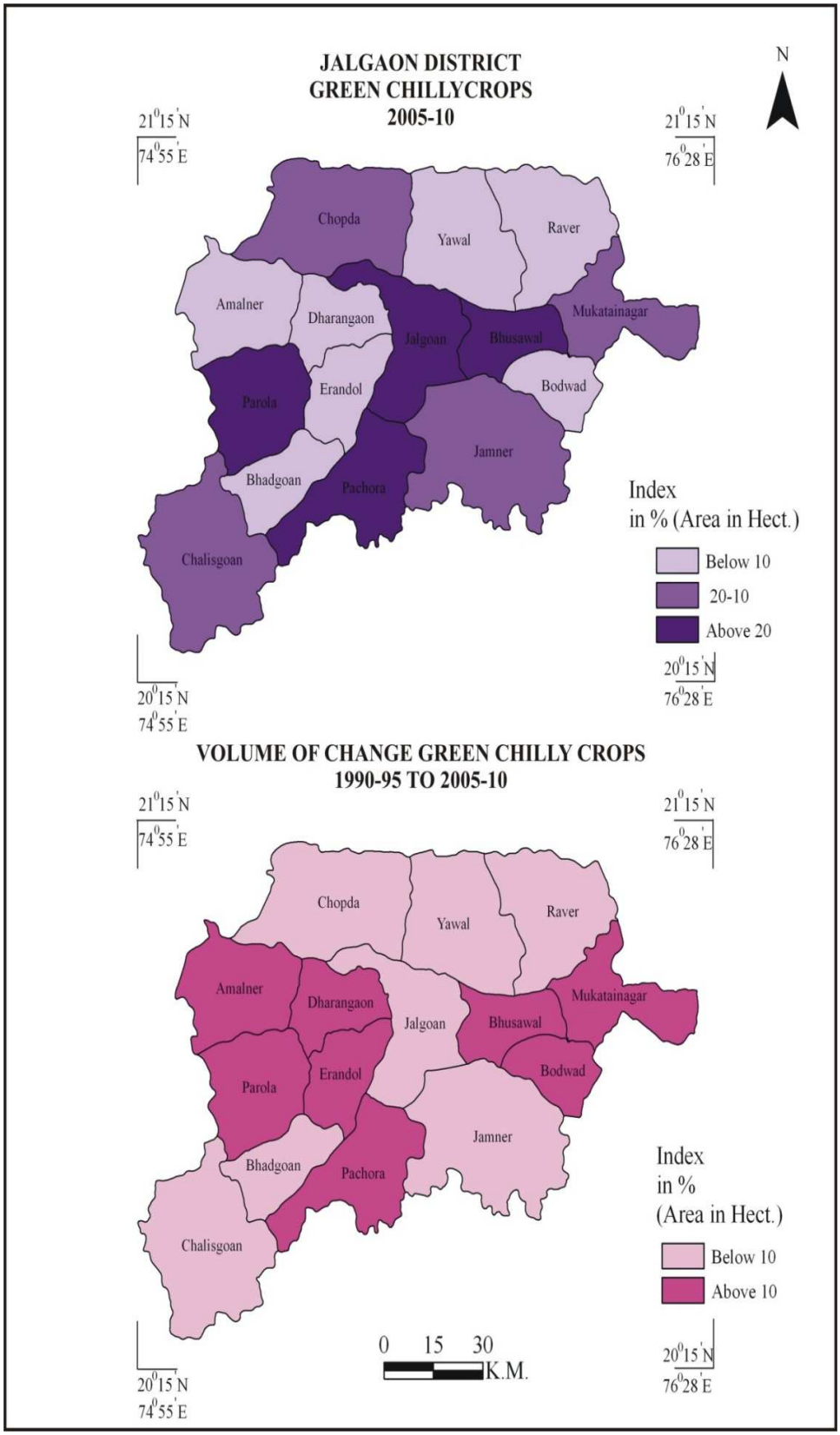
10) Maize:

Maize is a long time of cash crop requiring considerable amount of water. This crop has taken after the wheat crop production or before production in the season. Maize is poor cash crops was small area in cultivated during the investigation period.

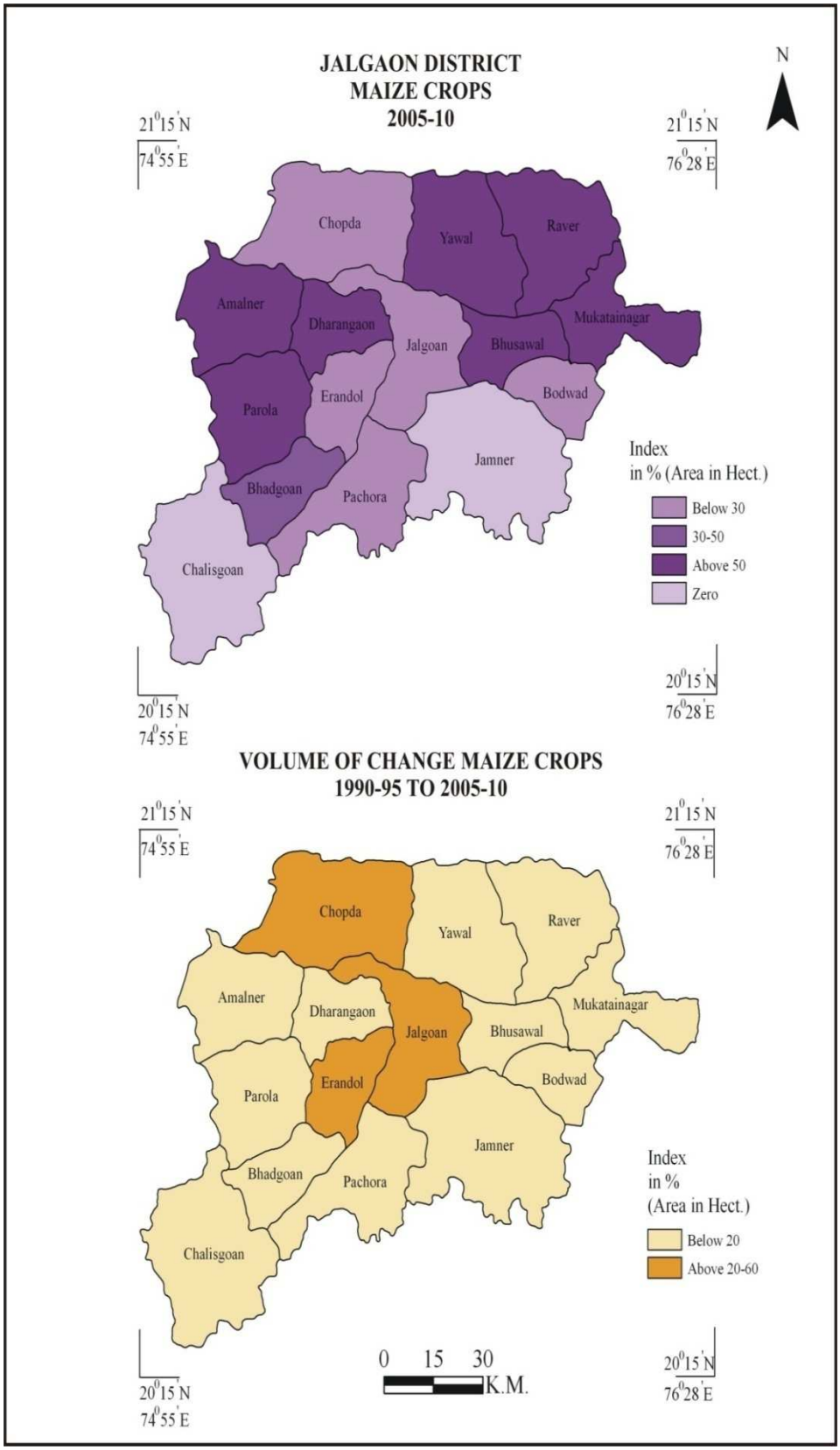
During the period of 1990-95 under the maize crop to total gross cropped area above 50% was practice in Raver and Jalgaon tehsils. Such as production between 30% to 50% was notice in Bhusawal, Amalner and Chalisgaon tehsils.

Observing below 30% in Chopda, Yawal, Muktainagar, Bodwad, Dharangaon, Erandol, Parola, Bhadgaon, Pachora and Jamner tehsils during the period of 1990-95. Above 50% was observed in Yawal, Raver, Muktainagar, Bhusawal, Dharangaon, Amalner and Parola tehsils.

Investigation of the same period in Jalgaon district under the maize areas between 30% to 50% was observed only in Bhadgaon tehsils. Below 30% was noted in Chopda, Bodwad, Jalgaon, Erandol and Pachora tehsils.


JALGAON DISTRICT
GREEN CHILLYCROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 10
20-10
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE GREEN CHILLY CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
Above 10
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.25


JALGAON DISTRICT
MAIZE CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 30
30-50
Above 50
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE MAIZE CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 20
Above 20-60
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.26

Zero percent area was seen in Chalisgaon and Jamner tehsils during the period of 2005-10. Table no.6.5 shows volume of change in maize area bring out an overall increase and decrease in area during the period of investigation. Three tehsils has been negative change was observed and notice area under maize, name as Chopda, Jalgaon and Erandol respectively below 60% and above 60% changes of positive was recorded in Yawal, Raver, Muktainagar, Bhusawal, Bodwad, Dharangaon, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils under investigation period of 1990-95 to 2005-10 it shows in table no.6.5.

11) Total Food Crops:

Total food crops include with rice, wheat, jowar, bajra, pulses, maize, vari, ragi, other nuts, some vegetables include onion, potato, muttor, beat and sweet under root (Ratale). The proportion of area under the total food crops to the gross cropped area has been increased by 58% in 2005-10 and decrease in 25% observed in the period of 1990-95. The food crops growing areas of all tehsils of Jalgaon district, mainly as Yawal, Bhusawal and Bodwad, it shows in table no.6.5 with spatial & temporal variation can be noted in each tehsils during the investigation period of 1990-95 to 2005-10.

In spatial and temporal variations and distribution of total food crops recorded in all tehsils respectively. The percentage above 30% was found in Muktainagar tehsils. Total food crops area to total gross cropped area under the tehsils was observed between 20% to 30% in Yawal and Bhadgaon tehsils. As per table no.5.6 was shows below 20% was noted in Chopda, Raver, Bhusawal, Bodwad, Dharangaon, Jalgaon, Erandol, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils during the investigation.

Other than the area under the total food crops to gross cropped area above 50% was recorded in Yawal tehsils. Such different condition was found in other tehsils where the percentage above 30% to 50% noted in Bhusawal, Bodwad, Jalgaon and Erandol tehsils. As per low percentage in Chopda, Raver, Muktainagar, Dharangaon, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils was observed below 30% during the investigation period of 2005-10.

Volume of changes as positive and negative was registered in the period of searching. The negative changes was decreases only three tehsils of study region an easily found it and name as Muktainagar, Raver and Bhadgaon tehsils which is observed below 10% was noticeable. Positive changes are various conditions due physical, social, economic are drastically impact where the areas has increased due to irrigation facilities, so the crops was increases and volume of change was high.

It was observed above 20% in Yawal, Bhusawal, Bodwad, Erandol and Dharangaon tehsils. Between 10 to 20% was seen in Chopda, Jalgaon, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils under the investigation period of 1990-95 to 2005-10 it shows in table no.6.5.

12) Gram:

Gram is important food for both human and live stocks was observed in study region. It has nutritional and protein base food as an addition with also constitutes an important chain in rotational system of crops from the point of view of soil management. The main base of crop gram is a Rabi crop and generally favor in rain fed and it rarely needs to irrigation sources.

During the investigation period in 1990-95 was observing and analyze to each tehsils of Jalgaon district, it shows the clearly indicate the data are high or low in percentage in table no.5.6, above 20% was recorded in Parola, Bhadgaon and Pachora tehsils. Below 20% was noted in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Bodwad, Dharangaon, Jalgaon, Erandol, Amalner, Chalisgaon and Jamner tehsils.

Period of 2005-10 investigate and find out the statistics above 20% was observed in Raver, Muktainagar, Bodwad, Erandol, Parola, Bhadgaon and Pachora tehsils. Below 20% was noted in Chopda, Yawal, Bhusawal, Jalgaon, Dharangaon, Amalner, Chalisgaon and Jamner tehsils.

The period of under investigation has witnessed the areas under gram, which increase or decrease in 1990-95 to 2005-10 whether the positive changes under the gram area of total gross cropped area was observed above 20% in Bodwad tehsils and below 20% was observed in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Erandol, Dharangaon, Parola and Bhadgaon tehsils.

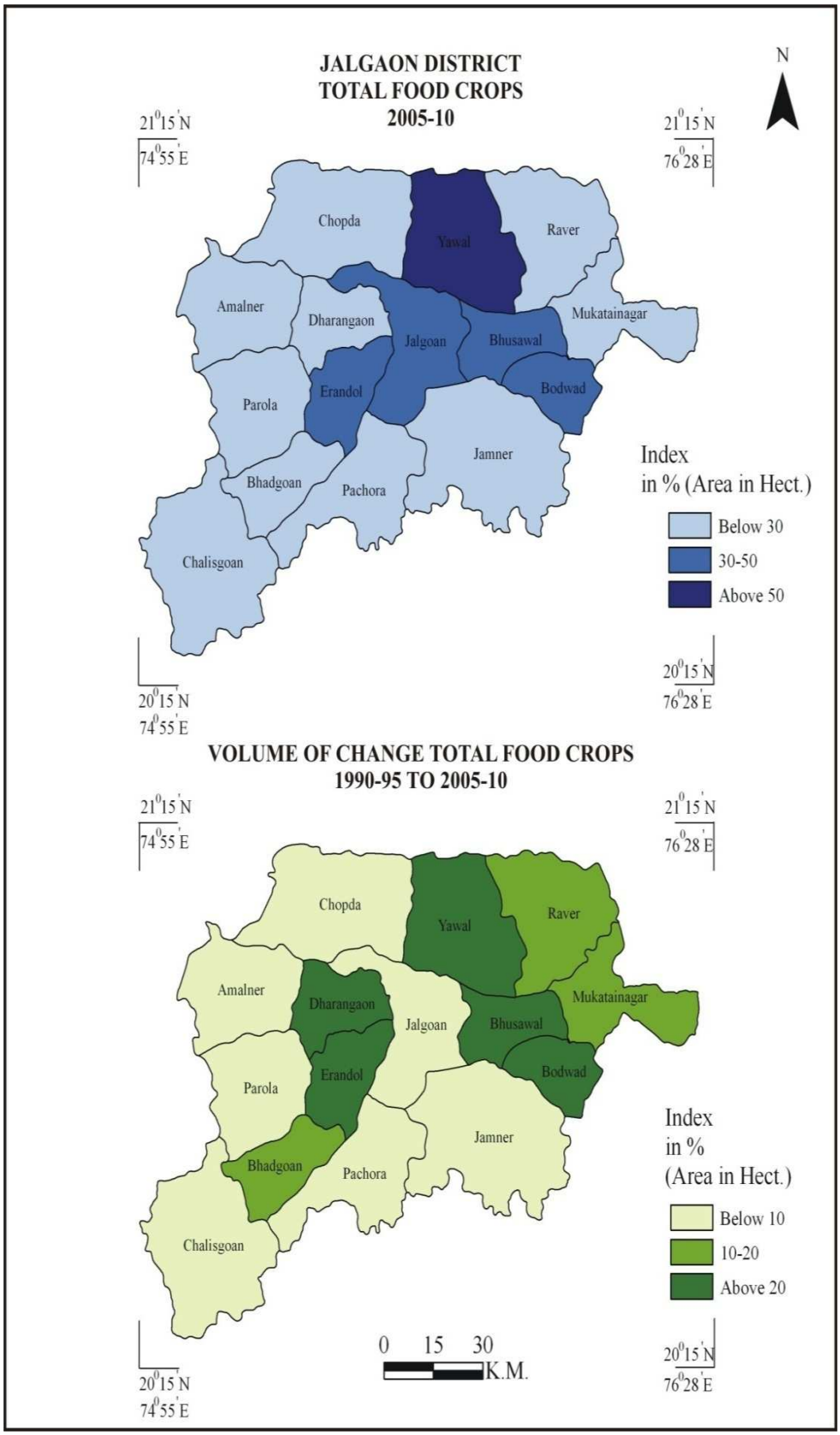
Other way the negative changes has been occurred in below 10% in Jalgaon, Amalner, Chalisgaon, Pachora and Jamner tehsils under the investigation of same period.

13) Tur:

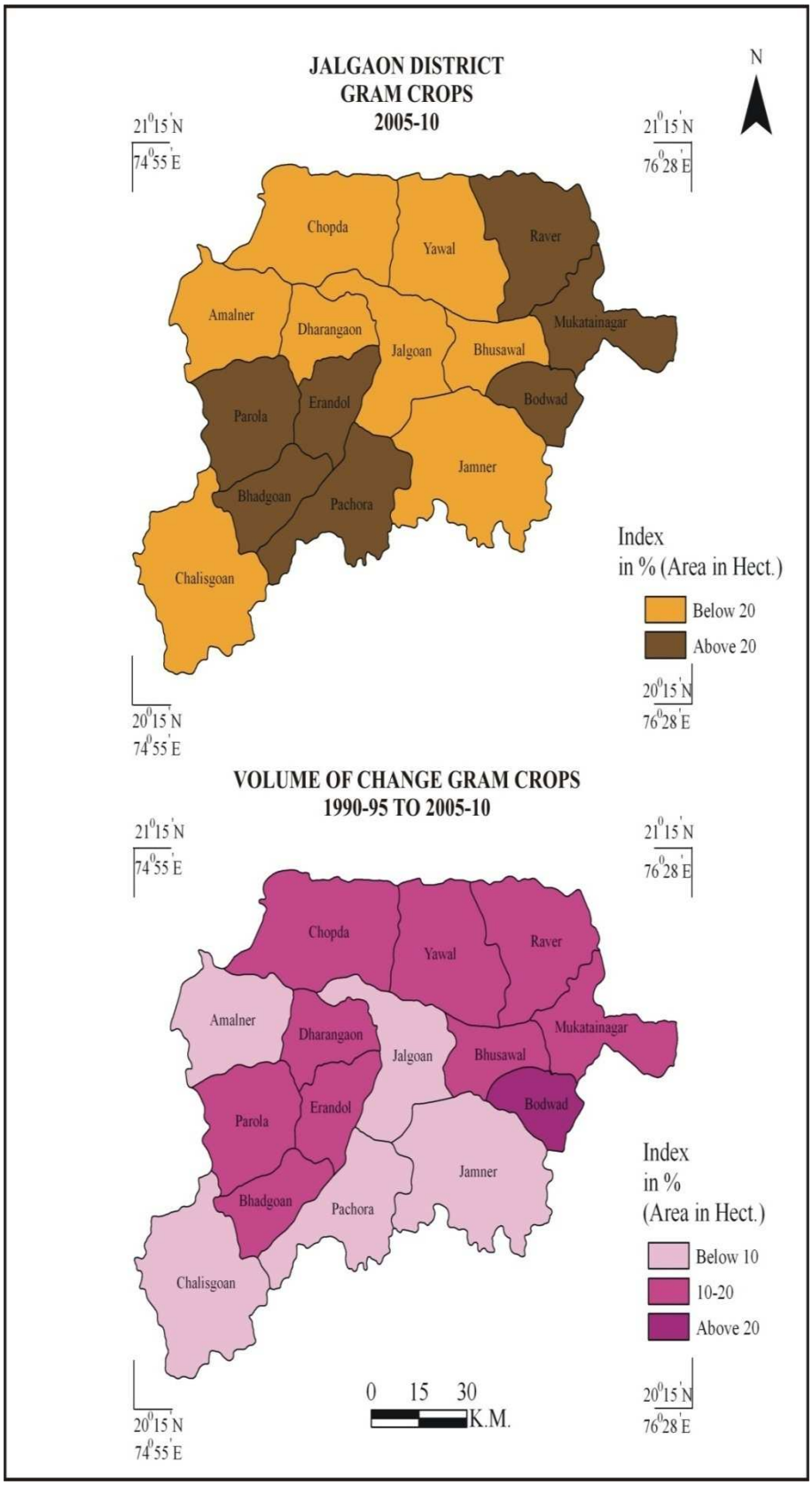
Tur is a Rabi crop which has taken in black soils and suitable climatic condition and irrigation facilities; a tur has a many seeds in long leaf, when they dry the seed was remove from the leaf. Protein and nutrient base of tur seeds, it was observing the study region. During the period of 1990-95 to 2005-10 the tur has small change in production on that same year. The total cropped area and gross cropped area under the tur was observed in study region. Above 20% was recorded in Chopda, Jalgaon and Bhadgaon tehsils.

Other tract below 20% was noticed in Yawal, Raver, Muktainagar, Bhusawal, Bodwad, Dharangaon, Erandol, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils. Period of 2005-10 under the tur cropped area was observed above 20% in Chopda, Bhusawal, Bodwad, Jalgaon and Dharangaon tehsils. Below 20% was noticed in Yawal, Raver, Muktainagar, Bhusawal, Erandol, Amalner, Parola, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils during the period of 2005-10 under the investigation.

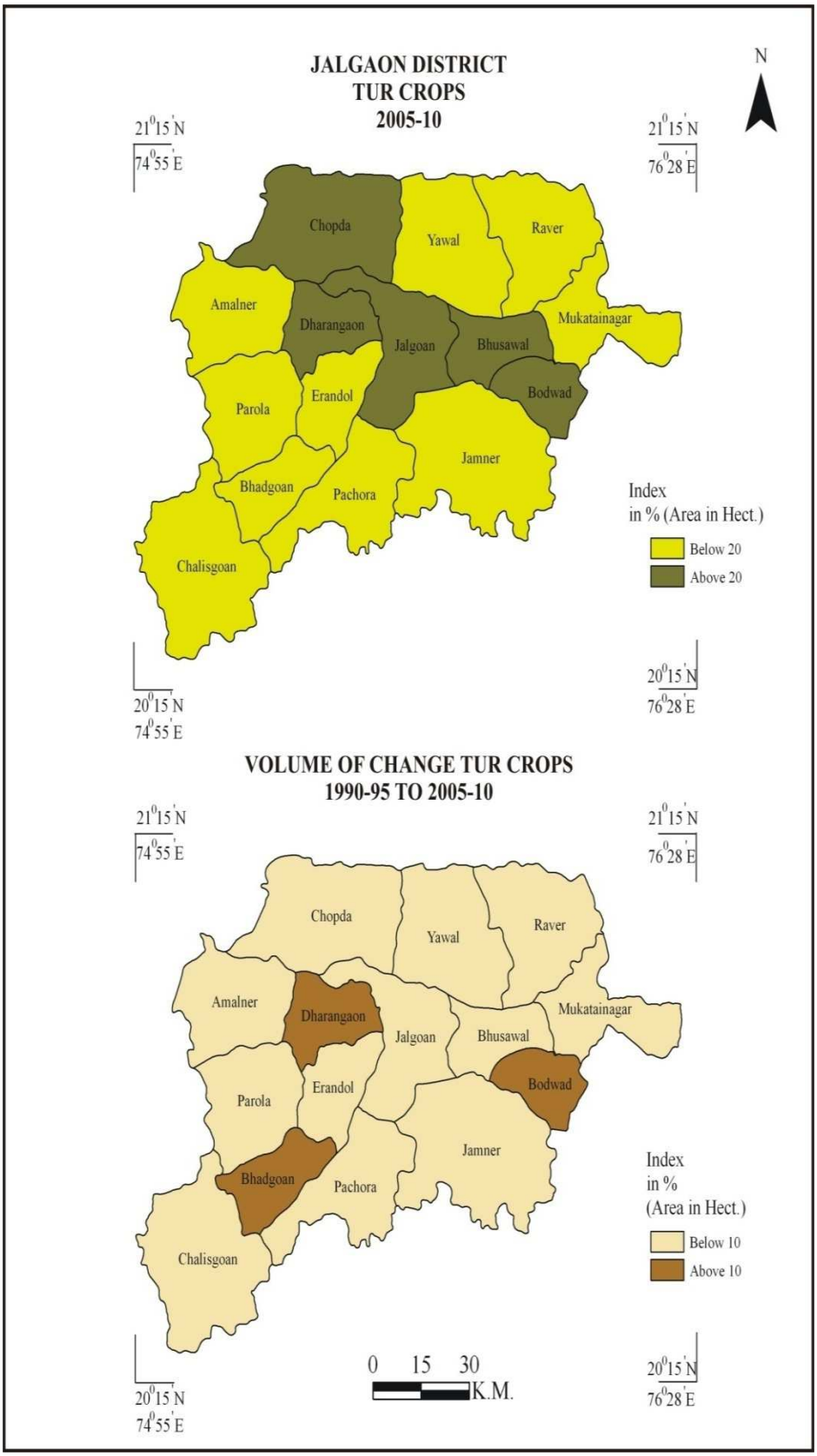
The table no.5.6 show negative and positive changes in study region under tur cropped area to total gross cropped areas. The positive changes above 10% were observed in Bodwad, Dharangaon and Bhadgaon tehsils. Below 10% was noted the negative changes in Chopda, Yawal, Raver, Muktainagar, Bhusawal, Jalgaon, Erandol, Amalner, Parola, Chalisgaon, Pachora and Jamner tehsils under the investigation period of 1990-95 to 2005-10 respectively.


JALGAON DISTRICT
TOTAL FOOD CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 30
30-50
Above 50
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE TOTAL FOOD CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
10-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.27


JALGAON DISTRICT
GRAM CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE GRAM CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
10-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.28


JALGAON DISTRICT
TUR CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE TUR CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
Above 10
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No. 5.29

14) Fruits & Vegetables:

In commercial potentials of fruits and vegetables farming was realized by the farmers, expansion of old technique and establishment of new ones can follow. Cropping pattern depend on monsoon seasonal began to be replaced by fruits and vegetables. Mostly fruits and vegetable are depend on the irrigation facilities in study region under the investigation period. Irrigation play has vital role in agriculture practice in study region. The land use pattern began to be change from a mobile land use to a more immobile land use.

In Jalgaon district area under the fruits and vegetables covered 70% in 1990-95 and 85% in 2005-10 to the total cropped area in Jalgaon district. It is the main producer of world famous 'Banana' variety of banana, like Kandebag, Pilbaug and Junari are major commercial varieties of which have attracted to the farmers in the cultivation of banana on account of quality and quantity of high government prices they gave. It has a wider areal covers towards the north Jalgaon district.

Banana crop cultivation area under the totally irrigation schemes, sources and canal system in study region. With banana fruits well as Custard Apple, Papaya, Ramphal, Mango and Peru are taken in horticulture technique. In Jalgaon district maximum green vegetable have been included in straight category, the vegetable namely as green flower, leaf flower, shephu, methi, karle, ladies finger, brinjal (small & large size) in this category, brinjal famous for Bharit food, Bharit is specialty of this region, this unique atom found and exibit in over the large area in district. Because of these reason that out of grown widely in the study region.

It is strongly influenced by the physical requirement of the fruit plant and vegetables growing. Table no.6.5 shows the spatial and temporal variations in the distribution of area under the fruits and vegetables. It occupying the smaller and larger areas to share of land use in the study region. During the investigation period of 1990-95 above 50% was recorded in Amalner and Parola tehsils.

Percentage values of 20% to 50% were observed in Bhusawal, Erandol and Chalisgaon tehsils. Below 20% was recorded in Chopda, Yawal, Raver, Muktainagar, Bodwad, Dharangaon, Jalgaon, Bhadgaon, Pachora and Jamner tehsils. Another difference was found in 2005-10 out of total cropped area to gross cropped are under the fruits and vegetables was observed in study region, it seems

to above 50% noted in Bhusawal, Amalner and Parola tehsils. Below 50% to 30% was observed in Bhadgaon, Chalisgaon and Pachora tehsils. Very low percentage below 30% was recorded in Chopda, Yawal, Raver, Muktainagar, Bodwad, Jalgaon, Erandol, Dharangaon and Jamner tehsils under the investigation period of 2005-10 show in table no.6.5 in study region.

