CHAPTER - I

INTRODUCTION

1.1 INTRODUCTION

Agriculture is the science and art of cultivating soil, growing and harvesting of crops, domestication of animals and raising of plants for the human being. Agriculture land use is the basic resource. It forms the basic for all biological, ecological, human and eco-activities. In the developing countries like India, where agriculture is the main source of economic and livelihood for more than 2/3 of the working population, proper utilization of land resource is vital. Agriculture is more diverse than any other human activity. It encompasses all those productive efforts of man on the earth’s surface which help him to achieve food, fibre and animal products, through growth process of flora and fauna. The geographer correlates these efforts of man with the various elements of physical and cultural environment. He also tries to delimit and asses the regional characteristics of agriculture.

Agriculture is an age-old occupation in India. It is still the main foundation of rural life. Agriculture has been the subject matter of the geographic study since long. It is not only because most of the people depend for food and several raw materials on it, but also because largest fraction of land under human occupancies is used for agriculture purpose. It is largely depend on environmental conditions and present wide spatial variation. Agriculture is the main occupation of working population and major source of income in India. Though significance of agriculture in terms of employment and generation of national income is gradually declining, the development of agriculture is an essential, though by no means, a sufficient condition for rural development in India. Agriculture
is not capable to contributing to economic growth, as much as other sectors, of the economy, nevertheless, its development will strengthen the rate of industrial development by increasing food production capacity, by capital formation, by proving market for industrial output of consumer’s goods and lastly by utilizing agricultural inputs originated in industrial sectors (T.W. Schultz, 1964, pp. 3 & 6).

The study of agriculture land use from the geographical point of view gained importance only after fifties in the context of regional planning. The government and the people could think of improving the lot of agriculture in planned way, large number of experiments were continued which were responsible for gradual change in agriculture land use. Agriculture land use in study region is a recorded continuous change from last five decades. In 1990-93 the study region has average 78.38% (793700 hectares) of its area under cultivation, which rose to 82.82% (834619 Hect.) in 2007 to 10. Total gross cropped area during the span of twenty years was recorded 3.99 % increase in the district. The agricultural landuse in the study region has been undergoing a transformation, since the introduction of the new agricultural technology, in which involves, extension of irrigation, introduction of improved and high yield seeds in selected crops, use of chemical fertilizer and mechanization of farming brought these changes. A change in agricultural land use implies a change in proportion of area, under different crops at two different times; changes in cropping pattern indicate that change in socio-economic status of farmers (Pawar, 1982). There is considerable change in pattern of agricultural land use during last two decades.
1.2 CONCEPT OF AGRICULTURE

Agriculture geography is an important discipline in the science of geography. It studies different aspects of agriculture, such as land-use, availability of rain, cropping pattern, as well as yield and production. The change in resource use technology, scientific knowledge, social institutions and human aspirations has been reflected in the use of land resource. The word ‘agriculture’ comes from a Latin term ‘Agercultura’ which has its origin in the words ‘ager’ meaning a field and ‘Cultura’ meaning to cultivate. Watson’s Longman Modern English Dictionary (1976) defines the word agriculture as the science or the art or the practice of large scale soil cultivation in order to produce crops. For the lack of appropriate word, agricultural geographers used the word agriculture to cover both cropping and grazing. Humphrey’s American people Encyclopedia (1965) mentions under the head ‘Agriculture’ the production of crops, live stock and its products. The primary aim of agriculture is to cause the land to produce more abundantly, and at the same time, to protect it from deterioration and misuse.

Agricultural geography can be considered a science in view of its techniques of analysis, methods of interpretation and its approaches to the investigation of agriculture. The word ‘Agriculture’ in the term ‘agriculture geography’ implies the subject matter and geography gives the ways of viewing or investigation the subject matter for instance, the impact of geographical factors an agricultural activities prevalent on the surface of the earth.
1.3 MEANING OF AGRICULTURAL GEOGRAPHY

Agricultural Geography is a branch of Economic Geography and it is one of the most highly developed branches of economic geography of 21st century. The primary purpose of agricultural geography is to undertake a geographical enquiry into the regional differences and spatial variations. A few decades back, agricultural geography was almost at the primitive stage of its development. In the recent past, it has made considerable progress towards maturing, as agricultural geography have begun to treat agricultural data, concepts and interpretation qualitatively. Agricultural geography may be considered as a science in view of its techniques of analysis, method of interpretation and its approaches to the investigation of agriculture. The subject is also concerned with the formulation and testing of hypothesis, interpretation of geographic distribution and location aspect of various attributions of agricultural activities prevalent on the surface of the earth.

**Hillman** (1911) had defined as the ‘Agricultural Geography’ deals with a comparative study of agriculture of countries and continents. The basic focus of this definition is to study the agricultural activities of different countries and continents at a macro-level. The decision on regards the cropping pattern and concerned activities are taken at the micro-level. Besides, this definition does not explain the causes of such spatial variations in agricultural phenomena.

