Chapter I

Introduction

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Chapter I

Introduction

1.1 Introduction:

Agriculture is one of the oldest and basic primary economic activities of the man. Generally, it is understood to man both cultivation of food and fiber crops and rising of livestocks. It has remained an important source of livelihood even today over the years in spite of growing industrialization and urbanization in the world and nearly 50 percent of working population is still engaged in agriculture.

In the developing countries, agriculture sector has been a principal source of employment and largest portion of income. However, it provides raw material to industry and much of export items. Agriculture in India is a major source of economy. It contributes 50 percent to national income, gives direct employment to 68 percent of total population and nearly 90 per cent population to rural area and nearly 35 percent of countries export, besides supplying of wage goods required the non agricultural in industry.

The word agriculture is derived from two latin words i.e. ‘ager’ meaning a field and ‘cultural’ meaning to culture of cultivate in this sense agriculture means ‘care of soil’ or cultivation of fields. Watsons’ Longman modern English Dictionary (1976)\(^1\) defines the world agriculture as the ‘science’ or the art of the practice of large scale soil cultivation in order to produce crops.

Geography is one of the important and permanent discipline of knowledge. The word ‘geography’ is derived from the Greek word’ geographia’ Greeks word ‘geo’ means eart and ‘graphie’ means description. It means geography is the discussion of the earth surface. In this sense geography is the science of the earth surface. In the course of
time this branch of knowledge is very much developed. Hence, the nature and subject matter becomes a very vast. Therefore, traditionally, geography is divided into two main branches. One of them is physical geography and another one is human geography.

Agricultural geography is one of the main and important branches of human geography. Which is scientifically studies the spatio-temporal pattern of agriculture activities. Further more, it is also seeks to identify, describe and classify the problems of agriculture against a geographical backdrop.\(^2\) Agricultural geography is basically concerned with agricultural phenomena and studies its regional Variations and factors responsible for it.

Eytmologically, agricultural geography deals with the art of the science of domestications of plant and animals. ‘Agricultural’ in agricultural geography implies the subject matter and geography gives the ways of viewing of investigating the subject matter. Agricultural geography thus means the ‘geography of agriculture’ some of the important definitions of agricultural geography have been given below.

According to Janet D Henshall (1957)\(^3\) the study of agricultural geography is concerned with individual forms having certain characteristics of area, soil, crops, livestocks etc and complicated functional relationship based on the natural environment of agricultural economy and rural society.

According to Andreae (1981)\(^4\) agricultural geography is defined as the science of the agriculturally transformed earths surface, with all its associated natural, economic and social inter-relationship is reflected spatially.

According to Sing Jasbir and S. S. Dhillon (1984)\(^5\) as a science, agricultural geography is concerned with the formulation and testing of hypothesis, interpretation of spatial distribution and location of various
characteristics of agricultural activities on the surface of the earth and measurements of geographic relationship. Further more, as a science it also seeks to identify, describe and classify the problems of agriculture against a geographical backdrop.

According to Johnston (1985) agricultural geography has been defined as the study of spatial variations in agricultural activities, involving both the description or such variations and attempt to explain them.

Apart from the above definitions, agricultural geography has also been defined as the science of areal arrangement of agricultural phenomena. Some scholars opinies that agricultural geography is the science of relationship between physical environment and forms of agricultural life.

Agricultural Geography, a branch of economic geography, mostly developed in the later part of 20th century. In recent years, considerable progress has been made in agricultural geography after the introduction of quantitative techniques and the most sophisticated tools such as remote sensing (data collection) and GIS (Mapping). Now, the subject is fully alive to the changing economic, social and political situations, which have resulted from the overall progress in science and technology. Currently, agricultural geography encompasses every aspect of agricultural practice, looking for general principles and laws.

Agriculture is an economic activity and any activity changes its from through space and time, according to the need of the society. Indian civilization has been built and has grown on the foundation of its agricultural economy. Though, the non-agricultural sectors also promote developmental impetus, Indian agriculture still continues to from the backbone of the Indian economy. Agriculture in India has sen more as a way of life than as an occupation. However, during the post-
independence period, more specifically in 1960’s, Indian agriculture witnessed a dramatic change in cropping pattern and agriculture production; generally laeled as “Green Revolution”.

Geographers, economists, agriculturists, planners and other social scientists have made efforts to study such changes that have gone into Indian agriculture in recent years. In this context the present study is undertaken to analyze the spatio-temporal changes in agriculture concentrating on Buldhana district in Maharashtra state, as a case study.

1.2 Importance of the Geography of Agriculture:

Every subject has its own field. While one subject studies the economic activities of men, another tries to solve his economic and political problems. One studies on the surface of the earth and another makes a study of the activities taking place there on. In the same way we study the agricultural activities of man in various parts of the world in geography of agriculture.

The real field geography of agriculture is to explain the mutual relationships between production and man actions on physical environment. Production is directly or indirectly related to environment. Each part of the earth is equipped by nature in certain ways that set wide or narrow limits up on its potential agricultural use. It is number, kind and association of these items of natural endowment which help to establish the individuality of agricultural regions.