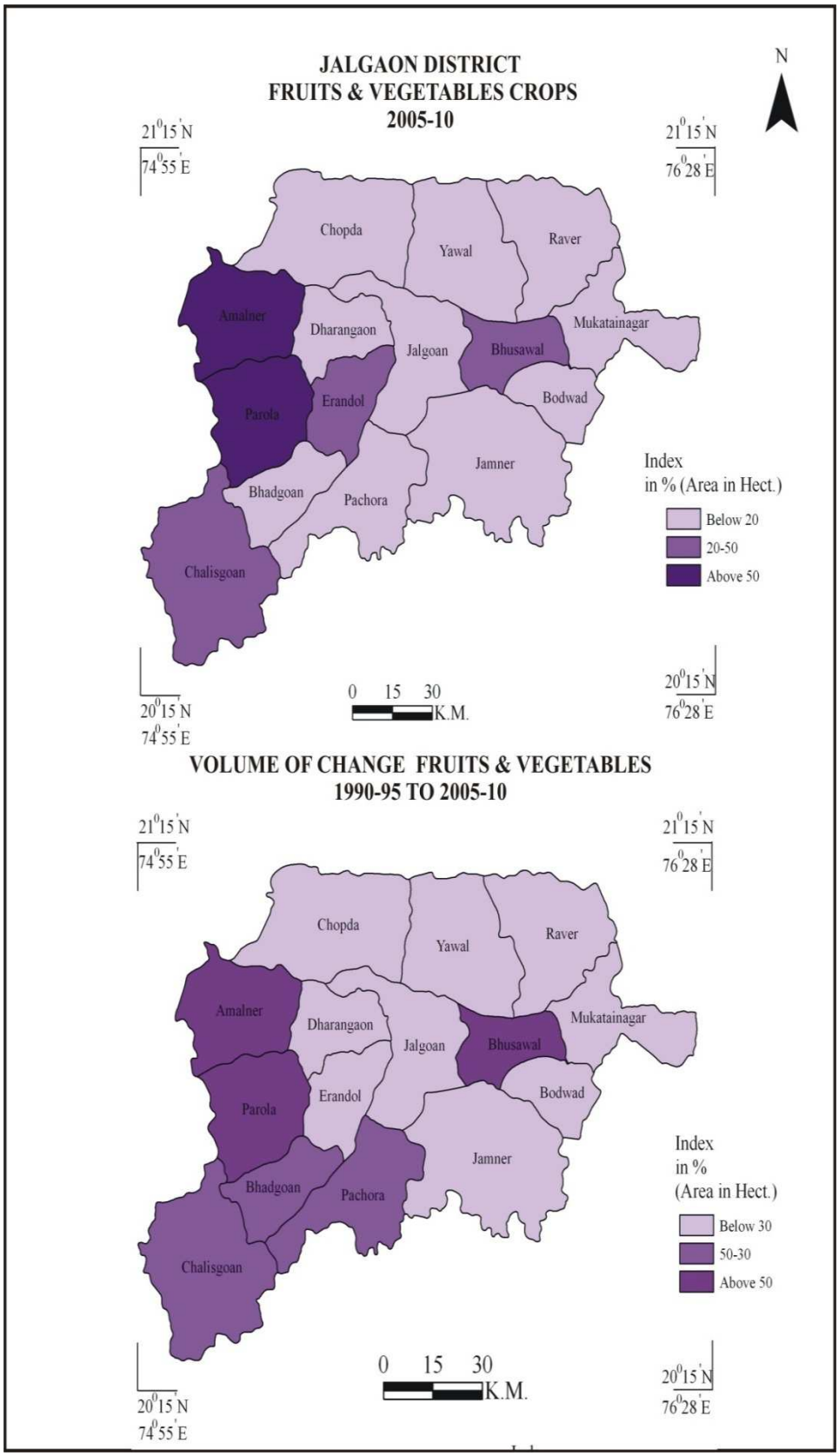
15) Fodder Crops:

Fodder crops and non food crops occupied in the study region in investigation period of 1990-95 to 2005-10. It include long and short length grass, bamboo, dry crops, dry wheat, jowar, bajra and maize leaf and root fodders in study region accounting for almost the entire area under non food crops and fodder crops. The distribution of fodder and non food crops in Jalgaon district it shows in map no.5.6 which exhibit and reveal that a remarkable variations in the investigation period.

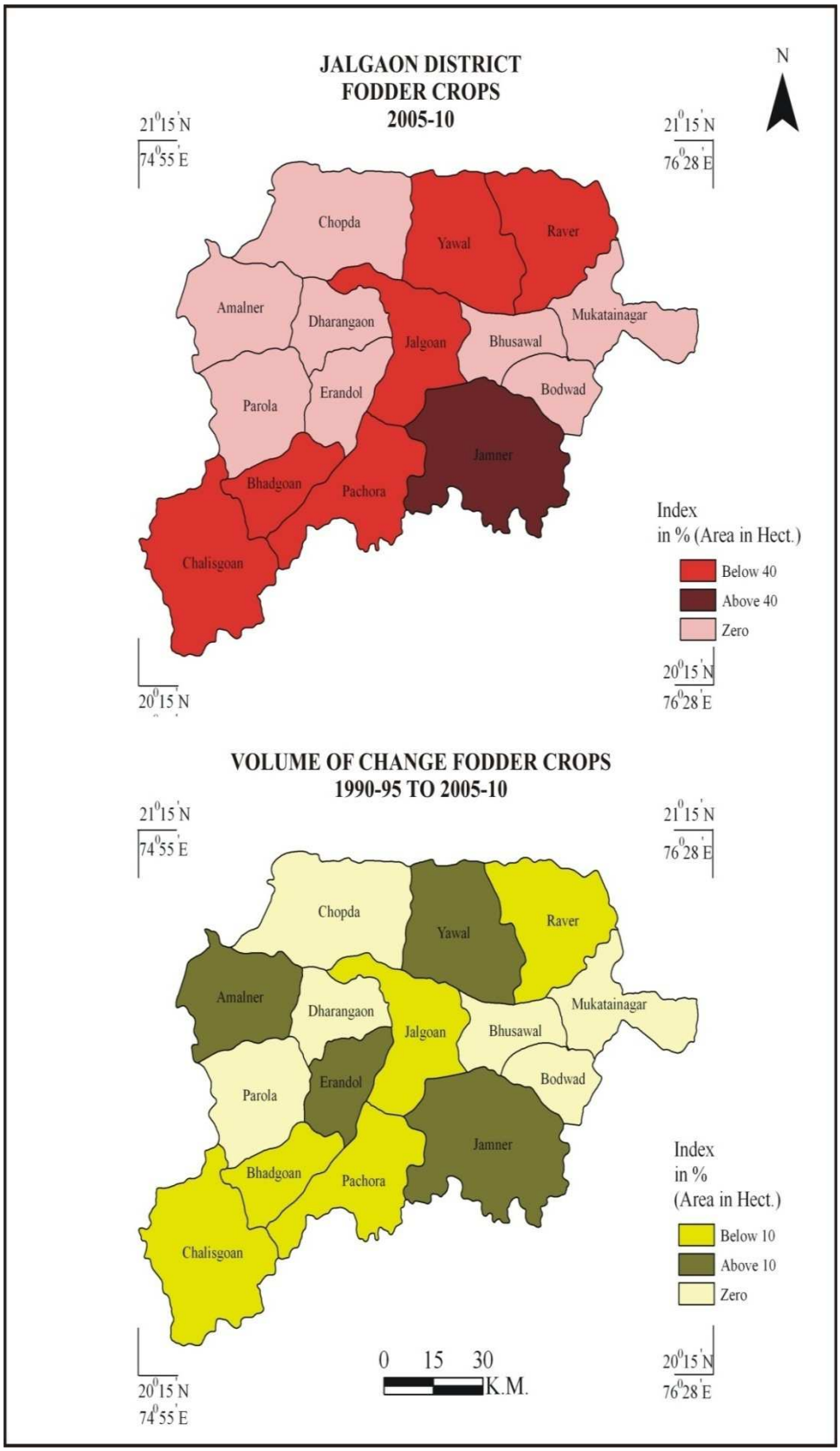
During the investigation period of 1990-95 under the fodder crops areas to total cropped areas above 40% was observed in Bhadgaon tehsils, below 40% was noted in Yawal, Raver, Muktainagar, Bodwad, Dharangaon, Jalgaon, Erandol, Amalner, Chalisgaon and Jamner tehsils. Zero percent was observed in Chopda, Parola and Pachora tehsils during the period of 1990-95. It was seems above 40% was recorded in Jamner tehsils. Below 40% was noted in Yawal, Raver, Jalgaon, Bhadgaon, Chalisgaon and Pachora tehsils.

A zero percent was observed in Chopda, Muktainagar, Bhusawal, Bodwad, Erandol, Dharangaon and Amalner and Parola tehsils. Because the climatic condition i.e. heavy rainfall, high temperature, humidity, etc, it was happened in the study region during the investigation period.

It was seen the increase of entire region above 10% positive changes area under the crops in Yawal, Erandol, Amalner and Jamner tehsils. Where the negative changes was observed in below 10% in Raver, Jalgaon and Pachora tehsils. Zero changes was observed in other tehsils name as Chopda, Muktainagar, Bhusawal, Bodwad, Dharangaon and Parola tehsils under the investigation period of 1990-95 to 2005-10


JALGAON DISTRICT
FRUITS & VEGETABLES CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 20
20-50
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE FRUITS & VEGETABLES
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 30
50-30
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.30


JALGAON DISTRICT
FODDER CROPS
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in % (Area in Hect.)
Below 40
Above 40
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE FODDER CROPS
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
(Area in Hect.)
Below 10
Above 10
Zero
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.31

5.8 TRENDS OF AVERAGE YIELD OF SELECTED AGRICULTURAL CROPS PRODUCTION:

In agriculture productivity changes in percentage share to tehsils to district of total production of selected crops in Jalgaon district. The changes in the production of selected crops in Jalgaon district during the period of 1990-95 and 2005-10. These two terms years data, average changes of production of selected crops are find out the entire region of the study area. The total productions of selected crops are indicated the value is increases and decreases over this period in study region. Below Table No. 5.7 shows the indicates the production of wheat, jowar, bajra, pulses, cotton and sugarcane etc, the changes of production increase above 5.0 % wheat, jowar, bajra, pulses, cotton, oilseeds, tur, other cereals and gram respectively. But other crops are decreasing the value below 5.0% in changes of production like rice, sugarcane, spicy chilly and total nuts crops in Jalgaon district.

The percentage of average yield selected crops are nominally observed in the table no.5.7, it shows the increase value of selected crops which is very high in Wheat, jowar, bajra, cotton, oilseeds, total nuts, tur and gram crops but very less percentage are found in rice, pulses, sugarcane, green chilly and total food crops respectively. All the information same as the above the table no. and trends of production of average yield of selected agricultural crops.

A) Rice Production:

Rice production is a rarely investigate crops are found in Jalgaon district. This food growing for domestic and general purpose by farmers but take of limitation in his work. It taken in Kharip and Rabbi Season; in area of agriculture the productions of rice are increases in 2005-10 years. After 1990-95 to 2000 the production was increases with the volume 444 and percentage of rice production is 1.11 are raised. While the very lowest decrease the rice production means negligible in yield in 1990-95 years a 938 hectors during the period of under the study region. Percentage value in Jalgaon district was very low so the map does not shown.

TABLE NO.5.7. AVERAGE TRENDS RATE OF PRODUCTION OF SELECTED CROPS 1990-95 TO 2005-10 IN JALGAON DISTRICT

Sr. No	Selected Crops	Average production in Metric Tones 1990-95	Average production in Metric Tones 2005-10	Changes in Production between 1990-95 to 2005-10	Annual changes (Quantity tones)	%
1	Rice	38	82	44	94	1.11
2	Wheat	1457	1846	389	1068	5.74
3	Jowar	1535	1722	187	1348	8.20
4	Bajra	669	737	68	601	9.83
5	Pulses	366	558	192	174	5.90
6	Cotton	192	2610	1290	63	5.48
7	Sugarcane	8478	65	8471	65	1.00
8	Oilseeds	1825	2159	334	1491	5.46
9	Green Chilly	1716	1120	596	1121	2.87
10	Other Cereals	1318	1752	434	884	3.03
11	Total food crops	877	670	-207	970	4.23
12	Tur	703	697	-6	697	11.7
13	Gram	1428	1696	268	1160	5.32

Source: Computed by Researcher

B) Wheat Production:

Wheat is the most important crops in Jalgaon district; area under the 2005-10 was increase the value of 1846 hectors, where the decrease the value of 1990-95 are 1457 hectors during this period. The highest production and volume of change are investigated during the period of 2005-10 study regions. The percentage of per hectors are 3.74 and the total production of wheat percentage is 2.16 are low to the percentage of hectors.

c) Jowar Production:

Jowar is also important crops productions were found in study region. These crops are generally taken by every farmer in agriculture land of Jalgaon district. Where the most dominant food are using in Jalgaon district during the period and under the observation. Every village farmers has taken these crops in Kharip and Rabbi Season of every year. The variations of these selected crops are highest increasing during the period of 2005-10 and lowest found in 1990-95 years under the study region. The production of volume change is the percentage 8.20 and total production of Jowar is near about 5 percent are observed in investigation period. The highest productions of Jowar are taken in Jalgaon district by farmers. The total hectors of production of Jowar is 3828 and 3057 metric tons are observed in 1990-95 to 2005-10 years.

D) Bajra Production:

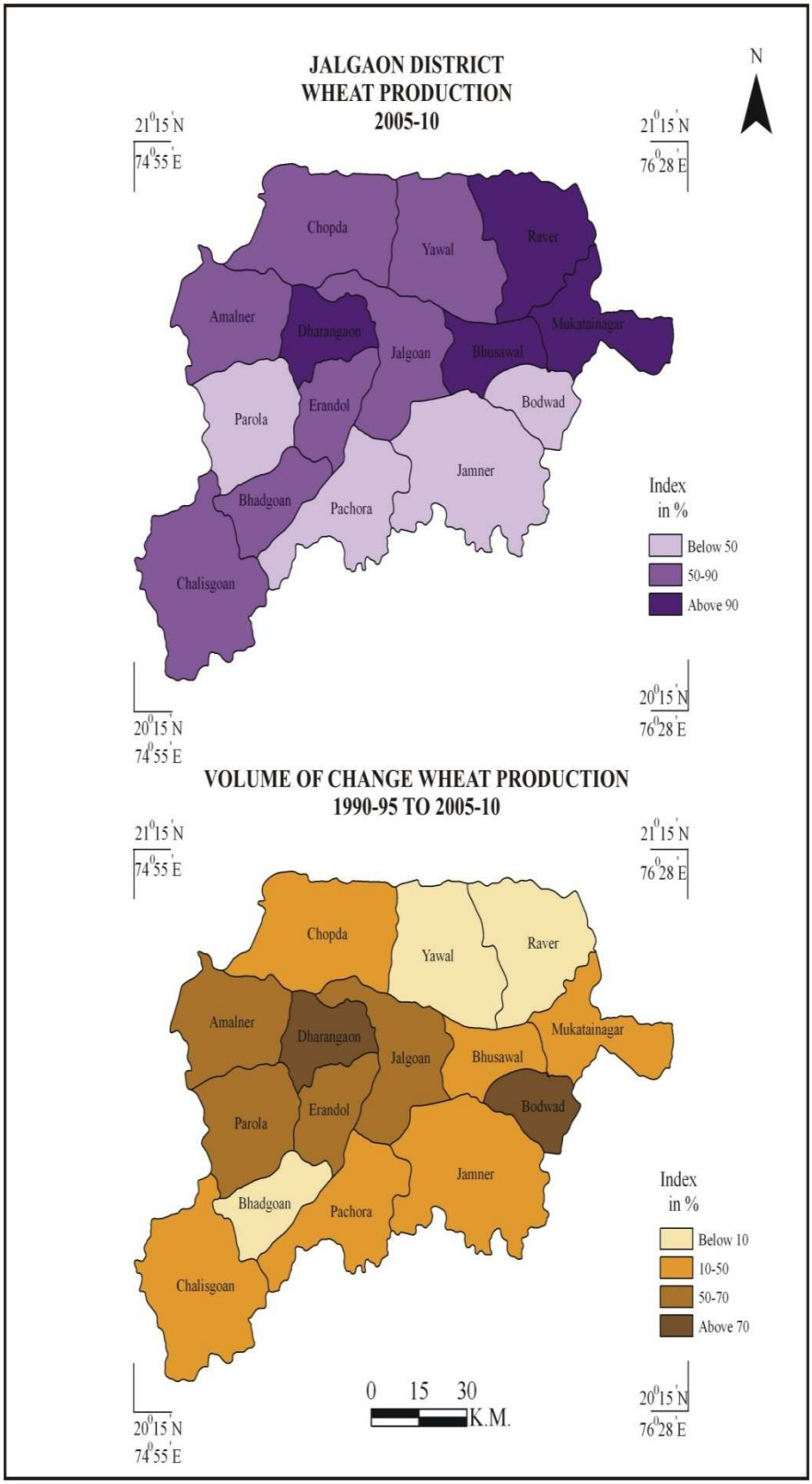
Bajra is also important crops in study region during the investigation period of 1990-95 to 2005-10. The highest value of production Bajra was found in 737 per hectors in 2005-10 totals production in metric tons are 443 this value are low in 1990-95 years 611 metric tons are highest production in Jalgaon district. The Bajra use for every farmer and every rural and urban people for domestic food in study region.

E) Pulses Production:

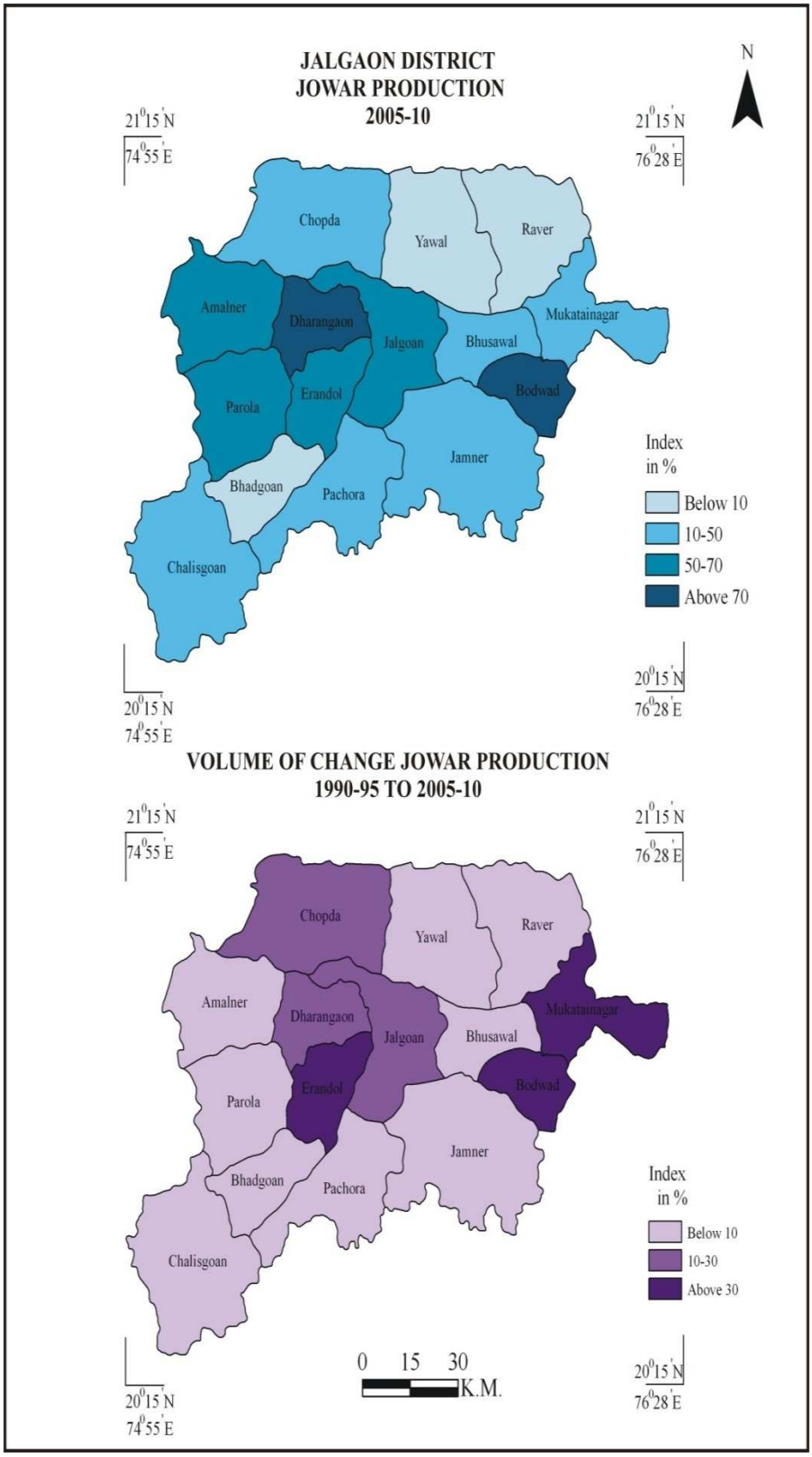
Pulses are raised in Kharip and Rabbi most dominant food taken by farmers in season. Due to farmers activity changes the pulses showed in during the period of 1990-95 and 2005-10. Highest pulses production is taken in the period of 2005-10 and very lowest production are taken in 1990-95 period of years. Total pulses productions in metric tons are high in 2005-10 years than the 1990-95. Percentage of pulses of crop production is highest of total production of 3.54 % than the total production per hectors in 3.21% are observed in study region.

F) Cotton Production:

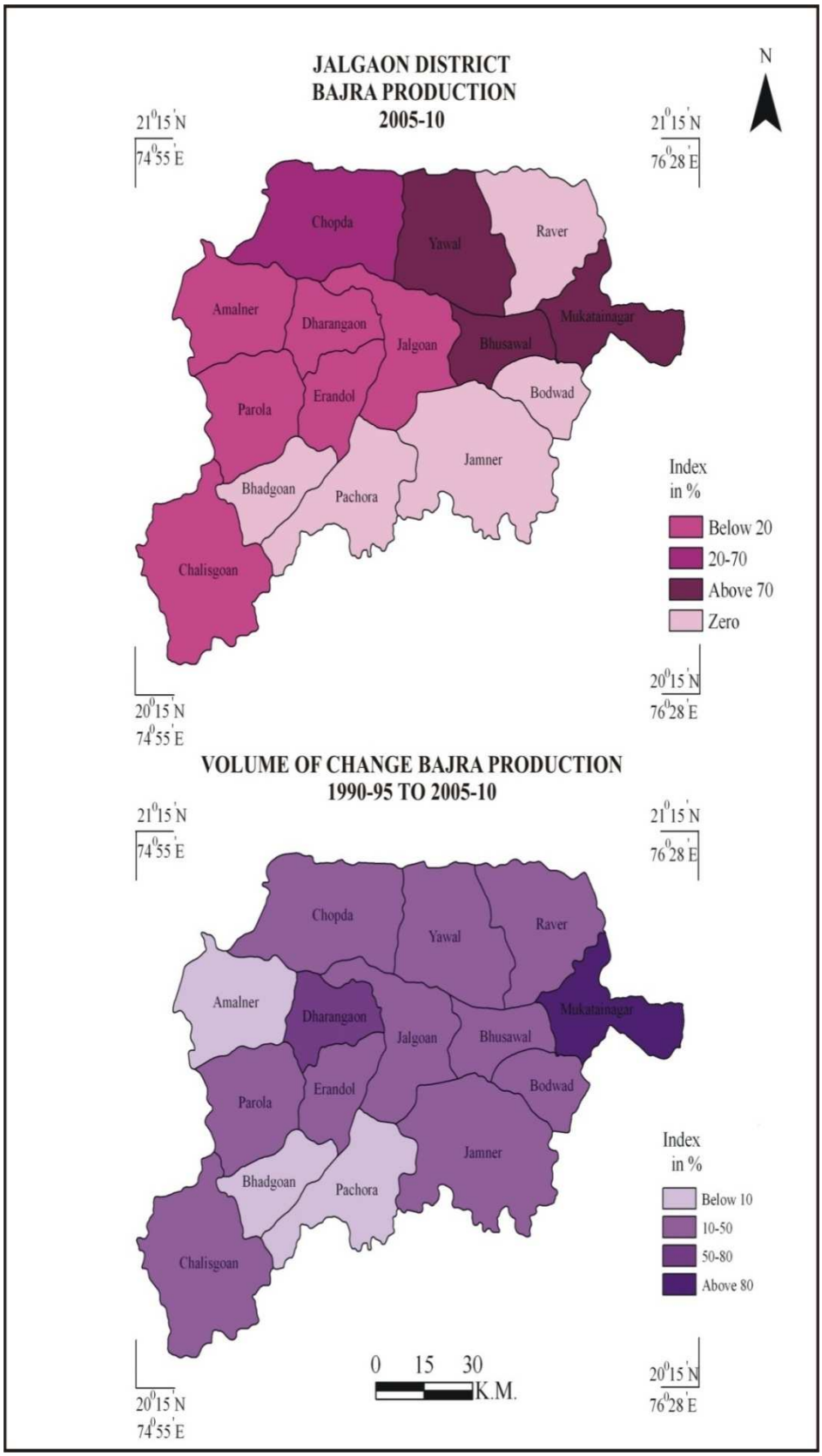
Cotton is a ‘life of crop’ of every farmer in Jalgaon district during the investigation period. Cotton is a most important cash crops and most valuable crops for farmer in agriculture sectors.


JALGAON DISTRICT
WHEAT PRODUCTION
2005-10
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 50
50-90
Above 90
20°15'N 74°55'E
20°15'N 76°28'E
VOLUME OF CHANGE WHEAT PRODUCTION
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 10
10-50
50-70
Above 70
0 15 30
K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.5.32


JALGAON DISTRICT
JOWAR PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-50
50-70
Above 70
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE JOWAR PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-30
Above 30
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.33


JALGAON DISTRICT
BAJRA PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 20
20-70
Above 70
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE BAJRA PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-50
50-80
Above 80
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.34

This crop has given to the government price, value so that the farmers are happy and satisfaction to take this production with hard works in agriculture. The maximum productions of cotton are taken in 2005-10 of 26100 hectors and 6042 metric tons are produce the cotton crops in Jalgaon district in agriculture land. Highest percentage of cotton crops are 2.78 and 1.08 very low value than the total production in hectors during the period of 1990-95 and 2005-10.

G) Sugarcane Production:

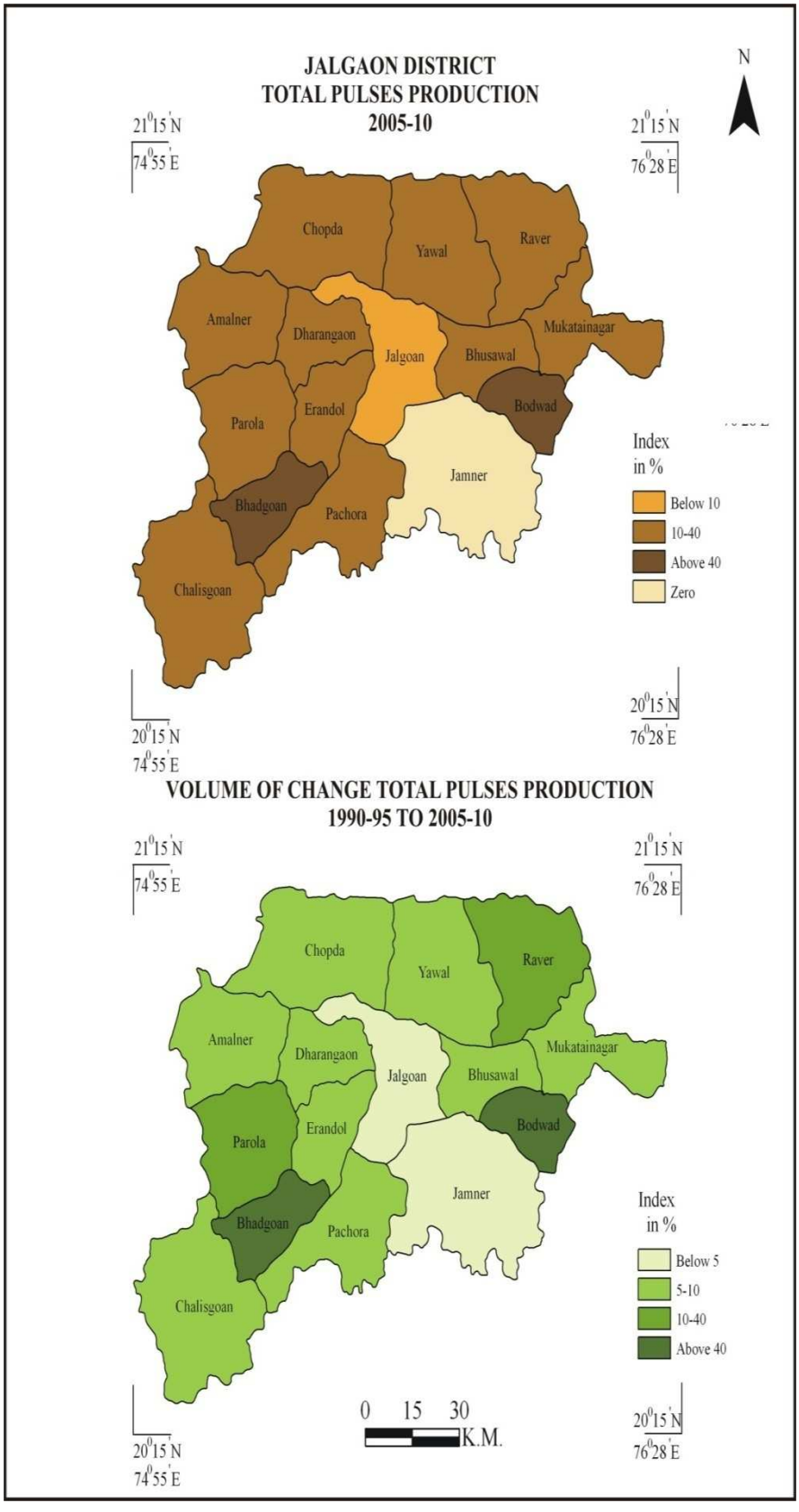
The main purpose of sugarcane production is for sugar and 'Gul'. It is a popular crop taken in the study region during the observation and field work. Sugarcane increase in 1990-95 years 84 hector and 65 hectors decrease during the period of 2005-10 years. Main reason of these crops has a government value, government given to the farmers low price so un satisfy and the production was decrease during the period of study region.