**Bernhard, H** (1945): “Agricultural Geography” strives to bring light to spatial variations in agriculture and reasons for them. It is relative more rational definition, of agricultural geography, as it take into account the regional distribution of agricultural activities. It also try to find out the physical and cultural factors, which put limit on the spatial distribution of agricultural pursuits.
In the opinion of Coppock (1969) in ‘Agricultural Geography’ facts are arranged in an orderly manner. He emphasized that the main task of agricultural geographer is to collect data for the testing of hypothesis and to provide adequate explanation for the spatial distribution of agricultural activities.

According to Zimmeman (1951) “Agriculture would mean the cultivation of land. But agriculture include more than this. It also includes animal husbandry, tree culture, forestry and many other varied activities”.

Andreac (1981) has defined “Agriculture geography” as the science of the agriculturally transformed earth surface with its entire associated natural economic and social interrelationship as reflected spatially.

Reeds (1964): Agricultural geography seeks to describe and explain regional differentiations and interrelationship on the basis of agricultural characteristics.

Singh, Jasbir and Dhillan, S.S. (1981): Agricultural geography is concerned with the formulation and testing hypothesis, interpretation of spatial distribution and location of various characteristics of agricultural activities on the surface of the earth and measurement of geographic relationship, further, as a science, it also seeks to identify, describe and classify the problem of agriculture against geographical back drop.

Otremba (1964) argues that the area studies can be comprehended only through the knowledge of agricultural activities.

Johnson (1985) “Agricultural geography” has been defined as the study of spatial variations in agricultural activity, involving both the description of such variation and attempts to explain these. This definition has been widely accepted by geographers, as it describes not only the spatial variation of agricultural phenomena, but also explains the geo-ecological and socio-economic bases of such variations.
From all above definition, Agricultural Geography has been also defined as the science of area arrangement of agricultural phenomena. The definition of Agricultural Geography is also changing in space and time. The differences in the definition may be, the subject matter of agricultural geography.

1.4 SIGNIFICANCE OF AGRICULTURAL GEOGRAPHY

The spatial variation of agricultural phenomena is the main core of agricultural geography. The main thrust of geographer in the modern agricultural geography is to investigate the spatio-temporal variability of agricultural activity. Landuse is the most obvious spatial variable and an effort has gone into describing and classifying. Landuse, which is done by crop combination crop concentration, crop diversification, agricultural efficiency and land carrying capacity region.

In the study of landuse, other farming variables i.e. land tenure, field size, size of holding and labour supply must be taken into consideration along with physical variable, such as terrain, temperature, moisture, soil etc. where as in economic variables involves irrigation, fertilizer, technology etc. On the whole, it is concluded that, physical, Social, economic etc. variables have significant role in the comprehensive study of agricultural geography. Agricultural landuse is always to study with the connection of geographical and manmade factors.

Agricultural geography, in its broadest sense, seeks to describe and explain the aerial variation in agriculture. However, geography of agriculture makes a scientific investigation of nature of world areas in their different influence on the production of various crops.

The geographical activities of man and his economic action are studied in agricultural geography, for the fulfillment of the needs. As the result of the diverse circumstance of atmosphere in the various area of
the earth. Agricultural system and production play significant role in economic development. The mutual study of the agricultural life, as a result of this similar and dissimilar circumstance is made under agricultural geography.

The main objectives of the study of agricultural geography are as below-

i) To demarcate the crop production region or crop combination regions or agricultural enterprise region.

ii) To explain how different kind of agriculture are distributed over the earth and how they function in spatial arrangement.

iii) To delimit the areas of agricultural stagnation, transition and dynamism.

iv) To analyze the operation of farming system and the changes they undergo.

v) To identify weaker areas in terms of agricultural productivity.

vi) To measure and examine the level of differences between the regions.

vii) To understand how particular types of agriculture have developed in particular areas and how they are similar to or different from farming in other areas.

viii) To highlight in what direction and in what volume the changes in agriculture are taking place.

All these fall within the scope of agricultural geography. The geographers are organizing studies in the spatio-temporal perspective in relation to physical and non-physical bases of farming. Such studies dealing with the application of geographical discipline to the problem of agricultural and rural community become all the more essential in view of
the heavy reliance of population on agriculture and the challenging food problem. Regional imbalance and disparities in level of agricultural activity can be highlighted. It is the application aspect of agricultural geography. The investigation work in agricultural geography will be provide information to agricultural planners to enable them to plan, the available resources efficiently, to discover trends in landuse with definite units of area. The farmers are adjusting their farming operations to different physical and socio-economic condition.

The study of agricultural geography is focuses on three basic sets of relationship, viz.

i) Those between physical environment and agricultural operations.

ii) Relationship between population distribution, density or characteristics and the available agricultural space.

iii) It highlights on relationship between the socio-economic or cultural ecology and agricultural landuse and productivity patterns. The research in modern agricultural geography should provide the collective information on the three sets of relationship; moreover, such information is expected to cover.

i) How farmers have adjust their farming operations to different natural, demographic, socio-economic and cultural environment.

ii) How farming activities are changing under the changing influence of environment of agricultural relevance.
The significance of agricultural geography is that, it provides help and guidelines for decision makers and useful for.

i) The irrigation engineer, who plans to introduce new irrigation schemes.

ii) The regional planners, who is on the lookout for the most favourable location for recreation area.

iii) To demographic planners, who plans public services and utilities.

iv) The agricultural specialists, who wishes to improve the structure of agriculture.

v) The food economist, who wishes to increase the production of food production of food stuffs.

vi) The transportation engineer, who has to lay the new rail-road lines.