Many dwellers in developed and developing and other highly industrialized and urbanized countries seldom appreciate the fundamental importance of agriculture in their lives, of course, farmers and ranchers realize its significance, but the millions of urban residents scarcely give it a thought. They get milks from the milkilometersan, meat from the butcher, vegetables, and fruits from the grocer and bread from the baker.
For them, agriculture might be an activity practiced on the earth. Only when supplies are scarce, as during a war, does production from the soil enter their minds.

1.2.1 **Agriculture is a source of Food for Human Beings:**

Probably the chief concern of at least half of the people of the world is to get enough food to stay alive. The struggle for subsistence has been the lot of the majority of mankind for centuries. It is nothing new for millions of persons to starve to death in China and some African countries in a single year. One famine year in China is estimate to have cost the lives of ten million Chinese and this takes no account of malnutrition and disease among those many other millions who somehow stayed alive. Europe too, has seen its share of famine. Whether caused by crop failure or the ravages of war.

Admittedly, the world has a host of problems to solve. Yet, outstanding experts in world affairs state that the problem of food is the greatest of all. Hence, no matter how other activities progress, agriculture must be successful at all costs. If it is not, we are faced with a largely hungry world, one in no mood or condition to solve other serious problem. It is often said that hunger encourages endeavor, but the truth is that hunger first creates uneast, than desperation and later complete apathy.

One of the most acute problems facing a large section of the world’s population is limited available resources and shortage of food. These people must be fed and the way to ensure this is to raise their incomes, since a basic cause of hunger is poverty. The solution of this problem is agricultural development, which is the corner stone of social and economic prestige of society. In developing countries about 60 to 80 percent of the total population is engaged in agricultural sector of economy. The most important means of eking out livelihood to the people
is agriculture, because the other natural resources have not yet been exploited full and properly. The population of these developing countries is distributed between workers and non-workers in the ratio of 78 and 22, among 70% worker works as cultivators and agricultural labours. Next come house hold industry and other manufacturing jointly claiming for 20 percent followed by other services about 10%. The largest number of workers is in the age group 25 to 40 amounting for 50 percent followed by next age group 40 to 50 accounting for 30 percent while lowest above 50 and below 75 years of age. If we visualize this problem deeply we will see that there are some other related problems such as poverty, illiteracy, ill heath, disease and population explosion.

1.2.2 Agriculture is source of Animals Food:

Food for animals and food for man are not entirely separate. It is true that many domestic animals are not destined to become human food, but great numbers of them are raised specially for human consumption. Regard of their use, animals have to be fed and usually man has to provide their food in the form of hey, corn, oat, or some other crop. Several of the world’s major crop regions have become animal regions as well. This is particularly true where population is not so great as to preclude the use of the land for the production of animal foods, to be consumed indirectly by man in the form of meat and animal fats. One good example of a crops region which has become an animal region is the United States Corn is not only a corn belt, but a hog buel, a beef belt and a major area of mutt on and poultry production. Denmark offers another example. There almost all of the agricultural land produces feed for dairy. Cattle, hogs and chickens pasturing is done on all the mountain slopes of Himalaya and Alpa. The result has been an astonishingly large production and export of wool, meat bacon, eggs and butter.
1.2.3 Agriculture is a source of Raw Materials for Factories:

Agricultural development is the keystone of industrial and economic development. We may appreciate the importance of crops for human food and livestock feed, but rarely do we properly connect them with industry. As pointed out in the beginning that agriculture is the source of world economy. The production of Geography of agriculture depends on the combined effect of natural factors, stages of human culture and degree of human energy. It is only from geography of agriculture that we get a factual knowledge of production. It is from a study of geography of agriculture that we get a factual knowledge of production. It is from a study of geography of agriculture that we can gain proper knowledge of where the chief sources of raw material exist in the various countries of the world. The regions of the tropical zone have always been considered the nations producing raw material. This is way western countries exploited them and made their own economic system strong. In fact geography of agriculture throws light on the world distribution of various crops and the details of production. So we cannot get from a study of geography of agriculture only the comparative knowledge of the areas. Where as various crops can be available in sample quantity.

In addition, many other industries depend on farms, ranches and plantations for raw materials. Common examples are the cotton textile Woolen silk, leather, rope and twine and rubber industries less well-known industries consume large amounts of crops in order to produce soaps, cosmetics paints and varnishes, industrial alcohols, starches, sugars and even medicines. Each year more industries become dependent, or partly dependent, on products obtained from the soil.
1.2.4 Agriculture the Original Occupation:

Agriculture is the main foundation of rural life. Most of the people of the villages ranging from 15 to 60 years of age are occupied in agriculture. Infants and the aged too lend a hand in agriculture in some way or other.

