CHAPTER I
INTRODUCTION

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CHAPTER-1

INTRODUCTION:

Introduction The term agriculture has been derived from two latin words; ager meaning 'land' and cultura meaning 'cultivation' Agriculture ; 'thus means cultivation of land rearing of animals. India is an agricultural country because 70 percent of the people depend on agriculture for their livelihood. It contributes 20-25 percent of the Gross domestic product. It ensures food security for the country and produces several raw materials for industries. National security and prosperity are closely linked with agriculture. Agriculture is one of the old and primary activities of human beings. People get their food from agriculture in various forms ie. Cereals, fruits and vegetables. at present, agriculture sector provider livelihood to about 64% of me labour force and 29% of national income.

Agriculture plays an important role in economic development, such as provision of food to the nation, enlarging exports, transfer of man power to non-agricultural sectors, contribution to capital formation and securing markets for industrialization (Johnston & Mellor, 1961). Agricultural development is an integral part of overall economic development. Agriculture the general prosperity of the nation. the continued high growth of agriculture is essential to meet the food and nutritorial security requirements of the people and provide livelihood and income in rural areas. the significance of Indian agriculture can be discussed in the following ways:

- Agriculture is the predominant occupation of two-third of working population of their livelihood.
- Agriculture is the major source of income for about three fourth of India's population who live in villages.
- Agriculture provides not only food but also raw material for manufacturing industries like textiles, sugar, vegetable oil, jute 8 tobacco.
- Agriculture is not only an important occupation of the people but also way of life, culture & custom.
- Food security.
The total geographical area of the country is 328.7 million hectares of which 140.3 million hectares is the net sown area, while 193.7 million hectares is the gross cropped area. The gross and net irrigated area is 85.8 million hectares and 60.9 million hectares respectively, with a cropping intensity of 138 present.

Uppar Pradesh is the most populous state in the country accounting for 16.4 present of the country's population. It is also the fourth largest state in geographical area covering 9.0 (a) Doab (b) Rohilkhand (c) Awadh (d) Bundelkhand (e) Bagelkhand (f) Purvanchal. The Doab designates the flat alluvial tract. The Doab region which runs along Uttar Pradesh western border from north to south. This region is divided into three zones: the upper doab in the north-west, the middle Doab in the west and the lower doab in the south-centre. The economy of Uttar Pradesh is predominantly agrarian and performance of agriculture and allied activities rate of the State. Primary sector contributed 36.8% to the state's income in 2003-04 & provided employment to 66% of total workers (Kuma, 2005).

Agriculturally, the Ganga-Yamuna Doab is one of the most important part of Uttar Pradesh. It lies between the two important streams. The Ganga and the Yamuna. Agriculture occupies an important place in the last three decades, agriculture. The upper Ganga-Yamuna Doab are below than the states of Punjab & Haryana.

**IMPORTANCE OF THE STUDY :**

Agriculturally the upper Ganga-Yamuna Doab is on of the most important part of Uttar Pradesh it lies between the two important streams. The Ganga and the Yamuna, which covers an area of about 19375-74 Sqp.m. The doab consists of 7-districts, namely, Saharanpur, Muzaffarnagar, Meerut, Gautam Budh Nagar, Baghpat, Gaziabad and Bulandshahr. The entire region of the Upper Ganga Yamuna Doab forms a part of the Ganga and Yamuna plain. The alluvial deposits brought down by the Himalayan rivers spread over the entire area and the general slopes of the plain gently runs towards the eastern parts of the state of Uttar Pradesh. The alluvial deposits of the Upper Ganga- Yamuna Doab comprises the khadar lands which contains newer alluvium.
Agriculture occupies an important place in the economy of Uttar Pradesh and more specially in the Upper Ganga- Yamuna Doab, it not only provides food to the people but also raw materials to the numerous agro-based industries. About 70% of the working population is directly or indirectly engaged in agriculture. In the last three decades agriculture in the Upper Ganga-Yamuna Doab is one of the fertile regions of the state of Uttar Pradesh but comparatively the yields of crops are below than the states of Punjab and Haryana of the country. There is still a considerable scope for the improvement of agriculture production and productivity per hectare and per agricultural worker, particularly on small and marginal farms which will help to increase income levels and improve the quality of life of the people in the rural areas.