1.5 DEVELOPMENT OF AGRICULTURE IN INDIA.

In India during the time of independence farming was in deplorable condition. Agriculture was practiced on conventional lines, in which there was very little use of improved seeds, chemical fertilizers, pesticides, and farm machineries, mostly agriculture was dependent upon rainfall and upon the vagaries of the monsoon. Field was small and farmers were generally in heavy debts to the professional money lenders and agriculturist money lender. The agriculture was of subsistent type with predominance of food crops productivity of land as well as of labour had been declining and the country had come to depend very heavily on imports of food grains to satisfy the minimum requirements of the people.

The Government had implemented various strategies, to improve the situation of India agriculture. These strategy were called various names i.e. Intensive Agricultural District Programme, High Yielding
Verities Programme. Through these programme the efforts were made to increase agricultural productivity, to enlarge the supply of water, fertilizers, pesticides, improved seeds etc. in selected areas. Agriculture has remained one of the improvement sectors in the various five year plans designed by India’s Planning Commission. The government had spent on an average, 23 to 24 percent of the plan outlay in each of the five year plans on the development of agriculture and allied activities and irrigation.

**First Five Year Plan (1950-51 to 1955-56)**

As this was the period of food shortage agriculture, including irrigation was accorded uppermost priority during the first five year plan. Out of the total investment of Rs.1960 crore, Rs.610 crore or 31.1 percent was to be paid to agriculture sector. As a result of it about 5 lakh hectares of land was reclaimed and brought under cultivation. Similarly about 57 lakh hectares of agriculture area was brought under irrigation and the use of chemical fertilizer was doubled. The agricultural growth rate was 2.8 percent and the production of food grains went up from 50.8 million tonnes in 1950-51 to 65.8 million tonnes, recording growth of 29.5 percent.

**Second Five Year Plan (1955-56 to 1960-61)**

In the second five year plan the agriculture received somewhat lower priority vis-a-vis industry. Out of the total plan outlay of Rs.4600 crore, it was allocated Rs.950 crores (20.6%), of which Rs. 420 crores were spent on irrigation. This led to the creation of additional 85 lakh hectares of irrigation potential and reclamation of 4.8 lakh hectares of additional land for agriculture. Although the agricultural production registered a growth of 4.1 per annum and the production of food grains
increased to 82 million tonnes, an increase of 24.6 percent over 1955-56. But oil seeds, cotton etc. was far below the plan target, except sugarcane. The poor performance of the agriculture due to drought conditions, led to price rise, and instability in the economy.

**Third Five Year Plan (1960-61 to 1965-66)**

During the third five year plan out of the total plan outlay of Rs.8,577, crore 20.5 percent (Rs.1754 crore) was allocated to agriculture. The achievement of self-sufficient in food grains and increase agricultural production to meet the requirement of industry formed one of the five basic objectives of the third plan. The plan target fixed 30 percent increase in the output of food and non-food crops, but actual production remained far behind the target due to wars with China and Pakistan and severe drought conditions. After the third five year plan three annual plans were formulated during 1966-69 in which about Rs.1624 crores (24 percent of the total outlay) During this time emphasis was placed on the use of chemical fertilizer, high yielding verities of seeds, and extension of irrigation facilities. The annual growth rate of agricultural reached 6.9 percent per annum and food-grains production touched 95.6 million tonnes.

**Fourth Five Year Plan (1968-69 to 1973-74)**

The total investment under agricultural sector was Rs.3814 crores (24 percent of the total plan outlay) against the actual expenditure of Rs.3466 crores (20.7 percent of the plan outlay). The target for food grains was 129 million tonnes for 1973-74, but actual production of food grains was merely 103.6 million tonnes. During the plan about 15.6 million hectares of additional cropped area was brought under irrigation. Although the overall agricultural growth was limited to 3.1 percent per
annum but the actual production was short of the plan target. The unsatisfactory performance of the agricultural sector was the root cause of the stagnation and the emergence of inflationary pressure since 1972-73.

Table 1.1: Agricultural Development through Five Year Plan in India (1950-52 to 2007-12)