Table No. 1.1 Percentage of Population of Chief Countries Occupied in Agriculture

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asia</strong></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>70</td>
</tr>
<tr>
<td>Japan</td>
<td>50</td>
</tr>
<tr>
<td>Pakistan</td>
<td>76</td>
</tr>
<tr>
<td>Thailand</td>
<td>85</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>95</td>
</tr>
<tr>
<td><strong>Soviet Union</strong></td>
<td><strong>42</strong></td>
</tr>
<tr>
<td><strong>North America</strong></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>57</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>12</td>
</tr>
<tr>
<td>Canada</td>
<td>15</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Europe</strong></td>
<td></td>
</tr>
<tr>
<td>Britain</td>
<td>5</td>
</tr>
<tr>
<td>West Germany</td>
<td>22</td>
</tr>
<tr>
<td>France</td>
<td>29</td>
</tr>
<tr>
<td>Spain</td>
<td>49</td>
</tr>
<tr>
<td>East Germany</td>
<td>25</td>
</tr>
<tr>
<td>Yugolsavia</td>
<td>67</td>
</tr>
<tr>
<td>Netherlands</td>
<td>19</td>
</tr>
<tr>
<td><strong>South America</strong></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>25</td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>60</td>
</tr>
<tr>
<td>Union of South Africa</td>
<td>47</td>
</tr>
<tr>
<td>Algeria</td>
<td>80</td>
</tr>
</tbody>
</table>


Rural society all over the world is mainly composed of farmers and the main occupation of all the members of the farmers family and of other families is agriculture, in which his wife, sons and daughters and kith and
kin all help. Most of the population of the world in this scientific age resides, in the villages with agriculture for its main occupation. Agriculture is the main occupation of developed and as well as developing countries and most of the people of these countries are busy in farming. The table below shows the percentage of population occupied in agriculture. Only countries with a population above 10 million have been dealt with and the percentage of their total population occupied in agriculture and leading rural life has been shown.

This table no. 1.1 shows that agriculture is the chief economic activity of the countries where industrialization and urbanization are in their infant stage. Modernization should thus begin in rural areas where the greater part of population resides. According to M. De Clerk, “In those regions Thus modernization should start with the rural areas where the majority of the population is living.

In rural life the farmer’s association with the agriculture is considered most important. Agriculture is the real wealth of rural life upon which depend the economy, not only of the village, but of the cities and the whole country. Agricultural productions are the real key to the industrial and economic development of the country. If the villages are prosperous the country too can be considered so. Villages of North America are more prosperous than those in the countries of Asia and Africa. It is therefore that the economic system there is quite strong and permanent as compared that of the countries of Asia and Africa. The development of industrialization and urbanization in these countries has been possible only owing to the prosperity and firmness of agricultural production. One should look at the villages to see the true shape of a country. It is these that the living structure of the prosperity of poverty of the country. Just as every villager is a citizen of the country in the same way every village is its representative. Where cotton is supplied from for
the industrialization of the country / who supplies foodstuffs? Where do the laborers come from? Who does truly represent the ancient traditions, civilization and culture of the country? Where do raw materials come from? What is the real area of the production? There is only one answer to these question; village and villagers.

In rural life land is called mother earth. The development of the civilization and culture of a particular place is measured according to the land productivity. Land provides him opportunity for life food and clothes. Land has entered his bones, tissues, mind and soul. In rural life the first to be worshipped on occasions of marriage, festivals and celebrations, is land. In this way rural life begins with land ends with land.

It is highly controversial how and when agriculture actually began, but all sociologists and archaeologists agree that agriculture began with the history of civilization. In new Stone Age environmental adjustment and ecological adaptation by man took several shapes. Various economic systems of man developed under conditions of the best environmental adjustment and ecological adaptation only and were called the developing progress of his civilization and culture. It is believed that man learned, first of all hunting, then cattle-grazing and last of all agriculture. The various stage of rural life, the various circumstances through which man had to pass, are briefly described below. The hunting age is the first step of the growth of civilization; man was fully depending on nature for his livelihood then. In the final stage of hunting there arose the feeling of taming rather than killing the animals that were formerly hunted and animals were tamed in herds. The system of cattle grazing and cattle breeding was consequent born. In the beginning there was no difficulty in breading animals. There was grass everywhere on the land in those days. Man got from those animals’ milk and curd and even meant was eaten at
their death. In this age man had no knowledge of growing fodder. They went where grass was available. As long as there was enough grass, the life of men there was fixed, but life had now grown a little more progressive and permanent.

According to some archaeologists and Anthropologists sheep, goat, cow, swine and mule were first of all tamped in Egypt 3000 B.C. In North western Indian the camel was tamped first and the Stone Age, in the highland of Europe and Asia, the Sheep was tamped first and the buffalo has the chief place in India. The reindeer, although found in the Tundra regions today, is believed to have originated in China. The rural agricultural life of the region developed according to the animals and ecological conditions available e.g. in the deserts the camel, called the ship of the desert, and their rural and agricultural life is nomadic and roaming. In the same way, rural life in the different countries of the world depends upon the kind and availability of agricultural land and their productivity. In this age even in the cattle grazing stage, the way of collecting food and rural life changed with the change of seasons. Even then they had a fixed territory and formed little communities, while the family was the unit of the economic organization of the aborigines of this status, village groups worked as the rural masses of a village for several of their activities. Their economic life grew somewhat more certain than before. As long as animals obtain grass at one place either life was stable. The life of those days was static for some time and they lived community life in mud made huts. It was at this time that cattle-grazing villages were first established which developed in the direction of the various forms of human and rural life. In the cattle-grazing stage man noted what factors were needed to grow grass and when grass grows. They saw grass growing, sprouting and then drying. In the end he saw seed growing and then scattering. Finally he saw grass growing out of those very seed. Thus
he learnt that animals should get grass and men get grain, if these seeds were properly used. He collected wild seeds and scattered them in the ground where the soil had been cleared or forest burnt to ashes. After rain the plants grew and other wild grasses too grew with the harvest. In this way his first harvest was not pure, but other wild grasses were mixed in it. Later on, after having grown several harvests he discovered the solution of pure seeds and it was from here that agriculture began.