H) Oilseeds Production:

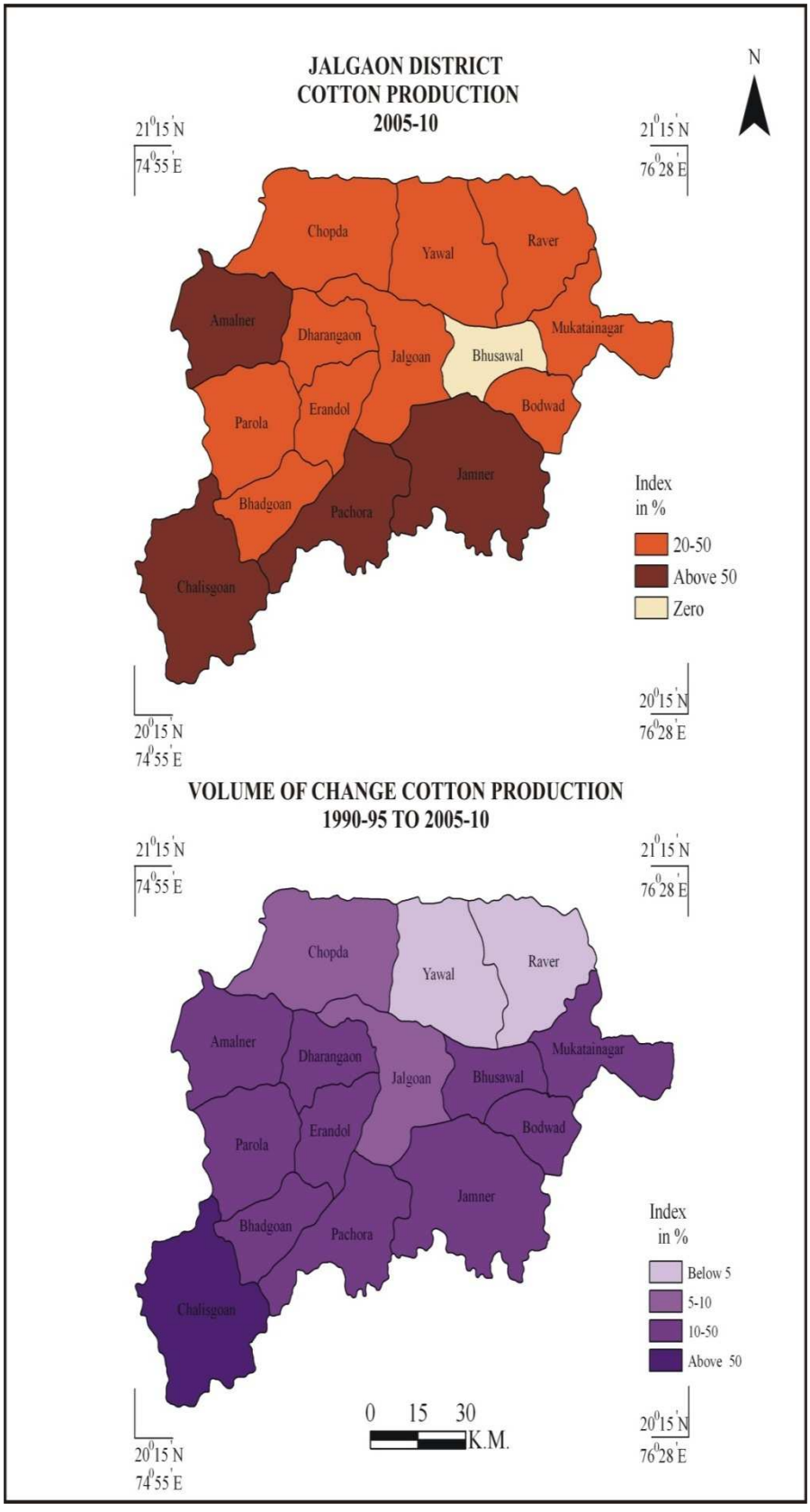
Oilseeds include (Ground nut, Kardai, Soyabeen, Sunflower and Sesamum) are concentrate production in Jalgaon district. Maximum hectors under the oilseeds production are found in 1990-95 which is 1825 hectors in agriculture land area where the lowest production in study region are found in 2005-10 years an 1159 hectors during this period. High volume of change is negative found in total production and negative change is found in total production in metric tons during the study region. Farmers they have taken more production of ground nut well as kardai, and sesamum for extract usable oil and edible oil for all of us. Ground nut production was highest in 1990-95 and also 2005-10, the production will increase last five hears. So oilseeds are important included all crops in investigation during the study region.

I) Green Chilly Production:

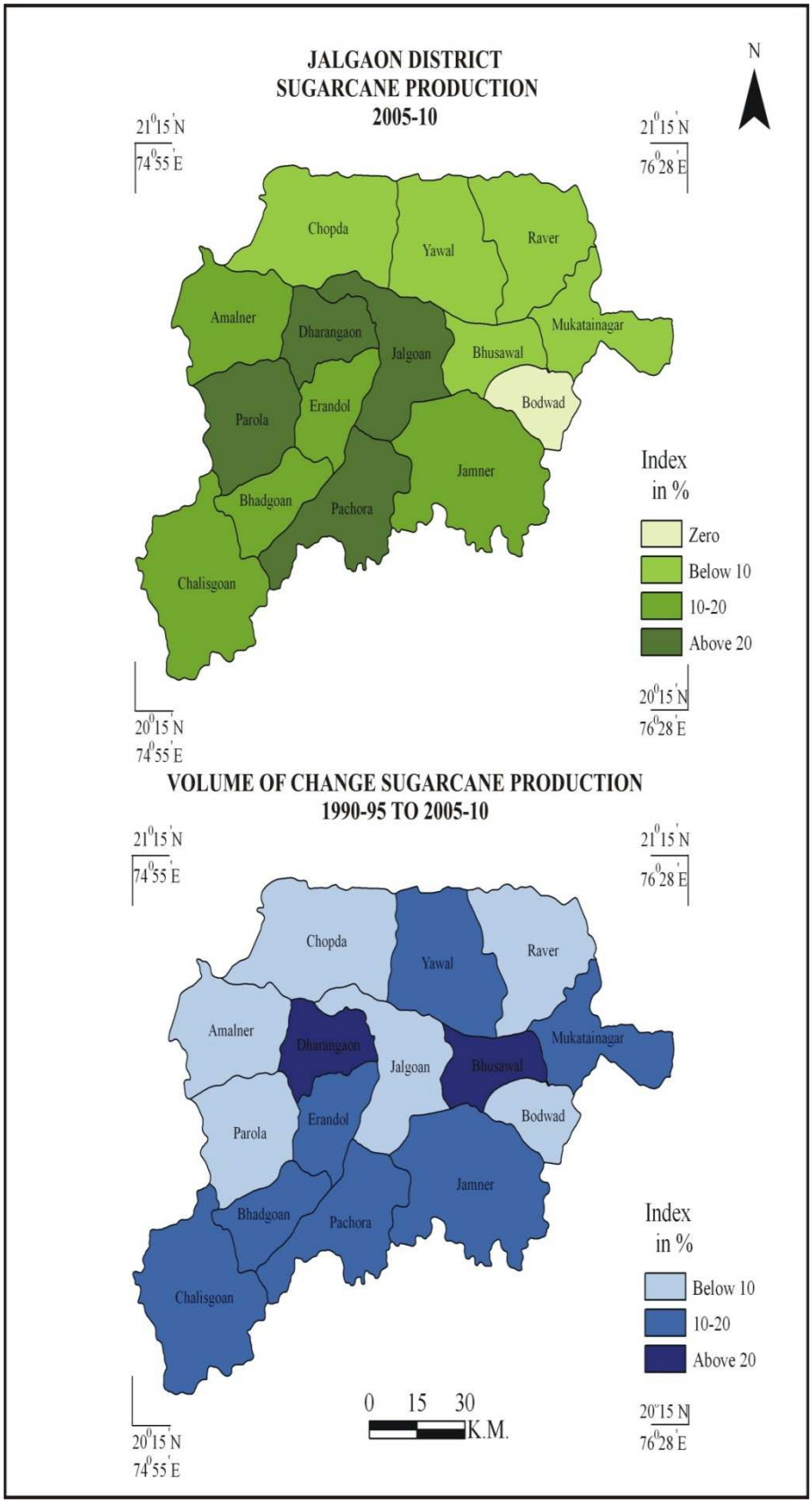
Jalgaon district is famous for hot and spicy chilly production. Lots of production taken under the chilly crops in study area.


JALGAON DISTRICT
TOTAL PULSES PRODUCTION
2005-10
N
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 10
10-40
Above 40
Zero
20°15'N 74°55'E
20°15'N 76°28'E
VOLUME OF CHANGE TOTAL PULSES PRODUCTION
1990-95 TO 2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index in %
Below 5
5-10
10-40
Above 40
0 15 30
K.M.
20°15'N 74°55'E
20°15'N 76°28'E

Map No.5.35


JALGAON DISTRICT
COTTON PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
20-50
Above 50
Zero
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE COTTON PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-10
10-50
Above 50
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.36


JALGAON DISTRICT
SUGARCANE PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Zero
Below 10
10-20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE SUGARCANE PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Mukatainagar
Bhusawal
Bodwad
Parola
Erandol
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.37

These chilly are sailing inside and outside of the District and States, so it is very valuable crops are taken to the farmers. Chilly are growing to the maximum area of hectors in the district where the last decades chilly production are constant which is 48 metric tones are found in 1990-95 to 2005-10 years during the investigation period. Because this valuable product are constantly growing and taking to the farmers in study region. Last ten years the productions are increasing and many farmers are taking these crops in two crops combination with production after cotton crop. very high and less percentage found of total production of maize 1.26% found during the period of 2005-10.

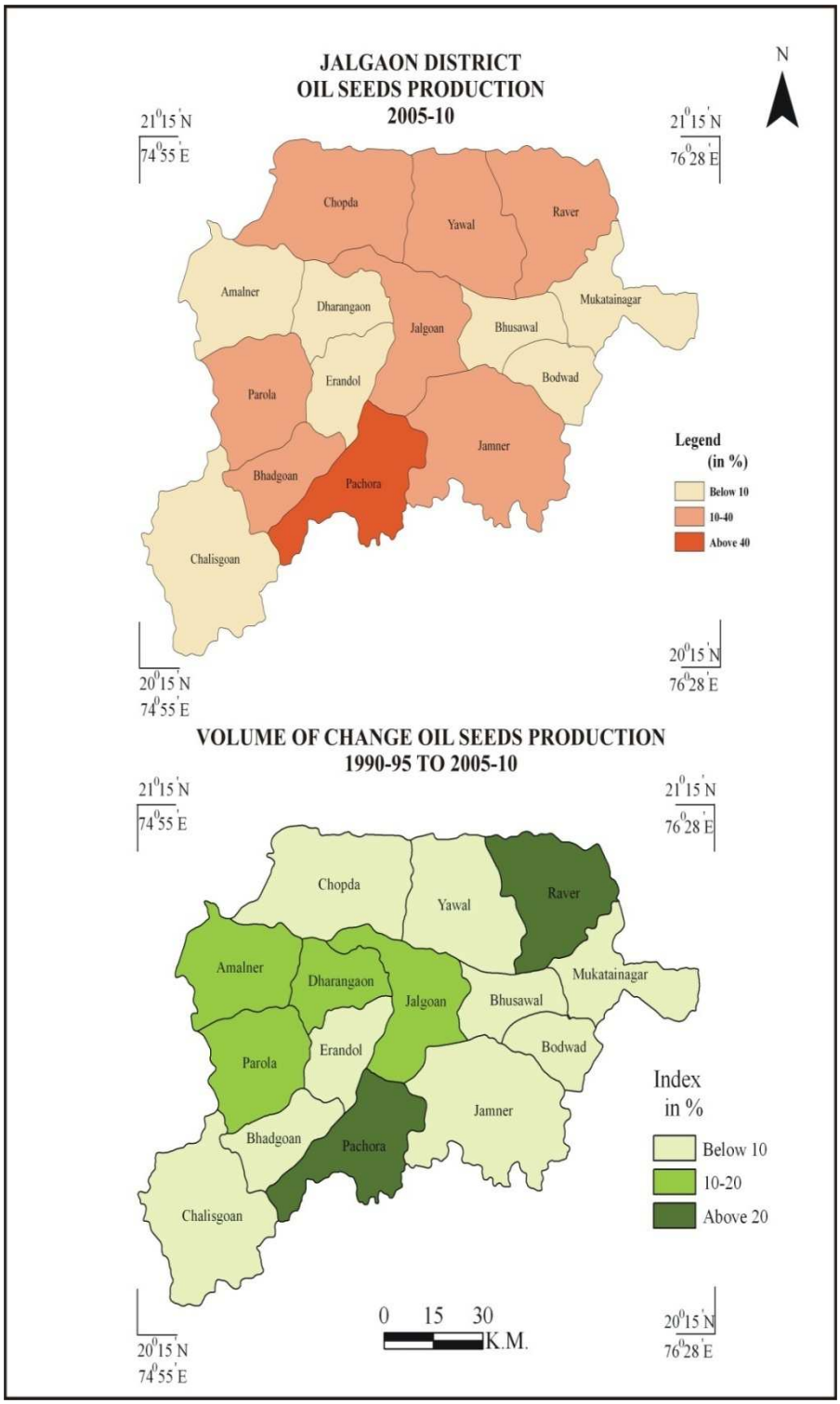
J) Tur Production:

Tur is important crops where the farmer was taken the high price with value of these crops. Tur production are highest value are observed in 2005-10 years and low percentage are observed in during the period of 1990-95 but low production are taken in 2005-10 years per hectors and high production taken in 1990-95 investigate during the period of study region. High percentage of tur are observed in total production in metric tons and low percentage in an hectors area of Jalgaon district during the period 1990-95 to 2005-10

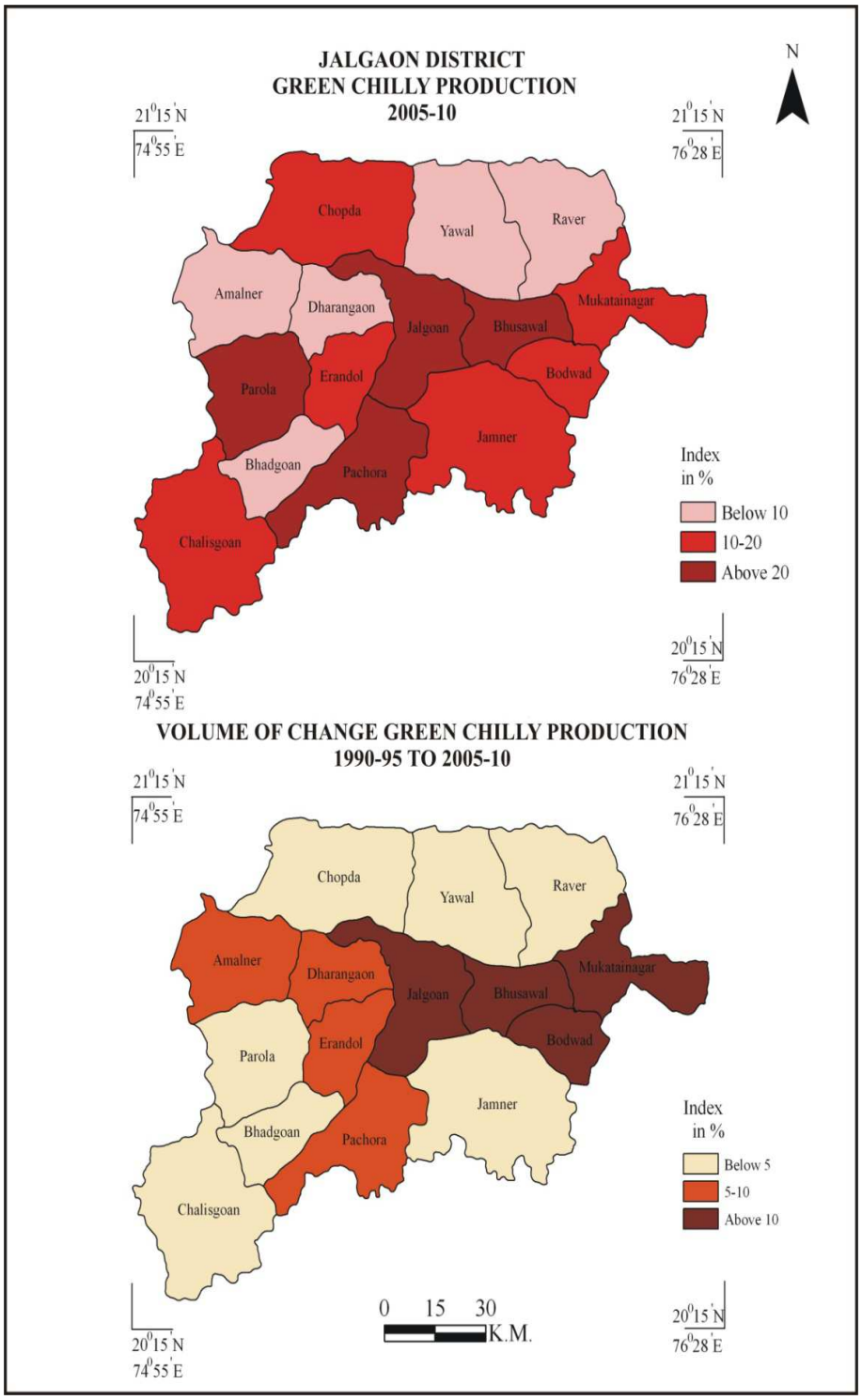
K) Total Food Crop Production:

Total food crops include with rice, wheat, jowar, bajra, pulses, maize, vari, ragi, other nuts, some vegetables include onion, potato, muttor, beat and sweet under root (Ratale). The proportion of area under the total food crops to the gross cropped area has been increased by 58% in 2005-10 and decrease in 25% observed in the period of 1990-95. The food crops growing areas of all tehsils of Jalgaon district, mainly as Yawal, Bhusawal and Bodwad, it shows in table no.6.5 with spatial & temporal variation can be noted in each tehsils during the investigation period of 1990-95 to 2005-10. Spatial and temporal variations and distribution of total food crops recorded in all tehsils respectively.

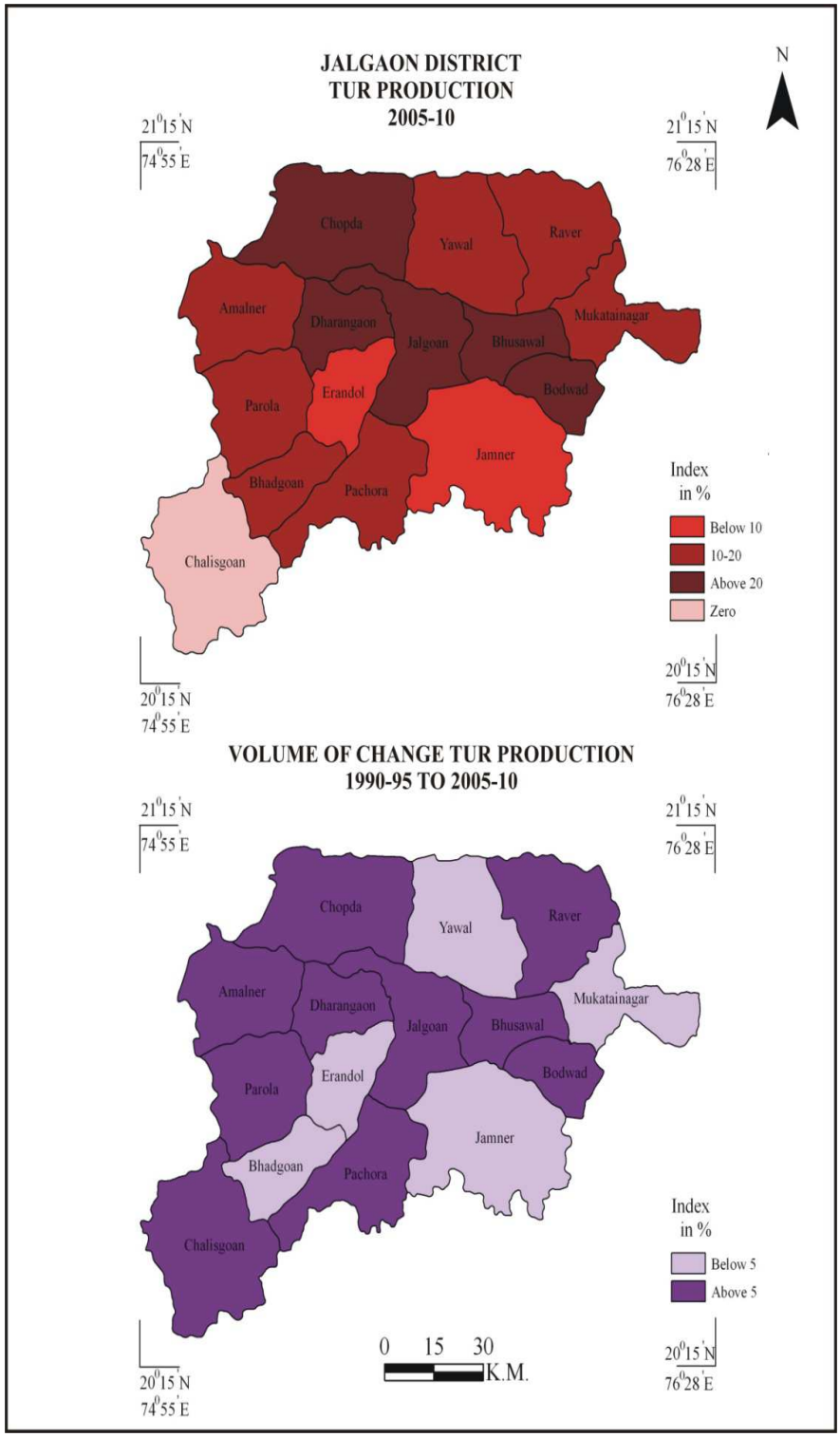
The percentage above 30% was found in Muktainagar tehsils. Total food crops area to total gross cropped area under the tehsils was observed 20% to 30% in Yawal and Bhadgaon tehsils. Volume of changes as positive and negative was registered in the period of investigation.


JALGAON DISTRICT
OIL SEEDS PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Legend
(in %)
Below 10
10-40
Above 40
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE OIL SEEDS PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

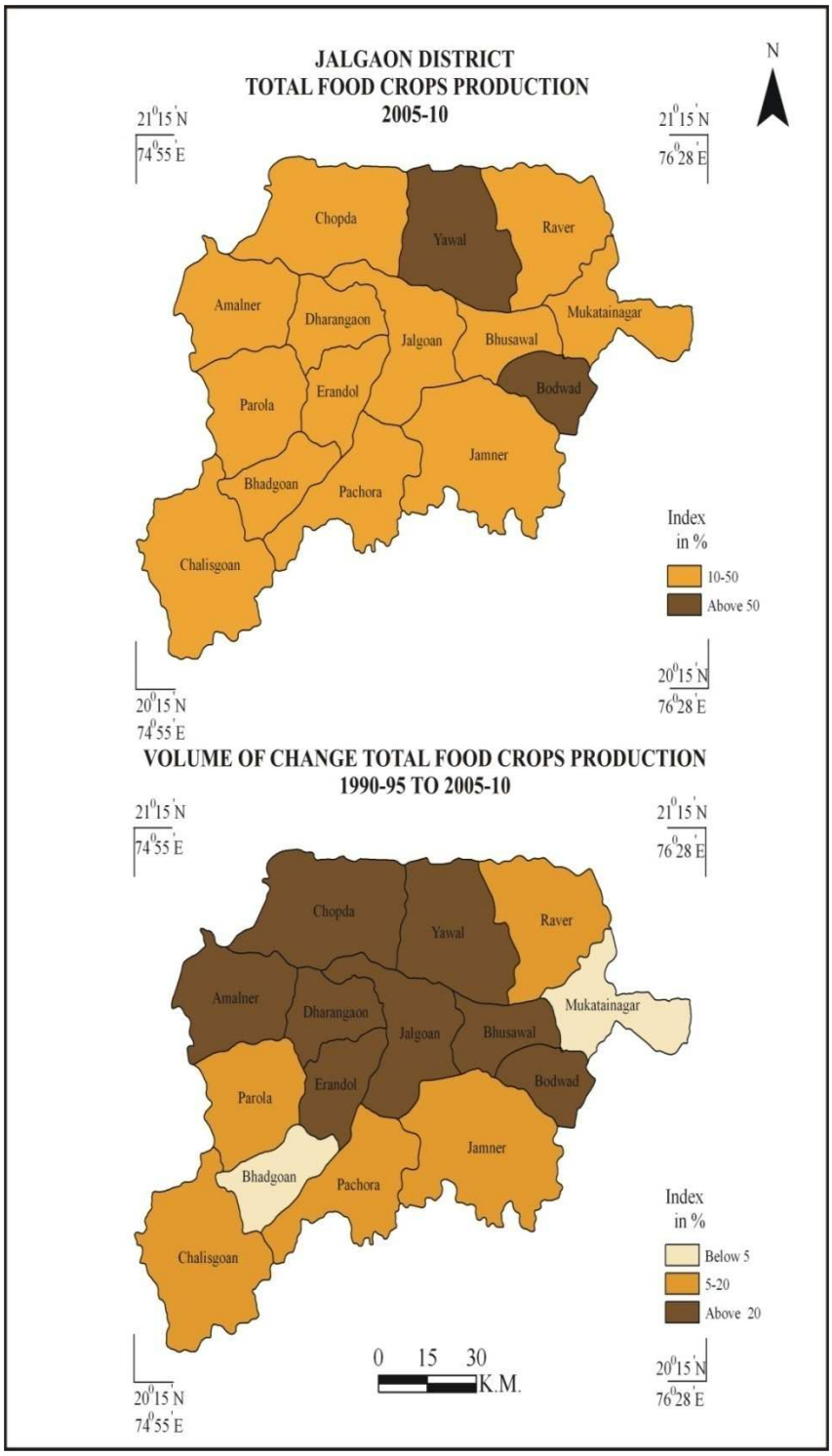
Map No.5.38


JALGAON DISTRICT
GREEN CHILLY PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE GREEN CHILLY PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-10
Above 10
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.39


JALGAON DISTRICT
TUR PRODUCTION
2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 10
10-20
Above 20
Zero
20°15' N
74°55' E
20°15' N
76°28' E
VOLUME OF CHANGE TUR PRODUCTION
1990-95 TO 2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
Above 5
0 15 30
K.M.
20°15' N
74°55' E
20°15' N
76°28' E

Map No.5.40


JALGAON DISTRICT
TOTAL FOOD CROPS PRODUCTION
2005-10
N
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
10-50
Above 50
20°15'N
74°55'E
20°15'N
76°28'E
VOLUME OF CHANGE TOTAL FOOD CROPS PRODUCTION
1990-95 TO 2005-10
21°15'N
74°55'E
21°15'N
76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
Index
in %
Below 5
5-20
Above 20
0 15 30
K.M.
20°15'N
74°55'E
20°15'N
76°28'E

Map No.5.41

5.9 PRODUCTIVITY OF SELECTED AGRICULTURAL CROPS:

These selected crops in Jalgaon district whereas crops productivity changes have occurred in response to many technological developments in agriculture sector and irrigation facility during the last decades. The adoption of seeds, fertilizers and irrigation sources has resulted into increase of crop production and production pattern.

The black soil plays an important role because all these crops soil suited and increasing the productivity. So, all these factors interact and changes in agriculture production in Jalgaon district during the investigation period.

a) Levels of Wheat Productivity:

The distribution pattern of wheat productivity is given in table no. the average productivity of wheat in the region were 1800 Kg. per hector during the investigation period. There are four tehsils which have a yield wheat production above 2000 Kg. per hector namely as Yawal, Raver, Erandol and Chalisgaon whereas moderate production of wheat 1000 to 2000 kg was observed in Muktainagar and Parola tehsils.

While low production below 1000 kg was noted in Chopda, Bhusawal, Jalgaon, Dharangaon, Pachora and Bhadgaon tehsils. Bodwad, Amalner and Jamner have no changes (nil) of wheat production during the investigation period of 2005-10. It is observed that the yield and wheat production are the highest in the region, but slowly decline from 1990-95 period.

b) Levels of Jowar Productivity:

In Jalgaon district jowar has principal and main crops during the investigation period. Last decades there are wide variations in the yield of Jowar in study region. The average productivity of the region as a whole 1700 kg per hector in 2005-10. The jowar of high productivity above 5000 kg per hector was recorded in Chopda, Yawal, Raver, Muktainagar, Bodwad, Bhusawal, Dharangaon, Parola and Chalisgaon tehsils.