<table>
<thead>
<tr>
<th>Plan</th>
<th>Total plan outlay (Rs. in crores)</th>
<th>Outlay on Agricultural Irrigation (Rs. in crores)</th>
<th>% of outlay</th>
<th>Food-grains production (millions tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Five Year Plan (1950-5 To 1955-56)</td>
<td>1960</td>
<td>610</td>
<td>31.1</td>
<td>65.80</td>
</tr>
<tr>
<td>Second Five Year Plan (1955 56 To 1960-61)</td>
<td>4600</td>
<td>950</td>
<td>20.6</td>
<td>82.00</td>
</tr>
<tr>
<td>Third Five Year Plan (1960-61to1965- 66)</td>
<td>8577</td>
<td>1750</td>
<td>20.5</td>
<td>72.30</td>
</tr>
<tr>
<td>Fourth Five Year Plan (1960–69to1973–73)</td>
<td>15780</td>
<td>3814</td>
<td>24.0</td>
<td>103.60</td>
</tr>
<tr>
<td>Fifth Five Year Plan (1973–74 To1977- 78)</td>
<td>39430</td>
<td>7411</td>
<td>22.0</td>
<td>126.00</td>
</tr>
<tr>
<td>Sixth Five Year Plan (1979-80 to 1984-85)</td>
<td>110,467</td>
<td>26131</td>
<td>23.65</td>
<td>145.54</td>
</tr>
<tr>
<td>Seventh Five year plan (1984-85 to 1989 - 90)</td>
<td>218730</td>
<td>48100</td>
<td>22.0</td>
<td>171.00</td>
</tr>
<tr>
<td>Eight Five Plan (1991- 92 to 1996- 97 )</td>
<td>434100</td>
<td>93600</td>
<td>22.0</td>
<td>191.20</td>
</tr>
<tr>
<td>Ninth  five year plan (1996-97to2001 -02)</td>
<td>941041</td>
<td>201442</td>
<td>21.0</td>
<td>250.10</td>
</tr>
<tr>
<td>Tenth five year plan (2002 - 2007)</td>
<td>1525639</td>
<td>305055</td>
<td>20.0</td>
<td>275.20</td>
</tr>
<tr>
<td>Eleven five year plan (2007 - 2012)</td>
<td>14,21,771</td>
<td>12,15,556</td>
<td>8.54</td>
<td>415.70</td>
</tr>
</tbody>
</table>

Sources: Five Year Plan

**Fifth Five Year Plan (1973-74 to to 1977-78)**

In the fifth five year plan a sum of Rs. 7411 crores was allocated to the development of agriculture and irrigation, which increased rupees 8,084 crores (20.5 percent of the plan outlay) at the end of the plan. This five year plan set the objective of self sufficiency and poverty at eradication. The agriculture recorded a yearly growth of 4.6% but the
progress had been fluctuating. The production of food grains reached 121 million tanner in 1975-76, but declined to 112 million tanner in 1976-77. Due to some difficulty the plan had to be terminated one year before in 1977-78. The Janata government gave more emphasis to the agricultural sector and started annual planning with a five year perspective, also known as the rolling plan.

**Sixth Five Year Plan (1979-80 to 1984-85)**

Out of a total plan expend of Rs. 110,467 crores Rs. 26,131 crores (23.65 percent) were allocated for agricultural and allied activities. The plan put stress on land reforms, optimum utilization of inputs, greater use of HYV Seeds, chemical fertilizers and ground water resources and improvement etc. The annual growth rate was 6 percent the highest recorded during the planning era. Irrigation prospective increased by 11 million hectares and the impact of Green Revolution started spreading to new areas.

**Seventh Five Year Plan (1984-85 to 1989-90)**

Agricultural sector attracted the plan outlay of 22 percent with target growth rate of 4 percent per year and food grain production of 178 million tonnes by the end of the plan, consequently the food grains production increased to 171 million tonnes by the end of the plan, showing an increase of 17.5 percent over to 1984-85. The yearly growth rate has been moderate in pulses 1.5 percent wheat 2.62 percent but some has been quite acceptable incase of rice 5.22 percent, oil seeds 6.14 percent sugarcane 6.48 percent and cotton 6.85 percent.

The main thrust of the plan is to produce surplus food-grains for export and export and to achieve self sufficiency in respect of pulses and oilseeds. In the eight plan agriculture including irrigation has got an allocation of Rs.96,167 crores, which is 18 percent of the total plan outlay and almost double than that of the seven plan. The plan has fixed up a target of producing 210 million tonnes of food grain, 23 million tonnes of oilseeds, 275 million tonnes of sugarcane etc. But the actual production has been 191.2 million tonnes of food grains, 24.1 million tonnes of oil seeds and 273.6 million tonnes of sugarcane.

**Ninth Five Year Plan (1996-97 to 2001-02)**

The objective of the ninth plan include priority to agriculture and rural development with a view to generating adequate productive employment and eradication of poverty, accelerating the growth rate of the economy with stable prices and ensuring food and nutritional security for all. The plan has fixed up an annual growth rate of 4.5 percent in agriculture, through adequate strategy in agro-climatic regions.

**Tenth Five Year Plan (2002-2007)**

Out of the total investment Rs. 15, 25,639 crores Rs. 30,50,55 crore or 20 percent was to be paid to agricultural sector.

**Eleven Five Year Plan (2007-2012)**

Indian Planning Commission under the presidency of Prime Minister, Dr. Manmohan Singh approved the draft of Eleventh Five years plan in organized meeting on 18 October 2006. After that in 52nd meeting of National Development Council approved the draft of Eleventh Five
Years Plan. In the Eleventh Five Year Plan, following suggestions are made to increase the production in Agriculture.

To increase the proportion of cultivated area under irrigation, with the help of modern irrigation methods by using better water management, minimum water should be utilized for maximum cultivated area, to provide modern agricultural knowledge to farmers, along with the food protection, to give inspiration to the farmers to produce commodity which have high quality value like fruits, vegetables etc. improvement in market and increase the investigation in the field of agriculture.