The study area has a lot of regional variations in the distribution of resources and levels of agricultural development. Hence, it is imperative that the magnitude of spatial variations in the level of agricultural development in the study area is assessed objectively. Since the major part of the study area is rural and agrarian in character, a study of agriculture development A green revolution experience during 1985-86 and 2005-06 of great relevance and significance for determining various parameters and problems of agriculture. Relief, climate, soil, water resources, population characteristics, aspects of agricultural modernization, land use patterns, cropping patterns, parameters of agricultural development and various levels of agricultural development constitutes the subject matter of the present study. In recent years due to its relevance and significance for agricultural development, the problem has attracted the attention of geographers, economists and agricultural land use planners.

The objective of the present research is to examine the crop productivity variations of different major corps (grouped under cereal, pulses, oil seeds and cash crops) grown in the Upper Ganga-Yamuna Doab 1985-86 and 2005-06. It also attempt to identify the variations in crop productivity among different districts of Upper Ganga-Yamuna Doab and how the changes in crop productivity have taken place from one period (1985-86) to another period.

Diversities in the cropping pattern, production techniques and resultant quantum of output means production in Upper Ganga-Yamuna Doab region are the striking characteristics of agricultural development. The drastic agricultural development took place in every part of Upper Ganga-Yamuna Doab but Upper
Ganga-Yamuna Doab noticed drastic changes in agricultural development during last twenty years. Therefore, it is essential to examine the regional diversities in natural conditions, population characteristics, inequalities in the distribution of various aspects of agricultural modernization and to explain the imbalances in land use patterns and in production of various crops in the study area. All these circumstances inspired the research scholar to conduct a research study in this direction and the topic entitled, "SPATIO-TEMPORAL PERSPECTIVES OF AGRICULTURAL DEVELOPMENT IN UPPER GANGA-YAMUNA DOAB" has been taken for this purpose.

It is believed that the results of this study would bring the factual position of the partial variations in the level of agricultural development in the Upper Ganga-Yamuna Doab region and will attract the attention of government, agriculturists, economists, agricultural land use planners and research scholars. Moreover, the suggestions of the study would prove helpful in the problems of agricultural development in the Upper Ganga-Yamuna Doab region to a satisfactory level.

REVIEW OF LITERATURE:

Uttar Pradesh is largely depends on agriculture where 70% of the total workforce is engaged in agriculture and allied services and the state comprises one of the most fertile area of the world i.e. Upper Ganga-Yamuna Doab region. In a growing economy like Uttar Pradesh, the role of agriculture is much wider than the requirement of foods & raw materials. As development proceeds, there is more integration of agriculture and industry by a regeneration process promoting each other. Agriculture therefore is rightly recognized as engine of growth which forms the basis of any development planning process.

Agriculture development can be measured in crop productivity, crop specialization or crop diversification and agriculture commercialization. Agriculture development should be balanced from the ecological point of view. Whenever, soil is eroded or lost its fertility or the basic nutritious value, level of underground water decreases, deforestation & water logging etc, the agriculture production in the area decreases.
Well known geographer Prof. Gopal Krishan (Punjab University, Chandigarh) has written in his paper "The concept of agricultural development, 1981" that agricultural development denotes the quality of agricultural systems of a region in terms of productivity, diversification, and commercialization consistent with a desired state of agrarian relation and ecological balance.