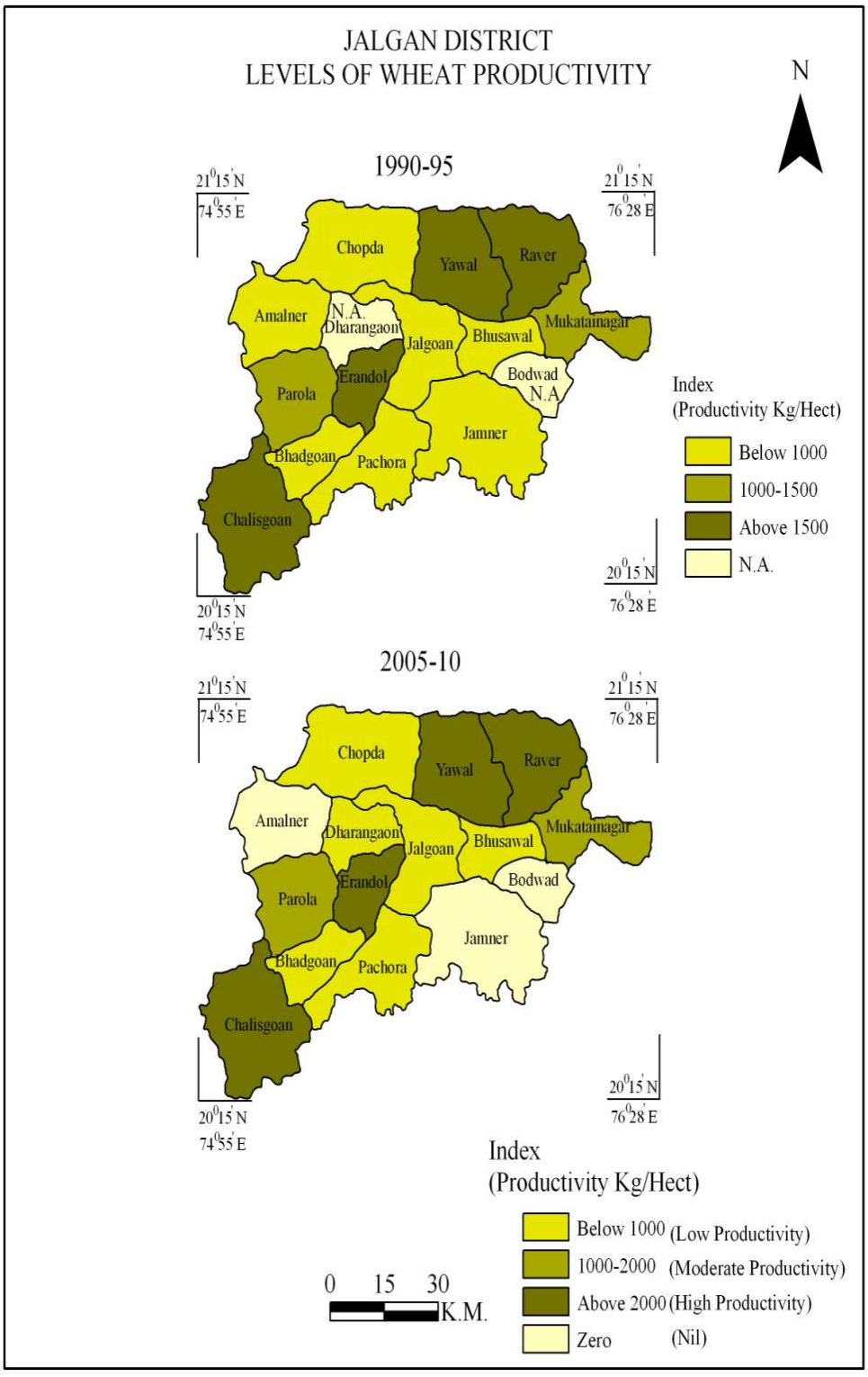
TABLE NO.5.8.AVERAGE YIELD PER HECTARE OF SELECTED CROPS IN JALGAON DISTRICT 1990-95 TO 2005-10

Sr. No	Crops	Yield per Hectare in Kg.		Production in'00' tones		Volume of Change in%
1	Principal Crops	1990-95	2005-10	1990-95	2005-10	1990-95 to 2005-10
2	Wheat	1457	1846	453	668	18.09
3	Jowar	1535	1722	3828	3057	41.22
4	Bajra	669	737	611	443	24.70
5	Maize	1605	2873	130	946	15.55
6	Tur	703	697	180	204	4.00
7	Oilseeds	1158	1159	344	122	22.22
8	Gram (Harbara)	611	866	288	413	13.00
9	Cotton	192#	261	3143#	6042	42.02
10	Sugarcane	8478#	65	15006	10990#	12.96
11	Fruits & Vegetables	2120	2225	230	390	15.22

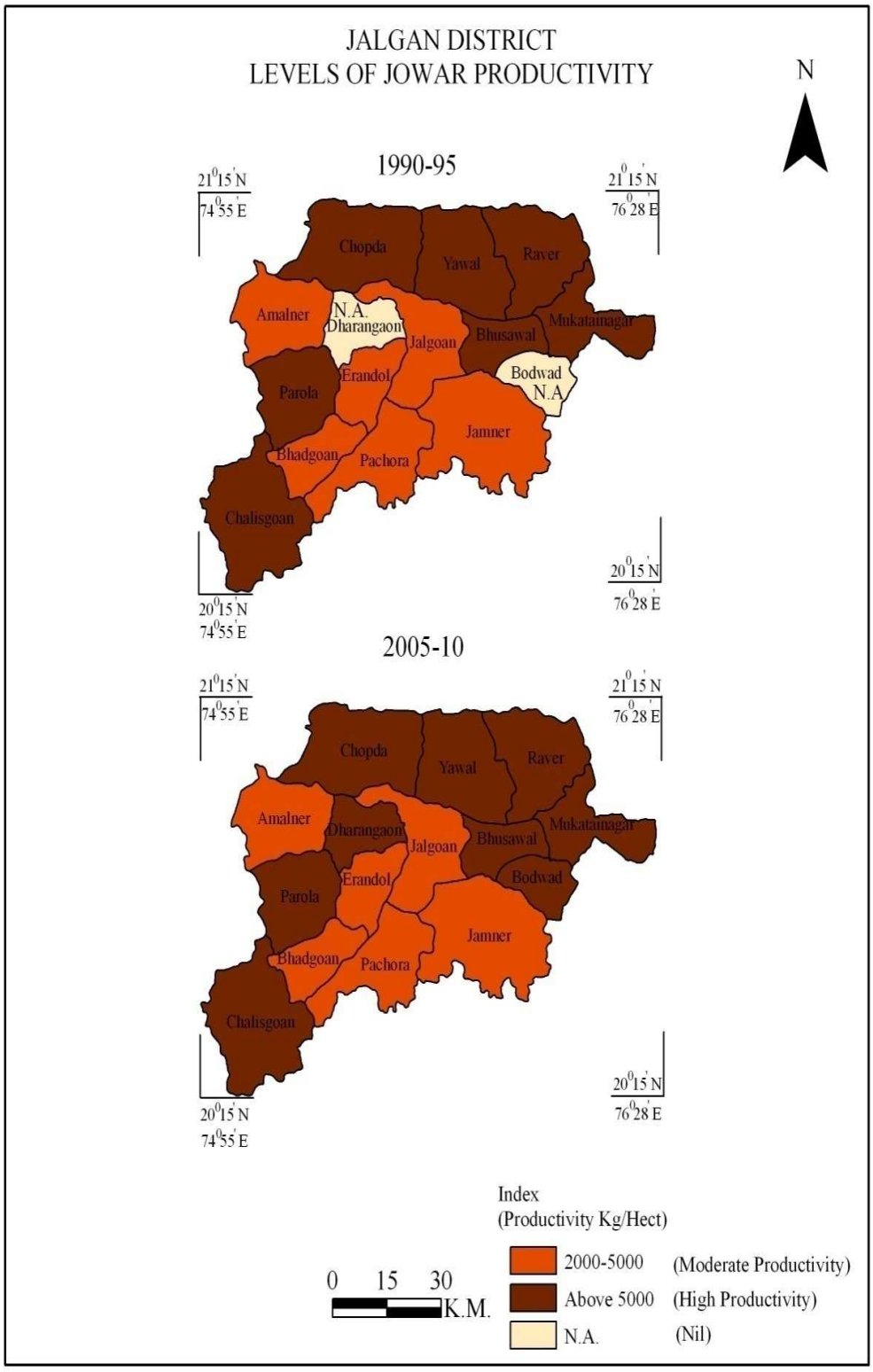
Source: Socio-Economic Abstract of Jalgaon District (1990-95 to 2005-10)

{Note: # sugarcane production given equal to in 1 crane and cotton production showed in 1 bag equal to 170 K.G}

While moderate productivity 2000 to 5000 kg per hector of jowar noted in Amalner, Jalgaon, Bhadgaon, Pachora, Erandol and Jamner tehsils, no low productivity of jowar was observed in this region, so jowar has highest production in this region during the period of 2005-10. because the irrigation facilities to supply of water, use of new seeds from farmers, use of fertilizers, use of modern technique and adverse climatic conditions all of them responsible for higher jowar production.


JALGAN DISTRICT
LEVELS OF WHEAT PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
Below 1000
1000-1500
Above 1500
N.A.
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
Below 1000 (Low Productivity)
1000-2000 (Moderate Productivity)
Above 2000 (High Productivity)
Zero (Nil)
0 15 30
K.M.

Map No.5.42


JALGAN DISTRICT
LEVELS OF JOWAR PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
2000-5000 (Moderate Productivity)
Above 5000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.43

c) Levels of Bajra Productivity:

There are wide variations in the average level of Bajra productivity in Jalgaon district. The average productivity of Bajra in the region 737 kg per hector during the investigation period of 2005-10. In this region high Bajra productivity above 1000 kg per hector was noted in Chopda, Yawal, Jalgaon, Erandol, Dharangaon, Parola, Bhadgaon, Chalisgaon and Pachora tehsils.

While moderate productivity of jowar 100 to 1000 kg per hector confined in Raver, Muktainagar and Bhusawal tehsils. Bodwad, Amalner and Jamner tehsils has no change productivity was observed in period of 2005-10. The highest yields of 737 kg per hector are recorded in 2005-10 and production is recorded of 15600 metric tons region as a whole.

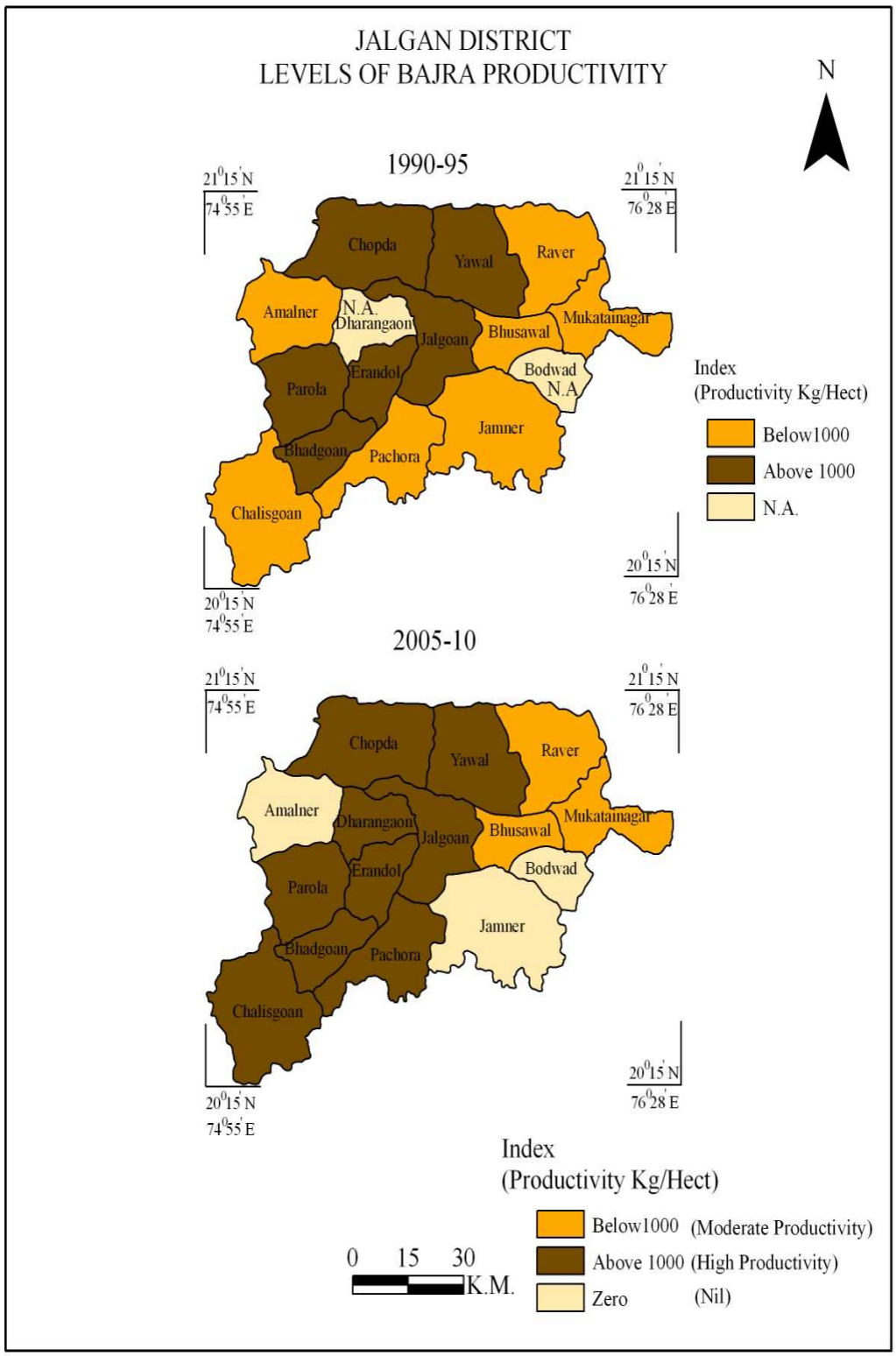
d) Levels of Maize Productivity:

Maize is also important crops in Jalgaon district during the period of 2005-10. The average level of yield maize productivity in the region 2800 kg per hector. Highest productivity of maize above 1000 was recorded in Yawal, Jalgaon, and Parola tehsils. whereas moderate productivity of maize 500 to 1000 kg per hector was noted in Chopda, Erandol, Dharangaon, Chalisgaon and Pachora tehsils.

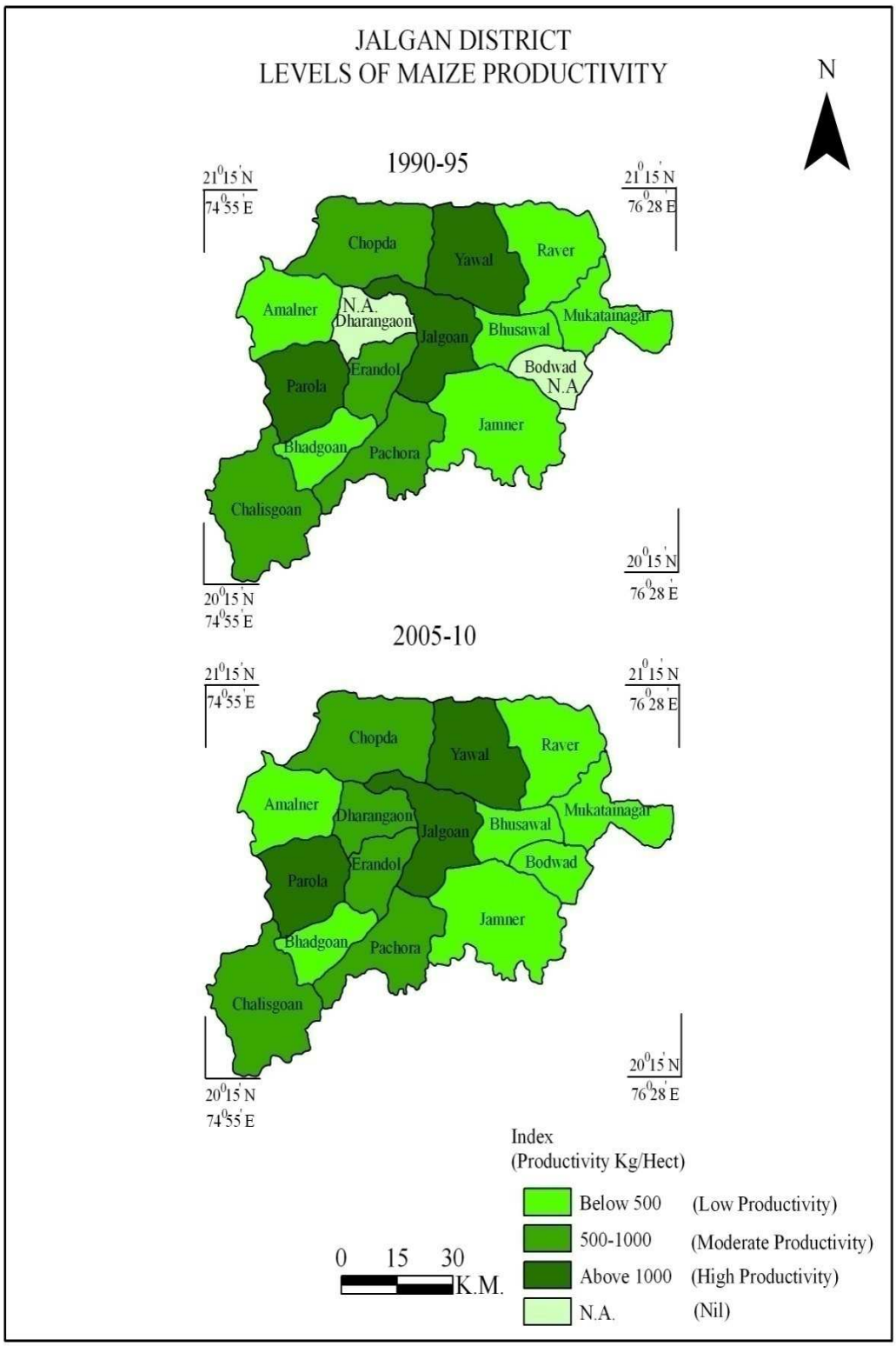
Low productivity of maize less 500 kg per hector was seen in Raver, Muktainagar, Bodwad, Bhusawal, Amalner, Bhadgaon, and Jamner tehsils during the investigation period of 2005-10. Important cash crops overall the district and cultivators were happy to this production in this region because good climatic condition, soil texture temperature and availability of water responsible for maximum production.

e) Levels of Tur Productivity:

Tur is an important food grain of the Jalgaon district. The average productivity of tur in this region is 697 kg per hector. Four tehsils have a high productivity above 1000 kg per hector of tur was observed namely as Yawal, Raver, Muktainagar, Bodwad, Bhusawal, Erandol, Amalner, Chalisgaon, Pachora and Jamner tehsils.


JALGAN DISTRICT
LEVELS OF BAJRA PRODUCTIVITY
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
(Productivity Kg/Hect)
Below1000
Above 1000
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
(Productivity Kg/Hect)
Below1000 (Moderate Productivity)
Above 1000 (High Productivity)
Zero (Nil)
0 15 30
K.M.

Map No.5.44


JALGAN DISTRICT
LEVELS OF MAIZE PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
Below 500 (Low Productivity)
500-1000 (Moderate Productivity)
Above 1000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.45

While moderate productivity of tur 500 to 1000 kg per hector was noted in Jalgaon and Bhadgaon tehsils. Low productivity of tur less 500 kg per hector was confined in Chopda, Dharangaon and Parola tehsils during the period of 2005-10. In this region tur productivity are very high in those tehsils of the Jalgaon district where tur concentration and play a significant role. It is used by the people in daily for diet and it is grown by the people in limited suitable area of Jalgaon district. The highest total production of tur 4496 metric tons recorded in 2005-10, whereas the yield of per hector and production was low similar to the period of 1990-95.

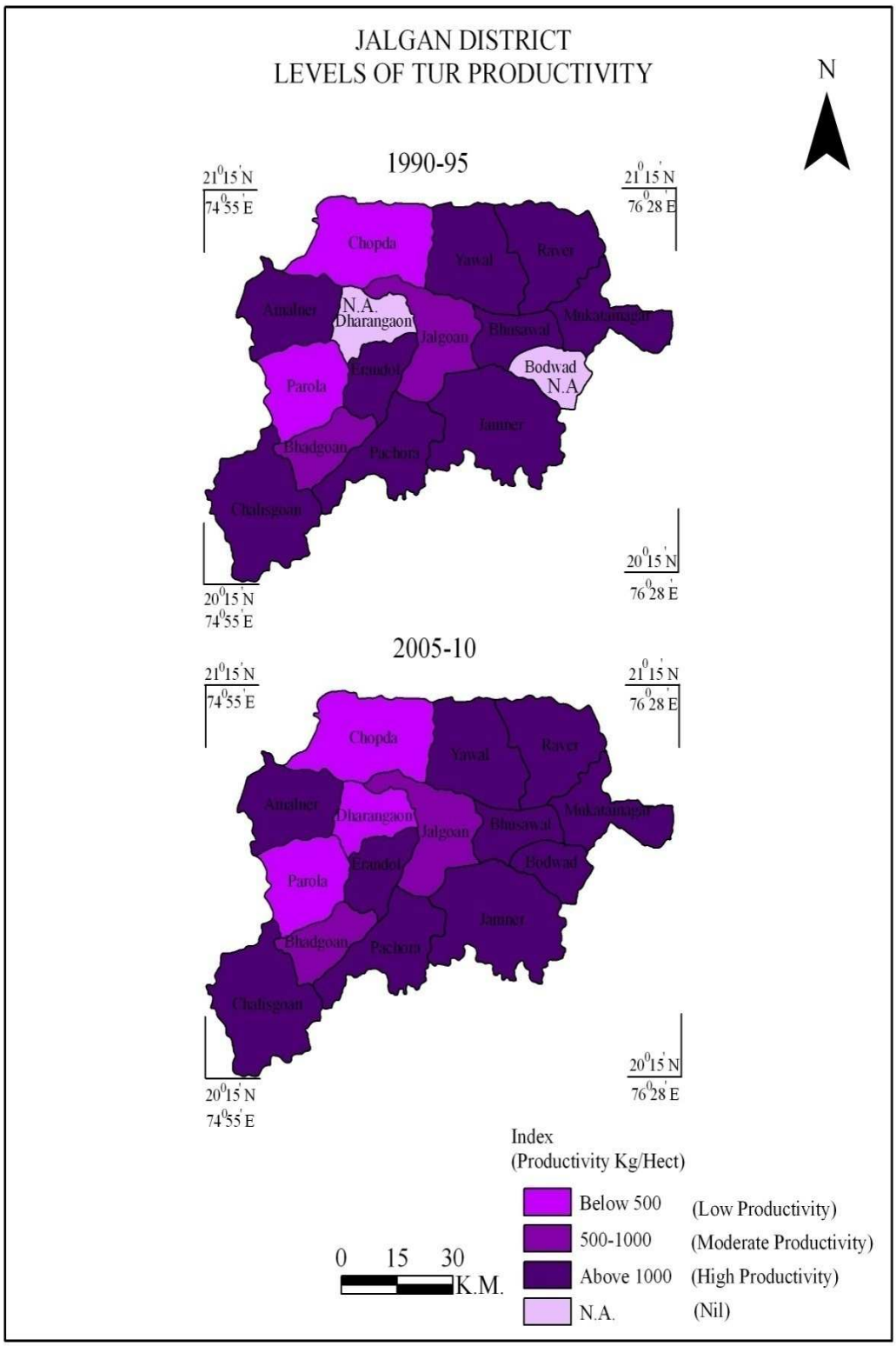
f) Levels of Oilseeds Productivity:

Oilseeds include (ground nut and sesames) are important crops in the region its area of concentration in the south and middle part of Jalgaon district. The average productivity of oilseeds is 1150 kg per hector during the period of 2005-10. Whole region above 1500 high productivity of oilseeds was recorded in Erandol, Yawal, Amalner, Parola, Chalisgaon and Pachora tehsils. Moderate productivity of oilseeds 1000 to 1500 kg per hector noted in Chopda and Raver tehsils. while low productivity less 500 to 1000 kg per hector was observed in Muktainagar, Bodwad, Bhusawal, Jalgaon, Dharangaon, Bhadgaon, and Jamner tehsils during the period of 2005-10. The levels of production are moderate due to agronomic limitation and the competitation with other grain crops.

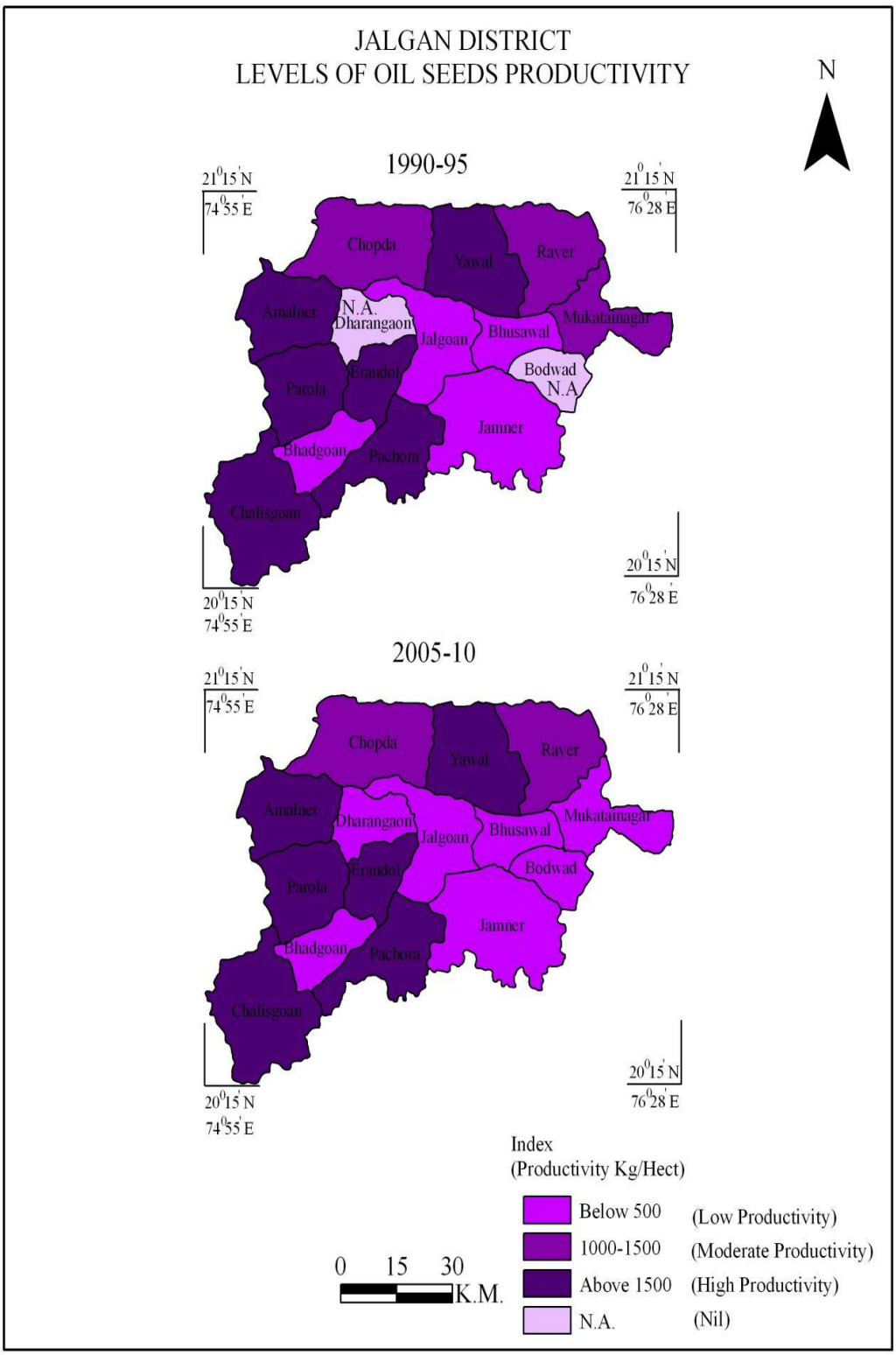
Total production of oilseeds 22400 metric tons for a region as whole, and yield of per hector was 1158 kg per hector. After the production of and yield were increased in last decades were 1159 kg per hector.

g) Levels of Gram Productivity:

The average productivity of this region is 866 kg per hector. High productivity above 5000 kg per hector was observed in Raver, Muktainagar, Jalgaon, Erandol and Amalner tehsils. Moderate productivity of gram 2000 to 5000 kg per hector noted in Yawal, Dharangaon, Bhadgaon, Chalisgaon, Pachora and Jamner tehsils. While low productivity less 2000 kg per hector was recorded in Chopda, Bodwad and Bhusawal tehsils during the period of 2005-10.


JALGAN DISTRICT
LEVELS OF TUR PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Muktainagar
Erandol
Bodwad
N.A.
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Muktainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
Below 500
(Low Productivity)
500-1000
(Moderate Productivity)
Above 1000
(High Productivity)
N.A.
(Nil)
0 15 30
K.M.

Map No.5.46


JALGAN DISTRICT
LEVELS OF OIL SEEDS PRODUCTIVITY
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
(Productivity Kg/Hect)
Below 500 (Low Productivity)
1000-1500 (Moderate Productivity)
Above 1500 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.47

Maximum high production of gram was observed in Amalner tehsils i.e. 7073 kg per hector as well as Jalgaon district as a concentration. During this period the gram productivity was recorded a highest yield of production in Jalgaon district.

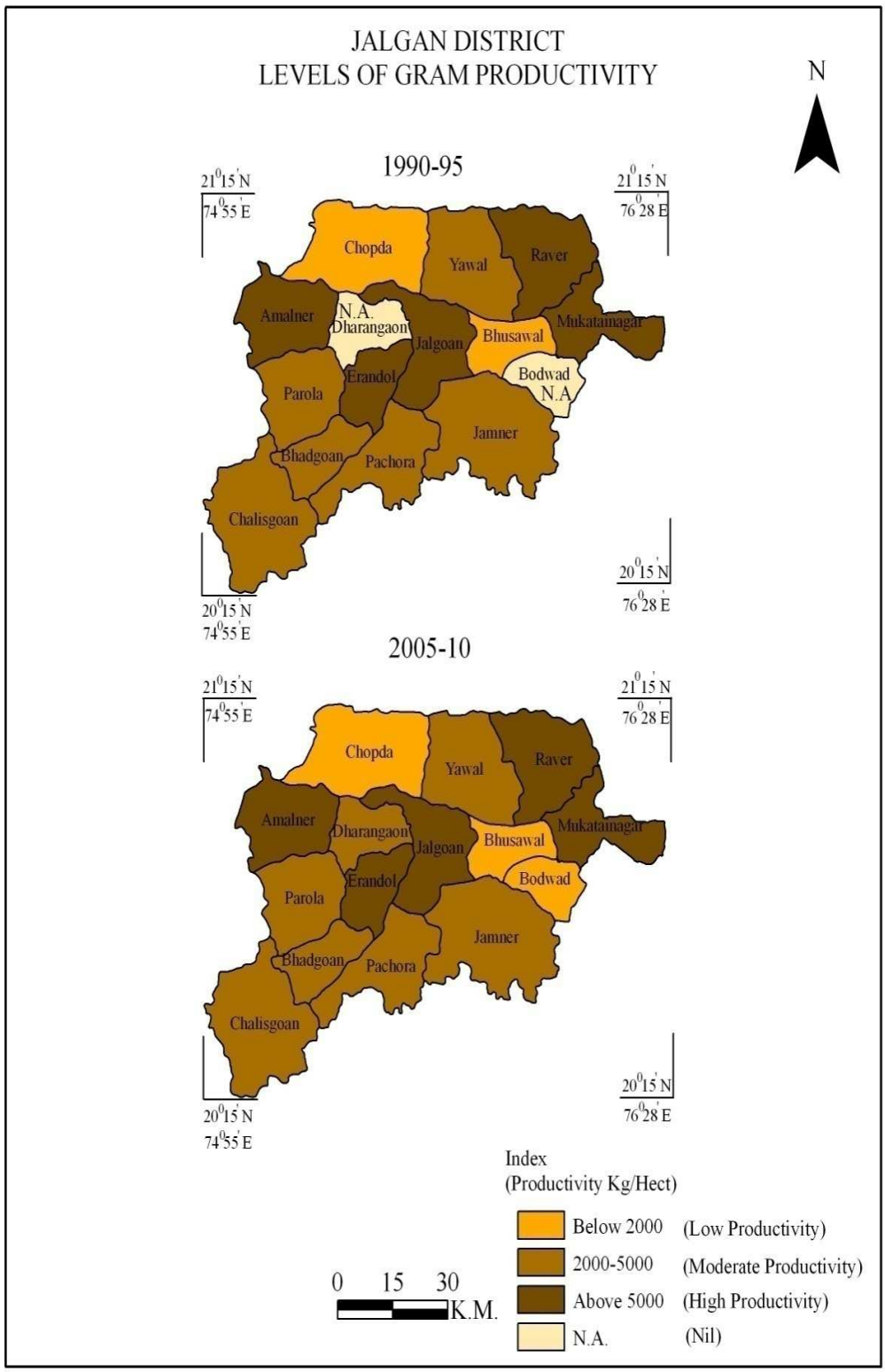
h) Levels of Cotton Productivity:

Cotton is important cash crops were observed in the Jalgaon district. Maximum farmers cultivate the cotton crops and taking the highest production in this region. Cotton crops production higher than 1990-95 periods because suitable climates, soil, temperature and new techniques of irrigation for the supply of water to these crops that was responsible. The average productivity of this region is 261 kg per hectare and production was 6042 metric tons during the investigation period of 2005-10.

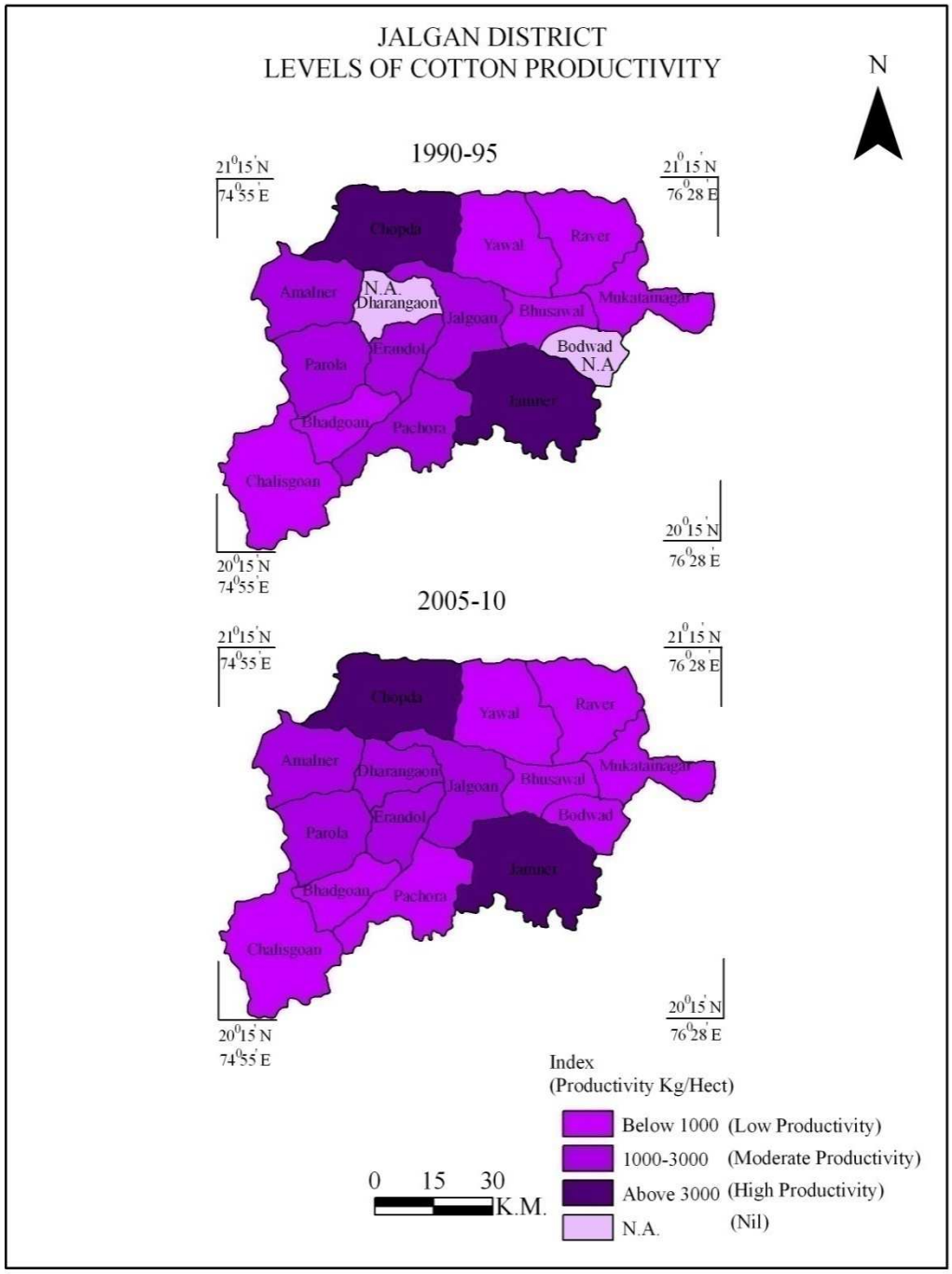
The highest productivity of cotton above 3000 kg per hector was noted in Chopda and Jamner tehsils, whereas moderate productivity 1000 to 3000 kg per hector noted in Jalgaon, Erandol, Dharangaon, Amalner and Parola tehsils. while low productivity of cotton less 1000 kg per hector confined in Yawal, Raver, Muktainagar, Bodwad, Bhusawal, Bhadgaon, Chalisgaon and Pachora tehsils during the period of 2005-10 with a high concentration whole region of cotton productivity. The highest yield productivity was recorded in 2005-10 is 6042 metric tons similar to 1990-95 period.

i) Levels of Sugarcane Productivity:

Average productivity of sugarcane of Jalgaon district is 650 kg per hector during the period of 2005-10. Sugarcane is also a cash crop taken to the farmers in Jalgaon district. The high productivity of sugarcane above 3000 kg per hector was noted in Yawal and Chalisgaon tehsils. While moderate productivity of sugarcane 1000 to 3000 kg per hector observed in Chopda and Raver tehsils. Low productivity less 1000 kg per hector was record in Muktainagar, Bodwad, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Parola, Bhadgaon, Pachora and Jamner tehsils during the period of 2005-10.


JALGAN DISTRICT
LEVELS OF GRAM PRODUCTIVITY
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
(Productivity Kg/Hect)
Below 2000 (Low Productivity)
2000-5000 (Moderate Productivity)
Above 5000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.48

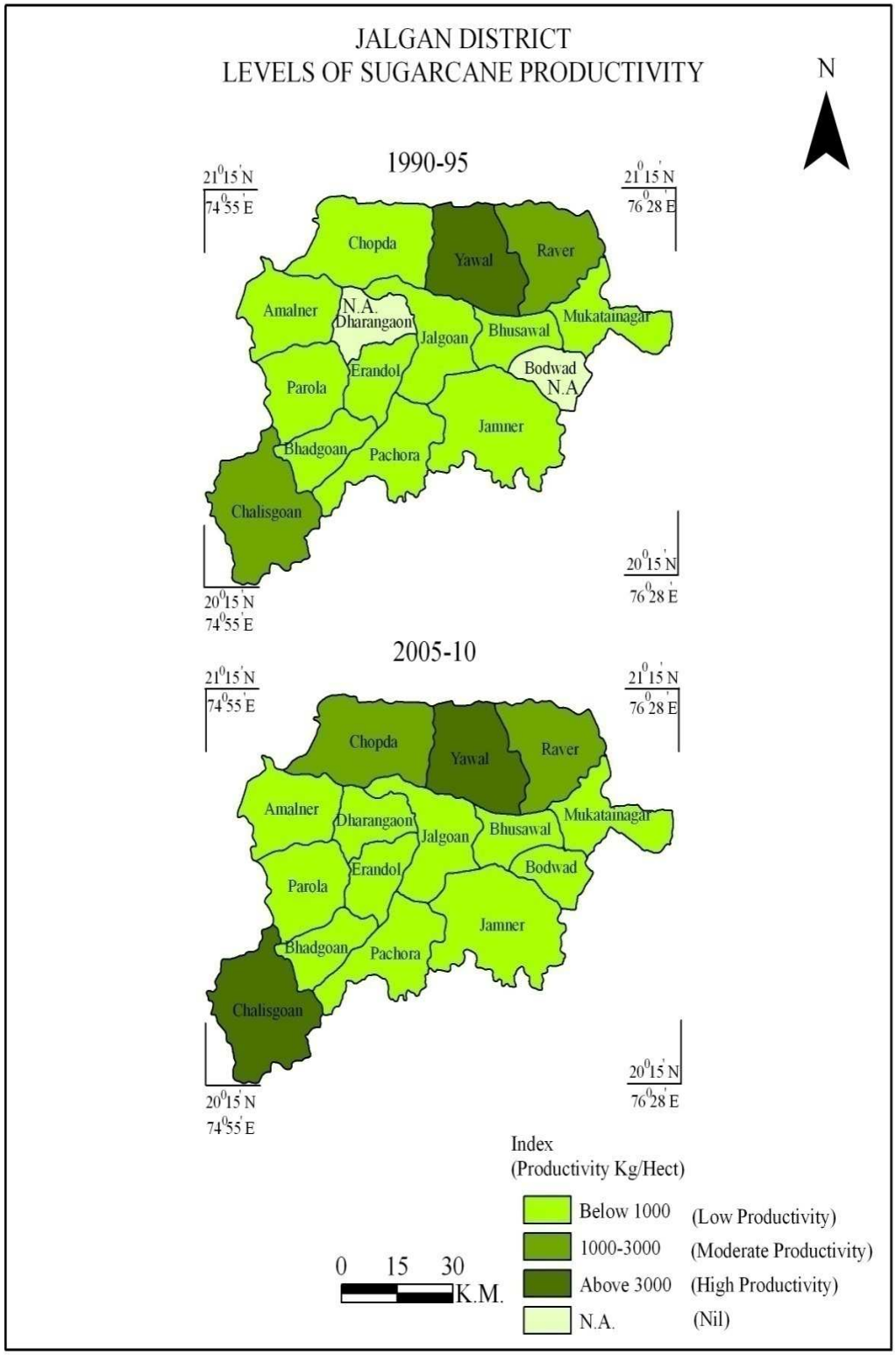

JALGAN DISTRICT
LEVELS OF COTTON PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Bodwad
N.A
Erandol
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
(Productivity Kg/Hect)
Below 1000 (Low Productivity)
1000-3000 (Moderate Productivity)
Above 3000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.49

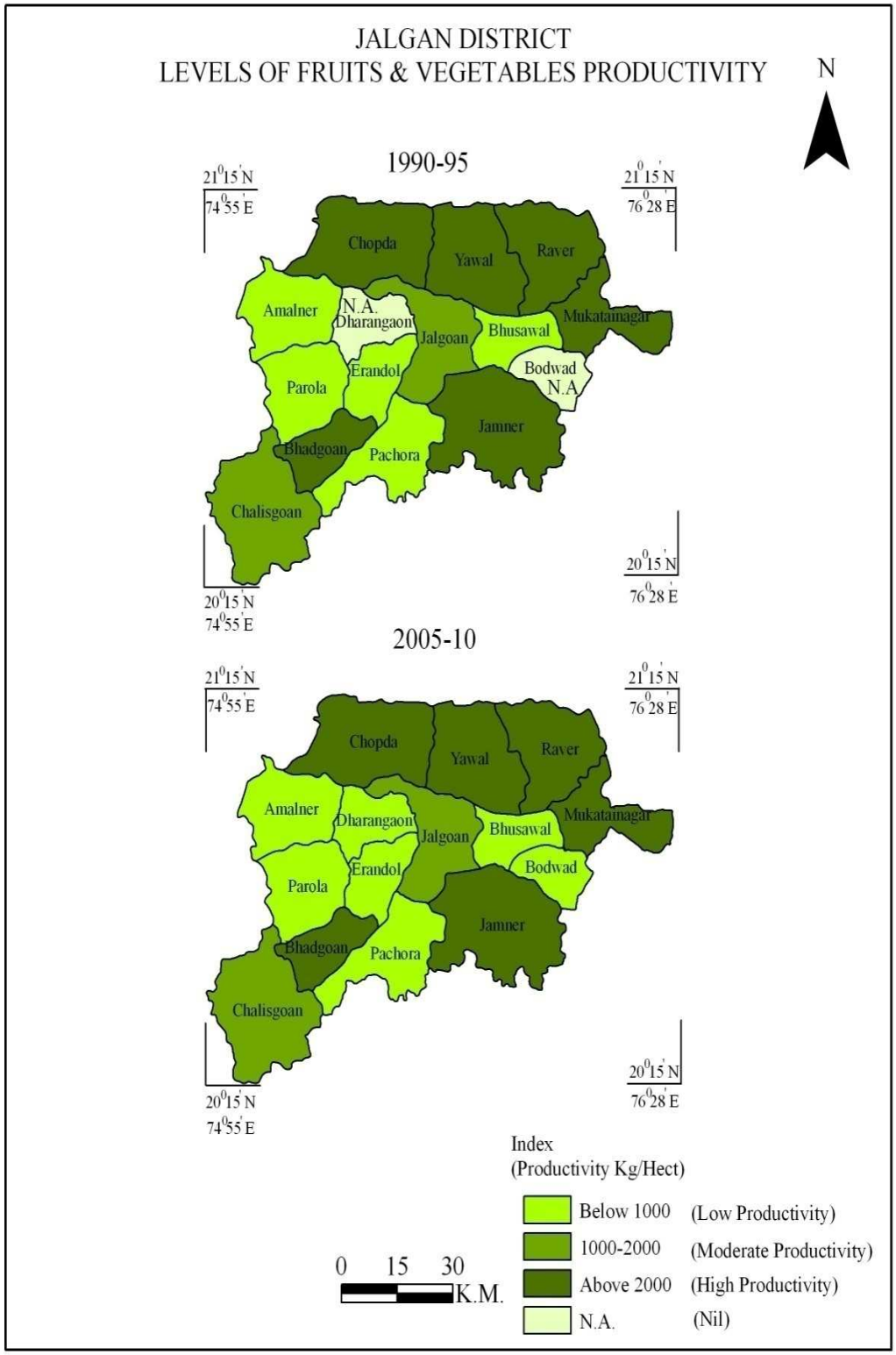
j) Levels of Fruits & Vegetables Productivity:

Fruits and vegetables play an important role in Jalgaon district. Fruits include banana and papaya has a maximum production was taken to the farmers as well as all edible green vegetables in the region. Banana important crops in Jalgaon district over the 75% was engaged on this fruits crops production in the region. The average productivity of fruits and vegetables is 2225 kg per hector in 2005-10.

The highest productivity of fruits and vegetables above 2000 kg per hector was observed in Chopda, Yawal, Raver, Muktainagar, Bhadgaon and Jamner tehsils. Moderate productivity 1000 to 2000 kg per hector noted in Jalgaon and Chalisgaon tehsils. while low productivity less 1000 kg per hector recorded in Bodwad, Bhusawal, Erandol, Dharangaon, Amalner, Parola and Pachora tehsils with high concentration whole of the district during the period of 2005-10. The highest production was found in 2005-10 than 1990-95 periods to confine.


JALGAN DISTRICT
LEVELS OF SUGARCANE PRODUCTIVITY
N
1990-95
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A.
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
76°28' E
20°15' N
74°55' E
2005-10
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
76°28' E
20°15' N
74°55' E
Index
(Productivity Kg/Hect)
Below 1000 (Low Productivity)
1000-3000 (Moderate Productivity)
Above 3000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.50


JALGAN DISTRICT
LEVELS OF FRUITS & VEGETABLES PRODUCTIVITY
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
N.A.
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
(Productivity Kg/Hect)
Below 1000 (Low Productivity)
1000-2000 (Moderate Productivity)
Above 2000 (High Productivity)
N.A. (Nil)
0 15 30
K.M.

Map No.5.51

6.0 OVERALL PRODUCTIVITY OF JALGAON DISTRICT:

THE MEASUREMENT OF YIELD INDEX METHOD

During the investigation period of Jalgaon district 1990-95 to 2005-10 the regional imbalance in agriculture productivity, whether it is calculated measured by using a statistical Yield Index Method. While applying this method the following crops grown in district and it has been selected. The crops name as wheat, jowar, Bajra, maize, tur, oilseeds, gram, cotton, sugarcane and fruits & vegetables etc.

The yield index of selected crops is calculated by the following formula according the Jasbir Singh (1982) method:

$$\text{Yield of Crop} = \frac{\text{Yield of Crop 'a' in the areal unit}}{\text{Yield of Crop 'a' in the region}} * 100$$

Composite yield index was obtained for each talukas and same is represented and showed in Map No.

According to table no. the yield index calculated and divide into three categories such as;

I. Areas of High Productivity
II. Areas of Moderate Productivity
III. Areas of Low Productivity

I. Areas of High Productivity (above 100%):

During the investigation period of 1990-95 and 2005-10 the selected major crops productivity was observed in this category name as Chopda, Yawal, Raver and Muktainagar talukas, this part belong to the north Jalgaon district in the study region. Because climatic condition is good, heavy rainfall, suitable soil for crop production and highly developed irrigation facility (wells tube well and canals) and sources to get maximum production of crops in this region. A high productivity area shows above 100 % in the region of the Jalgaon district during the investigation period of 1990-95 to 2005-10.

TABLE NO.5.9.OVERALL AGRICULTURAL PRODUCTIVITY OF JALGAON DISTRICT (1990-95 TO 2005-10), BY JASBIR SINGH METHOD (1982)

Sr. No	Agri. Productivity	Percentage Category	No. of Talukas	Name of Talukas
1	High Productivity	Above 100%	4	Chopda, Yawal, Raver and Muktainagar
2	Moderate Productivity	80% to 100%	6	Bhusawal, Bodwad, Jalgaon, Erandol, Dharangaon and Parola
3	Low Productivity	Less 80%	5	Amalner, Bhadgaon, Pachora, Chalisgaon and Jamner

Source: Computed by Researcher

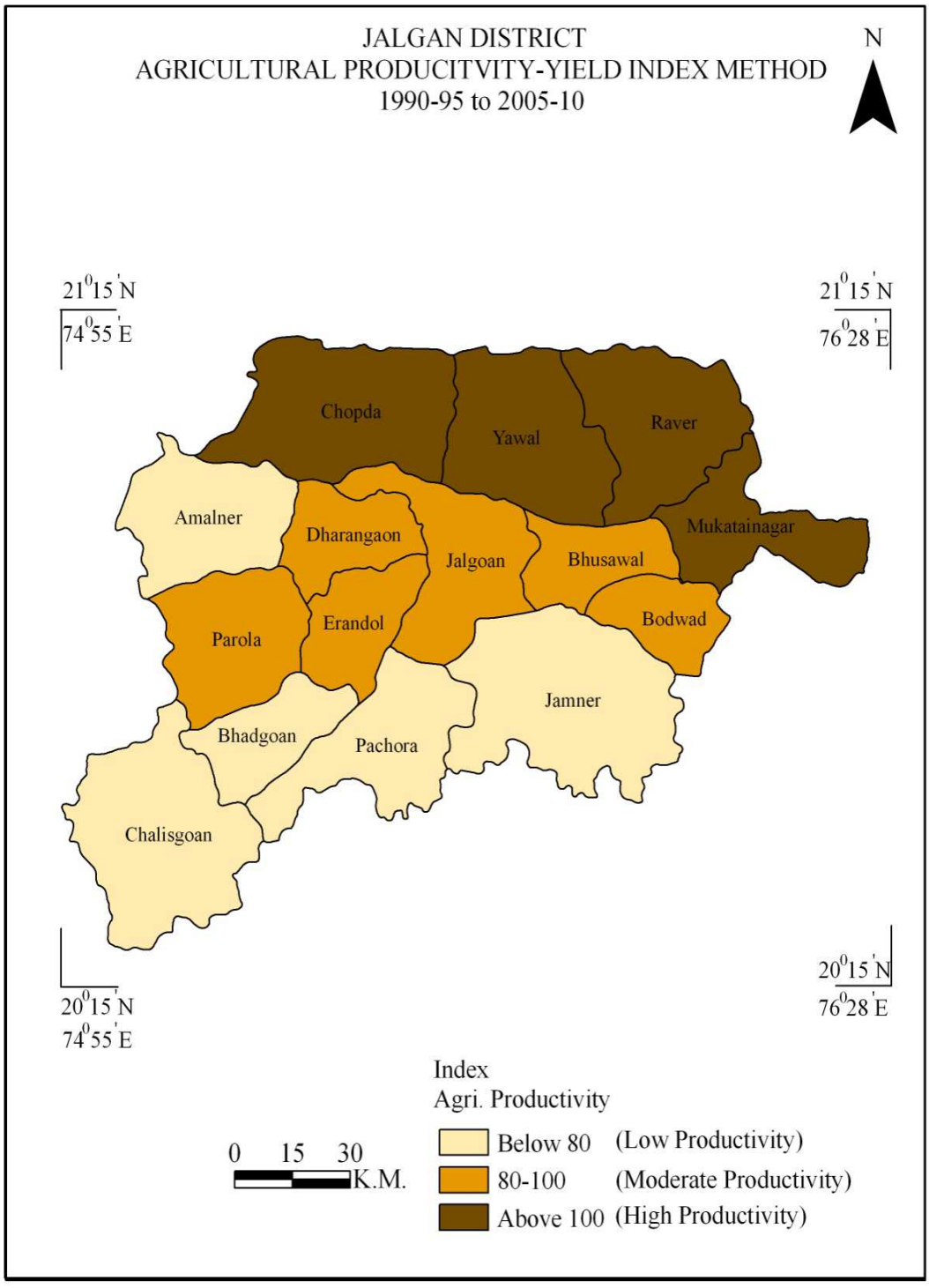
II. Areas of Moderate Productivity (80% to 100%):

This category of moderate productivity is mainly observed in middle and southern part of Jalgaon district during the investigation period. Moderate productivity shows above 80% to 100% was noted in Bhusawal, Bodwad, Jalgaon, Erandol, Dharangaon and Parola talukas. Because rainfall is limited in this region and soil factor and economic condition of farmers was responsible for crops productivity in this region.

III. Areas of Low Productivity (below 80%):

In Jalgaon district the part of south west name as Amalner, Bhadgaon, Pachora, Chalisgaon and Jamner talukas involved this category during the investigation period. Bhadgaon and Jamner this talukas the irrigation facility was not developed and good in service.

Whereas agricultural implements are old and poor with traditional practiced. Rainfall and climatic condition is also responsible to combine effect of all these factors lead to low agricultural productivity (less 80%) in this region during the period of 1990-95 to 2005-10.


JALGAN DISTRICT
AGRICULTURAL PRODUCITVITY-YIELD INDEX METHOD
1990-95 to 2005-10
N
21°15' N
74°55' E
21°15' N
76°28' E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Parola
Erandol
Bodwad
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15' N
74°55' E
20°15' N
76°28' E
Index
Agri. Productivity
0 15 30
K.M.
Below 80 (Low Productivity)
80-100 (Moderate Productivity)
Above 100 (High Productivity)

Map No.5.52

6.1 AGRICULTURAL EFFICIENCY ACCORDING TO KENDALL'S METHOD:-

MEASUREMENT OF RANKING CO-EFFICIENT METHOD -

Kendall (1939) developed a method of determining the agriculture efficiency based on output per unit area and devised a system of ranking co-efficient. He explained by taking into account the hector yield of ten leading crops for 48 administrative countries of England. Stamp (1960) applied Kendall's ranking is co-efficient technique for international comparisons; it was selecting twenty countries and nine major crops.

In India Shafi (1960) to use this technique for determine the efficiency of the district comprising the state of Uttar Pradesh by considering the hectors yield of eight food grains crops of that period.

The procedure followed by Kendall is a follows: First, is the enumeration units are ranked in the order of output per hector for each of the selected crops; Second, the ranking positions occupied by each unit in respect of the selected crops are added; Third, the sum of ranks of each unit is divided by the number of selected crops to obtain ranking coefficient. Kendall's technique is similar form of ranking regions according to per hector output.

Formula = Agricultural Efficiency = r1+r2+r3+r4+r5+r6……..r n / n

In the present study of Jalgaon district an attempt has been to examine the Kendall's method and compare its result with Jasbir Singh's method. The data of crops of yield which has been used in Jasbir Singh's method is used in Kendall's method.

Overall observation of the period the efficiency of crops were the ranks of all score values indicate the higher the development in agriculture when ranks are in lower score and it is vice versa in case of lower development of the study region.

TABLE NO.5.10. AGRICULTURAL EFFICIENCY IN JALGAON DISTRICT, 1990-95 (AS PER KENDALL'S METHOD)

Sr. No	Agri. Efficiency	Percentage of Class	No. of Talukas	Name of Talukas
1	High Efficiency	Below 6.89%	4	Chopda, Yawal, Raver and Muktainagar
2	Moderate Efficiency	6.89% to 8.00%	7	Bhusawal, Jalgaon, Erandol, Amalner, Chalisgaon, Bhadgaon and Parola
3	Low Efficiency	Above 8%	2	Pachora, Jamner

(Mean score 6.89%, standard deviation score 2.05; Source:

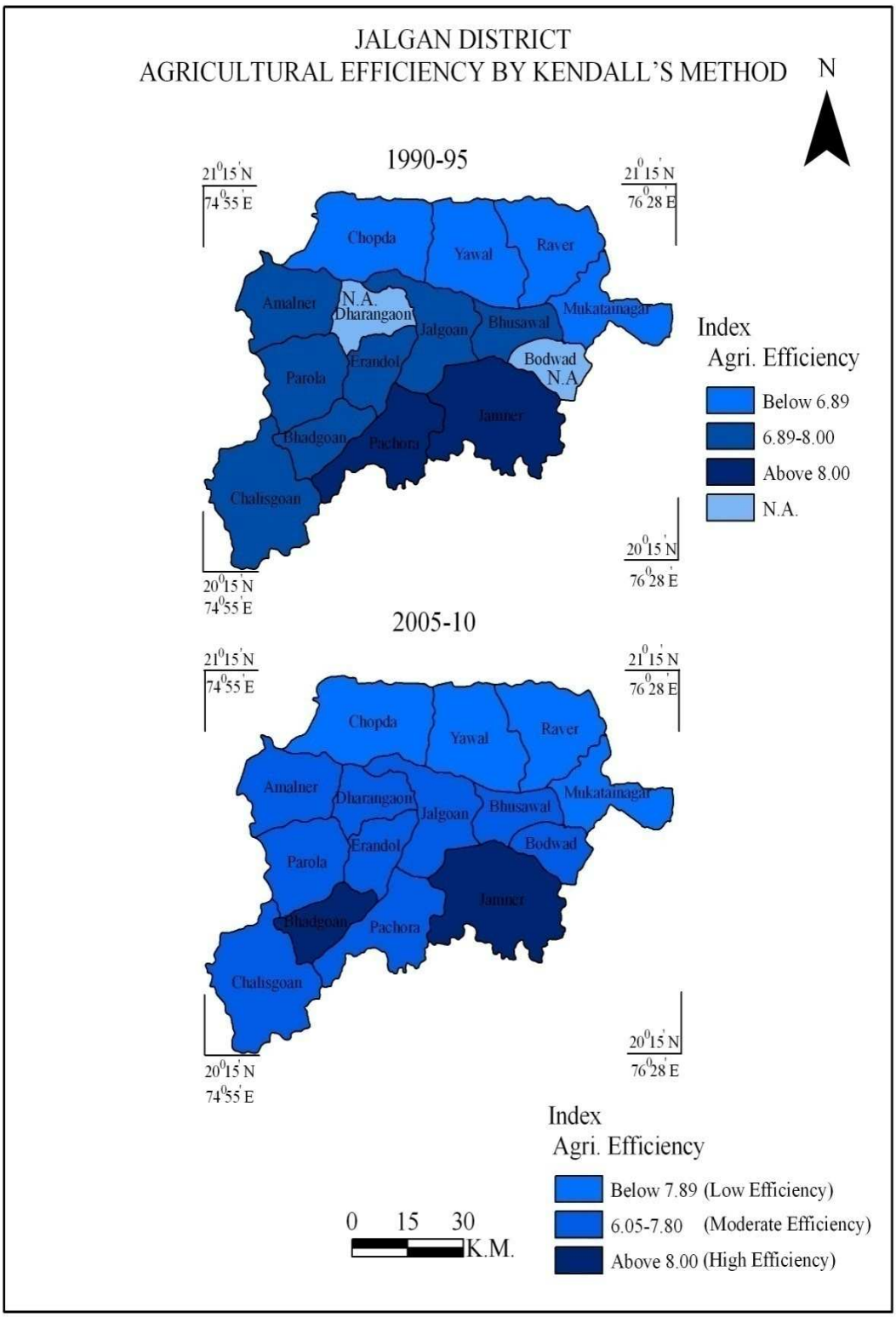
Computed by Researcher)

TABLE NO.5.11. AGRICULTURAL EFFICIENCY IN JALGAON DISTRICT, 2005-10 (AS PER KENDALL'S METHOD)

Sr. No	Agri. Efficiency	Percentage of Class	No. of Talukas	Name of Talukas
1	High Efficiency	Below 6.89%	4	Chopda, Yawal, Raver and Muktainagar
2	Moderate Efficiency	6.89% to 8.00%	9	Bodwad, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Parola, Chalisgaon and Pachora
3	Low Efficiency	Above 8. %	2	Bhadgaon and Jamner

(Mean score 6.05, standard deviation scores 2.82, Source:

Computed by Researcher)


JALGAN DISTRICT
AGRICULTURAL EFFICIENCY BY KENDALL'S METHOD
N
1990-95
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
N.A.
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
N.A.
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
Agri. Efficiency
Below 6.89
6.89-8.00
Above 8.00
N.A.
2005-10
21°15'N 74°55'E
21°15'N 76°28'E
Chopda
Yawal
Raver
Amalner
Dharangaon
Jalgoan
Bhusawal
Mukatainagar
Erandol
Bodwad
Parola
Jamner
Bhadgoan
Pachora
Chalisgoan
20°15'N 74°55'E
20°15'N 76°28'E
Index
Agri. Efficiency
Below 7.89 (Low Efficiency)
6.05-7.80 (Moderate Efficiency)
Above 8.00 (High Efficiency)
0 15 30
K.M.