1.6. AGRICULTURAL DEVELOPMENT IN MARATHWADA REGION

Agricultural sector is the most dominant sector in the economy of Marathwada region. Marathwada region has total area of 64302 sq.km. Which is 21.01 percent of the state? Its population is 1.55 crores, accounting 16.22 percent of the state. The region has 64.78 percent medium black soil, 12.95 percent deep black soil and 22.26 percent coarse and shallow black soil. Out of the total geographical area about 83.5 percent area was under cultivation. Agricultural land varies from 77.09 percent to 90 percent in the districts of Marathwada region. Marathwada region is known as one of the backward region of the Maharashtra state, where industrial development is the took place only in few districts of region. Therefore, agriculture is the back-bone of economic development of region and still about 65 percent population is depending on agriculture. But large proportion of agriculture is depending on rainfall, which is erratic nature. The success of agriculture is always depending on good amount of monsoon rain. So, there is no consistency in agricultural production of Marathwada region.
During the last few decades, due to increase in area under irrigation, the average yield of major agricultural crops have shown rising trend. But per hectare yield of various crops are still below than the Maharashtra’s yield rate. This has happen mainly because of bad economic condition of cultivators, lack of adequate capital, limited use of pesticides and chemical fertilizers, scanty and sporadic rainfall etc. But presently, the situation is changing for the better.

Marathwada region is still behind in irrigation development as compared to Western Maharashtra. Marathwada region has good potentials for the agricultural development, but there is shortage of water in the entire region. The Godavari, the Manjars, the Bindusore, the Penganga etc. are the important rivers of Marathwada. But most of rivers become dry in summer season. Therefore, there is shortage of water in summer season for agriculture. As compare to state average of irrigation (37.40%) the proportion of irrigation in Marathwada is lower (36.60%). The district-wise position indicates that Parbhani (40%), Nanded (36.5%) have higher proportion of irrigation, while Aurangabad and Osmanabad have very low irrigation proportion which is recorded 11% and 16% respectively.

There is wide scope to increase agricultural land in Parbhani, Hingoli, Nanded, Osmanabad, Jalna etc. district. As we consider the Marathwada region as climatic zone, it falls under three zones such as, scarcity zone, assured rain fall zone and moderate to highly rainfall zone, where as rainfall variability is marked very high in Osmanabad, Aurangbad, Latur, Parbhani and Jalna district. About 78 medium projects, 1316 Minor schemes and Seven Major project are built in Marathwada region. Therefore, the agriculture land use of region is recorded continuous changes during the past. The cropping pattern of the region experienced remarkable change from last few decades. Crops which
become more remunerative in due course of time established their supremacy over the less remunerative one. The development of irrigation play a key role in extending the frontiers of cultivation and in transforming the cropping pattern of the Marathwada region. Marathwada region has made considerable progress in agriculture through five year plan.

1.7. **CHOICE OF REGION AND TOPIC**

Every research problem requires specific area for research work. A study of agricultural land use in Aurangabad district is conducted on the basis of following points.

Aurangabad district situated in the central part of the state, which has been incised by the Godavari River and its tributaries in the southern part. The district lies between 19°18’ N. to 20°40’N.latitude and 74°34’E. and 76°4’ E longitude. At present the Aurangabad district has nine tahsils. The average rainfall of Aurangabad district is 734 m.m. and minimum temperature is 5.6°C and maximum temperature is 45.9°C. There are two kinds of superficial formations, one consisting of upland soil derived from the decomposition of rocks on the spot, and the other alluvial soil, deposited by water belonging to the plain and the hollows in the valleys of rivers, hence it supports to high concentration of agriculture. That’s why these characteristics make this region a distinct physical entity and homogeneous unit for geographical research.

The climate of the district is characterized by a hot summer and general dryness throughout the year, except during the south-west monsoon period. There is variation in rainfall distribution from north to south and east to west. About 86 percent of the rainfall received from monsoon. Annual variation in rainfall from year to year is large in the
study area. However, it is necessary to investigate the entire region in a geographical view.

After the built of major, medium and minor irrigation projects, in the district. The cultivated area under irrigation has constantly increased in the study region. At present number of wells and tube wells are also increased in the district. Therefore, it is required to study the effect of irrigation on agricultural land use.

In agricultural land, how much area is under cultivation that is a very important phenomenon in geographic research. Because such conditions help a great deal for agricultural production. Due to this consideration Aurangabad district is selected for the study.

The pressure of population on agricultural land was more in 2001, as compared to 1991 census. Per capita cultivated land was very less and it varies from tahsil to tahsil. It is essential to divert the population to other economic sectors i.e. agro-base industries.

Aurangabad city is the administrative centre of the Marathwada region. It is one of the leading Urban and Industrial centre in the Maharashtra state. That’s why; there is more demand for fruit and vegetable etc. Therefore, it is require studying the impact of industrialization and urbanization on the agricultural land use of the district. So, the Aurangabad districts selected for the study.

All these consideration motivated the research scholar to turn his attention towards the Aurangabad district and its agricultural development.

1.8 THE APPROACH

Agricultural geography as it stands today is one of the recent branches of economic geography. In the late twenties reorganization and
regional description were its common themes, studies in agriculture are not the exclusive concern of geographer, but economists, agricultural scientist and other scholars to study agriculture. The approach of each of them however, is different. An economist confines himself to the study of production, consumption and distribution of agricultural commodities and prescribes the means maximizing profits with given inputs. An agricultural scientist studies various aspects of agriculture, such as agronomy, plant pathology, entomology etc. A historian concentrates upon the development of agricultural through time.