As time passed, more and more wild plants were tempted for use and faring tools slowly became more numerous and more efficient. Small sickles with metal blades were in use in Egypt. A great advance over the hoe was made when crude wooden plows were invented to help break the soil. Moreover, by this time animals had been tamed and some of them were hitched to plows to help man do his work; no longer was he completely dependent on his own limited muscle power. Despite continued advance it was not until the nineteenth century that the metal plow was in use. The steel plow, invented in 1833, has played a large part in world agriculture because it enables man to break the tough sod of the grasslands. Formerly it was easier to clear the forests and grub out stumps than it was to tear through the tangled mat of roots present in grassland soils. Thus, new inventions not only made the farmers work progressively easier and allowed him to increase production from land already under cultivation, but also enabled agriculture to spread more widely over the earth.

The nineteenth century was a period of great agricultural progress, just as it was a time of rapid advance in manufacturing and commerce. In fact, the connection between them was very close; new machines demanded more raw materials, many of which come from farm, ranch, or plantation and many of the new inventions were those which facilitated farming operations and the domestic and international exchange of both
raw and finished goods. The commonly use term Industrial Revolution actually had a twin whose name was Agricultural Revolution. Multiple, or gang plows and mechanical seeder, reapers, binders, and threshers were some of the new tools provided. At first, Oxen’s horses and mules provided most of the power for the machines but by the end of the century many of them were engine-powered. While all this was going on, plant scientists discovered or developed new crops, some of which are able to live in colder and dryer parts of the earth than was previously considered possible again. The result was an increase in the amount of land under cultivation.

The foregoing account might give the impression that the world’s agriculture is entirely or almost entirely modernized or that it is chiefly agriculture of machines and scientifically selected crops. Actually, the vast majority of the world’s farms today are still run in old-fashioned and often primitive ways.

This is especially true in Asia where a bit more than half the people of the world live, in the poorer sections of Europe, and in extensive portions of Africa and South America. Modern agriculture is perhaps best exemplified in the United States, European Russia and sections of Southern Canada and South East Australia.

1.3 Agricultural Development in India:

Agricultural is considered as backbone of Indian economy. If refers to the art of raising plant life from the soil useful for mankind. It is most important among all primary human occupations and is carried out throughout the world where natural environment allows them to do. In India more than 70 per cent of the population depends upon agriculture. The early years of Independence witnessed accentuation on the development of infrastructure for scientific agriculture. The steps taken included the establishment of fertilizer and pesticide factories,
construction of large multipurpose irrigation – cum - power projects, organization of community development and national extension programmes and, above all, the starting of agricultural universities as well as new agricultural research institutions across the length and breadth of the country. However, the growth in food production was inadequate to meet the consumption needs of the growing population which necessitated food imports.

Policy makers and planners, in order to address the concerns about national independence, security, and political stability realized that self-sufficiency in food production was an absolute prerequisite. This perception led to a program of agricultural improvement called the Intensive Agriculture District Programme (IADP) and eventually to the Green Revolution. The National Bank for Agriculture and Rural Development (NABARD) was set up. All these steps led to a quantum jump in the productivity and production of crops.

The Green revolution generated a mood of self-confidence in our agricultural capability, which led to the next phase characterized by the Technology Mission. Under this approach, the focus was on conservation, cultivation, consumption, and commerce. An end-to-end approach was introduced involving attention to all link in the production-consumption chain, owing to which progress was steady and sometimes striking as in the case of milk and egg production.

Indian agriculture continues to face internal and external challenges. While monsoon dependence, fragmented land-holding, low level of input usage, antiquated agronomic practices, lack of technology application and poor rural infrastructure are some of the key internal constraints that deter a healthy growth, whiles subsidies and barriers have been distorting international agricultural trade, rendering agri-exports from developing nations such as India uncompetitive.
Today, India ranks second worldwide in form output. Agriculture and allied sectors like forestry and logging accounted for 16.6% of the GDP in 2007, employed 52% of the total workforce and despite a steady decline of its share in the GDP, is still the largest economic sector and plays a significant role in the overall social-economic development of India.

India is the largest producer in the world of fresh fruit, jute, pigeon peas, pulses, spices, millets, castor oil seed, sesame seeds, safflower seeds, lemons, limes, cow’s milk, dry chillies and peppers, chick peas, cashew nuts, okra, ginger, turmeric guavas, mangoes, goat milk and buffalo milk and meat. India is also the largest producer of millets like Jowar, Bajara and Ragi. It is second only to China in the production of rice. India is the 6th largest coffee producer in the world it also has the world’s largest cattle population (281 million). It is the second largest producer of cashews, cabbages, cotton seed and lint, fresh vegetables, garlic, goat meat, silk, nutmeg. Mace, cardamom, onions, wheat, rice sugarcane, lentil, dry beans, groundnut, tea, green peas, cauliflowers, potatoes, pumpkins, squashes, gourds and inland fish. It is the third largest producer of tobacco, sorghum and rapeseed. Coconuts, hen’s eggs and tomatoes. India accounts for 10% of the world fruit production with first rank in the production of mangoes, papaya and banana.