Various economists & geographers of India have studied a lot on agricultural development. Well renowned are Prof. Mohd. Shafi (Geographer, Aligarh Muslim University); Prof. Jasbir Singh (Ghaziabad), Prof. (Late) Moonis RAza (Jawahar Lal Nehru Univ.) & Prof. Majid Hussain (Jamia Millia Islamia New Delhi) & many other like Amitab Kundu & Ashok Mitra Hussain (Jamia Millia Islamia, New Delhi) & many other like AMitab Kumar & Ashok Mitra are well renowned geographers. Amitab Kundu & Moonis Raza has developed the concept of regional development. In order to measure the levels of agricultural development ten variables related to agricultural production were taken into consideration and nine variables related to productive conditions of an area were taken into consideration.

Prof. Mohd. Shafi had demarcated the production of 12 major crops of Ganga plains, Prof. Majid Hussain have demarcated agricultural productive regions of Ganga-Datleuj plains, Prof, Faqooq has demarcated the crop combination regions of India.

Forming the spine and life line of the state Uttar Pradesh, the river Ganga, its numerous tributaries and hundreds of subtributaries have drained entire Uttar Pradesh. Ganga is joined on the course by famous rivers like Yamuna, Ramganga, Gomti & Ghagra. Being perennial, they facilitate canal irrigation for which the region has been famous from ancient time (K.L. Rao, 1975). The eastern Upper Yamuna, Upper Ganga, Lower Ganga, Sarda & Ramganga are the important canals of various rivers. The upland regions in the South is drained by Chambal, Sind, Betwa & Ken which joined to Yamuna and by Tons & Sone which joined the Ganga directly.

Cultivated land per agricultural worker is one of the relevant & positive indicator of quality of operation on land. Utmost attention & attempt to be given to cultivated land on which superstructure of agricultural development is raised (Gosal & Krishan, 1984). Agricultural workers compared more food grains & other crops. It
increases the scope of diversification of crops, as large farms are conducive to a high degree of mechanization while small farms are generally labour intensive.

The percentage of area under commercial crops is a good measure for agriculture development as it reflects the transformation of the agricultural economy from subsistence to market oriented cultivation. As commercial crops are grown only on fertile land with advancement of techno-biological inputs, it reflects the level of quality of agricultural and in an area. Agricultural development is fairly represented by the level of commercialization because the degree to which market forces have penetrated in an area and the scale upon which they operate will be the crucial factor in almost every question of agricultural development. (Hunter, 1969)\(^4\).

Finance is a great necessity for the development of agriculture like other economies. There are strong arguments in favour of developing agricultural financial institutions for adequate credit facilities. Institutional system are not meant simply for granting loans but it has a broader connotation in both technical guidance and planning of the farm business. Provision of initial credit supply in the appaling economic condition of rural India is more of a social transformation rather than purely economic and is essential for economic transformation (MAIKAP, 1972)\(^5\).

\(^1\) Krishan Gopal,"The concept of agricultural development in Noor Mohd. (ed.)" in Perspectives Agricultural geography, Vol. I, concept publishing company, new Delhi, 1981.
Irrigation is a basic determinant of agricultural development because its inadequacies are the most powerful constraints on the increase of the agricultural production. (Singh & Dhillion, 1994). It is essentially the artificial application of water to overcome deficiencies of rainfall for growing crops. (Cantor, 1967). Irrigation not only gives stability, rationalization and diversification to agriculture but also provide protection against natural calamities. Water resources are tapped by an intensive network of tubewell irrigation specially in the Upper Ganga-Yamuna Doab region. Irrigation has played a key role in the transformation of Uttarpradesh agriculture. It helped in enhancing the productivity and stability of agriculture, increasing the intensity of cultivation, reclaiming the dry agriculture, increasing the intensity of cultivation, reclaiming the dry agricultural waste lands and regionalizing the cropping patterns. (Dubey, 1981).