But an agricultural geographer is always concerned with the study of spatial variations in agricultural phenomenon. Even when he has to study the temporal trends in agricultural; he does so, through the element of space.

The agricultural geographers focus is mainly chronological rather than chorological. The theoretical and methodological base attained stability and cerographical and numerical precisions became indispensable tools to geographers. B.B.Singh (1981) presented seven fundamental concept of agricultural geography.

1. The concept of agricultural landscape.
2. Dynamic nature of agricultural phenomena.
3. Agricultural landscape as function of resource structure, process and stage.
4. Location of Agricultural activities.
5. Agricultural region and aerial differentiation.
6. Inter region equilibrium and spatial functional Interaction.
7. Region agricultural development and planning.
1.9 STUDY AREA

The district of Aurangabad lies in the north-west corner of his highness the Nizam’s Dominions, and is situated between the parallels of $19^017'N.$ and $20^040'N.$ latitude, and between the meridians of $74^039'E$ and $76^040'E.$ Longitude, covering an area of about, 10,100 sq.km. Its greatest length from east to west is 130 miles and its greatest breadth from north to south 95 miles. The district total population was 29,20,548 (2001 census) among this male population was 9,51,497 and female 8,82,887. The annual population growth rate was recorded 31.93% in the 2001 census. The total literacy rate was marked 73.63% (2001) and where male and female literacy rate was recorded 85.07 percent and 61.28 percent respectively in 2001 census. Aurangabad district comprises nine tahsil i.e Aurangabad Kannad Soygaon, Sillod, Fulambri, Khultabad, Vaijapur, Gangapur Paithan. But due to non availability of data, Fulambari tahsil is omitted from this research work.

1.10 OBJECTIVES

Every scientific research work is based on specific objectives. Research cannot be done without set of well objectives. Science has been concerned with observation, description, definition, clarification, explanation, and predication etc. of the world. In order to undergo through this process. Specific objectives are need. In this study following objectives have been set forth.

1. To highlight the areal variation in changes in agricultural land use in the study area during, 1990-93 to 2007-10.
2. To analyze spatial pattern in agricultural land use at the end of the investigation.
3. To study the availability of infra-structural and geographical factors on which the development and growth of agriculture depend.

4. To study the agricultural cropping pattern and its variation in the district.

5. To assess the trend of production and yield in the study region.

6. To study the general and agricultural landuse and its variation in the study area.

7. To study general landuse and cropping pattern of selected villages and mark out the agricultural region of the study area.

8. Evolution of the changes in area and yield of crops, So, as to explain the trend of efficiency.

9. To analyze and map the spatio-temporal distribution of irrigation, facilities and its effects on agricultural landuse.

10. To draw conclusions and find out the agricultural problems and suggest suitable remedies to solve them.

These objectives can be testifies on the basis of following hypothesis.

1.11 HYPOTHESIS

Hypothesis is required for any research to arrive at specific goals. It is provisional formulation and tentative solution of the problem facing the scientific knowledge. In this work also hypothesis can help a great deal for attaining scientific approach. On this background three general assumptions, which this inquiry follows.

a) There are spatio-temporal changes in agricultural landuse and area, yield and production of crops in the study region.
b) Relief, climate and soil have broad limit to the use of land, physical and cultural factors, may play an important role, in making the change in agricultural land use.

c) The physiographic controlled and input differential are responsible, for the growth disparity. The general land use and cropping pattern is changing, as per irrigation facilities and percentage of monsoon rains. Agricultural problem can be solved by improving land use pattern and by maintaining quality of land.

1.12 DATA BASE AND METHODOLOGY

The present work encompasses three major disciplines such as geography, economics, and management. Study of agricultural landuse has been conducted here mostly focusing geographical perspectives data base.

The present study relies upon primary as well as secondary data for the period 1990-93 and 2007-10. The primary data is the raw data, collected through different sources, for which special questionnaires were designed. The primary data concerning field-wise location of crops in selected villages were taken from the village level Revenue Officers and from the discussion with the farmers of concerned villages, field map of the selected village were also procured from the same officers, such as talathi office. Selected farms were marked on the villages maps through personal visits to the chosen villages. The data regarding the number of wells, live stock tractors, electric pumps etc. of concerned villages were also collected through questionnaires.

The secondary data concerning irrigation, land use and cropping pattern etc. were personally collected from the revenue records, available at various tahsil and district head quarter. Such data are recorded in
In the present study, the geographer’s approach of areal differentiation has been followed and in this respect it differs from approaches of agricultural science. Field work was carried out during 2009-10. These data are processed and analyses in form of maps and diagram, graphs and tables etc. most of the maps are choropleth maps, on which the areal differences in the importance of particular elements are shown by the difference in the density of shading. For studying the pressure of population on agricultural land, agricultural density, caloric and nutritional densities has been calculated. These densities have been computed by using area and population variables. For measuring the actual pressure of population on agricultural land, the relative co-efficient value of over population, is computed by taking into consideration the standard hectares.