Indian agriculture has been the source of supply of raw materials to our leading industries. Cotton and jute textile industries, sugar and plantations all these depend on agriculture directly. There are many other industries, which depend on agriculture in an indirect manner. Many of our small scale and cottage industries like handloom, weaving, oil crushing, rise husking etc. depend upon agriculture for their raw materials together and they account for 50% of income generated in the manufacturing section in India. But then, in recent years, the significance
of agriculture to industries is growing down as many more industries have come up which are not dependent on agriculture. Under the five-year plans, iron and steel industry, chemical machine tools and other engineering industries, aircraft etc, have been started. However in recent years, the importance of food processing industries is being increasingly recognized both for generation of income and for generation of employment. Importance of Indian agriculture also arises from the role it plays in India’s trade. Agricultural products like tea, sugar, oilseeds, tobacco, spices etc. constitutes the main items of export of India. Broadly speaking the proportion of agricultural goods which are exported may account to 50% and manufactures with agricultural content (such goods as manufactured Jute, cloth and sugar) contribute another 20% or so and the total comes to 70% of India’s export. This has great significance for economic development of the country.

Importance of agriculture in the national economy is indicated by many facts. For example, agriculture is the main support for India’s transport system, since railways and roadways secure bulk of their business from the movement of agricultural goods. Internal trade is mostly in agricultural products. Further, goods crops implying large purchasing power with the farmers lead to greater demand for manufactures and therefore, better prices. In other words, prosperity of the farmers is also the prosperity of industries.

1.4 Agricultural Development in Maharashtra State:

Agricultural has progressed a long way in India form an era of frequent droughts and vulnerability to food shortages, to become a significant exporter of a diversified basket of agricultural commodities. Maharashtra accounts for nearly 9% of the total agricultural income of the country. The state has major area under jowar. Forty three per cent of the total area under jowar is in Maharashtra. The productivity of some of
the food crops like wheat, paddy and cash crops such as cotton has however remained low. The net sown area of 18 million ha is distributed among nearly 10 million farm holdings. The state government have invested substantial amount in agriculture infrastructure like irrigation, fertilizer industry. However, only 16% of the land is under irrigation. As much as 76% of the irrigation water is used for sugarcane grown on 3% of the cultivated area. The water resources are scarce, therefore improved methods of water management is imperative.

In the last 19 to 12 years, drip irrigation has become most popular, particularly in crops like grapes, banana, sugarcane, cotton etc. the increased water use efficiency helps conserve scarce resources including capital investment for additional water storages as well as brings additional area under irrigation at much lesser cost. Sixty percent of the area under drip in the country is located in Maharashtra.

The state us implement the project on horticulture in about 1 million ha. Under this project the state has recorded an impressive growth rate of about 20% far ahead of many states in the country. Crops like grapes, pomegranate, and processed banana are exported earning valuable foreign exchange. Inspite of natural advantages, there are no vibrant food processing industries in the state. Most of the vegetable and fruits produced are not suitable for processing and/or exports. Post-harvest wastage is more than 20%. Efforts should be taken to establish viable food processing industries in the state so that farmers are able to get remunerative returns to their produce.

The new developments in biotechnology are revolutionizing agriculture. Traditional microorganisms like moulds and yeasts are being geared to increase productivity. Genetically modified plants like cotton, soyabean are becoming popular. New formulations of bio-pesticides and bio-fertilizers are increasingly popular in the state.
1.5 Study Area:

Buldhana district is a part of Vidarbha region of Maharashtra state. The district lies in the western most part of Vidarbha region. The district is bounded on the north by Madhya Pradesh state, on east by Akola and Washim districts, on west by Jalna and Jalgaon districts and on the south by Parbhani and Hingoli districts.

Buldhana district consists of thirteen talukas, occupying an area of 9661 sq.km. most of the people found in the district are engaged in traditional subsistence agriculture. However, commercial agriculture is also noticed, Cotton, Jowar, Wheat, Soyabeans, Sunflower, Groundnuts, Green Gram, Red Gram are the predominant crops grown in this district.

Buldhana is a district in the Amravati division of Maharashtra state in western India at the western most border of Vidarbha region and is 500 km from the state capital, Mumbai.

The district is mainly covered in Survey of India topographic Sheet No. 55D/8 partly in 46P and 56 A and lies between 19°51' to 21°17' North latitude and 75°57' to 76°40' East Longitude.

The district consists of five subdivisions and thirteen blocks. The district Head Quarters is at Buldhana. The distances of the other major towns from Buldhana is Aurangabad ( 180 KM ), Pune ( 425 KM ), Amravati ( 200 KM ), Nagpur ( 350 KM ).

This district is a major tourist attraction owing to the ancient Lonar crater (second largest in the world), declared a world heritage. Shegaon of Gajanan Maharaj, Sailanibaba's Dargah are the major places of pilgrimage. Sindakhedraja in this district is renowned to be birthplace of Rajmata Jeejabai. National Highway 6 - NH6 passes through Khamgaon, Nandura, and Malkapur towns in the district.