Tractor is an agent of modernization in agriculture. It is a multi purpose asset. Its engine can be used in running tubewells, or a thresher or a crusher (Dubey, 1981). In spatial terms, the number or tractors is highest in Upper Ganga-Yamuna Doab and Rohilkhand regions, largely inhabited by enterprising Jat and Gujjar communities. The higher level of tractorization is also noticed in Terai belt along southern edge of Uttarakhand, where advanced agriculture is practiced by Sikhs & Jat on the recently reclaimed land.

Regions are determinable and divided into individual units according to the degree of correspondence as homogeneity of the various geographical phenomena or areal variables (Prof. R. Singh. (Ed. 1971).

FAO's study have shown that the use of fertilizers is more instrumental of agricultural development because wherever efforts are made to increase agricultural efficiency and productivity to meet the demand of rising population, more fertilizers and manures have been invariable used.

Saharanpur, Muzaffarnagar, Meerut & Bulandshahr districts, located in the upper-Ganga- Yamuna Doab, constitute the Meerut region. These districts are characterized by high proportion fo their cropped area under non-food grains crops. Wheat, Sugarcane,
and forage crops are the dominant crops in the region. Wheat is uniformly important throughout the region and occupies almost one third of the total cropped area in all 1 districts of the region. Sugarcane & forage crops are more important in Muzaffarnagar, Meerut & Saharanpur districts. Maize, another important crop of the region, is widely grown in Bulandshar district. Its importance goes down progressively northward to the advantage of rice, the fifth important crop of the region (Tiwari P.S., 1986) 9.

The distribution of Sugarcane acre-yields shown two areas where the yields are above average: a large area in the eastern section and a small area in the western section. The former extends from the north eastern districts of Basti, Gorakhpur, & Deoria to the Southern districts of Allahabad and hence to Wtawah. The latter area extends from Saharanpur in the north to Bulandshar in the South and include the adjacent districts of Bijnor & Moradabad. The proportion of crop land devoted to sugarcane seems to the high in the western part and to decrease towards the East & South. In the western part, sugarcane has a density of more than 15 percent in four district, namely Saharanpur, Muzaffarnagar, Bijnor & Meerut. The highest density, however, occurs in Muzaffarangar where almost a quarter of the total crop land in under sugarcane, (Bhatia, 1986) 10.

Sen Gupta (1968) 11 divided India into agricultural regions assuming that micro-agricultural regions are by bad large crop regions. Singh (1974) 12 in a recent study also suit an objective and quantitative basic for dividing India into agricultural regions, where is crop land occupands by various crops has been taken into consideration.

The regional economy is dominated by agriculture which together with the allied activities forms the most important source of employment and revenue in the Upper Ganga-Yamuna Doab region. Though in general the proportion of the Net Sown area to the total area is high, being over 65%, there is a wide sub-regional variation which gets sharper at districts and tehsil Levels over 70% of the total land is

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1 Raza, Moonsi (1979), "Levels of regional development in India, Paper presented in Indo-soviet symposium in Regional development or National planning, Tibilisi, USSR.
under cultivation in the Upper Doab and excepting only Saharanpur (66%) all other districts record between 74% (Muzaffarnagar) to over 78% (Aligarh). (Singh 1971)\(^1\).

The upper Ganga plain is one of the highly irrigated agricultural regions of India and irrigation has played a dominant role in boosting its agricultural prosperity particularly during the last 100 years. About 30% of the net sown area is irrigated. There is a wide sub-regional and district level variation in the irrigated percentages. Most of the upper Doab have greater proportion of irrigated area: Muzaffarnagar (59.1%), Meerut (68.6%), Bulandshahr (61.2%) in the upper Doab record the highest percentage, more than double the state average while most of the other districts in the upper Doab irrigate 30% to more than 50% of their Net Sown area (Singh 1971).

**Objectives of the Study:**

The main objectives of the present research work are as follows:

To understand and examine the role of demographic factors on agriculture development in the upper Ganga Yamuna Doab.

To study the impact of social, institutional & technological inputs on the levels of agricultural development.

- To examine the spatial variations in the levels of the pattern of irrigation & its impact on productivity & cropping pattern in the study area.
- To assess the changes in land utilization & cropping intensity of the study area.