For the quantitative measurement of the General landuse and agricultural landuse during the period 1990-93 and 2007-10 Weaver’s Index (1954) is used. Weaver’s Method, Rafiullas Method are used for delimitation of crops combination in the study region. Bhatia’s method has been used for the computation of index of crop concentration.
INDEX FOR DETERMINING CONCENTRATION OF CROP

\[
\text{INDEX FOR DETERMINING CONCENTRATION OF CROP} = \frac{\text{Area of the crop } a}{\text{Area of the crop } a \text{ in the entire region}} \times 100
\]

To investigate the spatial pattern of crop diversification Jasbir Singh (1976) formula is used.

\[
\text{INDEX OF CROP DIVERSIFICATION} = \frac{\% \text{ of Total harvested area under } n \text{ crop}}{\text{Number of } n \text{ crops}}
\]

Where,

‘n’ crops are those crop which individually as occupy 5% or more of the gross harvested area.

To calculate the agricultural productivity the technique introduced by Jasbir Singh (1976) such as crop yield and concentration indices ranking co-efficient have been employed. The statistical producer of this method is as follows-

i. **Crop Yield Index** -

\[
Y_i = \frac{Y_{ac}}{Y_{ar}} \times 100
\]

Where,

\(Y_i\) - is the crop yield index
\(Y_{ac}\) is the average yield per hectare of crop ‘a’ in zone
\(Y_{ar}\) - is the average yield of the crop ‘a’ in the region.
ii. **Crop Concentration Index** -

\[
\text{Ci} = \frac{\text{Pac}}{\text{Par}} \times 100
\]

Where,

- **Ci** - is the crop concentration index
- **Pac** - is the % strength of crop ‘a’ in the total harvested area in the Component enumeration unit.
- **Par** - is the % strength of crop ‘a’ in the total harvested area in the Entire region.

iii. **Ranking Co-efficient**

The crop yield and concentration indices thus derived for all the regional unit and the crops are ranked separately yield and concentration ranks for individual crops are added and there after divided by two, thus giving the crop yield and concentration indices ranking Co-efficient. The equation is as follows.

<table>
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<tr>
<th>CROP YIELD AND CONCENTRATION INDICES RANKING CO-EFFICIENT FOR CROP ‘A’</th>
<th>Crop Yield Index ranking of Crop ‘a’ + Crop Concentration Index ranking of crop ‘a’</th>
</tr>
</thead>
</table>

The result, thus derived will give us an idea of the level of agricultural productivity, the lower the ranking co-efficient, the higher and the level of agricultural productivity.
1.13 REVIEW OF LITERATURE

1. **Majid Hussain (1969):** He worked geographical basis of tube well irrigation in the upper Ganga-Yamuna Doab and selected fourteen villages, six of them lying in well drained irrigate plains having loamy soil. Three of them situated in well drained areas, where the sandy soils, with benefits of irrigation. Three villages in ill-drained plains, with clay soil and irrigation facilities partly available two untreated villages with soil varying from sandy to salty sandy.

2. **Datye V.S. and N.S. Pawar (1989):** Both researches were studied micro-level study of two villages of Maharashtra state. Datye V.S. and Pawar N.S. made attempt here to study the bearing between productivity of selected crop and soil characters and economic factors at micro-level. Related data and soil samples were collected from two villages, namely Bhadalwadi and Karavil, which have different physical and economic aspects, result of the correlation and multiple regression analysis shows that nitrogen is the only significant variable influencing productivity of jowar in both villages in case of bajra, economic factors are significant in Bhadwadi where in Kurawali only nitrogen has significant correlation with bajra. Productivity of wheat is significant related to phosphorus, irrigation and fertilizer are the important factors for sugarcane production in Bhadalwadi, is associated with nitrogen and in Kuravali within come.

3. **Gajhans D.S. (2007):** Studied spatio-temporal changes in landuse of Latur district, the entire work is divided into eight chapters. The work is based on primary and secondary data for the period of 1980-81 and 2001-02 Censuses. For the study of population, a research has calculated various densities. He has calculated indices, compound growth rate trend of area under various crops, its production and productivity for the
determinates of agricultural region. Author applied crop concentration method. Finally he focused on various problems of agriculture in study area and also given proper remedies to solve then.

4. **Suryawanshi M.V. (2008):** He studied changing pattern of agricultural landuse in Raigad district. This study has been divided into eight chapters. Author has focused on physical and cultural determinants of agricultural in Raigad district, comprises of relief, drainage, climate, soil types transport, agricultural implements etc. He concluded that physical environment in Raigad district is not suitable for agricultural development. There is more limitation of physical factors an agriculture and also weaker development of infrastructure, the agriculture in the study region is remain subsidiary form.