The principal rivers in the district are Painganga and Purna. It is bounded on the North by Khandawa District of Madhya Pradesh on the
South by Parabhani District on the west by Jalna and Jalgaon Districts and on the North East by Amravati District. The other important rivers are the khandakpurna, Nalganga, Vishwaganga, Gyanganga and Banganga. The principal tributaries of purna are Nalganga, Vishwaganga and Gyanganga from the south. There are two medium irrigation project of the river Nalganga and Gyanganga in the district. The total area of the district is 9661 Sq. Kms. which is about 3.14% of the total area of Maharashtra State.

1.6 Objectives of the Study:

The specific objectives of the present study are as follows

1. To understand the nature of crops cultivated and the types of livestock rose.
2. To regionalize the district in terms of crop and livestock combination and concentration.
3. To measure the agriculture productivity and to bring out the regional variation, if any.
4. To bring out the spatio-temporal agricultural landuse changes over the last two decades.
5. To asses the effect of irriation, HYV and fertilizer consumption on agricultural development.
6. To asses the recent technological impact on overall agricultural development.

1.7 Data base and Methodology:

For the period 1995-96 to 2015-16 the data collected from various primary and secondary sources. The primary data is the raw data collected through personal interviews.
Secondary data obtained from socio-economic review district census handbooks, Gazetteers agricultural epitomes season and crop reports published by the department of the agriculture.

Thus, the data collected through primary and secondary sources, were processed and data presented by statistical and cartographic techniques not only basis of primary and secondary with the help of various statistical and cartographical methods and techniques, researcher studied spatial as well as temporal changes in Agricultural landuse in Buldhana district from 1995-96 to 2015-16 for the present research work researcher has been used the following method to calculate different aspects.

**Rainfall Variability:**

The co-efficient of rainfall variability is calculated by the following formula.

\[
Co\text{-efficient of rainfall variability} = \frac{SD}{a} \times 100
\]

Where, \(SD\) = Standard deviation

\(a\) = Arithmetic mean of rainfall during the 8 years.

**Growth Rate of Population:**

The following formula is used to calculate the growth rate of population

\[
r = \frac{P_n - P_0}{P_0} \times 100
\]

Where, \(r\) = denotes growth rate of population

\(P_n\) = denotes current year population

\(P_0\) = denotes base year population
**Index of Landuse Efficiency:**

The index of landuse efficiency is obtained by using the following formula:

\[
\text{Index of landuse efficiency} = \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100
\]

**Crop Combination:**

For the present study an attempt is made to delineate the crop combination regions by applying crop combination method i.e. minimum standard deviation method as introduced by Weaver (1954).

\[
d = \frac{\sum d^2}{n}
\]

Where, \(d\) = The difference between the actual crop percentage in a given area unit and the appropriate percentage in the theoretical curve

\(n\) = The number of crops in given combination

**Crop Concentration:**

The location quotient method adopted by Bhatia (1965) is employed here to analyses the concentration of oilseeds in the study region.

The formula is as follows:

\[
\text{Index for determining concentration of crop} = \frac{\text{area of crop ‘a’ in the component areal unit}}{\text{Area of crop all crops in the component areal unit}} \div \frac{\text{area crop ‘a’ in the entire region}}{\text{area of all crop in the entire region}}
\]
1.8 Significance of the Study:

Cultivation pattern of any region is not constant for long period. After a span of five or ten year’s cultivation pattern as well as sequence of various crops are also changes e.g. Jowar and cotton was leading crop in Buldhana district before ten years but now a days Soybean, Groundnuts, Green and Red Gram has taken place of them. Basically cultivation pattern of any crop is related to many physical factors, particularly physiographic, soil, climate etc. as like physical factors socio-economic factors also affect the such as insecticides, production cost of crop, market price of crop etc. With the development of science and technology many benefits as well as losses are taken place in environment. Due to this impact many micro level changes are also taken place in environment particularly in soil and climate. This micro level changes in environment also effected on cropping pattern on any region. Due to continuous sown of only one crop rising efficiency of that crop is decreases seed becomes more prone to insects, quality as well as quantity of that crop is also decreases. Therefore, farmers are using more and more powerful and costly insecticides and pesticides. Due to this total production cost of that crop increases. After some times production quantity is also decrease. Therefore, a cruel cycle is developed. Market cost of any crop is related to its production. If production of that particular crop is increases then the cost is decreases, on the other hand, if the production decreases cost increases. All this factors are responsible for the changes of the cropping pattern of any region of the world.

In this research researcher analysed how all this factors are effecting on agriculture in all tahsils of the study region. Micro level climatic conditions and socio-economic factors changes spatial and temporal pattern of agriculture. Basically this type of study is more important for agricultural planning for short as well as long period.
1.9 Selection of the Topic and Region:

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

Firstly Buldhana district comprises the 13 tahsils in Maharashtra state has a significant location on North-east of Maharashtra plateau. Thirteen tahsils are considered for the study region in Buldhana district is covered by rough topography and the remaining part have flat surface.