Map No.5.53

1) High Agricultural Efficiency:

During the investigation period of Jalgaon district has four talukas name as Chopda, Yawal, Raver and Muktainagar which was under the category of high agricultural efficiency in period 1990-95 and 2005-10 the high agricultural efficiency of above four talukas are mentioned their standard of this category. There are no changes in other talukas of high efficiency group during the investigation period showed in Map.

2) Moderate Agricultural Efficiency:

Overall observed of moderate agricultural efficiency in Jalgaon district was noted in eight talukas name as Bhusawal, Jalgaon, Erandol, Amalner, Chalisgaon, Bhadgaon and Parola during the period of 1990-95 and period of 2005-10 total nine talukas were observed in moderate agricultural efficiency group in district namely as Bodwad, Bhusawal, Jalgaon, Erandol, Dharangaon, Amalner, Parola, Chalisgaon and Pachora. While Pachora and Jamner talukas which were under the low efficiency group in 1990-95 have improved their agricultural efficiency in 2005-10 and therefore are classed in moderate efficiency group in Jalgaon district, showed in Map.

3) Low Agricultural Efficiency:

During the investigation period of Jalgaon district three talukas was observed in low agricultural efficiency include Pachora and Jamner talukas in the period of 1990-95 and two talukas were noted in 2005-10 period name as Bhadgaon and Jamner talukas. Bhadgaon and Jamner talukas which was under this low agricultural efficiency category. Pachora and Jamner talukas which were under the low efficiency group during the 1990-95 have shown improvement over the period and appeared in moderate efficiency group during the investigation of 2005-10.

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CHAPTER - VI

CASE STUDIES - A MICRO LEVEL ANALYSIS

6.1 INTRODUCTION:

The “impact of irrigation on agriculture development in Jalgaon district (1990 to 2010), Maharashtra” in a particular has studied in previous chapters of the thesis. They bring out the spatial variations and changes in demographic factors, physical & socio-economic factors, irrigation of total irrigated area to irrigated crops, general, agricultural land use and cropping pattern and agricultural productivity to agriculture development. This chapter comprises of a case studies of selected villages as a micro level analysis.

In case studies have a play vital role in research observation and importance particularly in the field of Agriculture and Irrigation based Agriculture while analyzing the various geographical factors by taking into account of the area and get the general pictures. However, it is common experience of that within the region there are great variations in situations like climatic changes, socio-economical changes, worker’s role and important of farmer’s role in agriculture field. So, therefore it becomes necessary to conduct the analysis at micro level at least for some cases, which can throw light on the variations in different factors.

View of this, it was decided to assess the agricultural set up of selected villages. Six villages have been selected of the Jalgaon district, out of four villages selected under irrigation source of area and two villages selected in scarcity or very less irrigated area of the Jalgaon district, in all information are taken for case studies from the entire region of Jalgaon district.

These villages are not selected arbitrarily, because the different agriculture conditions and impact of irrigation are taken and consideration while selected the villages. The data of selected villages are collected from the various sources such as Government records, Talathi, Gramsevak and other concerned authorities. Factual information is collected through field visits, questionnaire and personal interviews, at least 50% farmers from each village for better analysis.

6.2 METHODOLOGY:

The existing land use in selected villages was recorded on cadastral maps obtaining from the respective talukas of head office. Personally goes to the farmers in each village was interviewed and note down the information for correct and factual it was seen too different parts of land use and irrigation, use of pesticides, fertilizers, inorganic mixture, use of implements etc.

During the field survey exhausted information and notes were also prepared which have been used for the subsequent micro level analysis. It was study and considered as essential, since it acts as supplement to and checks upon the broad picture of general discussion.

The following analysis shows the integrated impact of irrigation and other inputs on agriculture of six villages in different ecological and climatic condition in Jalgaon district.

6.3 GENERAL SETUP OF THE VILLAGES:

Following villages have been selected for Micro Level Analysis in Jalgaon District:

1) Virvade:

(Location - Virvade Village, Taluka – Chopda, Dist - Jalgaon)

This village is settled at foot hill in southern parts of Satpuda mountain of Jalgaon district. It has elevation of about 250 meters above mean sea level of the area. It is 63 km far from Jalgaon city. Virvade village comes in Chopda Taluka and Amalner subdivision circle of agriculture in Jalgaon district. Chopda is 10 km from Virvade and Yawal is 45 km from this villages. Chopda - Yawal – Burhanpur highway near about 8 km of this village. Railway line has not available for transport; only road ways are available for transport of local people.

Total geographical area occupied by this village is about 1550 hectares (15.5 Sq.km) out of this. About 300 hectares or 20% area is under the forest area.

Village landscape is mainly covered by medium and dark black soils. More recently this region is benefited by ‘Gul River Medium Project’ of Irrigation, due to nearly constructed canal, which is an extension of Gul Left Canal. This project built

up in bank of river Gul, near Virvade village, Chopda Taluka, so the farmer using the canal irrigation facilities to agricultural land area. Agricultural area under the irrigation increased in this region.

According to the census 2011 total population of this village is about 1765 and total households are 312. However, this village has reported negative growth of population in ten years period of 2001 & 2011.In 2001 total population of Virvade village was 1840.

2) Pimpri:

(Location- Pimpri Village, Taluka – Dharangaon, Dist - Jalgaon)

Pimpri village is also belongs to Dharangaon tehsils but situated in central parts of Jalgaon district. It lies is Amalner subdivision of agriculture of Jalgaon district. It is located at an elevation of about 280 meters above mean sea level. A stream of Girna river passes nearby this village on which a percolation tank is constructed. The Pimpri Village is 15 km away from Jalgaon city and connected to National Highway of Dhule - Jalgaon - Nagpur near 3 km of this village road and Erandol is also 15 km from this village. In 2001 total population of Pimpri village was 3074; it is increased up to 3584 (with 570 households) by the ten years of 2011.

Total geographical area of the village about 2016 hectares (20.16 Sq/km), out of which about 742 hectares of land is occupied by forest and only 55% of area of this village under cultivation. However, due to presence of ground water level is maintained and well irrigation facilities are available to great extension in this region.

In addition to many farmers have adopted to using a drip irrigation and sprinkler irrigation system, therefore percentage of this area comes under the irrigation is comparatively more. The farmers of the village are alert to ready to accept of modern agriculture technology in this system. Consequently agricultural productivity is high in this village area.

3) Hivarkheda:

(Location- Hivarkheda Village, Taluka – Jamner, Dist - Jalgaon)

Hivarkheda village lies in the eastern part of Jalgaon district and Jamner taluka. It comes in Pachora agricultural subdivision of Jalgaon district. It is located on the left bank river of Waghur streams, at an elevation of about 240 meter above mean sea level. Jalgaon city is near about 30 km from this village and Jamner is 8 km far away. Southern slope in this village direction of Ajanta ranges and west on Satmala ranges of a geological features. In 1991 the population of the village was only 1300. It becomes more than double within 20 years period i.e. from 1991 to 2011.

According to census 2011 the population of Hivarkheda village is 2013. Many workers of this village daily migrate to other main city or any industries area for the purpose of employment. It is one of nearby villages which supply to fruits and green vegetables to the Jalgaon city. It has occupied of total geographical area about 706 hectares (7.06 Sq/km) of area; out of this 21.6% area is under forest which is 15% area not available for agriculture. Net sown area accounted for more than 50% area. The soils are very shallow black soils in high land areas as well as in the southern parts. Along with the river bank also soils are poor fertile and medium black soil are found in east and south east parts of this village.

4) Kingaon:

(Location- Kingaon Village, Taluka – Yawal, Dist - Jalgaon)

Kingaon village also lies in Satpuda mountain region of north side of Jalgaon district, Kingaon village comes in Yawal Taluka. It belongs to Jalgaon agricultural subdivision and Yawal tehsils. It is located at 250 meters elevation above mean sea level. Kingaon far away 15 km near Yawal and 18 km from Jalgaon city. It is located in Chopda - Yawal – Burhanpur State Highway.

As stream passes of Tapi River near by the Kingaon village. In the year of 2011 population of Kingaon village was 5560 so it is distributed in four settlement known as ’Wada’ or ‘Galli’. i.e. Bhoie Wada, Teli Wada, Mahar Wada and Mahajan Wada. More than 65% population involves in SC & ST cast category of the village.

As compared to other villages this village enjoys the number of facilities such as Primary Health Center, Primary & Secondary High School, and Residential CBSE Public School.

Topography of the village landscape is highly uneven and hence therefore great variations in soils varying very black to dark black soil in this areas. Maximum cotton, sugarcane, jowar & fruits and green vegetables are taken of the farmers. In these areas irrigation facilities are more available than other village. Most of the well irrigation and also sprinkler irrigation system is available in the valley region. In this village area of total geographical area is about 805 hectares (8.05 Sq/km), out of which about 740 hectares land is cultivable.

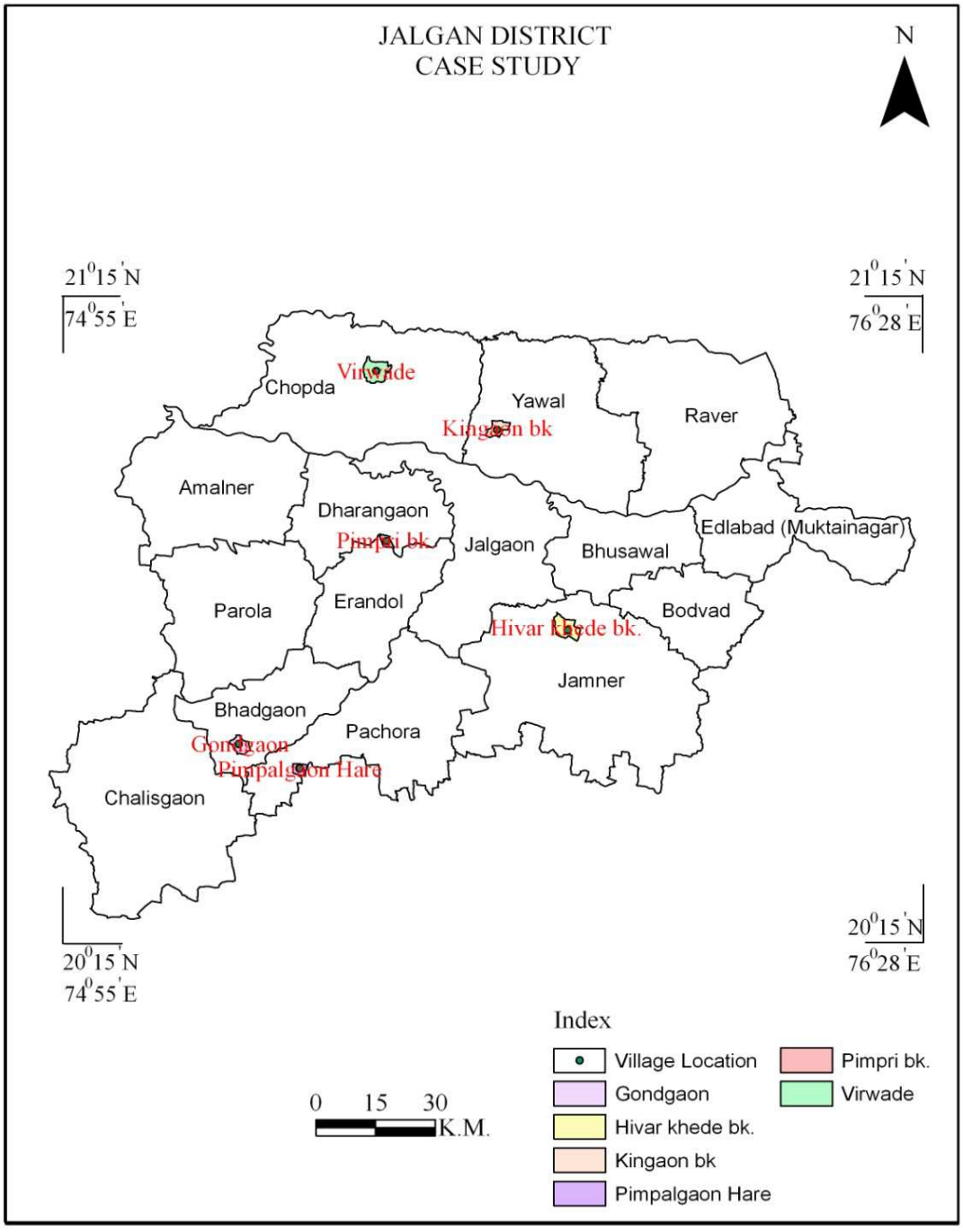
5) Pimpalgaon (Hare):

(Location- Pimpalgaon Hare Village, Taluka Pachora, Dist - Jalgaon)

This village is popularly known as Hareshwar of Mahadev temple. Lord Mahadev and Lord Vishnu temple is located at the river bank of Bahula of Jalgaon district. The village is sited at an elevation of 140 meter above mean seal level. Bahula is the tributaries of Tapi River.

Just few kilometers away from the Pachora taluka place of the village. The Pachora tehsils place close to Bhadgaon as well as Erandol from this area. In 2011 population of Pimpalgaon (Hare) was 1568 with 290 households. Total geographical area of Pimpalgaon (Hare) is about 332 hectares (3.32 Sq/km). In these village are great variations of landforms, some parts of village land are very fertile where as some parts are occupied by landforms with undulating topography.

During the floods of Bahula river water goes to the agriculture land and the crops get badly affected. Bore well irrigation and canal irrigation facilities are available for the farmers in this village.



Location Map No: 6.1

6) Gondgaon:

(Location- Gondgaon Village, Taluka – Bhadgaon, Dist - Jalgaon)

Gondgaon village lies are southern part of Pachora subdivision of agriculture in Jalgaon district. This village situated at southwest direction of Jalgaon district in Bhadgaon taluka. It is located between Parola and Bhadgaon tehsils. An elevation of Gondgaon village about 370 meters above mean sea level. It is 8 km from Bhadgaon, 15 km of Pachora, 38 km of Parola and 68 km from Jalgaon city.

Total geographical area of this village 1238 hectare (12.38Sq/km) of land, out of these area 450 hectares is not useful for the purpose of agriculture and other sources and crop production. The landscape of this village is mainly covered by medium dry and black soils. This village is benefitted by bore well irrigation; if the water available in deep depth on the land and depends on rainfall season. According to census 2011 the population of Gondgaon village is 1460.

6.4 LIVESTOCK OF VILLAGE:

Livestock in villages is key stone of the farming for farmers in land. This livestock are family members in an area. Where the importance of livestock in agriculture is a great significance, as the land is of small use to the cultivator without the poor technique that crash the plough and soil. Here livestock rising serves in dual purpose, farmers grown a certain crops because their permanent labour force is depend on seasonally unemployed and they wish to be used throughout the year. Overall village of livestock are available in small number of animals like cow, buffalos, bullock pair, and goat/sheep support to the farmers in agriculture.

Total livestock share of cow was seen in all villages like Virvade, Pimpri, Hivarkheda, Kingaon, Pimpalgaon and Gondgaon. Every village cow livestock 50 to 60 cows was found for better milk and Kingaon village 7 Jarsi cow was found out of six villages for high milk production. as well as buffalos has a play an important role in overall village, total buffalo of livestock every village 20 to 25 female buffalos and male are observed in all areas. In all villages near about total number 180 buffalos are observed for milk production.

Out of total livestock of bullock are share in all villages. Every village the number of bullocks and pair of bullock was seen in Virvade, Pimpri, Hivarkheda, Kingaon, Pimpalgaon and Gondgaon village. Total livestock of bullock where 10 to 16 bullock pair are observed in each village, this bullock pair are useful for transport in local areas and useful for crop cultivation means farming in land. Bullock is best friend of every farmer and they take care of good in condition.

Another livestock of goat and sheep play a wide role with other livestock in selected village. Goat and sheep are one of the important in a small economy related to wool and meat industry in local area and outside of areas; here sheep are also use for dual purpose like mutton and wool in selected villages. Out of three villages Virvade, Kingaon and Pimpri was both livestock of goat and sheep seen in rural areas. But out of other three villages Hivarkheda, Pimpalgaon and Gondgaon the number of goat livestock was observed and sheep livestock was negligible in the areas. Total number of livestock are goat in 750 and sheep is 330 are measuring in all villages of Jalgaon district.

6.5 CROPPING PATTERN:

The table No.6.1 shows the area under selected crops in selected villages in Jalgaon district during the period of 2014-15. The data before 2014 was not available in village records.

All the information put from the period of 2014-15 in Jalgaon district. the crops selected villages may i.e. food crops rice, bajra, jowar, wheat, maize, gram, fruits & vegetables, chilly, onion and non food crops like oilseeds (ground nuts), sugarcane and cotton crops respectively.

In this filed the main occupation of every rural people or farmer is agriculture, where it largely intensive subsistence type and mostly single important crops and clearly dominates the entire economy of the study area or Jalgaon district. This technique very useful to show variations of all crops whether it is food or non food crops, but every crops has a play important role in soil and physical condition of the region. The cropping pattern of selected villages is presented in table no.6.1, it reveals that out of total irrigated cropped area of Virvade, Pimpri, Hivarkheda, Kingaon, Pimpalgaon and Gondgaon about 62.31% area under these food crops in

villages of Jalgaon district. Important food and non crops in all villages occupying the important cash crops like cotton, maize, fruits and onion are seen here.

TABLE NO.6.1 CROPPING PATTERN OF SELECTED VILLAGES OF IRRIGATED CROPS AREA IN PERCENTAGE IN JALGAON DISTRICT

Sr. No.	Name of Crops/Name of Village	Virvade	Pimpri	Hivarkheda	Kingaon	Pimpalgaon	Gondgaon
1	Rice	0.0	0.0	0.0	0.0	0.0	0.0
2	Bajra	4.5	0.0	0.0	0.0	0.0	0.0
3	Jowar	2.5	4.9	3.5	0.0	11.0	5.5
4	Wheat	4.0	13.2	17.3	11.2	7.1	1.6
5	Maize	0.0	1.9	8.7	75.8	0.0	0.0
6	Gram	3.1	31.2	16.3	11.1	4.5	1.1
7	Green Vegetables	3.3	6.6	2.0	5.1	5.5	4.0
8	Fruits	1.6	19.0	3.5	3.2	0.0	1.9
9	Green Chilly	2.5	6.2	3.8	2.0	0.0	1.9
10	Onion	2.3	47.1	10.7	9.3	0.0	3.0
11	Sugarcane	0.0	2.9	0.0	13.4	7.1	0.0
12	Oilseeds (G.N)	0.9	3.6	0.0	14.2	2.9	0.0
13	Cotton	30.9	17.4	23.4	3.5	21.5	31.7
14	T.I.A (00’ hc)	55.6	150.2	89.2	149	48.5	43.3
15	N.I.A (00’ hc)	40.1	115.1	60.4	121.4	34.3	31.2

Source: Computed by Researcher & Village Records

In all villages cotton crops where total irrigated area of this percentage 68.85%, second in maize 46.22% crops in all villages, third is onion 38.68%, then gram 35.95%, wheat 29.10%, bajra 24.07%, jowar 14.92%, sugarcane 12.50%, oilseeds (ground nut) 11.66% and last is chilly 8.77 has very lowest percentage in all villages. Cotton was highest irrigated crops cultivated in first crops, after cotton maize, onion, wheat as well as jowar, bajra are cultivated, then fruits & vegetables, ground nut, gram are third irrigated crops cultivated; very lowest percentage of irrigated crops are found in this village chilly crops i.e.

Important food crops are observed in villages Mostly cotton crops cultivated in every farmer in study area because cotton is most suitable crops in environment as well as soils in this region. Maximum cotton crops cultivated in two varieties in study area first is Swadeshi cotton and second is Hybrid (BT) cotton in overall the district. These crops have more price value to other crops because government has to give a big value of money for cotton crops.

6.6 SOURCES OF IRRIGATION:

In selected villages the basic use or benefit of irrigation is that it will increase the land under cultivation in study area. For successful crop cultivation timely and adequate of water is essential. Water for irrigated crops is available from a number of sources; they are rainfall, river water and underground water. Source of irrigation during the 2014-15, whereas water is the most significant determinant uses of land use in Jalgaon district. Water supply is also necessary for the maximum agriculture production of irrigated crops is on higher than 50% that of non irrigated crops in the study region. All villages the sources of irrigation by well and canal irrigation in under the study area.

TABLE NO.6.2 AREA IRRIGATED BY DIFFERENT SOURCES OF SELECTED VILLAGES 2014-15

Sr. No	Name of village	Well Irrigation	Canal Irrigation	Non Irrigation Percentage	Total Irrigation in Percentage (Hectares)
1	Virvade	50 (6.0)	200 (88.00)	50 (6.0)	300 (100)
2	Pimpri	300 (33.50)	N.A	70 (58.20)	370 (100)
3	Hivarkheda	80(12.8)	20 (1.2)	124 (86)	224 (100)
4	Kingaon	90 (8.2)	60 (12.33)	590 (79.47)	740 (100)
5	Pimpalgaon	40 (8.3)	100 (3.32)	272 (88.38)	332 (100)
6	Gondgaon	20 (2.5)	N.A	430 (97)	450 (100)

Source: Figures shows in hectares and in bracket as percentage

The land of Virvade is irrigated by left bank canal of Gul Medium Irrigation Project in Jalgaon district. Before the constructed of canal the sources of water for irrigation was well and depend on also rainfall. At present different sources of irrigation in all irrigated area by canal irrigation in 300 hectares of agricultural land.

The surface of flow method particularly in this village is applied to supply of water to the farms in this villages of Jalgaon district.

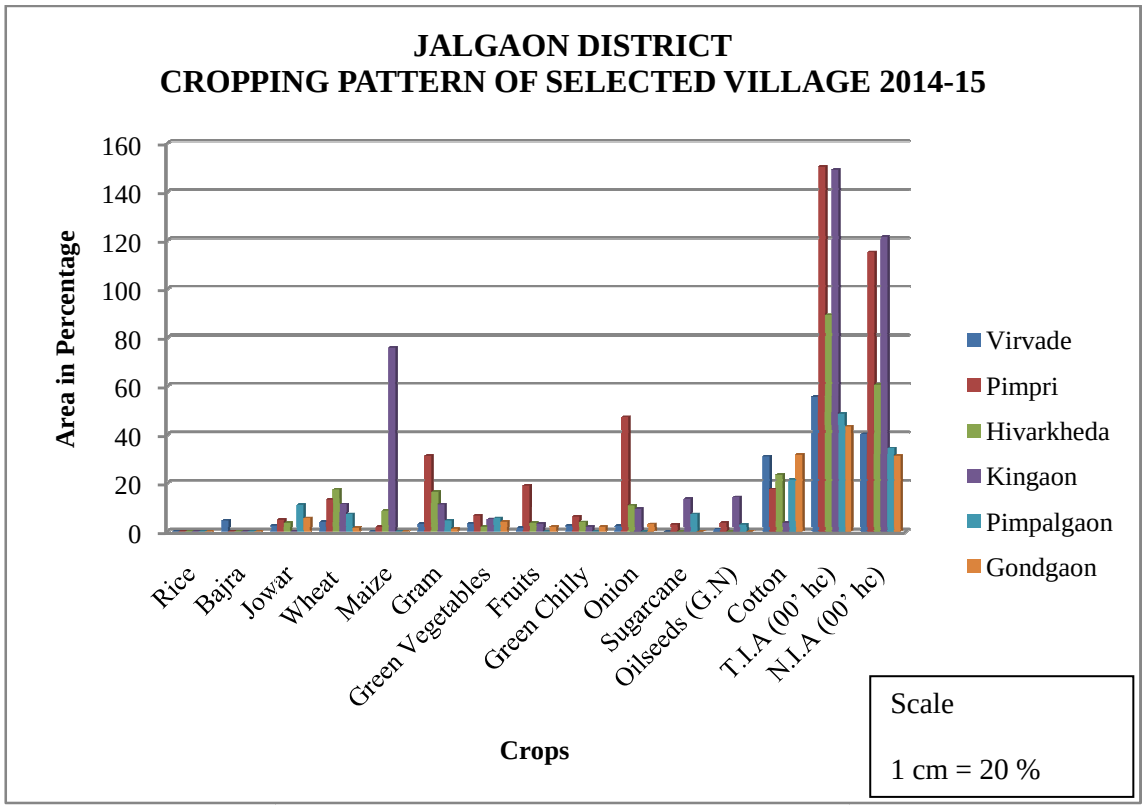
Most of the irrigated land is occupied by Cotton crops. Village Pimpri land irrigated by the stream of Girna river near by this village on some farmers use of this water and constructed a percolation tank for supply of water to the crops in land. Maximum well irrigation system has been using the land. At present situations many farmers can use from percolation and well irrigation of water to the crops has sprinkler irrigation mostly in jowar, gram, onion, vegetables and cotton crops cultivation. Total irrigated area under this system is 370 hectares of the land.

Another conditions about irrigation in village Hivarkheda is different, Hivarkheda is situated at the left bank river of Waghur, but in rainy season this river flows with high quantity of water but after post monsoon the river will dry so the outside of the area are irrigated through the well sources but not enough to supply of water to the agricultural land. Although cultivated crops support the river bank of soils little moist with fertile composition. Total irrigated crops of this village land are 224 hectares and mostly wheat, gram and cotton are cultivated.

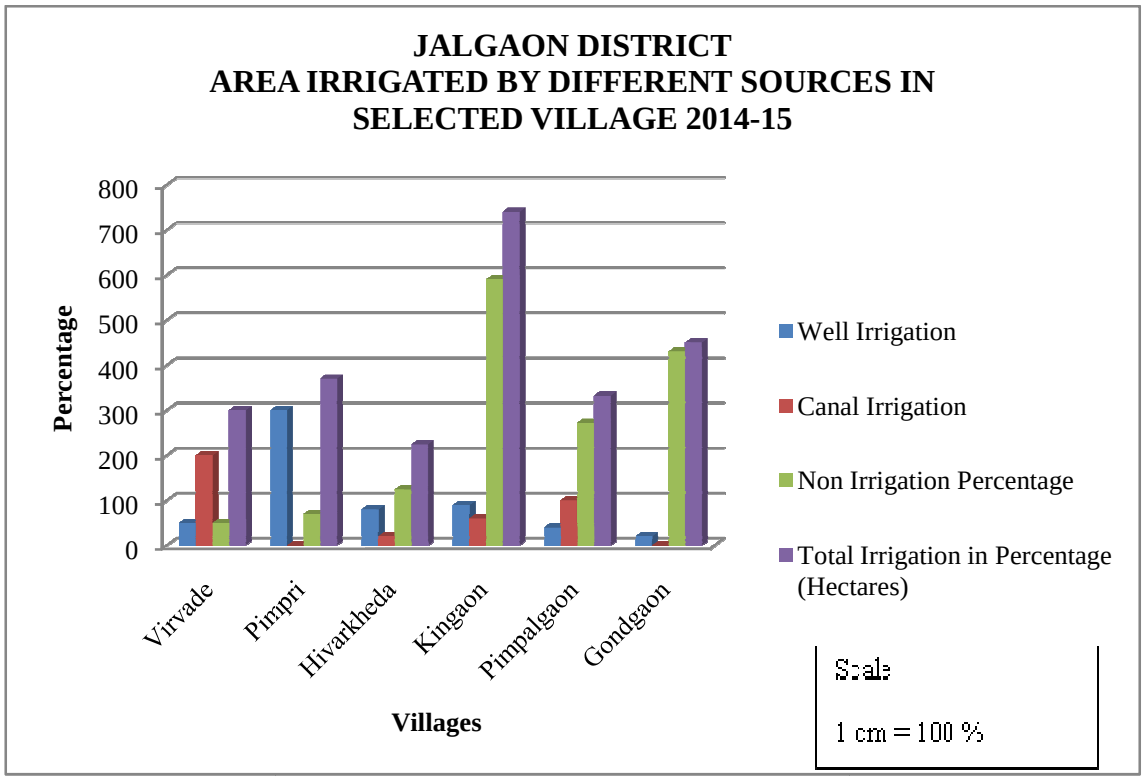
Kingaon village is located at near Satpuda mountain of Jalgaon district where the land of agriculture under irrigation is 740 hectares. Important features about village where the Tapi River streams passes through this agriculture area. So the soil mostly in fertile and dark black soil which support to the crops quality and quantity. All village surfaces depend on the topography and observed the great variations in agriculture land.

At now a day's condition, farmers can be use sprinkler irrigation system with well irrigation support to supply of crop plants. Wheat, maize, gram and green vegetables are cultivated this land and high production of this. Where as compared to Virvade, Pimpri, Hivarkheda and Kingaon village the village of Pimpalgaon and Gondgaon are relatively less irrigated villages in study area.

In agriculture most of the jowar and cotton crops are cultivated here, because water availability is very low in land surface. Irrigation sources of this village are well irrigation system and in fact depend on rainfall water.



Graph No.6.1



Graph No.6.2

6.7 GENERAL LANDUSE:

Land use is most important factor in case study for micro level analysis, as per the land use properly how to use or not use in to the village but whenever we go that village office the village records looking real condition and note down in field book, so all about land use known about it. In agriculture development crop production by and large can be increased by increasing area under cultivation, double cropping raising the yields of crops per hectares by the applications of new agricultural technology and by the recognition of institutional factors. Land use is major factor of agricultural economy of the villages. Table no.6.3 gives the idea of about general land use of the selected villages in Jalgaon district for analysis.

TABLE NO.6.3 GENERAL LANDUSE PATTERN IN SELECTED VILLAGES OF JALGAON DISTRICT 2014-15

Sr. No	Name of Village/General Land use	AUF	ANAFC	OUL	FL	NSA	TGA
1	Virvade	300 (20.1)	98 (6.8)	42 (2.9)	125 (8.6)	883 (61.0)	1448
2	Pimpri	742 (35.1)	135 (6.4)	237 (11.2)	41 (1.9)	961 (45.3)	2116
3	Hivarkheda	153 (21.6)	105 (14.9)	121 (1.7)	57 (8.2)	379 (53.60)	815
4	Kingaon	62 (7.7)	36 (4.5)	24 (3.1)	32 (4.1)	648 (80.8)	880
5	Pimpalgaon	00 (0.0)	343 (27.7)	18 (1.5)	135 (10.9)	741 (60)	1237
6	Gondgaon	00 (0.0)	25 (7.5)	55 (16.7)	00 (0.0)	252 (75.8)	332

Source: Computed by Researcher & Village Records, Figures Showing in Hectares and Bracket in Percentage.

A) Area Under Forest:

The area under the forest is found in out of four villages like Virvade, Pimpri, Hivarkheda and Kingaon; out of two villages the area under the forest is negligible in Jalgaon district. Large area under the forest in Pimpri (35.1), Virvade (20.1) and Hivarkheda (21.6) but low percentage area under the forest was found in Kingaon (7.7) village during the investigation, it shows in table no.6.3.

B) Area Not Available for Cultivation:

From given table no.6.3 the percentage of area not available for cultivation is high percentage in Pimpalgaon village (27.7), moderate percentage in Hivarkheda (14.9) village, but low percentage was found in Virvade, Pimpri, Kingaon and Gondgaon village with very small percentage respectively in study area during the investigation.

C) Other Uncultivable Land:

It reveals that the table shows other uncultivable land is observed in all villages in Jalgaon district. The area under other uncultivable land use and excluding fallow land is low percentage in Hivarkheda and Pimpalgaon villages, moderate percentage observed in Virvade and Kingaon villages and out of two villages Pimpri and Gondgaon was highest percentage are found in this area. During the investigation period of observation low area under this category, it can be attributed to increase in cultivable land.

D) Fallow Land:

This land includes current fallow and permanent fallow land under this category of general land use patter. The extent of fallow land is influenced either by the climatic condition and temperatures situation limited means of farmers to rest of soil after the exhaustion due to the cropping pattern of the proceeding years.

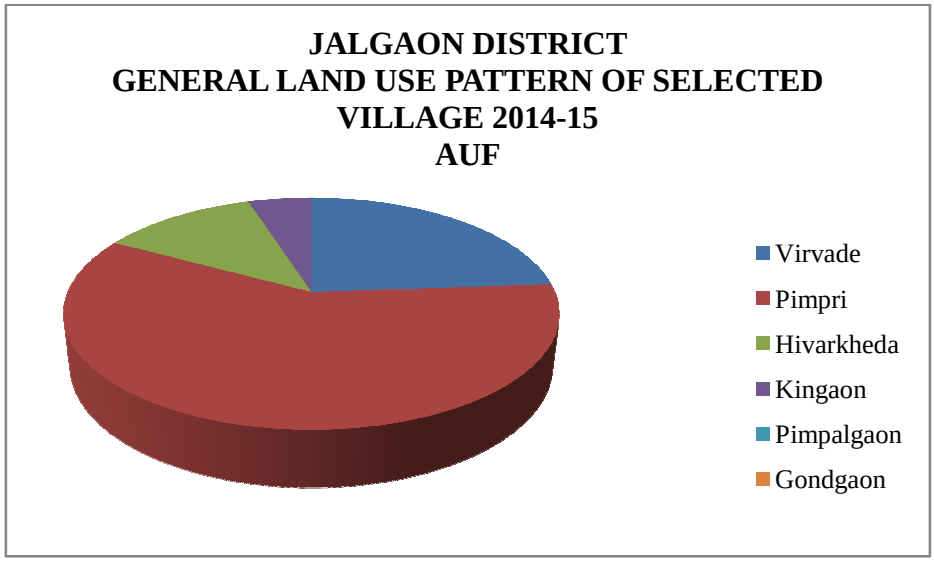


Diagram No.6.1

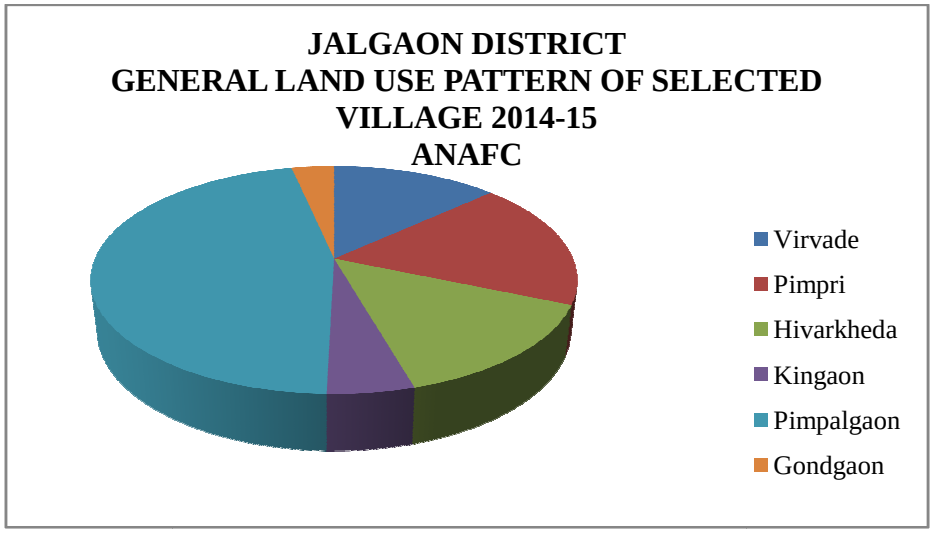


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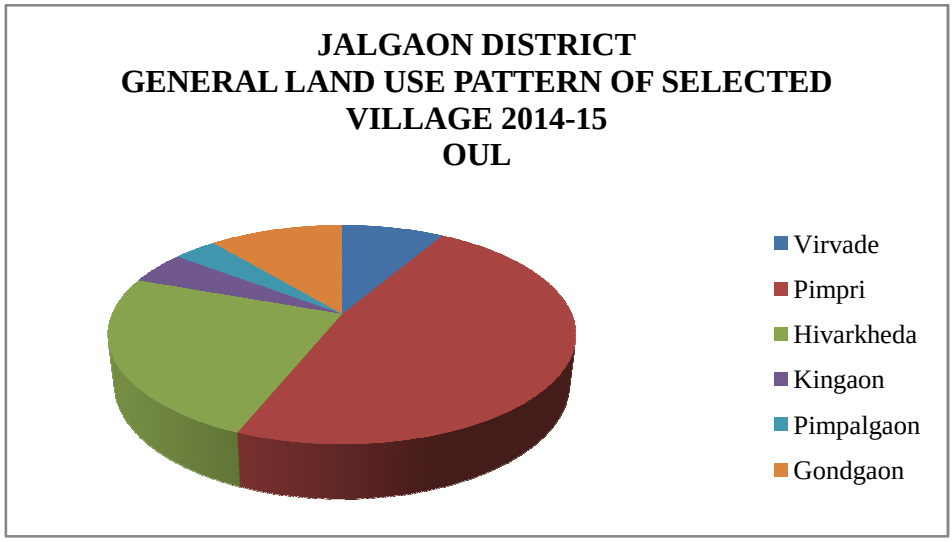


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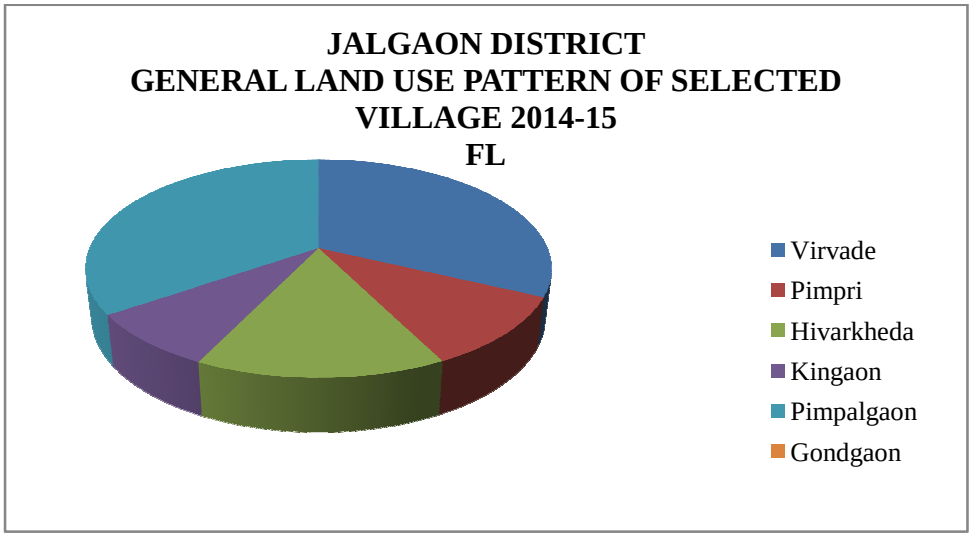


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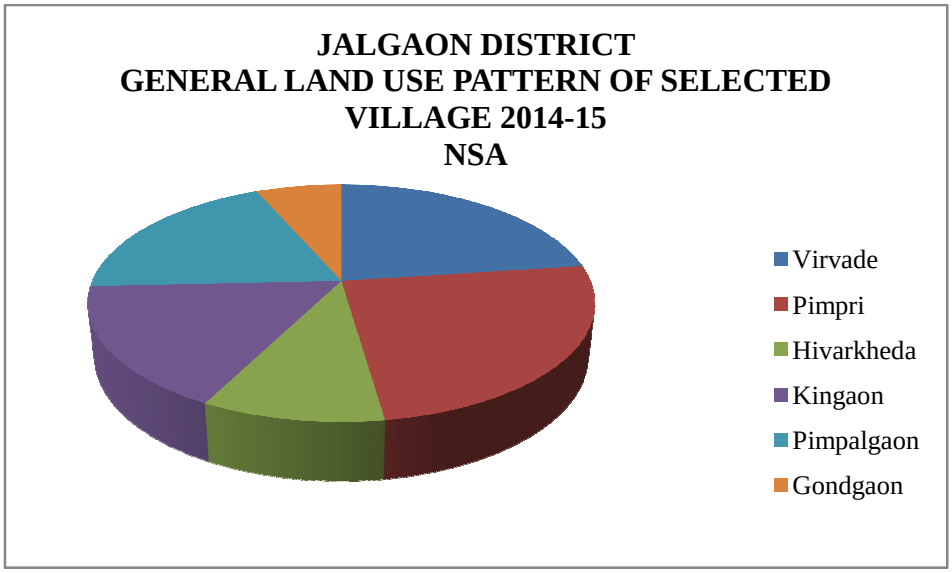


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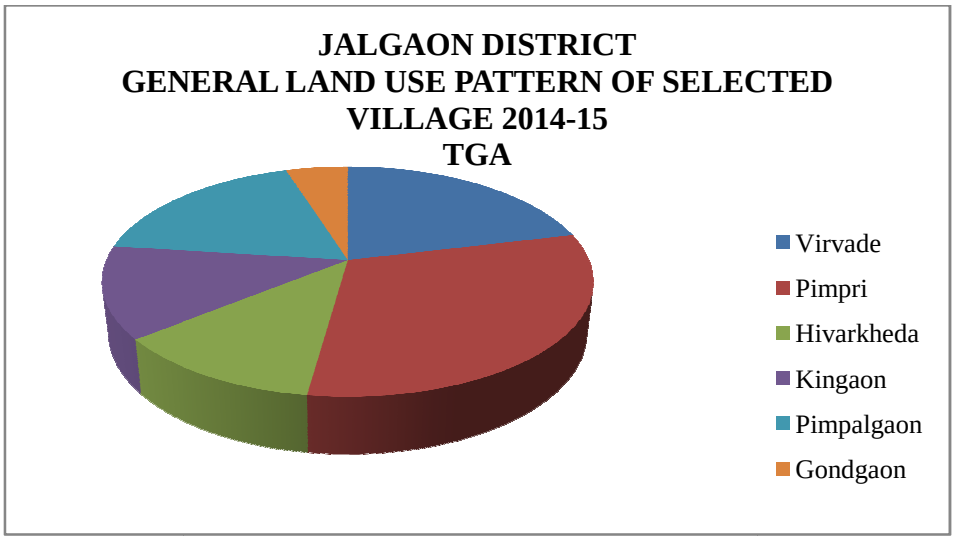


Diagram No.6.6

out of the total geographical area of selected villages 10.9% area found under fallow land in Pimpalgaon village, Virvade 8.6%, Hivarkheda 8.2%, Kingaon 4.1 and Pimpri 1.9% area in this category, but only one Gondgaon village area under fallow land is negligible during the observation in Jalgaon district.

E) Net Sown Area:

The net area sown is the actual area under the crops includes area sown more than once in the same year. Most of the significant category of land use in all villages is net sown area which is above 70 percentage in Kingaon 80.8 percentage and Gondgaon 75.8 percentage, where Virvade 61 percentage, Pimpalgaon 60, Hivarkheda 53.60 and Pimpri 45.3 percentage of village in study area.

6.8 AGRICULTURAL LANDUSE:

Agriculture land use important of land which way to understand the how many crops and whatever crops are cultivated, to know the agricultural land use pattern of selected villages of an area under different crops and their percentage share in total cropped area during the year 2014-15 are given. Areas occupied by irrigated crops are reported in the table no.6.4

1) Rice:

In Agricultural land use all crops has play a important role to irrigated area in total cropped area in Jalgaon district. Total all crops are observed in all villages except rice crops, these crops was not found in selected villages to total cropped area are cultivated in other way of season through the farmers. So, rice crops are negligible in all villages of Jalgaon district.

2) Jowar:

Agriculture is main occupation of rural people in Jalgaon district region, it is largely of intensive subsistence type of where the single crops and clearly dominates in entire economy of the study region.

TABLE NO.6.4 AREA UNDER DIFFERENT CROPS AND THEIR PERCENTAGE TO TOTAL CROPPED AREA OF SELECTED VILLAGES, 2014-15

Sr. No	Village/ Crops	Virvade	Pimpri	Hivarkheda	Kingaon	Pimpalgaon	Gondgaon
1	Rice	0.0	0.0	0.0	0.0	0.0	0.0
2	Jowar	230 (23.9)	100 (10.3)	91 (22.2)	161 (22.4)	00	46 (17.8)
3	Bajra	215.3 (24.3)	350 (35.9)	109.8 (26.5)	17.1 (2.4)	347.1 (44.6)	37.2 (14.3)
4	Wheat	4.0 (0.4)	13.2 (1.4)	17.3 (4.2)	1.6 (0.2)	11.2 (1.4)	7.1 (2.7)
5	Maize	0.0	1.9 (0.2)	8.7 (2.1)	0.0	0.0	0.0
6	Total Cereals	450.2 (50.2)	466.1 (47.7)	227.2 (55.1)	180 (24.9)	225.8 (29.0)	90.3 (34.8)
7	Gram	3.1 (0.3)	31.2 (3.2)	16.3 (4.0)	1.1 (0.2)	11.1 (1.4)	4.5 (1.7)
8	Tur	1.8 (0.2)	3.0 (0.3)	5.9 (1.4)	7.2 (1.0)	3.4 (0.4)	2.0 (0.8)
9	Fruits and Vegetable	3.3 (0.4)	84.6 (8.7)	3.5 (0.8)	4.5 (0.6)	8.2 (1.1)	5.4 (2.1)
10	Fodder	1.2 (0.1)	13.5 (1.4)	0.0	0.0	2.0 (0.3)	0.0
11	Sugarcane	0.0	2.9 (0.3)	0.0	0.0	13.4 (1.7)	7.1 (1.7)
12	Cotton	403 (45.3)	131.6 (13.5)	118.7 (28.8/)	486.8 (3.8)	3.5 (0.4)	128.2 (49.2)
13	Green Chilly	2.5 (0.3)	6.2 (0.6)	3.8 (0.9)	1.9 (0.3)	2.0 (0.3)	0.0
14	Oilseeds	5.4 (0.6)	191.8 (19.6)	5.7 (1.4)	2.2 (0.3)	59.4 (7.6)	14.7 (5.7)
15	TCA	891 (100)	976.8 (100)	412.1 (100)	723.6 (100)	777 (100)	259.9 (100)
16	Sown More Than Once	8.00	16.1	33.5	75.0	96.5	7.4
17	NSA	883	960	375.6	6486	741.3	252.2

Source: Computed by Researcher and Village Records 2011-12,

(00 IN HECTARES) Figures Bracket in Percentage

This crop is main crops as well as staple food in study area is generally grown in all villages. A comparatively highest percentage to total cropped area of jowar crops are found in Virvade, Hivarkheda and Kingaon villages.

Moderate percentage found in Gondgaon and Pimpri village. Not any change is observed or not cultivated in the village Pimpalgaon during the investigation.

3) Bajra:

Bajra crops of the total cultivated area and percentage to share in all villages. These food grains grown in all villages during the observation. High percentage found in Pimpalgaon village and Pimpri village. Moderate percentage observed in Virvade and Hivarkheda village but Gondgaon and Kingaon village at very low percentage recorded under the investigation in Jalgaon district. Study area for these crops is suitable for its production and quality due to irrigation sources

4) Wheat:

wheat is also important crop and mainly cultivated in rabbi season of winter temperature during the harvesting period are necessary to have better quality, but availability of water irrigation source of this villages are suitable for less quantity so production of this area are very low in percentage. High percentage of wheat crop cultivation was observed in Hivarkheda village, moderate was found in Gondgaon, Pimpri and Pimpalgaon village, but very low percentage was confined in Virvade and Kingaon village.

5) Maize:

Availability of surface water or ground water irrigation and rainfall due to absence for these cash crops. Maize crops are cultivated in only two village viz. Pimpri and Hivarkheda and other village the production of maize was not taken of farmers. Because climatic condition, workers are not available and government policy was not support to the farmers during the investigation of field survey.

6) Total Pulses:

Total pulses overall selected villages are grown in both Kharip and Rabbi season during the observation. Varieties of pulses like Mung, Math, Chavali, Matki,

Red Harbhara etc are produces in the areas. Total pulses mainly cultivated as of intercropping and area in rain fed. Highest production of pulses above 50% was observed in Hivarkheda and Virvade village. Moderate was found in Pimpri and Gondgaon, where lowest was observed in Kingaon and Pimpalgaon village in study area of Jalgaon district.

7) Gram & Tur:

Gram is important crops include in pulses category and it is useful for livestock and humans as a food. Gram has cultivated in Rabbi season and it cultivate in rain fed and irrigation sources. Gram and Tur Cultivation of these crops in all villages with lowest percentage found below 2% in areas of Jalgaon district during the observation.

8) Fruits & Vegetables:

Varieties of vegetables and fruits are grown in the all village. Fruits and vegetables cultivated through the drip irrigation and well irrigation sources. The lowest percentage of five village fruits and vegetable are found in below 2 percent and highest percentage was found in Pimpri village i.e. 8.7 percent in Jalgaon district during the investigation period.

9) Fodder Crops:

Fodder crops are important crops for livestock animals in study area. But out of three villages fodder was cultivated and other three village fodder was not cultivated because these crops depend on unsuitable climate and absence of water. So, Hivarkheda, Kingaon and Gondgaon village fodder crops was negligible under the observation.

10) Sugarcane:

During the investigation in case studies these crops was absent in three villages like Virvade, Hivarkheda, and Kingaon. Other way sugarcane production was taken in Pimpri, Pimpalgaon and Gondgaon village the percentage was calculated below 2%; due to well irrigation and climate does not support to the land of these crops in study areas.

11) Cotton:

Cotton has a play important role in all villages in Virvade, Pimpri, Hivarkheda, Kingaon, Pimpalgaon and Gondgaon. Cotton has principal cash crops cultivated in all village support through the well irrigation, canal and surface water irrigation sources in the agricultural land. Highest cultivated of cotton in above 40% in Virvade and Gondgaon village. Moderate percentage was observed 10% to 40% in Hivarkheda and Pimpri village, but lowest percentage was noted in Kingaon and Pimpalgaon village during the investigation in study area of Jalgaon district.

12) Green Chilly:

Green Chilly is a intercrops in green vegetables cultivated in all village viz. Virvade, Pimpri, Hivarkheda, Kingaon, Pimpalgaon and Gondgaon. Basically these crops support well irrigation of surface water to the plants. The percentage shares in all villages are observed in below 1.0% during the observation of filed survey of study area.

13) Oilseeds (Ground Nut):

Oilseeds in the selected village include only ground nut seeds mostly grown in areas. Whether agriculture region in all hectares of village under the ground nut cultivation, it shows in table.

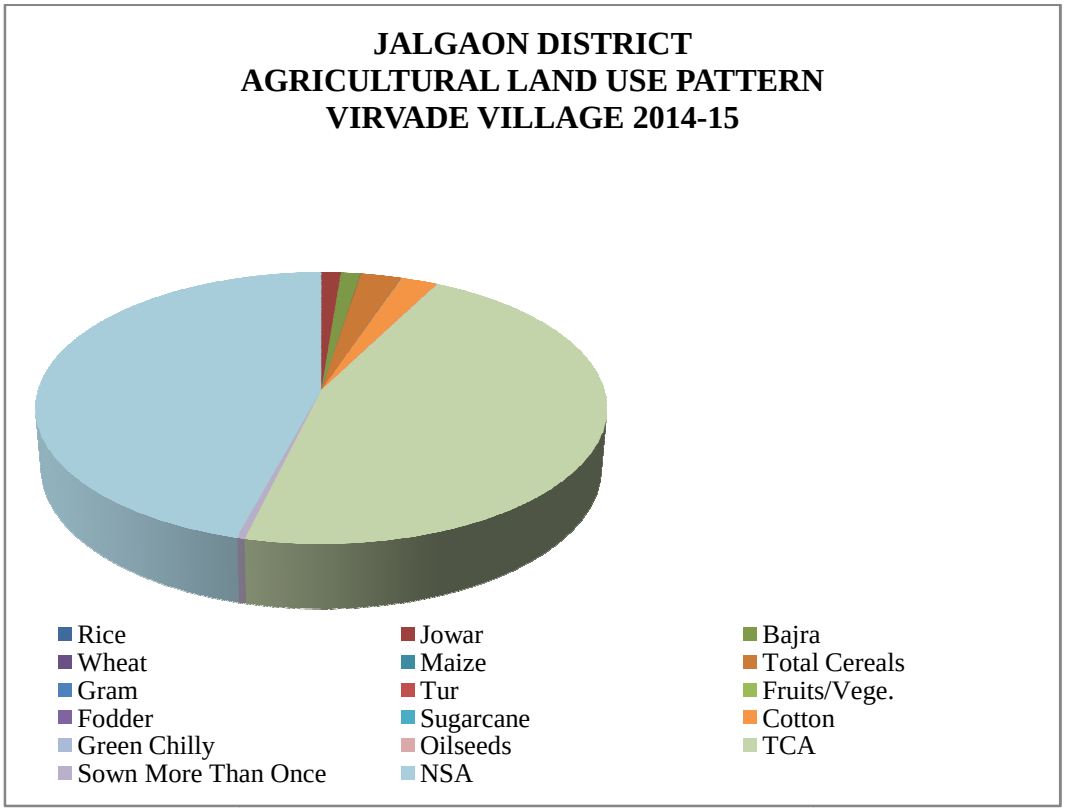


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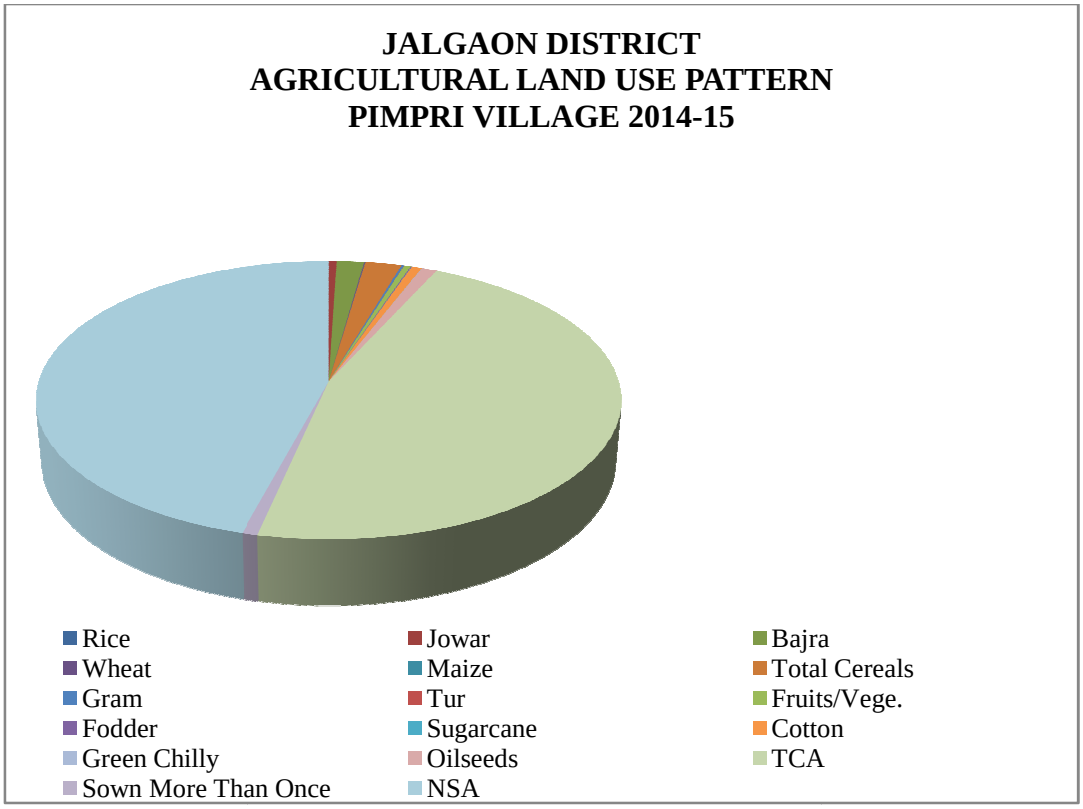


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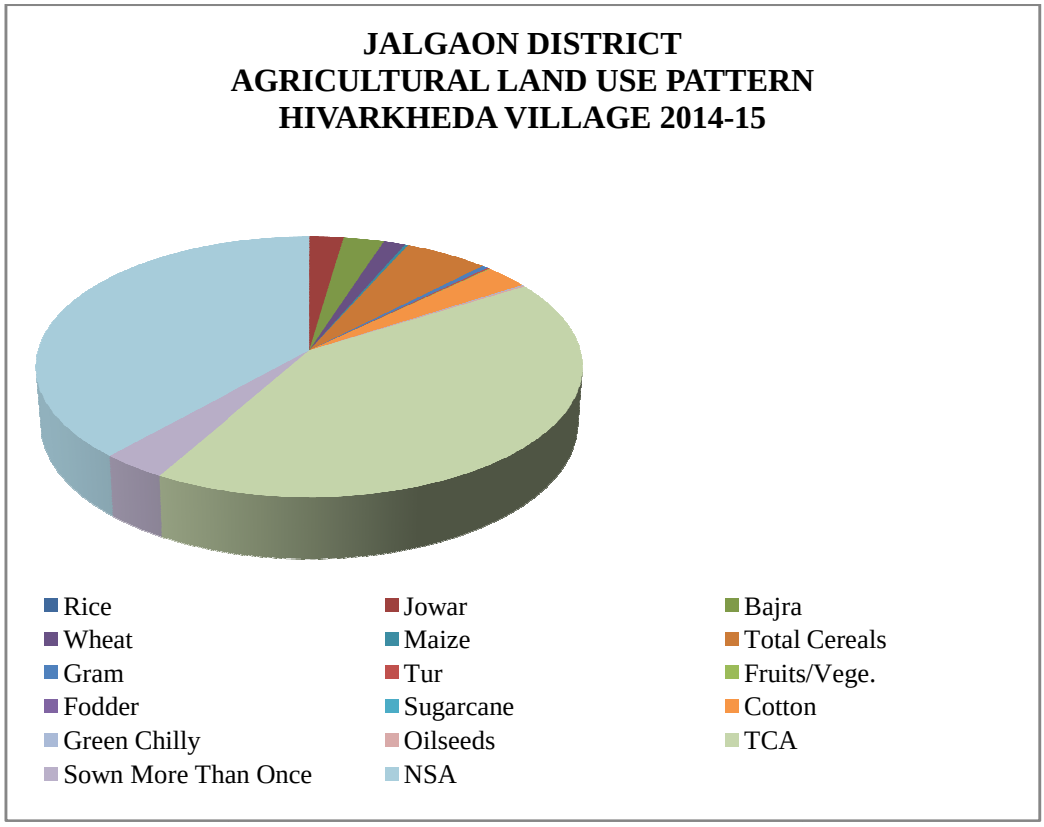


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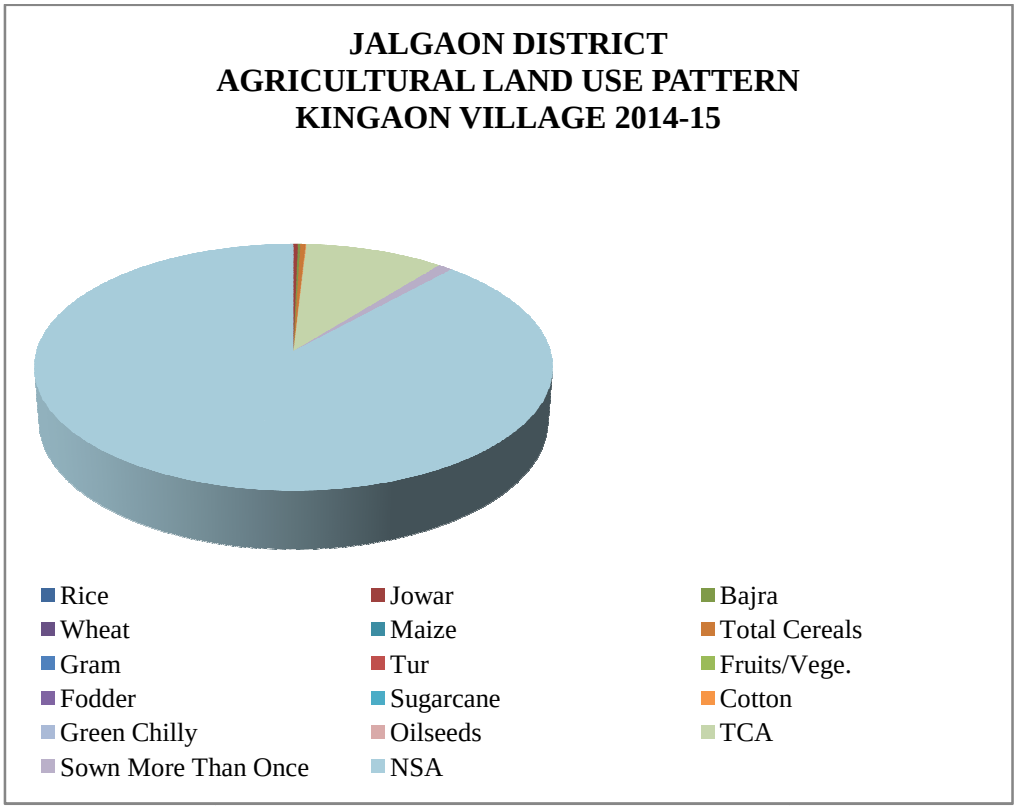


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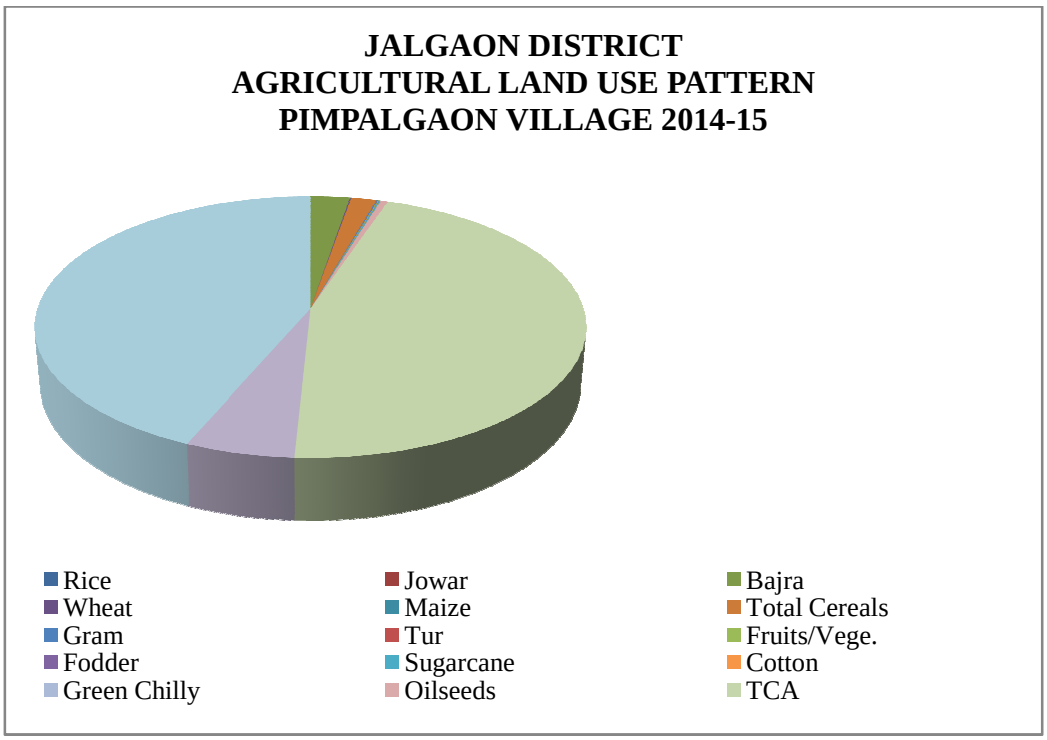


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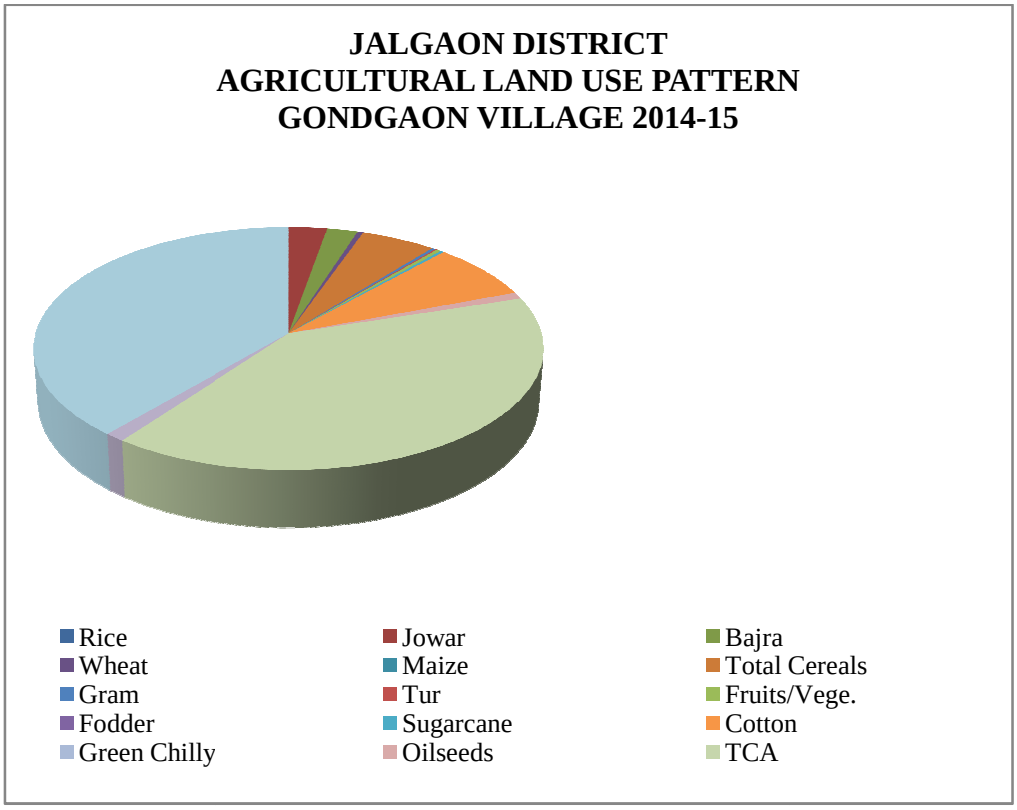


Diagram No.6.12

An area in hectares of land the percentage of ground nut was noticed in Pimpri village was 19.6 highest. Moderate change above 5% observed in Pimpalgaon and Gondgaon village. Lowest percentage to share in Virvade, Hivarkheda and Kingaon village. Oilseeds crop cultivated due to well irrigation sources support in all villages agricultural land.

6.9 AGRICULTURAL IMPLEMENTS:

Agricultural Implements in all selected village are important role in study area of the Jalgaon district. The use of traditional implements is more widespread in all villages and impact in Jalgaon district. Total equipments are use by farmers in his land area with man power in agriculture. Earlier time the farmers using the traditional equipments related to farming and he satisfying his work but now farmers have the development and increase the production of his crops in thousands hectares, he can use new technique in farming, modern equipments and working process. So he has done in area what he wants from agricultural land.

TABLE NO.6.5 VILLAGE WISE DISTRIBUTION OF AGRICULTURAL IMPLEMENTS PER THOUSANDS HECTARES IN IRRIGATED AREA, 2014-15

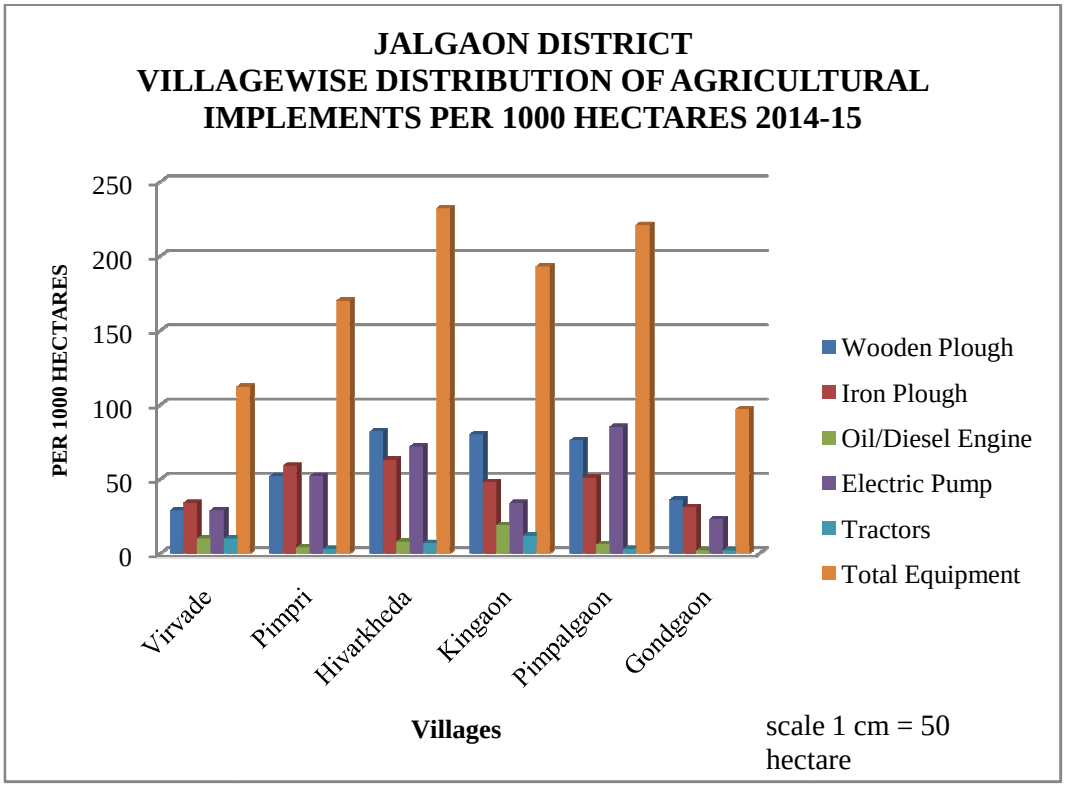
Sr. No	Name of Village / Agricultural Implements	Virvade	Pimpri	Hivarkheda	Kingaon	Pimpalgaon	Gondgaon
1	Wooden Plough	29	52	82	80	76	36
2	Iron Plough	34	59	63	48	51	31
3	Oil/Diesel Engine	10	4	8	19	6	2
4	Electric Pump	29	52	72	34	85	23
5	Tractors	10	3	7	12	3	2
6	Total Equipment	112	170	232	193	221	97

Source: Computed by Research & Village Record

1) Wooden Plough & Iron Plough:

The number of wooden plough per hundred hectares of irrigated area is 29 in Virvade, 52 in Pimpri, 82 Hivarkheda, 80 Kingaon, 76 Pimpalgaon and 39 in Gondgaon village in research area. Where the number of iron plough per hundred

hectares to irrigated area is 34 in Virvade, 59 Pimpri, 63 Hivarkheda, 48 Kingaon, 51 Pimpalgaon and 31 in Gondgaon villages. It is observed that as we passes from heavy rainfall zone to scarcity zone the wooden plough and iron plough number of decreases.



Graph No.6.3

2) Oil/Diesel Engine & Electric Pump:

The number of oil/diesel engines per hundred hectares to irrigated area is 10 in Virvade, 4 in Pimpri, 8 Hivarkheda, 19 Kingaon, 6 Pimpalgaon and 2 in Gondgaon village are observed in investigation period. other agricultural implement is electric pump set per hundred hectares to irrigated area is 29 in Virvade, 52 in Pimpri, 72 Hivarkheda, 34 Kingaon, 85 Pimpalgaon and 23 in Gondgaon village under the observation.

3) Tractors:

Most important implement and heavy vehicle in agriculture sector to irrigated area, the own tractors of farmers, but tractors are observed in rare numbers of the villages during case studies observation. It is note down 10 in Virvade village, 3 in

Pimpri, 7 Hivarkheda, 12 Kingaon, 3 Pimpalgaon and 2 in Gondgaon village during the investigation of filed survey of Jalgaon district.

Biochemical inputs like fertilizers, high yielding variety, hybrid and swadeshi seeds, insecticides and pesticides were rarely used in all villages during the investigation. The use of chemical fertilizers NPK is maximum use in Virvade, Kingaon, Pimpri and Pimpalgaon village in per hundred hectares of irrigated area. The use of high yielding varieties and hybrid seeds began the introduction of canal irrigation.

The per hectares use of high yielding variety for wheat, cotton, gram and as well as onion and jowar the use of hybrid seed for high production. Application of insecticides and pesticides is mostly confined to Kingaon, Pimpalgaon and Gondgaon village where it is applied to irrigated crops like jowar, wheat, onion, maize, cotton and fruits and vegetables during the investigation.

Chapter - VII

CONCLUSIONS AND SUGGESTION

7.1 INTRODUTION:

Agriculture is the largest industry in economic sector of India and hence the overall growth of nation economy has largely dependent upon the performance of agriculture and its technique. It provides not only food and raw material but also employment to large portion of population in India. Even today more than two third of Indian population depends upon the agriculture for livelihood. In past independence period particularly after 1970, the country has achieved self sufficiency in food production by green revolution where in more emphasis has laid on irrigation sector and not in rain fed sector, but there are certain physical constraints due to which it hardly possible to increasing the area under irrigation and irrigation sources in agricultural land. Irrigation sources like well irrigation, canal irrigation, tank or pazar or small lake based in farm area in agricultural land.

New technique will use to try farmer for high production of crops through the irrigation viz. sprinkler, flooding furrow, drip irrigation beyond the certain limits. Moreover irrigated areas are facing the problems like nutrient exhaustion, salinity built up and water logging problems due to mismanagement and over use of irrigation of water to agriculture land. There is need to give more emphasis on stabilization and agglomeration of agriculture production in rain fed (unirrigated) sector area also. The need of irrigation in the region arises in order to the uneven distribution and overall shortage of rainfall.

In my research Agricultural production depends on many physical factors such as topography, soils, climate, temperature and rainfalls etc as well as socio-economic condition are responsible of the people also. In agriculture physical factors directly influence in the region. There is a great scope to enhance the output and input by comprehensive scientific knowledge of both physical and non physical factors and proper planning for better production in agriculture at local level particularly, i.e. at district tehsils or village level. Therefore in the present study of the Jalgaon district of Maharashtra State has selected.

The investigation is to analyze the spatio-temporal development of different modes of irrigation in relation to the physical demographic setting of the region. The impact of irrigation and associated inputs on land use, cropping pattern, and yield is proposed to be assessed at micro level analysis as case studies in Jalgaon district.

But it must be pointed out that no attempted is made to examine negative aspects live environmental degradations. Research topic of the thesis a study the impact of irrigation is referred to as spatial changes in land use, cropping pattern and also crop yield.

The main focus of thesis has to assess **"An Impact of Irrigation on Agriculture Development in Jalgaon District 1990-2010".**

This is achieved through the following aspects like Objectives and done by the Hypothesis:

1. The effect of Physical Determinant on Irrigation Development in Jalgaon district.
2. The sources of Irrigation, methods and mean of Irrigation in Jalgaon district.
3. Spatio temporal changes in Irrigation facilities.
4. Effect of Irrigation on the use of mechanical and biological inputs in Jalgaon district.
5. General and agricultural land use pattern overall in the study area.
6. Impact of Irrigation on cropping pattern in general and irrigated crops in Jalgaon district.
7. Overall role of Irrigation in the agricultural productivity in the Jalgaon district.

Hypothesis done by following points:

1) Physical factors have a vital role in the introduction and expansion of irrigation.

2) And spatio-temporal variations in irrigation facilities and observing more in the scarcity areas of the Jalgaon district.

7.2 CONCLUSIONS AND SUGGESTIONS:

CONCLUSIONS:-

- The present research work was designed to test validity of two hypotheses, important among which was the role of physical factors have a vital role in the introduction and expansion of irrigation in Jalgaon district. The region in characterized by different physical features and it is divided into three physiographic units. Relief features of the region have affected the sources of the irrigation. In southern part of Jalgaon district the network of canals and other sources of irrigation have not developed and tube wells/ well have become dominant sources of irrigation. Tapi is a main drainage as well as Waghur, Girna, Anjani, Bahula and lift irrigation scheme sources. The whole region depends for its rainfall on southwest monsoon which is concentrated in a brief period of about 30 days. The annual co-efficient of variations is over 24.50%, this implies a great risk in crop cultivation. This fact clearly underlies the need of irrigation in both Kharip and rabbi seasons.
- The region is covered with black and dark brownish regur soils which vary greatly in pure texture and depth. But pure soil was found in northern side of Jalgaon district i.e. called as cotton soil. These soils give better yield in adequate of water supply is made available. High potentiality of groundwater which can be exploited for irrigation, but deficient to surface water as most of the rivers are non perennial expect one Tapi river.
- The second significant of hypothesis of the present research work is to test the association of irrigation development with other input used in agricultural activities. There are spatio-temporal variations in irrigation facilities and these are observed more in the scarcity zone of Jalgaon district. It is observed that the use of mechanical and biochemical inputs has increased in irrigated areas. In agricultural region wooden ploughs are replaced by iron plough and oil engines by electric pumps. However, the use of tractor with machines is significant. The use of chemical fertilizers and HYV seeds is confined only the Chopda, Yawal and Muktainagar irrigated talukas of the region. The use of inputs is low in other areas because of seasonal and non assured nature of the water to supply.

- The hypothesis relating to influence of irrigation on land use is tested by assessing the changes in land use categories, cropping pattern in general and irrigated areas in particular of Jalgaon district. It is observed that the area under the forest is negligible slight change has been recorded in last twenty years. The area under fallow land has increased but net area sown recorded decrease.
- The cultivated land of the region occupies 63.92 percent of the total geographical area. The entire cropping pattern seems to be controlled by agro-climatic conditions. However, the advantage of irrigation has changed the cropping pattern. The percentage of area under wheat, cotton, jowar, Bajra, gram, fruits and vegetables has increased. But area under Bajra has decreased. Wheat as well as cotton ranks in first in the irrigated cropping pattern. The area under jowar cultivation also shows in increasing trends.
- The study region has impact of irrigation in all Jalgaon district regions in last decades, due to completed construction work of major, medium and minor irrigational projects in the study region. So the positive changes in the net irrigated area to net sown area was observed in all tehsils expect Bhadgaon and Jamner talukas.
- In demographic factor of the Jalgaon district was confined in all tehsils, all density i.e. physiological, crude, caloric and agricultural densities of population generally of the study region has been increases due to increase in population 2001. The positive change in the percentage of literacy rate has been increased in all tehsils of the Jalgaon district during the period of 1991 to 2001.
- The changes in crop combination zones are noted in the region which has also resulted due to irrigation. The crop diversity is high in tube wells irrigation zone and index of diversification is decreased from 30.00 to 20.00%. The intensity of cropping has increased and it is high in river basins and low in hilly and drought prone area of the region. The intensity of cropping is 120 to gross cropped areas. The area under cotton and wheat as well as jowar has increased with increasing irrigation facilities.
- The yields of wheat, jowar, bajra, cotton, harbhara and fruits (banana & papaya) and green vegetables have increased with high productivity and the development of irrigation facilities as relationship between yields and

irrigated area under these selected crops stands positive throughout the region of the total cultivated area 3.98 percent of wheat was noted in Chopda, Bhusawal, Bodwad, Jalgaon, Dharangaon, Amalner, Parola and Jamner talukas to total cultivated area and jowar 23.98 percent of the total cultivated area with high productivity was observed in Chopda and Amalner talukas, whereas cotton 45.19 percent to total cultivated area in the district with high productivity which is observed in Dharangaon and Jamner talukas as well as other main crops also decline in the district.

- ❖ However, the performance of study region's agricultural productivity due to adoption of irrigation and other associated inputs in terms of yields suggest some improvement. It has been noted in 27 percent of the total cultivated area confined to relatively more irrigate pockets of the region. About 75 percent of the cultivated land records low to moderate overall productivity thereby indicating the urgent need of irrigation facilities and use of modern inputs.
- ❖ High productivity is noted in irrigated areas whereas it is low in the areas having moderate irrigation facilities. Therefore, it can be concluded that the development of agriculture in the region is concentrated with the development of irrigation.

SUGGESTIONS:

In the context of findings stated above some suggestions are improving irrigated farming and agricultural productivity have been made some suggestion. They are as follows:-

- ➢ Physical features, rainfall and soils conditions should be treated as basis for irrigation development in middle and southern part of Jalgaon district, where ground water is more dependable than surface water in the region; therefore, its potentiality has to be increased by different measures like contour bounding, percolation tanks and afforestation. This may bring a additional land under irrigation.
- ➢ Study region is known as for Mango, Banana, Papaya and other horticultural crops and vegetables. Similarly drip irrigation system for all these crops is necessary to be adopted. Each and every drop of rain water should be percolated in the soil and extra running of water should collect in percolation

tanks. New percolation tanks Kolhapur Type Weirs should be constructed in such areas (Jamner and Pachora tehsils) of the study region.

- Electronic motor pumps are significant water lifting devices, therefore cheap and assured power supply should be made available to the farmers. Farmer should be motivated to use small pump sets, seed drills, sprinkler irrigation system and fodder cutters. Increase in production is possible if advanced low price and proper machinery and equipment are used. The agricultural primary societies and banks or pathpedi, co-operative banks should give more or more loan and subsidies to the poor farmers because the farmers in the study region are illiterate, therefore they are using traditional and farm implement.
- Impact of irrigation in Jalgaon district it is hoped that, agricultural productivity work may help to provide good information to the study region in planning and agricultural development in Jalgaon district.
- Properly failure water harvesting and water saving in land for use, so many government scheme should be start continuously in scarcity region. High rainfall areas the minimum minor or some canal irrigation can be constructed and supply to those areas where the water are very less or not available in the areas, ex-Bhadgaon and Jamner talukas of Jalgaon district.
- Overall the observation above the Jalgaon district the main river is Tapi to support its tributaries, that tributaries water on constructed a canal irrigation long in kilometer at the end of south west and south east Jalgaon district or lift irrigation should try with the local people and farmer helps and their support.

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APPENDIX – X

QUESTIONNAIRE FOR SELECTED VILLAGES

Date: --/--/

Mr. Deshmukh Prasanna Suresh

(Ph. D) Research Student

==========

(A)Name of the Village: ----------

(B) Name of the House Owner/Agriculture Owner: ----------

(C) Agricultural Area in Hectares: ----------

(D) Location: ----------

(E) Physical Features: ----------

(F) Area Irrigated by Sources of Water Supply to Land (in hectares)

(1) Selected Village Information about the Irrigation and Sources:-

Sr. No	Irrigated area of the village	Canals System Private/Govt.	Tanks Irrigation	Wells Irrigation	Other sources of irrigation i.e. lift or schemes
1					
2					
3					
4					
5					
6					

Table No. 1

(2) Information about Irrigation Sources of village:-

a) Total wells found---------- in filed operation

b) Depth of well----------in meter or feet

c) Water table from surface irrigation in month of May---------- in meter and in month of October----------in meter.

d) Lift Irrigation Schemes, date of operation----------/--/-- to ----/--/--

(3) Method of Irrigation Used: Choose by Mark (√)

a) Flood Irrigation

b) Border Irrigation

c) Furrow Irrigation

d) Sprinkler Irrigation

e) Drip Irrigation

(4) Implements Use of Agricultural Areas in Village:-

A) Mechanical –

1) Total Oil Engines = ----------

2) Number of Electric Pumps = ----------

3) Number of Wooden Plough= ----------

4) Iron Plough = ----------

5) Number of Tractors = ----------

6) Number of Diesel Pumps or Motor = ----------

B) Bio-Chemical Uses:

1) Fertilizers or N.P.K. used Type ---------- Quantity ---------- in Kg. Or 1 Bag

2) HYV or Hybrid Seeds used ---------- No. Crops and Quantity ---------- in Kg.

3) Insecticides/Pesticides or total Consumption ----------in Kg/ Liter

(5) Information of Livestock:-

Sr. No	Name of Village/Name of Livestock	Cow	Buffalos	Bullock	Goat	Sheep
1						
2						
3						
4						
5						
6						

Table No.2

(6) General Landuse of Village:-

All types of land under the using in study area of field work.

a) Area under forest ---------- in hectares

b) Uncultivable land ---------- in hectares

c) Area put to non – agricultural uses---------- in hectares

d) Cultivable waste ---------- in hectares

e) Permanent pasture and other grazing land ---------- in hectares

f) Current fallow land ---------- in hectares

g) Net Sown Area ---------- in hectares

h) Total Gross Cropped Area ---------- in hectares

i) Total Geographical Area ---------- in hectares

(8) Problems of Irrigated Land in Agriculture: Just Mark (√)

a) Shortage of water ( )

b) Distribution of Water ( )

c) Financial Problem ( )

d) Water Logging ( )

e) Any other problems related to the environment ( )

(7) Area under Different Crops and Per Hector Yield in Village:-

Sr. No	Crops	Area in Hectors		Yield Crops in Tones/Kg	
1		Total Area in Hectors	Irrigated Crops in Hector	Irrigated Crops in Qua/Kg	Non Irrigated Crops Qua/Kg
2					
3					
4					
5					

Table No. 3

Signature of Gramsevak or Talathi of Village

Jalgaon District

Date: --/--/

APPENDIX XI

ABBREVIATIONS

IR	:	Intensity of Rainfall
AR	:	Annual Rainfall
ACZ	:	Agro-Climatic Zones
PD	:	Population Density
CD	:	Crude Density
PD	:	Physiological Density
AD	:	Agricultural Density
BR	:	Birth Rate
DR	:	Death Rate
CBR	:	Crude Birth Rate
CDR	:	Crude Death Rate
LR	:	Literacy Rate
SR	:	Sex Ratio
SC	:	Scheduled Cast
ST	:	Scheduled Tribe
OS	:	Occupational Structure
AS	:	Age Structure
DR	:	Dependency Ratio
DI	:	Drip Irrigation
TI	:	Trickle Irrigation
NIA	:	Net Irrigated Area
NSA	:	Net Sown Area
II	:	Irrigation Intensity
LIS	:	Lift Irrigation Scheme
WI	:	Well Irrigation

CI	:	Canal Irrigation
ICI	:	Intensity of Canal Irrigation
TI	:	Tank Irrigation
WP	:	Wooden Plough
IR	:	Iron Plough
OEP	:	Oil Engines Pump
DEP	:	Diesel Engine Pump
EP	:	Electric Pump
CF	:	Chemical Fertilizers
AUF	:	Area Under Forest
ANFC	:	Area Not Available for Cultivation
OUL	:	Other Uncultivable Land
FL	:	Fallow Land
NSAMO	:	Net Sown Area More Than Once
SD	:	Standard Deviation
Co-ER	:	Co-efficient Ratio
Hct	:	Hectares
FC	:	Food Crops
TFC	:	Total Food Crops
SDM	:	Standard Deviation Method
ICD	:	Index of Crop Diversification
CF	:	Current Fallow
OF	:	Other Fallow
GCA	:	Grossed Cropped Area
TGA	:	Total Geographical Area
OUL	:	Other Uncultivable Land
EFL	:	Excluding Fallow Land

ALU	:	Agricultural Land Use
LUA	:	Land Use Analysis
LUE	:	Land Use Efficiency
ILUE	:	Index of Land Use Efficiency
AYSC	:	Average Yield of Selected Crops
AF	:	Agricultural Efficiency
KM	:	Kendall’s Method
MAE	:	Moderate Agricultural Efficiency
YIM	:	Yield Index Method
NA	:	Not Available

APPENDIX XII - PHOTOPLATE



Photo No.1 Plastic Polythene using the farmer for flower (vegetables) production, plastic are useful technique with drip irrigation in inside to slowly supply of water this plant, it's safe and secure of drip irrigation, water does not go to the outside of polythene in land, it was seen in Paladhi village, Jalgaon Taluka, Dist - Jalgaon



Photo No.2 Sugarcane Crop Cultivation through drip irrigation seen in Dhanora village, Chopda Taluka, Dist - Jalgaon



Photo No.3 Well Irrigation, in Summer Season water level goes in very deep; sometimes water is not available in this season it was seen in Kanashi village, Bhadgaon Taluka, Dist - Jalgaon



Photo No.4 Papaya Fruit cultivation with Jowar Crop Cultivation inside through drip irrigation, intercrop cultivation seen in Pimpri village, Dharangaon Taluka, Dist – Jalgaon



Photo No.5 Water Filter Equipment using the farmer for Drip Irrigation from Well with electric motor through this filter, first water comes inside of the filter and after water goes to the land pure and clean water for crop cultivation



Photo No.6 Jowar Crop Cultivation seen in Sawale Village, Dharangaon Taluka, Dist – Jalgaon



Photo No.7 Fodder Crop Cultivation, it was observed in Kasoda Village, Erandol Taluka, Dist – Jalgaon



Photo No.8 Before using the Surface Irrigation of flood furrow technique, first farmer can get separated of cultivated soil between crops land with bullock



Photo No.9 Desi (Swadeshi) Cotton Crop Cultivation with Drip Irrigation was seen in Dharangaon, Taluka Dharangaon, Dist – Jalgaon



Photo No.10 Canal Irrigation, it was observed in Adavad Village, Chopda Taluka, Dist – Jalgaon



Photo No.11 Sprinkler Irrigation in Jowar Crop Cultivation, it was seen in Panchank Village, Chopda Taluka, Dist – Jalgaon



Photo No.12 Other Pastures and Grazing Land found in Hanumantkheda Amalner Taluka, Dist – Jalgaon



Photo No.13 Polyhouse technique using the farmer for better and good quality production, mostly use for fruits and vegetables, it was observed in Mangrul Village, Chopda Taluka, Dist – Jalgaon



Photo No.14 Newly Constructed Canal Irrigation, observed in Near Patonda Village, Amalner Taluka, Dist – Jalgaon



Photo No.15 Great Tapi River flowing through the District, Near Savkheda Village, Chopda Taluka, Dist - Jalgaon