5. **Das M.M. (1981):** Studied the landuse pattern in Assam. The objectives of this paper were (i) to analyze the landuse pattern in Assam for 1965-1974 period (ii) to analyze the spatial variation of land use of the district level in 1973-74 (iii) to analyze volume of change in different district of Assam during 1969-74 by the weaver’s index to identify the region’s dynamic semi dynamic and static landuse pattern. In order to achieve the above objectives the author has considered two hypotheses
   i) The scope for physical expansion of arable land is very much limited in Assam. ii) Areas with best soil are dynamic in respect of landuse changes, while those with poor soil to be static. Author used secondary data. He used volume of change, Weaver’s Index and choropleth maps. Author observed that a large proportion of the geographical area of Assam is not suitable for agriculture. Whatever land is available for cultivation has already brought under cultivation.
6. Rathod H.B. (2001): Studied the spatio-temporal analysis of agricultural land use of Beed district. For the period 1970 to 1997. He has focused on the correlation between agricultural land use and geographical factors in the district. Author has studied relief, climate, and drainage pattern and irrigation facilities in the context of agriculture. He has grouped the population on the bases of occupational structure. He also considered the block-wise agricultural implements and its modernization. Author has highlighted on tahsil-wise cultivated area under selected crops and changes there in, and tahsil-wise trends in production of crops. He applied Weaver’s Doi’s, Bhatiya’s and Jasbir Singh’s method to calculate the crop diversification, concentration and crop combination method to delimit the agricultural region of study areas.

7. Phule Suresh (1999): Studied the agricultural geography of Marathwada region of Maharashtra state. He has focused on the impact of physical and cultural factors on the development of agriculture, general landuse, cropping pattern, productivity and trend of crop production. The work is based on primary and secondary data, for the period of 1970-71 to 1994 - 95. Finally he concluded that the traditional cropping pattern is the obstacle in the development of agriculture of Marathwada region.

8. Ali Mohamad (1975): Examined agricultural land use and nutrition in Sitapur, Barabanki and Kheri districts. The whole work is divided into four parts, involves of fourteen chapters. In the first part, he takes into account the natural environment of region, which influenced the existing crop landuse and also spatial pattern of general landuse, agricultural land use, and crop combination regions. The sample villages for intensive study of landuse and pressure of population have been consistently discussed into one chapter. The study area has been
divided into homogenous strata and sample villages have been selected from each stratum on the basis of the systematic purposive cluster sampling. Second part is based on field work, comprising population pressure and land utilization study of twelve selected villages of the region. A sample village has been grouped in different categories and land productivity have been given by each villages, which show the extend of agricultural development as attained by the present method of technical advancement. The third chapter concerned with various components of diet to village people, the deficiency or surplus of the component and the resulting nutritional deficiency, diseases. The selection of household has been done on the economic strata and essential information is collected by door to door survey.

9. **K.Z.Amani (1985):** He worked land utilization in Gogarhi village of Kiol tahsil in Aligarh district. It has total area of 186 sq.km and situated at $28^0 5'$ N. Latitude and $78^0 2'$ E. Longitude and it is far of 20 km north of Aligarh city.

   The study of land utilization and crop production, spread over a period of forty years reveals that during this period a change in land use is seen only places, where some fundamental alternative are taken place, on account the nature of human factors, these have been such as deterioration in the soil fertility, to increase irrigation facilities, over use of fertilizer or economic factor.

10. **Prof. J. Kastrowick and Prof. K. Dzewonsk:** Lend utilization survey conducted in Poland under the direction of Prof. J.Kastrowick and Prof. K. Dzewonsk on country basis has followed almost the same principles, as those for the land utilization survey in Great Britain with the difference the former is more detailed as regard the utilization of
available land and some of the samples of land use map of various countries were presented by Prof. Dziewonsk at the international Geography seminar at Aligarh in 1950.

11. **Singh J. (1975):** did a more extended and elaborate work on Punjab. He furnished a detailed geographic analysis of the changes in land use, irrigation, cropping pattern, size of land holding, land tenure system and live-stock patterns during first three year plans. He also studied the changes at village level by taking case studies of a few villages from different agricultural region of the state.

**1.14. SCHEME OF CHAPTERS**

The present thesis has been organized into eight chapters. The first chapter deals with introduction, concept of agriculture, meaning of agriculture geography, significance of agricultural geography, development of agriculture in India, choice of region and topic, hypothesis, objectives, data base and methodology, review of literature and study plan.

The second chapter highlights on location and boundaries, physiography, geology, drainage, climate, soils, types of natural vegetations of the study region.

The third chapter deals with analysis of demographic factors, such of size and distribution of population, literacy, technological factors such as irrigation, agricultural implements, live-stock, chemical fertilizer and consumption of pesticides, cultural factors such of land ownership and tenure, land holding, farm workers and infrastructural services.

In the fourth chapter landuse classification, general land use pattern and changes there in, such as area under forest, area not available for cultivation, other uncultivated land, other follow land and current fallow
land, net area sown, tahsil-wise trends of land use, overall volume of change in landuse, land use efficiency.

Fifth chapter deals with analysis of cropping pattern, overall change in cropping pattern, tahsil-wise trend in area under various crops, crop combination, and region and change there in, crop concentration, pattern of crop diversification and changes therein.

Sixth chapter covers the study of broad trend and variation in production and yield of selected crops in the study area. Tahsil-wise trends of production, yield productivity, measured by Jasbir Singh’s method (1972). Yield index and crop concentration index are also analyzed in this chapter.

Seventh chapter concerned with key studies of selected village for instance general land use, cropping pattern, live-stock, agricultural implements, etc.

Eight chapter deal with brief Summary and Conclusion.
### 1.15 REFERENCES

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