Secondly the region under study has a major portion under flat topography hence, it supports to the high characteristics make. This district lies physical entity and homogeneous unit for geographical investigation. Buldhana is primarily a rural district with 79 percent of the total population living in the rural areas. Minorities constitute 25 percent of the total population; Muslims 9 percent and Buddhists 15 percent of the total population. The tehsil-wise minority community representation in Buldhana shows that in four tehsils i.e. Khamgaon (34 percent), Buldhana (27 percent), Chikli (26 percent) and Shegaon (26 percent), the minority population is more than the district average of 25 percent. The lowest level of minority population is in Lonar (17 percent) and Malkapur (16.8 percent). In the other tehsil, the ratio of minority population is as follows: Jalgaon (20 percent), Sangrampur (25 percent), Nandura (25 percent), Motala (25 percent), Mehkar (23 percent), Deolgaon Raja (23 percent), Sindhked Raja (24 percent). The overall literacy rate is 76 percent that is nine points above the national average (67 percent). Similarly, the female literacy rate is 64 percent, which is also above the national average. Even the sex ratio, i.e. 946, is above the state and all-India level. However, it is declining.

The overall work participation rate and female work participation rate are 39 percent and 23 percent respectively, which is just above the
national average. About 84 percent of the labour force is engaged in agriculture and related activities.

Thirdly the Ministry of Minority Affairs (GOI) has identified 90 minority-concentrated backward districts using eight indicators of socio-economic development and amenities based on 2011 census data with a purpose to improve all the eight indicators and bring them to the all-India level through a multi-sector development plan (MSDP) under the Eleventh Five Year Plan. Since it is expected that there may be changes in those indicators after 2001, a baseline survey has been conducted to inform the multi-sectoral development plan with the latest deficits and priorities. Buldhana is a backward district of Maharashtra and is one of the 90 minority-concentration districts in India.

Nearly 56 percent of the households are living in non-pucca houses. There is considerably better awareness about the Indira Awaz Yojana and since the demand for housing is so high in the district, the government policy should focus more on large scale construction and distribution of housing. Therefore, housing allotments should be increased, may be following a block-wise approach. The number of houses under the Indira Awaz Yojana in Buldhana can be increased with substantial funding support from the present scheme for housing. This can be given to those blocks or tehsils which have minority-concentration.

Fourthly the soil in the northern tahsils viz. Jalgaon, Sangrampur, Shegaon, Nandura, Malkapur and Motala are generally deep black formed by transported materials washed from the ghat land. Cotton, Jawar and Groundnut etc. are the main crops grown in this area. On the plateau i.e. remaining six tahsils areas of medium black soils and are suitable to grow cotton, Jowar, Pulses and Bajara.
The climate of the districts is dry and hot in general and considered to be generally healthy. Buldhana town is however the coolest and most pleasant district head quarter in the Vidarbha region. The district receives rains from the south west Monsoon during the period from June to September. Buldhana district is not at all endowed with major mineral resources with only a few deposits of Agate (Semiprecious Stones) reported to be occurring in the district. Bricks Soil, Sand and Bolder are some of minor minerals are available in the district.

It is felt that study of the system of agricultural production offers a helpful approach to obtain a more compare understanding of the problems of agriculture in region. Moreover the composite circumstances that contributes to the existing problems facing agricultural activities. Today a time and space perspective that may be appreciated.

Above considerations motivates the researcher to turn his attention to this region and it agricultural geography.

1.10 Review of Literature:

R. B. Mandal (1969)^6

He studied and has elaborated the Weaver’s method in analyzed ‘crop combination regions with special reference to North Bihar’. He has studied various crops of North Bihar. He used Weaver’s crop combination method with modification of the study of crop combination regions of North Bihar.

Majid Hussain (1969)^7

Studied the geographical basis of tube well irrigation in the upper Ganga, Yamuna double in this paper the geographical factors helpful in drilling of tube wells in the area have been assessed and the effect of tube well irrigation on the changes in the landuse pattern have been shown. The paper includes four maps showing the surface configuration of the area and the area under commands of canals and tube wells. The
proportion of the cropped land irrigated by tube wells also have been depicted in a map. The study can be utilized for the further extension of canals and small irrigation projects in the area.

**Sharma P. R. (1978)**

Sharma P. R. studied ‘spatial Characteristics of Landuse and its Efficiency of Chhattisgarh Region’. In his study, he tried to explain the efficient ways of land utilization. He used the developed landuse efficiency concept on ranking score basis. Six variables such as net sown area, non-cultivable land, cultivable land, irrigated area, area cropped more than once and cropping intensity have been considered in calculating the ranking scores. Based on the above mentioned method, he grouped the tahsils of the region into three efficiency groups. According to him technological attainments act as an important factor in different landuse stages but not always with the same intensity mainly because of topographic unsuitability, fiction of distance and socio-economic factors.

**B. N Tawade M. D. and Geophane (1980)**

They tried to assess ‘Agricultural efficiency for better rural economy on manjara Pleateau (Maharashtra)’. In their study an attempt is made to analyse the agricultural efficiency of Manjara Plateau by applying Bhattia’s formula owing to its simple procedure and suitability for a region with diverse physical characteristics. This may highlight the backwardness of the agricultural in the region and make strong case for its better agricultural planning.

Using S. S. Bhatias formula owing to this suitability for the study region has assessed the agricultural efficiency of the Manjara plateau. For this purpose tahsil wise yield of various crops has been used. For assessing the agricultural efficiency only ten crops have been selected whose aggregated land share is more than 60 per cent of GSA. The study reveals that the farmers in the major part of the region get smaller returns
from agriculture. Many factors physical as well as economic have contributed to this low level of efficiency, almost nullifying the topographic advantages.