- To compute percentage of area under different major crops and extent of their change in cropping pattern during two periods of time (1985-86 up to 2005-06).
- To identify the level of agricultural development in the light of various indicators such as agricultural modernization, agricultural commercialization, agricultural intensification, agricultural diversification & overall agricultural performance.

- To extend some suggestions based on main findings of the present study.

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HYPOSTESIS OF THE STUDY:

The Agricultural stagnation has been determined by agricultural input deficiencies particularly under developed irrigation facilities.

- The regional patterns of agricultural development area not only influences by natural parameters but also by a multitude of socio-economic and technological parameters.

- Agricultural development has been achieved in areas of prosperity due to agricultural land and cultivators relationship.

- That the farming decisions very according to the cultivator's perception & reception and modern farm technology & innovations.

SOURCES OF DATA:

The present study is based on secondary data collected from various published and unpublished sources. The secondary data relating to land use, irrigation, cropping pattern and agricultural farm implements were collected from various government publications maintained by the patwari, and other revenue records of various districts of the study area. The database compares of districtwise information on wide variety of items. The data regarding demographic features will be collected from census hand books of various districts of upper Ganga-Yaumana Doab (1991-2001). The data relating to various aspects of agricultural crops and other minor crops, will be collected from agricultural statistical handbook, Sankhikiya hand books of various districts of upper Ganga Yamuna Doab region. In addition to it several published and unpublished record of department of agriculture, U.P. are also consulted. The relevant information collected have been put to use to find out required, derived and computed data.

The study focuses on spatial variations of agricultural development of Upper Ganga Yamuna Doab as in 1958-86 upto 2005-06 Demographic data of various districts will be collected from 1991 and 2001 census.


7. Dubey K.N. (1981); "Regional Dispariteis in the levels of Socio-economic Development in an Indian state; a case study of U.P., Chandigarh, Deptt. of Geog., Punjab University.
METHODOLOGY AND TECHNIQUES:

The following research methodology & techniques were adopted in conducting the proposed research work. First of all, data related to crop production, cropping pattern, agricultural land use pattern, waste land under pastures & orchards, food crops, commercial crops, other minor crops, population growth, density, social & economic Structure of population, size of land holdings, man-land ratio, irrigating facilities etc. were collected, then the collected date were arranged in tabulation form and were analysed using required satisical tools. After completing analysis work, the results are interpreted in a systematic manner.

Data or indicators for identification of spatial pattern & variation of Agricultural development are to be choosen by keeping in mind the aims and objectives of the study. It is therefore, essential that data should be choosen in the light of operational definition of the theme of the study. The data collected should be in consonance with the analytical frame & objectives of the study. With all these consideration in mind, the present study of agricultural development is defined by attributes, namely, quality of agriculture land, technological inputs in agriculture, agriculture institutions & agricultural production. These attributes along with indicators cover the entire realm of agricultural development for operational purpose. The complete range of attributes & indicators are given below.

Attributes & Indicators of agricultural development in Upper Ganga Yamuna Doab region.

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Indicators</th>
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<tbody>
<tr>
<td>(a) Quality of Agricultural land</td>
<td>* Percentage of cultivated area to total area.</td>
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<tr>
<td></td>
<td>* Percentage of Net irrigated area to net cultivated area.</td>
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</tbody>
</table>

* Intensity of irrigation.

* Average size of operational Holdings.

* Cultivated area per agricultural worker.

* Area under Commercial worker.

(b) Technological inputs in Agri.  

* Use of fertilizers per hectare of cultivated area.

* Use of pesticides per hectare of cultivated area.

* Diesel & electric pumpsets per thousand hectoare of cultivated area.

(c) Agriculture Institution & service  

* Cultivators as percent to total agricultural area.

* Bank loans per hectare of cultivated area.

* Primary agricultural co-operative societies & land development bank per lac hectare of cultivated area.

(d) Agricultural production  

* Per hectare yield of Kharif crops.

* Per hectare yield of Rabi crops.

* Per agricultural worker production of food grains.

* Per hectare value of agriculture production.


The study area comprises of seven districts of Uttar Pradesh. The districts are selected as basic unit of investigation for the reason that most of the data in data in various government departments and agencies is collected and compiled at this level. All the selected districts comes under the upper Ganga Yamuna Doab region as on single geographic. Entity & suitable to give marked spatial pattern. To understand the spatial pattern of agricultural development of various regions, generally data in % or ration form is collected and compared and analysed acrodingly. Gosal & Krishan (1984) have used ranking method for making the data of various crops comparable. Pal (1975 & 1978) & many others applied standard score techniques. Standard score (Z-Score) involves standardizing different sets of observations in a way which makes two important properties of their distribution the same for all variable the mean and standard deviation. The mean are set at zero & the standard deviation at unity (Smith, 1975).

The standard score in found out.

$$z_i = \frac{x - \bar{x}}{\sigma}$$

Where $z_i$ = Standardised score for the ith observation.

$X$ = Original raw score

$\bar{x}$ = is the mean for all values of x.

$\sigma$ = is the standard deviation of x.

Thus, raw scores of all indicators of different years in the form of ratio or percentage are converted in to standard scores. Then comparison are made between different sets of data of different years and analysed according. Therefore, this techniques has been very useful


In aggregating the score of individual indicators at attributes and finally, overall level of agricultural development over a period of time. The main body of the study comprises to an analytical presentation of the spatial variation of the agricultural development of upper Ganga Yamuna doab over a period of 20 years.

DESIGN, LOCATION, & EXTENT OF STUDY AREA:

Agricultural development always operated in a geographic setting evolving through time. In an area of long human occupancy, such as upper Ganga Yamuna Doab region, development contours are the manifest expressions of alternating phase of growth and stagnation in its different parts. The region's changing spatial context, physical resources and cultural setting shaped the pattern of its agricultural development. Hence, an understanding physical and cultural geography of upper Ganga Yamuna Doab region is a pre-requisite for any analysis of spatial variation in agricultural development.

Upper Ganga Yamuna Doab is a well recognized micro region of India for its district geographic identity. It comprises of seven districts of Uttar Pradesh. These districts are Saharanpur, Muzaffarnagar, Meerug, Baghpat, Bulandshar, Gautam Baudh Nagar & Ghaziabad. The Upper Ganga Yamuna Doab region is a study area which is a part of India's most populous state. It covers highly fertile upper part of Upper Ganga Yamuna Doab, covered by alluvial deposits contains khaddar lands. It shares border with Nepal & Uttranchal to the north, Haryana, Delhi & Rajasthan to the West and South & central part of Uttar Pradesh to the east.

AREA & EXTENT:

The co-ordinated of upper Upper Ganga Yamuna Doab regions are as follws: Latitudinal extent -28° 28'12"N- 30°58'12"N longitudinal extent -77°035'0"E-79° 60"E. The area covered by the upper Ganga Yamuna Doab is 19357.74 Sqkm and the population of this region is 18007315 which is 10.84% of the state. The total area of Uttar Pradesh is 243, 290 Sq, km. and the total population of the state is 166, 052, 859 persons.
The climate of the region is tropical monsoon. It is marked by three district seasons summer, monsoon & winter. Rainfall ranges from 600 to 1000 mm in the region. About 90% of the rainfall occurs during the south west monsoon, lasting from June to September.

Agricultural, Upper Ganga Yamuna Doab is one of the most important part of Uttar Pradesh. It lies between two important streams the Ganga & the Yamuna. It forms a part of Ganga-Yamuna plain. The alluvial deposits brought down by rivers covers the entire area. The alluvial deposits contains the Khadar Lands; Khader Land contains newer alluvium and are free from alkaline & saline.