The imposed dry arming system with low efficiency has long been continued in the region due to defective tenure system prevalent since the days of the Nizam of Hyderabad. Under the system Jagirdars were almost the dictators and farmers were only laborers. The intensive cultivation of land was, therefore, far from possible. The defective land tenure system was coupled with low level of agricultural innovations expressed through traditional farming. These physical and economic factors, thus, are responsible for low agricultural efficiency in the region.

They suggested that there is a need for such reforms which could minimize farmer’s dependence on rainwater, ensures them better crop returns.

**Abdul Munir and Farasat Ali Siddiqui (1983)**

They attempted to correlate ‘Population Pressure and Agricultural Productivity in Gond District’. They have used present residual technique for establishing the functional relationship between the agricultural density and productivity. They have observed that the degree of agricultural productivity with a few exceptions increases with the high degree of agricultural density.


They have identified ‘Irrigation Requirement for the Development in Maharashtra’, in their article’ irrigation requirements and development in Maharashtra.’ In this study paper authors have considered necessity of irrigation development in the state of Maharashtra. According to them the disparities in the irrigation development lead to imbalances in the income and food production and this cannot be continued or allowed to persist. To achieve equilibrium in agricultural production and availability
of food grains in subsistence agricultural region, the imbalances in irrigation facilities must be reduced. Authors suggest that all those areas with low need of irrigation could wait for further irrigation development till all other areas get their due share, as the capital resources are very much limited in our country.

**Dubey R. S. (1984)**

Dubey R. S. has studies ‘Agricultural Productivity in Madhya Pradesh’. In this study he tried to find out the impact of variation in environment on the trends of agricultural productivity in Madhya Pradesh. Author has been considered physical and non-physical determinants of agriculture of Madhya Pradesh from the viewpoint of agricultural productivity. Author has chosen four indices crop yield index, population supporting capacity of the farmland and weighted productivity index viz. productivity per hectare and productivity per workers.

The author’s regionalization of the productivity indices has been based on the grouping of the districts by making use of Kendall’s ranking method. He has calculated productivity patterns by making use of the Sperman’s ranking correlation co-efficient method for identifying inter district variations in the level of agricultural development. Kendall’s method has also been used to ascertain the level of agricultural development. He has considered use of irrigation; fertilizers, tube wells, irrigation pumps and tractors are for the evaluation of the development inputs. The level of social well beings have been identified on the basis of the average value of two scores for the districts in respect of the education, health, economy of the living environment and social order.

Author has given six productivity regions of Madhya Pradesh. Malwa registered mixed pattern of agricultural productivity. It ranges from low to high productivity. The Madhya Bharat Plateau is one of the
best productive parts of the state. Medium to high productivity was observed in the Baghelkhand uplands. Mixed productivity was observed in the Narmada valley. Low to very low productivity was found in Vindhyachal-Baghalkhand region and mixed productivity was noticed in the Chhattisgarh region.


He examined, ‘A Critical Study of Agricultural Productivity in Parbhani District (MS)’. The entire work is divided into eight chapters. In first chapter he throws light on meaning of agriculture and agricultural geography, significance of the study of agricultural geography, the place of agriculture in Indian economy, agriculture in Maharashtra and Latur agricultural division, choice of the region aims and objectives, data base and methodology and review of literature. Second chapter deals with geographical setting of the region while third chapter is devoted to non-physical determinants of agriculture of the study region. Fourth chapter throws light on general landuse in Parbhani district whereas fifth chapter explains cropping pattern in the study area. Sixth chapter is dealt with agricultural output, yield and productivity while Seventh chapter throws light on case studies and agricultural regions of the Parbhani district. In the last chapter author has drawn some conclusions, problems and suggestions.

Author has used primary and secondary data for the study. He has used data for the period of 1995-2000 to 2010-15.

1.11 Chapter Outline:

The present study of ‘Spatio-Temporal Changes in Agriculture: A Case Study of Buldhana District’, is divided in Six chapters.

Chapter First thros light on introduction, importance of the geography of agriculture, agricultural development in India, agricultural development in Maharashtra state, study area, objectives of the study,
database and methodology, Significance of the study, selection of the topic and region, research design and Chapter outline etc.

Second chapter deals with geographical setting of the study area and the role of physical and non-physical factors in agriculture in this chapter we studied introduction, historical background of the study area, location, physiography, drainage, climate, soils, natural vegetation, irrigation development, Economic scenario, socio-cultural landscape, critical appraisal of the factors affecting agriculture etc. points discussed in detail.

Third chapter troughs focused on agricultural profile of the study region which was effects on general and agricultural landuse pattern of the region, trends in agricultural landuse pattern, changes in agricultural landuse of the study region.

Fourth chapter open with the discussion of agricultural regionalization. In this chapter introduction, cropping pattern, crop combination, crop concentration, crop diversification, patterns of crop rotation, livestock combination and diversification and agricultural productivity etc. points are analysed.

Fifth chapter is devoted to case studies of the region, this topic totally light on primary investigation and result of survey etc.

Sixth chapter covers to the conclusions, problems and suggestions regarding the research proposal.
References:
