REGIONAL VARIATIONS IN AGRICULTURAL DEVELOPMENT: A CASE STUDY OF JAMMU AND KASHMIR

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfillment of the requirements
for the award of the degree of

MASTER OF PHILOSOPHY

SONAM YANGDOL

CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067
INDIA

1992

जवाहरलाल नेहरु विश्वविद्यालय
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI - 110067

Centre for Study of Regional Development
School of Social Sciences

21st July, 1992

CERTIFICATE

Certified that the dissertation entitled "REGIONAL VARIATIONS IN AGRICULTURAL DEVELOPMENT - A CASE STUDY OF JAMMU AND KASHMIR" submitted by Ms. SONAM YANGDOL in partial fulfilment of the requirements for the award of the degree of MASTER OF PHILOSHPY (M.Phil) of this University, is to the best of my knowledge her original work and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any other degree of this University or of any other University.

PROF. SHIVASWAMI
21.7.92
(Chairperson)

DR. R.K. SHARMA
(Supervisor)

GRAM : JAYENU TEL. : 667676, 667557 TELEX : 031-73167 JNU IN

Dedicated to my father

Late Mr. Konchok Chospail

ACKNOWLEDGEMENT

I express, with sincerity my indebtedness to my teacher Dr. R.K. Sharma under whose supervision and guidance this work was completed. My academic interaction and discussions with him during the course of this work have a long way in giving my thought process a proper shape. A mere acknowledgement cannot express my immense indebte iness towards him.

Thanks to Mr. Satyen, Ms. Sis, and staff of E & S Library (Krishi Bhavan) and very specially to Sardar Laxman Singh Ji of E & S Library.

My special thanks to my friends Namgyal, Mahesh, Dinesh, Deepinder, Srujna, Sangeeta and Anu Dudha who helped me from time to time.

Andfinally, I am thankful to my mother, my sisters Dr. Yangchan, Dr. Nilza, Rinchen, Deachen and my brothers Dr. Wangchuk Khangsar and Jigmet Chospail for their constant love and support.

Dated :21.7.92

Sonam Yangdol
SONAM YANGDOL

LIST OF CONTENTS

LIST OF TABLES

Chapter IV

CHAPTER-1

INTRODUCTION

Development in its popular use embraces the analytical part of the process of change from a less advanced to a more advanced state and includes the sequence of activities and course of events in the transition and also the relative roles played by other factors which actuate the overall state to metamorphose or to change a backward region to an advanced region in a given norm of progress and betterment.

Economic development is the process of exploiting the natural resources of a region to the optimum. It is the advancement of the community along with evolving new and better methods of production and acquisition of capital resources.

John. K., Galbraith and others recognise three types of economic development-maximising economic growth, symbolic modernisation and selective growth.[1] The common factor in all these three types of economic development is change from a given situation to attain a better situation. Thus we see that change is the basic part of development.

At this junction it becomes important to distinguish between growth and development. They are used

---

1. Galbraith, J.K., "Economic Development", Harvard University Press, London, (1968),p.57.

synonymously but their meanings are distincts. Growth means more output, while development means both more output as well as changes in technological and institutional arrangements by which it is produced.[2].

So we can say that economic development is the process of securing a higher level of productivity in all the sectors of the economy which primarily depends upon advancement in technology that the region is able to make. Historically speaking, the process of economic development has been accompanied by the growth of agriculture and industry. Their relationship has been one of contemporary rather than one of substitutionability. In the short run, the development of these two leading sectors has been competitive in the sense that both compete for the scarce resources particularly, capital.

On the basis of a large number of studies conducted on economic development , we find that without agriculture development, industrial development will be hampered and will create severe imbalances in the economy and problems like poverty, disparity and unemployment will become more pronounced.

Johnson and Mellor (1961) Ragnar Nurkse (1952) and several other writers have come out with a number of broad

---

2. Kindleberger, C.P., "Economic Development" McGraw Hill Book Col. New York, Student's edition, (1965), p.3.

inter relationships between agricultural and non agricultural sectors in the process of development.

Agricultural growth stimulates expansion in non agricultural sector through consumption linkages as well as forward and backward linkages in the production process. Bearing these broad inter relationships in mind, most of the development economists of latter period have increasingly come to realise that far from being a passive and supportive sector, agriculture needs to be viewed as the dynamic and leading element in the overall strategy of economic development.

The importance of agriculture in enrichment of a nation was recognised even before the publication of 'Wealth of Nations'. The leading pre classical writers such as Richard Contillion, Turgot, and Francis Quesnay, in fact, over emphasized the role of agriculture. The classical economists, though disagreeing with their predecessor linked the fate of or the future of capitalist economics with agricultural development. Their views received support from contemporary writers as well as ancient economists. There are economists like Karl Brandt and H.R. Tolly and others who have adopted a balanced approach whereas Schultz, Wilcox and others have clearly highlighted the role of agriculture by referring to the interdependence of the various sectors of the economy.[3].

---

3. Sadhu and Singh, "Fundamentals of Agricultural Economics", (1983), (Delhi : Himalaya Publishing House), p.23-24.

Gunnar Myrdal says that it is the agricultural sector that the battle for long term economic development will be won or lost.

Developing economics, being agrarian in character, the rate of growth of the economy is mostly dependent on the agricultural sector's growth. Here, we see that it is the performance of the agricultural sector which determines, to a large extent, the generation and sustenance of economic growth and if agriculture does not respond to stimulai or is unstable in nature, the economy's growth might get retarded.

Development of agriculture means the process of mobilising a vast quantity of already existing resources and raising their productivity. This process should result in increase in total agricultural out put which is termed as agricultural growth. In most of the low income countries, an essential condition of economic development is a major increase in the domestic production of farm products.

So far achieving overall economic development, the target should be to expand the agricultural sector first. Agricultural growth is generally obtained, by expanding and intensively exploiting the productive capacity of its land resources and the levels at which these are carried out in a particular period reflects the technology of agriculture adopted by the people in response to various prevailing conditions including physical (climate, soil etc.) socio

economic (land distribution, tenurial conditions, types of farming, prices etc.) and technical and organisational conditions (cropping pattern, crop technology, irrigation, mechanisation etc.).

Due to research in agricultural sciences, agriculture is modernized day by day. Technical change is taking place in agriculture. Technical change is one of the most important forces which alters the structure of agricultural production process. Due to technological change, labour and capital become more productive when applied to agriculture. Agriculture is modernised by using improved seeds, fertilizers etc. Modernisation increases productivity of inputs and promotes the use of inputs with more elastic supply. In India, Agriculture is the backbone of the Indian economy, and as the most important sector, it contributes one third of the National Income and employs two third of the workers . Because of its predominance in economy and demand linkages with non agricultural sectors, agricultural development constitutes an essential component of the strategy for overall development of the country.

Progress made in India in the field of agricultural development since 1947 is an inspiring one. Before independence, this sector suffered from deep rooted institutional, structural, economic and social deficiencies leading to a low productivity trap.

AGRICULTURAL GROWTH AT NATIONAL LEVEL

Agricultural sector grew at an impressive rate after independence. Before independence, the rate of growth of agricultural sector was less than 0.5 percent between 1904-05 to 1944 to 1945 as compared to a rate of growth 2.7 percent in post independence period.[4]

This was due to the high priority accorded to this sector by the Indian planners. For the development of agriculture, planners adopted a two fold strategy (a) to implement land reforms to remove institutional bottlenecks and (2) to undertake massive investment in irrigation and other infrastructrue.

Since there was upper limits to the extension of area, steps were taken to increase the yield. So in the mid 1960's a new strategy of development was evolved which was concerned with the findings of methods of increasing the yields through the use of modern inputs and improved methods of production. Many studies have been carried out on this front of agricultural production and productivity and the relation ship between agricultual productivity and the inputs.

---

4. Bhalla, G.S., "Some Issues in Agricultural Development in India - An Overview" Vol. II (Indian Economy since Independence, Published by Synpse, edited by Uma Kapila, p.211.

Minhas[5] was the first one to decompose the production series and measure the influence of the individual component at the all India's basis. Other important contributions in this field were made by Ashok parikh[6] who studied all the states individually and V.V. Ventratesh warlu[7] who studied the production scenerio of Andra Pradesh. Shetty's[8] study of the cropping pattern and productivity were made at two level all India's level which covered a period from (1931 to 1965) and at the regional level (1925 - 1955)

All the studies came to the conclusion that the major contribution of growth in crop production came from an expansion of area and changes in cropping pattern.

Many studies have been conducted at state and district level. Mishra's[9] work was a district level study

---

5. Minhas, B.S., and Vaidyanathan, A., "Growth of Crop output in India 1951-54 to 1958-61", Journal of Indian Society of Agricultural Statistics (1965), 17(2), p. 230-252.

6. Parikh, A. (1970) "Cropwise, districtwise production function", Indian Journal of Agricultural Economists, 25(1), Jan/March.

7. Venkateshwarlu, (1965) "Growth in Agricultural Output in A.P., 1952-53 to 1961-62" Arthaniti, 8(2), July, p.157-170.

8. Shetty (1970), "Long term trends in farm productivity in U.P. 1901-1961", Ph.D. Thesis Lucknow University, (unpublished).

9. Misra, U.N., "Growth of Crop output in Gujrat: An Analysis", Anveshan, 1(1), June, p.1-15.

of Gujrat between 1949 and 1969. He studied the interaction between area and yield, yield and cropping pattern and area and cropping pattern, Result of the study showed that between 1949-1959 contribution of area expansion to production increase was important in seven out of 16 districts and Between 1959-69, no siginificant contribution was made is field of area expansion.

Many studie s were conducted on the interregional variation in productivity levels. Here mention must be made about Tambad and Ranachandra was who studied Karnataka and Andra Pradesh respectively. Nalini Govind[10] made a through study of the variation in the production of wheat and rice by examining.

1) Changes in cropping pattern

2) Variation in the yields of the two crops in terms of factors having an important bearing on yield. Her study has been an attempt in analysing the complex association among the among physical, economic and human factors.

Dr. Shafiqua Khan[11] gives a lucid account of the agricultural modernisation in the state of Jammu and Kashmir

---

10. Govind, Nalini, "Regional Perspectives in Agriculture Development", (New Delhi: Concept Publishing Company, 1986).

11. Khan, S., "Agricultural Modernisation in India", Anmol Publication, New Delhi, 1989.

which continues to exhibit the charateristicis on an agricultural economy. Special mention in made of the importance of agriculture in the newly created district of Pulwama.

S.K. Ray[12] studied the scope of intersification of agriculture at the regional levels. For this he explicity introduces cropping pattern and crop durations into the scheme for identification of region where crop productivity could be intensified through land angmenting and productivity angmenting technology with labour using bias. He used this scheme to analyse the pattern of intensification of agriculture at district level for the 46 districts of U.P. plain.

Another very interesting study on the regional variation in agriculture has been done by Mukhopadhyay[13] he used a production function model based on cross section and time series data to examine the differences in agricultural development between regions and over time.

But the most comprehensive work on the subject of agricultural productivity and the interdistrict variations

---

12. Ray, S.K., "Intensification of Agriculture : A Study in the Plains of U.P.", Hindustan Publishing Corporation, New Delhi, 1985.

13. Mukhopadhyay, S.K., "Sources of Variation in Agricultural Productivity", Macmillan, 1976.

in yeild levels has been done by Bhalla Alagh and Sharma[14] in the report on the foodgrain growth . This study brings out into sharp focus the crucial role being played by the new technological inputs in increasing yield levels in Indian agriculture.

The study reveals that the most disturbing feature of India's agricultural growth is thesevere interregional and interdistrict unevenness in growth. It also reveals that this glaring disparities in growth are matched by equally glaring disparities in the levels of productivity. In its analysis of factors explaining such disparities, the document says, "in certain region of the country growth in food grains production is explained by spread of irrigation and multiple cropping, while in others it is due to water seed and fertilizer technology".

PURPOSE OF THE STUDY

India, with its populaltion of 816 million (1988) and with its percapita income of $ 340 is among the poorest of the economies of the world. It had a share of 15.5 percent in the world's population but a little more that 1% of the world's G.N.P and so according to the United Nation's classification, it falls in the category of underdeveloped

---

14. Bhalla, Alagh, Thind and Sharma, "Foodgrains Growth - A Districtwise Study" Report on Second Phase of J.N.U. - Planning Commission Report.

economies. But within the union itself there are some states which are very backward while others are better off compared to the states which are lagging behind. As India is a major developing economy, disparity between regions is a growing concern and the temporal variability in agricultural output is such that monsoon has been called the traditional dispenser of India's Destiny."[15]

One such state which is far behind in the race of economic development is Jammu and Kashmir. The economy of the state was more or less static before the advent of the five year plans. Even after years of planning, inspite of substantial investment in development, the progress has been very unsatisfactory. Some areas of the state have not receivied the benefits of economic development to the desired extent and so the pace of development has been very slow in these regions so there is considerable economic distance between the backward region and the other.

The main purprose of this study in to find out the level of development that has taken place in the state's most dominant sector i.e, Agriculture and to make a comparison of the state's advanced districts with the backward districts and to examine the trend in interregional disparities in the levels of development

---

15. Britannica Book of the Year, 1974, p.361.

within the state and to examine whether the disparities have been reduced or accentuated over a period of two decades, i.e. 1961 to 1981 .

By identifying the backward and low productivity regions, this study can help in plugging the loopholes in development process. This study gives an insight into the complex process of regional variation of development agricultural and overall economic.

The information obtained from such a study should should help in policy formulation in dealing with the problems of regional inequalities and instability in agricultural output. This is the part of development objectives of the country. By shedding some light on the sources of growth in agricucltural allocation of resources for agriculture and thus can help in avoiding the regional disparities from getting further accentuated. And by studying the trend of interregional disparities over a period of two decades, this study can help in providing guidelines regarding the pattern of future growth and development.

Main objectives of this study are ,

1) To study the regional variation in the levels of development of agricultural sector along with its allied sectors.

2) To study the interdistrict variations in the use of agricultural inputs and services.

3) To estimate and compare the growth rates of production, area and yield of 5 major foodcrops in Jammu and Kashmir in two time periods.

4) To determine the interdisitrict variations in levels of agricultural productivity.

5) To determine the relationship between agricultural productivity and input use.

6) To demonstrate the various changes that are taking place in the availability of agricultural facilities over time.

METHODOLOGY

SELECTION OF STUDY UNIT

In this study, the area to be studied is the Jammu and Kashmir state and for the purpose of indentification of relatively backward or advanced region within the state during the period 1960-63 to 1980-83, District has been selected as the unit of measuring disparity.

For the present study, districts as they existed in the sixties have been taken. There were many reorganisations after that as five more new districts were carved out from the orginal mine districits, making the total number of districs fourteen. Here, for the purpose of

uniformity, the new districts have been clubbed together with their parent district out of which they were carved out. District Pulwama has been clubbed with Anantnag and is referred to as Anantnag. Likewise, Srinagar and Badgam, Kupwara and Baramula, Ladakh and Kargil, along with Poonch and Rajouri have been clubbed together and are referred as Srinagar, Baramula, Ladakh and Poonch.

DATA BASE

The relevant data, used in the present study, were collected for three points of time i.e, 1960-63, 1970-73 and 1980-83. Three years averages are used for these three points of time. This has been done in order to reduce to a minimum the annual fluctuations and to eliminate the irregularities arising out of the year being too good or too bad.

Data for the present study has been collected from various sources, mainly from the published governmental sources main sources are :

a) Census of India 1961, District Census Handbook

b) Census of India 1971, District Census Handbook

c) Census of India 1981, District Census Handbook

Most of the statisticis regarding agriculture were obtained from:

a) Agricultural statistical digest from the library of

Economics and Statistics, Ministry of Agriculture. Other sources are :

a) Statistical abstract of Jammu and KAshmir
b) Livestock digests
c) Fertilizer reports
d) Agricultural situation in India.

STATISTICAL METHODS USED

The present study is based on the use of three main statistical techniques namely factor analysis, regression and coefficient of variation. However, in order to analyse the behaviour of change of an individual district with respect to agricultural development, over time these statistical techniques have also been supplemented by the compound annual rates of growth.

Factor analysis is used in preference to regression analysis for its superiority in matter of getting over multi-collinearity and to maintain an adequate level of degree of freedom, especially when the no. of observation is small and the number of variables is large. Factor analaysis othogonalises the highly related indicators selected for the study, that is it gives the more representative indicator of all the indicators used.

A perusal of existing literature shows that its is difficult to put one's figures on a single indicator which would help gause the exact differences between levels of

development in the various regions of Jammu and Kashmir. We donot agree with those who say that a composite index tells less and hides more, essentially because we believe that development is a distinctive phenomenon which embraces progress of its various components. Its comcponents do not behave uniformly though they may change continuously. Thus a profile taking into account all the components showing the levels of development provides a more illuminating picture. So in order to compare various geographical region in terms of thier levels of development, we have constructed the composite index by what is known as principal component analysis or factor analysis.

In this excercise we are faced with two problems :

a) elimination of bias of scale in the indicators
b) determination of weightage to be assigned to the indicators.

As indicators are measured in different units, they are not additive. It becomes necessary then to convert them into same standard units to avoid any scale bias in ultimate results.

Various alternative ways have been suggested in literature to neutralise the influence of scale. These are ranking, standardisation (taking the deviation of each observation from its mean and then dividing it by its standard deviation), division by its length (normalisation)

and division by mean or any other ideal value. Each of them has its won merits and demerits though choice of any of these is not a value free decision.

In this excercise mean is used to transofrm the data matrix into scale free martic for two resource :

a) it does not affect the dispersion of indicators and

b) it satisfies the basic axioms

Since all indicators cannot be of equal importance in explaining the existing variations they need to be attached different weights some researchers have used arbitray weights in this attempt to explain the variations. We strongly feel that this method involves a high degree of subjectivity and should be resorted to only as the last option.

Among various methods available for weights 'principal components' is used in this exercise. The argument here is that it maximises the sum of squared projections of the transformed data matrix.

This is helpful because of the various indicators included here tends to be unevently distributed over space. The scheme for calculating the weights is as follows :

Let x be the original (n x m) matrics where x and m are the no. of districts or regions and indicators respectively.

Let x be transformed data matrix such that,

$X = \bar{x} I X$ where $\bar{x}$ is the transpose of the transformed matrix having each elemented divided by its mean of the vector. Our objective is to detemine.

Y = x.w wucrict with respect to agricultural development, over time these statistical techniques have also been supplemented by the compound annual rates of growth.

Factor analysis is used in preference to regression analysis for its superiority in matter of getting over multi-collinearity and to maintain an adequate level of degree of freedom, especially when the no. of observation is small and the number of variables is large. Factor analaysis othogonalises the highly related indicators selected for the study, that is it gives the more representative indicator of all the indicators used.

A perusal of existing literature shows that its is difficult to put one's figures on a single indicator which would help gause the exact differences between levels of development in the various regions of Jammu and Kashmir. We donot agree with those who say that a composite index tellaces progress of its various components. Its comcponents do not behave uniformly though they may change continuously. Thus a profile taking into account all the

components showing the levels of development provides a more illuminating picture. So in order to compare various geographical region in terms of thier levels of development, we have constructed the composite index by what is known as principal component analysis or factor analysis.

In this excercise we are faced with two problems :

a) elimination of bias of scale in the indicators
b) determination of weightage to be assigned to the indicators.

As indicators are measured in differe the purpose of showing the relaltionship between agricultural yield with the input use.

LIMITATION OF DATA BASE

It would be proper to mention that with respect to data, many inconsistencies were found. Utmost care has been taken to remedy these inconsistencies after consulting different sources and with the help of persons specialising in those fields. Again despite the best efforts, data for same of the indicators like HVY of seeds, etc were not made available.

SELECTION OF INDICATORS

To indicate a level of development certain set of variables is necessary but such a selection is very difficult task. For this study, we have chosen a number of

indicators which indicate the level of agricultural development as agricultre in the main sector of the states' economy. Some indicators showing economic development have also been taken just to see if, over the time, a gigher level of development in agriculture and the allied sector is accompained by a higher level of economic development too.

LISIT OF INDICATORS

AGRICULTURAL INPUTS

1. No. of tractors per lakh hectares of Gross cropped area
2. No. of Ploughs per thousand hectares of Gross cropped area
3. No. of tubewells and pumpsets per lakh hectares of G.C.A.
4. Fertiliser cocnsumption (in kgs) per hectare
5. Percentage of villages electrified.

IRRIGATION INPUTS

1. Irrigation Intensity
2. Percentagae of area irrigated by canals to gross irrigated area.
3. Percentage of gross irrgated area to gross cropped area

ANIMAL HUSBANDRY

1. No. of live stock per lakh rural population
2. No. of buffaloes per lakh rural population
3. No. of cattle per lakh rural population

4. No. of vetenary hospitals per/000 livestock.

AGRICULTURAL DEVELOPMENT

1. Agricultural productivity per hectare
2. Cropping Intensity
3. Net area sown per worker
4. Percentage of Net Area sown to Gross Cropped Area.
5. Percentage of Area under foodcrops to Gross Cropped Area

SOCIAL AND ECONOMIC INFRASTRUCTURE

1. Literacy level
2. No. of banks per lakh population
3. No. of hospitals per lakh population
4. No. of telephone connections per lakh population
5. No. of post offices per lakh population.
6. Length of road per thousand hectare of total reported area.

CHAPTER II

AN INTRODUCTION TO THE REGION

If Pamir is said to be the roof of the world then J&K is the crown of India. Being the northernmost state, it occupies a strategic position with its borders touching Pakistan, Afganistan and China. The state is transversely situated in that part of the Himalayas which is known as the Kashmir Himalayas.

The invasion by Pakistan in the year 1947 altered the boundry of the state and in the year 1948, the territories of the state were split up by the ceasefire line due to which the are of the state shrank by about 83,808 sq. km. which is now on the Pakistan side of the ceasefire line. So the total geographical area of the state, according to the 1981 census was 2,22,236[1] sq. km. which extends between $32^{o}17'$N to $37^{o}5'$ and from $72^{o}40'$E to $80^{o}30'$E.

The state is composed to three distinct geographical regions which differ from each other in terms of their physical features as well as their socio - economic and political conditions. So keeping all these in mind, the state is divided into three divisions for administrative convenience i.e, Kashmir, Jammu and Ladakh.

---

1. It includes 83,808 sq. km. which is under the illegal occupation of Pakistan and 41,000 sq.km. under China.

THE ADMINISTRATIVE DIVISIONS

Kashmir Division was originally made up of three districts i.e., Anantnag, Baramula and Srinagar. Later on, in 1978, each district got bifurcated into two for administrative convenience. The new districts so created were Pulwama, Kupwara and Badgam. These districts are known as the valley districts as they are situated in the Kashmir valley which has been a zone of convergence of different cultures. This region is quite homogeneous in terms of socio economic characteristics. Bamzai[2] has attributed the importance of this region to its central location in the state and the advantageous convergence of route ways in various directions within and outside nd that is why it has functioned and prospered as the main focal centre.

Jammu division lies in the South of the state and is the only plain area in the state. It was originally composed of five districts i.e., Doda, Udhampur, Jammu, Kathua and Poonch. Later on, for administrative convenience, Poonch district was bifurcated into two separate districts i.e., Poonch and Rajouri. Jammu city is the winter capital of the state

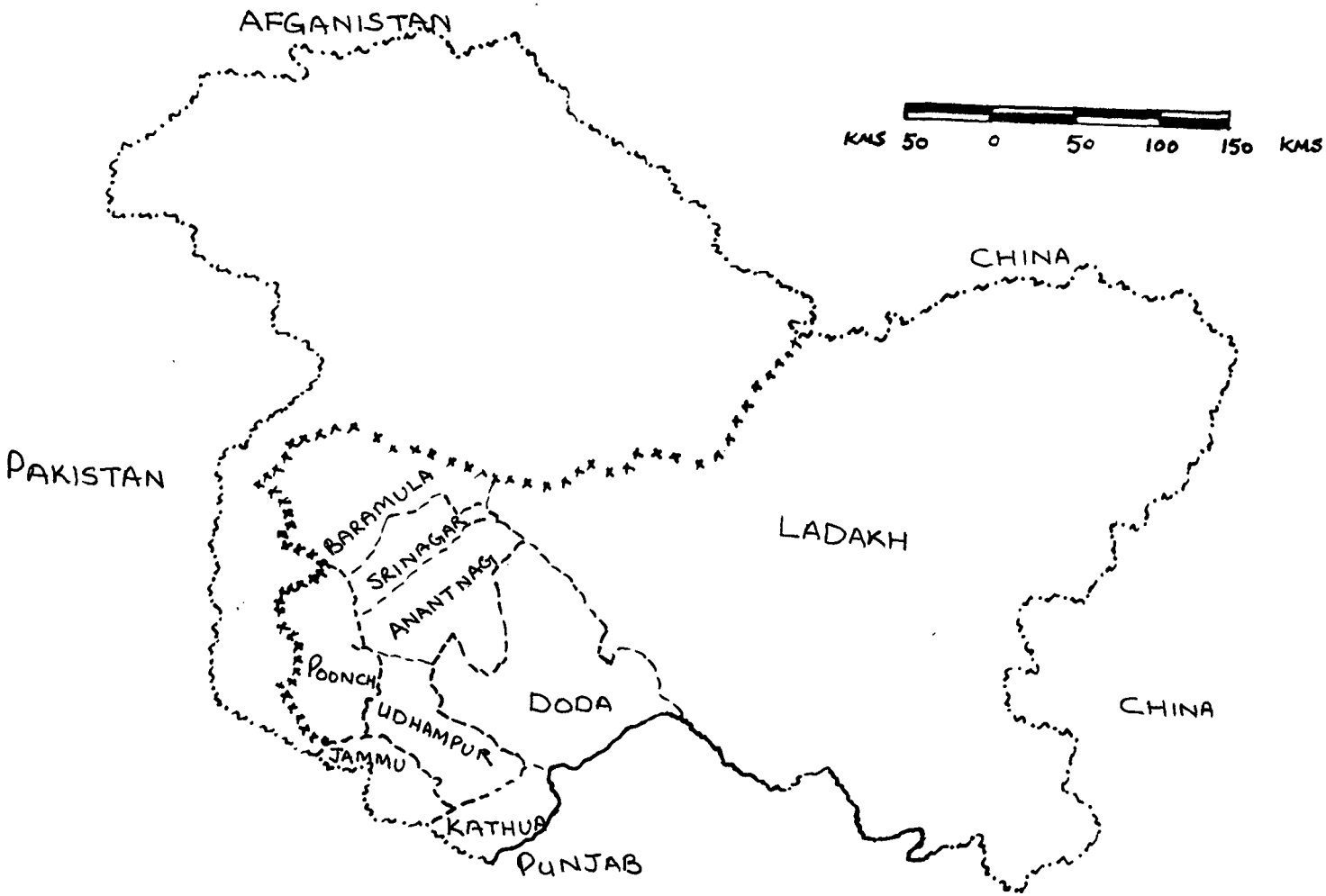
Ladakh[3] division is the northern most and one of

---

2. Bamzai, P.N.K., 'Kashmir and Central Asia', Trivandrum; Light and Life Publishers, 1980.

3. Ladakh is the Anglicised Spelling of the name which is pronounced 'La-dags' by the inhabitants of the region. Early British Explorers wrote Ladak'.

ADMINISTRATIVE DIVISIONS OF JAMMU AND KASHMIR



the loftiest regions inhabited by human beings. Originally, it was a single district but in 1978, the district of Kargil was carved out of it. This region covers 70% of the land in the state but sustains only 2% of the total population. This is so because only some of the pockets are inhabited while rest of the area is barren and "a desert of bare crats and granite dust, with vast arid table lands of high elevation - a land where there are no forests or pastures."[4]

SECTION I

AGRICULTURAL ECONOMY OF J & K

The significance of agriculture in Jammu and Kashmir arises from the fact that the development in agriculture is an essential condition for the development of the state economy.

Agriculture forms the backbone of the state economy with nearly 70% of its population depending on it for its livlehood. Its importance can be judged from the fact that it contributes nearly 55% of the state income and provides employment to the bulk of the labour force and with the exception of two or three major urban units, the state is totally agrarian. The importance of agriculture in the state economy can be determined by looking at its share in the state domestic product.

---

4. Hassnain, F.M., "Ladakh : The Moonland",Delhi: Light and Life Publishers, 1977.

The table given below shows the commanding position which agriculture occupies in the state's economy. It shows that agriculture is the largest contributor to the state's income. Its share stood at 56.80% in 1982-83. (as shown in table 2.1)

TABLE 2.1

Percentage Distribution of Net State Domestic Product by broad groups (Current prices)

Sl.No.	Item	1974-75	1981-82	1982-83
1.	Agriculture & allied activities	56.80	54.22	55.00
2.	Mining, manufacturing construction, power and water supply	16.30	16.11	15.95
3.	Trade, transport & communication	12.08	12.71	12.0
4.	Banking, insaurance real estate and business services	8.52	10.32	10.42
5.	Other services	6.30	6.69	6.65
6.	TOTAL	100.00	100.00	100.00

Source : Compiled on the basis of information provided in the Digest of Statistics, Directorate of E&S, Planning & Dev., J&K Govt. 1981-82, page 274-288.

Comparison can be made between the position of agriculture in the state with that of the national economy. The share of agriculture in the state economy is more than

50% while in the national economy, it is just one third or 33% of the national income. Another interesting fact that should be emphasised is that the share of agriculture in the state of Jammu & Kashmir has only marginally declined as compared to the decline in the national economy. It shows that only marginal diversification has taken place in the state's economy.

Agriculture also influences the distribution of population in the state. Out of the total population of 5,95,4009 persons, the Jammu division claims nearly 45%, Kashmir valley 53% and Ladakh just 2%. This distribution depicts highly concentrated patterns in the agriculturally rich regions of Kashmir valley and the Jammu plains and very low concentration of population in Ladakh. The distribution, thus, is very skewed as there is concentration of population in alluvial lands of the river while regions with difficult tarrain and harsh climate where agriculture is not very developed are sparsely populated. The domination of the state economy by agriculture is to such an extent that a very high proportion of working population is engaged in agriculture. Infact, the whole of the rural sector is tied to agriculture directly or indirectly. It provides employment to nearly 61% of the state's labour force. The main workers constitute 31% of the population. The cultivators constitute nearly 57% of the agricultural workers while 3.4% are the agricultural labour.

Agriculture is the most important sector and its importance cannot be judged entirely in terms of figures reflecting the dependence of population on it but by the fact of the peculiar geophysical characteristics of the state where the possibility of industry is limited and remote. The influence of these geophysical features on agriculture is great and its the difference in these factors and conditions which determine to a large extent, the setting of agriculture in the state.

SECTION II

In the light of the importance of these physical factors in the agriculture of J&K, the following section is devoted to discuss :

1. The physical features
2. Drainage
3. Climatic conditions and
4. The Soil

I. THE PHYSICAL FEATURES

The main physical features of this area which sets it apart from other states are :

a. The Karewas or the lacustrine deposits of the valley
b. The Kandi region of Jammu
c. The valley of Indus

d. The lofty mountain ranges

Karewas

The Karewas are the most striking feature of the Kashmir region. They are fresh water lacustrine deposits which protrude out of mountains and look like dry table lands, very senile in appearance. "The word Karewas applied strictly to the level surface between the incised streams dissecting the terraces, the flanks of which are generally steep."[5] Karewas are widely distributed and cover nearly half of the valley floor. They are generally found beyond Sopore and on the both sides of Jehlum river.

The Kandi Area:

Jammu division mainly consists of the submountainous tract and the broken Kandi area. "The region where soil is old alluvium but uneven with low rainfall and difficulty of water supply made the area arid, known as Kandi." This area lies to the west of river Ravi and to the east of the river Jehlum, with a varying width of 4 to 26 miles.

Indus Valley

The Ladakh region lies in the valley of Indus which is interwoven with a complex network of nude Himalayan

---

5. Raina, A.N., 'Geography of Jammu and Kashmir', (New Delhi : Anmol Publishers, 1971), p.3.

ranges.[6]

The territory of the region extends between $32^{o}15'N$ to $36^{o}N$ and $75^{o}15'E$ to $80^{o}15'E$ and is bounded by Zanskar range in the south and the Karakuram and Nun Kun in the north. It is a cold desert devoid of vegetation.

Saddiq Wahid in his book, "Ladakh between earth and sky"; describes the physical features of Ladakh in a very artistic way, "all the familiar elements of landscape are here, mountain, valleys, rivers and plain but in Ladakh, these are often found in unexpected combinations delighting the eye by their dramatic combination."

The Mountain Ranges

The most important mountain ranges are the Himalayan range, Ladakh range, Mustang range, Karakuram range, Nunkun and Quenlun range. These are exceptionally high and remain snow covered all the year round.

DRAINAGE

In Jammu and Kashmir, Rivers have special geographical importance and the drainage pattern has resulted in land erosion and the sculpture of divergent types of topography. Drainage here is inconsequent and antecedent.

---

6. Hassnain, "Ladakh : The Moonland", Light and Life Publishers, New Delhi, p.24.

In the Jammu division, Ravi, Chenab and Tawi drain the southern slopes of Pirpanjal, the outer hill region and the Kishtwar region respectively. Jhelum and its tributaries play the main role in draining the Kashmir region. While the Ladakh region is drained by Indus which rises from the north of Kailash range at an altitude of 5,165 mts. The other important river of this region is Shyok.

CLIMATIC CONDITIONS

The climate of J & K varies from the scorching subtropical heat of Jammu plains where the temperature goes above 44^{o}C during summers to the freezing subartic cold of Zanskar Himalayas (Dras in Kargil district of Ladakh division is the coldest place in India with the winter temperature dropping below - 20^{o}C) The main factor responsible for this kind of variation in climate is the physiography of the region.

In the outer plains of Jammu, temperature shoots up very high, as mentioned before, and the rainfall is 41.4" which increases towards north. On the other hand, the valley is enclosed by mountainous ranges and seasons are marked by fluctuations. During winters, western precipitation is attracted in form of snow. Rainfall is about 75 cms.

Hard winds, frozen winters, cold nights, warm or even scorching clear days characterise the climate of the upper parts of the Indus Valley. "Here climate like nearly

everything else is 'vertical', and the mountains receive a fair amount of precipitation, the vertical diversity of climate makes human life possible in Indian Tibet."[7] Here the annual precipitation is very low (less than 5") as the high altitude and mountain ranges prevent the western precipitation from crossing over it. Annual mean temperature is 40°F and that of the coldest month is 180°F.

SOIL

Like climate, the soil of Jammu and Kashmir also varies from rich alluvium of Kashmir Valley to the rocky and mountainous soil of Ladakh region. In the Ladakh region soil is sandy and rocky and therefore unfit for cultivation. Sometimes due to the damming of the streams by landslips, temporary lakes are formed where the soil is fine lacustrine clay For e.g., in and near Skardu.

In Jammu, soil is generally loamy with low clay content, very poor in lime. Soil is poor in the Kandi areas due to the low content of organic matter and nitrogen. This is due to high temperature and the heavy monsoon rains. The former disintegrates the organic matter and the latter bleaches the mineralised nitrogen.

---

7. Spate, O.H.K., Learmonth, A.T.A., and Farmer, B.H., "India, Pakistan and Ceylon : The Regions" ,(London: Methun and Co.), p.445.

In the Kashmir region, the soil is rich in organic matter and nitrogen content. In the rice growing areas, the local Kashmiri cultivator distinguishes the following types of soils:

1.	Gurtu	:	Rich in Clay content and high moisture content
2.	Bahil	:	Rich loam with natural strength
3.	Sekil	:	Light loam with Sandy subsoil
4.	Dazanland	:	Swampy soil
5.	Surzamin	:	Ash coloured soil for vegetable cultivation
6.	Kharzamin	:	Sour Soil due to nearness to water table
7.	Shath	:	Sandy and stony soil
8.	Nambli	:	Rich peaty soil found in marshes
9.	Lemb	:	Hard stiff clay which cakes when it dries.

Source: Koul, Pandit Anand., "Geography of J&K State", Life and Light publishers 1925, xxvii.

These physical features and the soil climate complex have decisively influenced the pattern of land utilization in the state which is discussed in the next section:

SECTION III

LAND USE PATTERN

The availability of land and its use pattern in agriculture is important. The table 2.2 gives the land use data for the year 1960-61, 1970-71, and 1976-77 of the total reported area of the state (2420 thousand hectares), 711 thousand hectares which accounts for 29.38% of the total area, was used for raising agricultural cope in 1976-77. The state showed a relative by lower proportion of area under plough compared with the nation (47%).

The state has 27.4% under forests, about 4.17% under fallow hand and nearily 5.16% under permanent pastures and land under misc. tree crops. About 14.29% of the land is not available for agricultural use, as much of it is barren and uncultivable land or in used for non agricultural purpose (viz 9.58%) The remaining 5..8% is retained as cultivable waste.

Looking over time we observe that between 1960-61 to 1976-77 Net Sown area, land put to non agricultural use have been expanding and this expansion has come largely from the decline of forests, barren and uncultivable land, land under misc. tree crops, culturable waste and fallow land.

Area available for cultivation is dispropotionate to that total area of the state. Area sown more than ones is also very low. This is yet another disquiting features indicating that the crop intensity is by and large limited to single crop over vast areas especially in the temperate

regions where geographical faction limit double cropping on account of longer maturity time of Rabi crop and the short interval between the hawesting of the Rabi crop and the sowing of Kharif crop.

TABLE 2.2

LAND - USE STATISTICS OF JAMMU & KASHMIR

DETAILS OF LAND USE	AREA IN 000 HECTARES 1960-61	1970-71	1976-77
1. Total area according Village papers.	2416 (100%)	2420 (100%)	2420 (100%)
2. Forests	678 (28.6)	671 (27.72)	657 (27.14)
3. Land put to non agricultural use	283 (11.7)	319 (13.18)	346 (14.29)
4. Barren & uncultivable land	266 (11.0)	229 (9.46)	232 (9.58)
5. Permanent pastures and grass lands	121 (5)	126 (5.20)	125 (5.16)
6. Land under misc. tree crop.	130 (5.38)	109 (4.5)	106 (4.4)
7. Culturable waste	162 (6.70)	153 (6.3)	142 (5.8)
8. Fallow land	119 (4.92)	126 (5.2)	101 (4.17)
9. Net sown Area	657 (27.2)	687 (28.3)	711 (29.38)
10. Net Irrigated Area	278 (11.5)	278 (11.48)	309 (12.76)

Source : Compiled from the digest of Statistics, Jammu & Kashmir Government, Srinagar.

Note : Figures in brackets refers to percentages.

SIZE AND NUMBER OF HOLDINGS

The size and distribution of holdings in Jammu and Kashmir is quite skewed. It shows an inverse relationship with the pressure of population. The higher the density of population of a region the greater is the percentage of below marginal holdings in that region.[8] Out of 10 lakhs holdings, nearly 7.26 lakh holdings i.e., 72% fall in the less than one hectare class and may be categorised as below marginal holdings. This shows a high degree of skewness and underlines the fact that the bulk of peasantry subsists on below marginal holdings and unless sub marginal farmers are either provided alternative non-agricultural employment or are employed in medium and large farms, the chances of removing poverty in the rural economy (which accompanies subsistence farming) are very bleak.

---

8. Shafi, Mohd., "Productivity in the plains of U.P."

TABLE 2.3

DISTRIBUTION OF LAND HOLDINGS

(IN HECTARES)

Sl. No.	Size of Holdings	No of Holdings	% age
1.	Below 0.5	472995	45.68
2.	0.5 - 1.0	253795	24.57
3.	1.0 - 2.0	175917	17.00
4.	2.0 - 3.0	73958	7.14
5.	3.0 - 4.0	29863	2.90
6.	4.0 - 5.0	14300	1.35
7.	5.0 - 7.5	10421	1.01
8.	7.5 - 10.0	2644	0.26
9.	10.0 - 20.0	1321	0.13
10.	20.0 - 30.0	208	0.02
11.	30.0 - 40.0	71	Neg.
12.	40.0 - 50.0	27	Neg.
13.	50 and above	153	Neg.
	All Sizes	10,35,376	100%

Source : Compiled from the digest of Statistics. 1981-82 Government of Jammu & Kashmir, Sgr Page - 41.

SECTION IV

In this section we have attempted to see the role and importance of Mechanisation and irrigation in the state's agriculture

MECHANISATION AND MODERN TECHNOLOGY

In the utilization of mechanical imputs like tractors, irrigation machinery and in the consumption of chemical fertilizers, the share of J & K in insignificant when compared to the national average and some of the developed states like Punjab and Haryana. This is mainly because of the diversified physiography of the state which ranges from the plain of Jammu to the hilly region of Ladakh. Since mechanization is possible only to a limited extent, tractorisation is not common in the state because of the size distribution of holdings. Only Jammu region is utilising this mechanical component of new technology, as other parts in the valley and Ladakh region have no feasibility for tractorization. This explains the nominal use of tractors in the state.

The use of electric pumps in the state are negligible whereas the average number of oil engines is as high as 10 per thousand hectares. This is mainly because Jammu region faces problems of irrigation the consumption of chemical fertilizers in the state is very low as it utilizes only 0.38% of the total fertilizers consumed in the country.

As compared to the agriculturally advanced state like Punjab and Haryana, this state has put meagre amounts of new inputs i n agriculture as is revealed in the table.

TABLE 2.4

DISTRIBUTION OF INPUTS (1979)

Sl.No.	Input	% of Total	No/000 hectare
1.	Tractors	0.30%	0.51
2.	Electric pumps	0.01%	0.07
3.	Oil engine	0.02%	10.03
4.	Fertilizers	0.38%	-

Source : Based on information collected from the all India Statistical Abstract 1980-81

IRRIGATION

In Jammu and Kashmir irrigation plays a very important role. In 1981, the net area sown was 718231 hectares out of which 309, 653 hectares (nearly 44%) was irrigated.

The development of irrigation system in the state, has a history of its own. The Zamindars, especially in kashmir valley has shown a special genius in developing a network of irrigation throughout the valley by his own

efforts. Primary source of irrigation is the canal which accounts for nearly 92% of the total irrigation provided. The bulk of these canals are the Zamindari Khuls.

Government has also played an important role since independence in developing more irrigation resources. Considerable amounts have gone into this sector of development during the last three decades. The area under irrigation has under gone considerable improvement as shown in table 2.5.

TABLE 2.5

Area Irrigated in Jammu & Kashmir. (lakh hectares)

Year	Net Area Irrigated	Gross Area Irrigated
1950-51	2.61	2.63
1955-56	2.90	2.99
1960-61	2.71	3.08
1965-66	2.78	3.01
1970-71	2.73	3.23
1974-75	2.95	3.55
1979-80	3.00	3.93
1980-81	3.90	3.97

Source : Irrigation Statistics
Planing and development Departmment.
Directionate of Economic and Statistics Jammu & Kashmir 1950-51 - 1979 -80 page 2.

In the three regions of the state, due to differences in the geographical features different types of irrigation is practised.

Jammu is known as the land of canals. The main canlas are : Ranbir canal, Pratap canal, Kathua Canal, Tawi Canal, Dudhar canal and Ujh canal, Wells and tanks are common in outer plains.

In Kashmir region, lift irrigation is practised on the banks of Jehlum.

In Ladakh, digging of canals is difficult as hard rock in a desert of thick sand cannot be easily dug. But at the same time it is an arid tract where agriculture is not possible without irrigation so it is carried on through a network of stream and canals and this is the reason why only 6% of Ladakh is under cultivation.

Table shows the net area irrigated by different sources in 1980-81.

TABLE 2.6

Net Area Irrigated

	Area in hect	% age
Canals	284799	91.97%
Tanks	2138	0.69%
Wells	1124	0.36%
Others	12911	5%
Total	309653	100%
Total Gross Irrigated area	397598	

Source : Compiled on the basis of information provided by the statistical abstract of Jammu & Kashmir state 1980-81.

CHAPTER III

INTERDISTRICT VARIATIONS IN LEVEL OF DEVELOPMENT

"The fact that there are vasts areas of the country which have remained backward over the years in both a challenge and an opportunity"

Sixth five year Plan (1980-85)

Regional disparities in agricultural and its allied sector's development offer unequal access to the opportunities and incentives. Disparities in facilities are bound to result in inequality and uneven development among various regions.

Balanced growth of the sectors is necessary for the harmonious development of an economy. Jammu and Kashmir, however presents a picture of extreme regional variations. Here some regions are more developed while others are almost primitive. The coexistence of relatively developed and economically depressed regions is known as regional imbalance. it might be natural due to unequal natural endowments or manmade in sense of neglect of some regions and preferences of others for investment and development effort. In light of this experience we have made an attempt in this Chapter to examine the inter district disparity in the development process of the state of Jammu and Kashmir. However, keeping in view the

predominance of agriculture in Jammu and Kashmir and the very physiography of the state which prevents the development of industries our main focus will be on development of agriculture and other sectors which are conductive to agricultural development.

In this chapter we will study the temporal changes in the levels of development in agriculture and other allied sectors and to see whether they are showing converging or diverging tendencies.

We have taken 24 indicators which indicate the level of development achieved by the different districts in different sectors. These indicators have been clubbed in five broad groups. As it is beyond the scope of this work to study each one of these indicators individually to examine inter district variations and the changes in their levels. We have therefore developed a composite index of indicators for each group. Since the composite index provides an aggregate picture we have also studied the availability of some components and selected some indicators from each group and have analyzed the regional pattern in the disitribution. The broad group of indicators included are:

a) Agricultural Inputs

b) Irrigation

c) Livestock and Animal husbandry

d) Agricultural development

e) Economic development

a) Agricultural Inputs

In the new agricultural strategy, the role of technology as a major input in agriculture was recognised. The working of the agricultural sector during the early sixties showed that a new technology in agriculture was very much needed if Indian economy was to be freed from imports. In was mentioned in the 4th five year plan that its necessary to make a far greater use of modern methods of production to bridge the gap between demand and production, by the application of the latest advances in the science of agriculture. New Technology adopted in the mid sixties had two distinct components:

a) biological - land augmenting

b) mechanical - labour saving.

Farm mechanisation is the use of machines for carrying out some farm operations hitherto being performed by the traditional methods involving human and animal labour. Thus it entails a transformation from biological sources of energy (human and animal labour) to mechanised sources energy pumpsets, tractors harvesters etc.).

Mechanisation increases the speed of carrying out operations and agricultural work is completed in less time than before. Mechanization is always accompanied by increase in production. A survey carried out in India shows that productivity per hectare and per labour employed is higher on mechanised farms as compared to non mechanised farms.

But several studies including Prem Vashista's[1] tend to include the contribution of HYV of seeds and fertilizers in the contribution of mechanisation to increase in productivity. In certain cases mechanisation can help in increasing productivity by reducing the time of agricultural operations. According to N.S. Jodha, introduction of tractors in sandy areas with deficient rainfall can reduce the period of sowing operations immediately after a rainfall. This helps in increasing agricultural production.

Apart from increasing agricultural production mechanisation leads to reduction in the per unit cost of production. On the face of it, one gets the impression that labour is the cheaper factor of production in this country but the study conducted by mannmantha has doesn't support this contention. Taking date for the period 1961-1968, the finds that where as the money wages of labourers and bullock prices rose faster than the price of agricultural commodities in many regions where the rate mechanisation has also been rapid the prices of tractors and tractor fuel seem to have risen by not more than 50% (compared to 100% rise in prices of agricultural commodities.[2]

---

1. Vashista, Prema, "Impact of Technological Change and Ecological Concern of Rural Development : America and India". Seminar on Dynamics of Rural Development (Delhi, 1980), p.41-42.

2. Rao, C.H. Hanumantha, "Farm Mechanisation" in C.H. Shah, ed. Agricultural Development in INdia : Policy and Problems" Bombay (1979), p.297.

The role of mechanisation in agricultural operations is a very important one, but to what extent it has progressed in Jammu and Kashmir and how the different district have benefited from it has been brought about by the following table.

Table (a) gives an account of the distribution of no. of tractors per lakh hectares of GCA, no. of tubewells and pumpsets/lakh hectares of gross cropped area, no. of ploughs/000 hectares, consumption of fertilizers per hectares and the % age of villages electrified, among various districts in the 60's, 70's and the 80's.

In case of tractors/lakh hect. in 1960-63, the state average of 12.8 was much below the all India average of 35/ lakh hectare/. In 1970-73, there was a sharp increase in the all India average to 116/lakh hectares while the state average increased only to 46.5/lakh hect. which was very low compared to the figures of states like Punjab and Haryana.

In 1980-83, the state average was nearly 90 tractors/lakh hect. as compared to the national average of 165.

We see that there has been a steady increase in the availability of tractors in the state. There was an 9.8% growth in its state average.

Table No. 3.1

Availability of Agricultural Inputs

District	Tractors per lakh hect. of GCA			Ploughts per 1000 of GCA			Tubewells & Pumpsets per lakh hect. of GCA			Fertilizer consumption per 1000 hect of GCA (tonnes)			% of Village electrified		
	'60-63	'70-73	'80-83	60-63	70-73	80-83	60-63	70-73	80-83	60-63	70-73	80-83	60-83	70-73	80-83
Anantnag	4.3	9.5	134.2	712.2	838.5	695.9	2.1	1.4	29.8	2.685	12.717	66.28	84.3	96.7	99.65
Srinagar	NA	NA	Na	521.1	670.1	652.7	11.6	67.6	156.8	1.905	11.143	43.89	89.6	98.3	99.5
Baramula	0.7	3.0	4.1	731.8	1120.8	1124.7	16.4	42.6	123.3	1.377	5.686	37.27	89.47	98.37	88.71
Ladakh	0	5.7	56.2	563.8	736.1	764.5	0	0	0	NA	NA	NA	11.72	26.8	35.63
Doda	0	0	0	722.9	730.1	856.2	0	0	0	2.36	0.658	7.72	66.7	72.5	75.2
Udhampur	0	4.5	10.7	568.1	547.0	567.7	2.4	6.8	3.8	0.32	0.615	9.43	78.4	80.2	81.2
Jammu	27.7	1864	249.3	363.4	553.3	514.5	24.5	65.5	245.1	1.89	4.658	38.12	89.9	92.31	93.51
Kathua	1.2	71.7	84.3	175.3	5990.5	225.3	16.0	7.8	165	0.567	3.712	13.15	87.6	91.31	92.35
Poonch	1.2	0	12.4	403.6	581.2	3631.8	1.2	0	3.5	0.235	0.332	2.46	69.2	74.62	78.36
J & K	12.8	46.8	83.9	560.9	730.4	1012.7	9.7	28.3	103	1.484	5.342	30.79	74.07	80.5	82.6
CV	217		129.8				108.3	128	108	75		.89	.31		22.6

Table No. 3.1

Compound Growth Rate of availability of Agricultural Inputs. Compound Growth Rate

	Tractors per lakh hect. of GCA			Ploughts per /000 of GCA			Tubewells & Pumpsets per lakh hect. of GCA			Fertilizer consumption per 1000 hect of GCA (tonnes)		
	A	B	C	A	B	C	A	B	C	A	B	C
ANANTNAG	16.32	21.27	18.77	1.64	-1.8	-0.8	-3.9	35.77	15.93	16.8	17.95	17.38
SRINAGAR	x	x	x	2.54	-0.2	1.17	19.2	8.77	13.98	19.31	14.72	16.9
BARAMULA	15.66	3.17	11.0	4.35	0.03	2.19	15.14	11.20	13.07	15.26	20.86	19.8
LADAKH	x	25.7	x	2.70	0.37	1.53	x	x	-	N.A.	N.A.	N.A.
DODA	x	x	x	0.09	1.69	x	x	x	-	-11.9	27.92	6.1
UDHAMPUR	x	9.04	-	-0.3	0.37	0.03	10.97	-5.6	2.68	6.7	31.39	18.4
JAMMU	21.0	6.48	16.98	4.294	-0.7	3.94	10.33	14.10	12.21	9.4	23.39	16.2
KATHUA	50.53	1.63	26.06	12.93	-9.18	1.86	-6.9	7.78	0.44	20.81	13.52	17.0
POONCH	x	x	x	3.71	20.1	11.90	x	x	x	3.6	22.2	12.5
J&K	13.76	6.07	2.67	3.329	2.99	11.30	12.79	13.79	12.54	13.7	19.0	16.3

But there existed large inter district variations. On the one extreme there are districts like Ladakh, Doda and Udhampur where this component of agriculture technology was not available and on the other extreme the district of Jammu had nearly 28 in the year 1960-63 which further rose to 186 and 249 respectively in 1970-73 and 80-83 showing a compared growth rate of 11.6%. So we find that in the sixties except Jammu all the other districts fall in low range category.

Between 1960-63 and 1980-83, the number of tractors per lakh hectares has increased considerably there is not much of a change in the regional pattern. Only Jammu and Kathua are above the state average.

However, during 1960-63 and 1980-83 the rate of growth of tractors per lakh hectares was maximum in Kathua district (23.6%) followed by Anantnag (18.7) to (11.6%). So we see that the growth has been concentrated in these 3 districts only.

The inter state variation as measured by coefficient of variation in the availability of tractors was as high as 217% showing concentration in one or two district during the year 1960-63.. But over the years this gap has narrowed as the coefficient of variation for the year 1980-83 was 129.8%. It shows that in the eighties too there existed large disparities but not as much as we had in the sixties. So over the year this gap is narrowing as other

districts are also using more and more of this input.

In case of distribution of tubewells and pumpsets the pattern is same as the distribution of tractors. In Ladakh and Doda the no. of tubewells and pumpsets is nil in all the 3 decades. In Ladakh its due to the lack of electricity which is necessary for operating the electric pumpsets and the absence of tubewells is due to the rocky tarrain and the low water level which hamper the digging of tubewells.

The districts of Srinagar, Baramula, Jammu and Kathua are above the state's average regarding this input in the sixties and they keep the trend in the next two decades except for Kathua which shows a sharp decline of -6.9% in the growth rate. But again picks up in the eighties. On the otherhand the districts of Anantnag, Udhampur and Poonch are at the bottom of the scale, though they show movement over the time but still it is in significant.

The coefficient of variation shows very large inter district variations in the availability of tubewells. C.V. was as high as 108% in 1960-63 which increased further to 128% in 1970-73 showing the widening of the disparity while in the eighties it was again 108% showing more or less the same picture as in the sixties.

The distribution of ploughs in the state shows a very progressing trend as more and more iron plough are

replacing the wooden one. Over the year the trend of distribution is very interesting as there is movement in both the directions positive and negative.

In 1960-63, the valley districts, Ladakh and Doda's average is much higher than the state average whereas the other districts of Jammu division are much below the state's average Baramula has the highest amount of plough while the number is lowest in Kathua.

Over the study period of 2 decades, Poonch shows the maximum growth of 11.6% while Udhampur and Anantnag shows negative growth. So in the eighties Kathua moves from medium range to low range while Anantnag moves from high range to medium range.

Here it is interesting to note that nearly 85% of the tractors are concentrated in Jammu division while the concentration of ploughs is more in the valley district.

Next component of modern technology which we have taken to measure agricultural development is the consumption of fertilizer (tonnes/000 hect.).

The addition of chemical fertilizers as a plant nutrient is a necessary step in agricultural production. Where as the scope of bringing any new areas under cultivation is now almost nil further addition to foodgrains production can be made through multiple cropping provided

water and chemical fertilizers are fed in as inputs along with HYV of seeds.

Where irrigation is available, the use of chemical fertilizer is a must as it increases the productive capacity and that being the main objective of Indian agriculture, has resulted in an increase in the fertilizer consumption in India over the year particularly in the mid sixties.

In the sixties the average consumption in kgs per hectare was 1.48 for the state which was much below the all India average of 3.45. Studying the regional variations in fertilizer consumption we find that only Anantnag has a consumption of above 2.5 kgs/hect. followed by Doda with 2.36 kgs/hect. Srinagar. and Jammu have nearly 2 kgs/hect consumption. On the other hand Poonch, Udhampur and Kathua have a consumption of less than half kgs per hectare.

In the seventies the state average increased at a growth rate of 13.7%. Which was low compared to the growth rate achieved by India i.e., 16%. During this time 3 district of Kashmir valley i.e., Anantnag, Baramula and Srinagar shows considerable increase in the consumption of fertilizers (kg)/per hectare. Ladakh has been kept away from this study as fertilizer data for this district is not available. All the other 5 district of Jammu division have not achieved a consumption rate higher than the state's so they all fall in the low range category. In the 2nd decade of 1980-83 we see that Anantnag , Srinagar. Baramula and

Jammu's consumptions per hectare of fertilizer is higher than the state average.

Poonch has remained in the low range class while Doda, Udhampur and Kathua have moved upward to the medium category. Jammu's consumption of fertilizer shows dramatic performanace as it jumps from low category to medium category.

Over the period of 20 years i.e. from 1960-1980, we see that fertilizer consumption has increased in the districts of Anantnag, Baramula Srinagar., Udhampur at rate greater than the 15% per annum. The Coefficient of Variation for fertilizer consumption for the year 1960-63 is showing high degree of district level disparity in the consumption of fertilizer and this disparity has grown over the next 20 years as the C.V. has increased from 75% to 89%. Another important component of technology is electricity. Electricity is an essential input in modernized agriculture. It plays a great part in modernizing the entire outlook of the rural population, Many studies made the 1970's shows that electricity makes a significant contribution to the development of agriculture. Most importantly, electric pumps are cheaper and its operational costs are also less then diesel pumps.

At the time of Independence, hardly 1300 villages had been electrified. But by the end of 1982-83, the no. of

Table No. 3.1 (b)

INDEX OF AGRICULTURAL INPUTS

	1960-63		1970-73		1980-83	
Districts	Scores	Rank	Scores	Rank	Scores	Rank
Anantnag	1.760	III	2.523	III	2.343	IV
Srinagar	6.755	I	3.280	II	2.813	III
Baramula	1.683	IV	2.422	IV	4.507	I
Ladakh	0.313	IX	0.528	IX	.713	IX
Doda	1.274	VI	0.675	VII	1.043	VIII
Udhampur	.814	VII	0.857	VI	1.063	VII
Jammu	3.707	II	5.793	I	3.285	I
Kathua	1.644	V	2.412	V	2.081	V
Poonch	0.670	VIII	0.590	VIII	1.996	VI
Rank Correlation with base Yr.			.96		.81	
Coeff of Variation	91.3%		75.97%		51.34%	

electrified villages had gone to 3,20,982 (55%). As against this in J & K the no. of villages electrified was only 383 in 1965-66 which grew to 5,214 - 1982-83 showing that 80% of the villages have been electrified. Here we have taken the % age of no. of villages electrified to the total no. of inhabited villages.

We find that except for Ladakh all the districts have 75% of their villages electrified. In Ladakh electricity has reached a very small no. of villages due to insufficient amount of electricity generated and the physiography (difficult terrain) of the region. In the 1980's only Anantnag and Srinagar have achieved 100% target.

We have worked out composite indices of all the indicators discussed above at the three points of time under study to examine the relative positions of various districts of the state with regard aggregate level of use of inputs in agriculture. The key points that emerge from the composite index table are :

During 1960-63, the district of Jammu was leading the state in use of different types of agricultural inputs and it was followed by Baramula and Anantnag. The lowest ranking districts in 1960-63 were Doda, Ladakh and Udhampur. In 1970-73 there were some major changes in the relaltive positions of various districts. Between 1960-63 and 1970-73, the disitricts of Srinagar and Doda improved their relative positions from 4th to 1st and 9th to 5th

respectively. In 1980-83 the district of Srinagar continued to be on the top and the districts of Ladakh, Udhampur and Doda remained the lowest in ranking. No changes were noticed in the ranking of various districts on the scale of composite indices between 1970-73 and 1980-83. However the high low value of the coefficient of rank correlation between ranks of 1980-83 and that of the base year suggests that there were some major shift in the relative positions of various districts between 1960-63 and 1980-83.

There was continuous decline in the value of the coefficient of variation indicating gradual narrowing down of inter-district disparities in the use of agricultural inputs in Jammu and Kashmir during the period under study. The coefficient of variation declined from 91.3 per cent in 1960-63 to 75.9 per cent in 1970-73 and further to 51.7 per cent in 1980-83. Thus despite a decline in the disparity over time we found that the level of disparity was very high even in 1980-83.

Block B: Irrigational Facilities

Water is a major input in agricultural production, more so under modern technology provided it is available systematically and on required basis. Indian agriculture is called 'gamble in the monsoons'[3] as nearly 67% of the

---

3. Vyas, V.S., "Some aspects of Irrigation and Power Development", in Vadilal Dagli (ed.), "Foundations in Indian Agriculture" (Bombay 1978), p.139.

cultivated land has to depend on aims as the availability of irrigation facilities is highly inadequate.

Role of irrigation in agricultural development is very important. Proper development of irrigation facilities can help the country in solving the problems created by insufficient, uncertain and irregular rains. With the help of irrigation droughts and famines can be effectively controlled.

The planning commission has estimated the productivity of irrigated land to be almost double (935) compared to that of unirrigated land. It helps improving the yield levels by helping in intensifiying agricultural activities and makes multiple cropping possible. Irrigation confers indirect benefits through increased agricultural production. Employment potential of irrigated lands increases, increased production helps in developing allied activities, means of water transports are improved.

The availability of irrigational facilities is shown by the

1) the %age of Gross Irrigated area to the total cropped area,
2) Irrigation Intensity, i.e.,

$$\frac{\text{Gross Irrigated area}}{\text{Net Irrigated Area}} \times 100$$

3) Area irrigated by canals.

Table No. 3.2

Disparity in Irrigation faci lities

Sl. No.	Districts	Irigation Intensity			% age of GIA to Gross Gropped area		
		60-63	70-73	80-83	60-63	70-73	80-83
1.	Anantnag	101	110	130	61.01	63.81	67.76
2.	Srinagar	106	104	112	63.36	63.33	66.73
3.	Baramula	100	100	100	47.14	48.11	45.8
4.	Ladahh	107	106	107	100	99.99	99.6
5.	Doda	162	112	110	14.70	13.14	10.99
6.	Udhampur	118	103	115	9.78	6.79	6.75
7.	Jammu	139	180	174	32.87	38.28	47.8
8.	Kathua	106	122	169	14.80	21.85	24.9
9.	Poonch	116	129	141	10.69	10.51	10.9
10.	J and K	108	118	128	36.46	37.80	40.37
	C.V	16.%	19.9%	12.1%	74%		70%

Between the 3 points of time i.e., 1960 to 1970 to 1980 there was a steady increase in the Irrigation Intensity of the state as it increased from 108% to 118% to 128%. This increase was not distributed evenly among all the districts of the state. Distribution was lopsided and like cropping intensity it was only the districts of Jammu, Kathua and Udhampur where the growth was maximum.

In the valley districts the irrigation intensity has marginally increased during 1960's and 1970's Anantnag shows an 9 percent point increase while for Srinagar and Ladakh there is a show 1 percent point decline in the Irrigation Intensity. In the Jammu division, Doda and Udhampur show sharp decline while Jammu, Kathua Poonch show that land is intensely irrigated. In the second decade there is more or less the same regional pattern.

This sort of picture emerges because of the cropping pattern of the state. The percentage of area sown more than once is very high in case of districts of Jammu division and that explain the intensity of Irrigation.

The other indicator which shows the availability of Irrigational facilities is the percentage of GIA to GCA. In 1960-63 find that Ladakh is the only region where 100% of the cropped area is Irrigated. This is possible there only because due to rough tarrain and insufficient rainfall, cultivation is possible only on that area which is

irrigated. Irrigation is carried on with the help of streams and local canals. Though the land cultivated is only 6% of the total reported area which is very low. Apart from Ladakh the two districts of Anantnag and Srinagar too had a high percentage of Gross Irrigated area to GCA. In Baramula too this percentage was fairly higher than the state average.

Its only the districts of Jammu division where the area irrigated is just a small part of the total area cropped. The disparity in the availability of irrigation is fairly high at 74%.

The figures for the years 1980-83 show that no significant changes have taken place except for Udhampur, Doda and Ladakh where the proportion of irrigational facilities has declined at the rate of -1.8%, -1.4% and -

However, the districts of Jammu and Ladakh have shown a positive growth the maximum growth is shown by Kathua (2.6%) followed by Jammu where the growth was 1.9%. Overall the state's percentage of GIA to GCA grew at an growth rate of 0.51% which was not uniformly distributed.

There is a plausible explanation for this trend also. The valley districts get perennial water supply throughout the year while in Jammu district irrigation is mostly carried on with the help of tubewells, tanks and other means, so over the year as more and more irrigation

Table No. 3.2

Index of Irrigation facilities

	1960-63		1970-73		1980-83	
Districts	Scores	Rank	Scores	Rank	Scores	Rank
1		2		3		4
Anantnag	2.061	III	2.059	II	1.889	II
Srinagar	2.104	II	2.016	III	1.820	III
Baramula	1.812	IV	1.748	V	1.436	VIII
Ladakh	2.729	I	2.635	I	3.220	I
Doda	1.630	VI	1.294	VIII	1.189	IV
Udhampur	1.158	VIII	1.154	IX	1.244	IX
Jammu	1.771	V	1.974	IV	1.786	V
Kathua	1.278	VII	1.454	V	1.709	VI
Poonch	1.054	IX	1.415	VII	1.384	VIII
Coeff of Rank correlation with base Yr.			.78		.81	
C.V.	29.01%		25.94%		33%	

facilities are provided in terms of tubewells tanks and canals the rate of growth of GIA to GCA goes on increasing while in the Kashmir division and especially Ladakh district irrigational facilities have become rather stagnant. Additional irrigational facilities in ladakh can lead to progress in agriculture as more and more land will be brought under cultivation as right now insufficient water is the only reason for the limited cultivation that is taking place in that area. But the natural tewain is a major constraint.

Over the period of twenty years, there is a decline in the disparities in Irrigational facilities as the irrigation deficient districts show more growth than the irrigation dominated region. So the lowering of the C.V. from 74% to 70% shows a positive trend that inter district disparities are narrowing.

The composite indices have been worked out for the three different points of time on the basis of the indicators discussed above. This has been done with a view to get a combined picture with of the availability of irrigation facilities in the various districts of the state from different sources.

The composite index gives the same ranking as that given by the proportion of irrigated area divided by gross cropped area because of the obvious reasons. It shows that

in 1960-63 Ladakh held the highest rank followed by Srinagar. Anantnag and Baramula. The districts at the bottom of the scale were Poonch, Udhampur, Kathua, Doda and Jammu.

No major changes were noticed in the relaltive ranking of various districts between 1960-63 and 1970-73. However, some movements did take place at both ends of the scale, these movement being largely contined to movements wiwthin the same goup. The disitricts of Kathua and Poonch improved thieir positions from 7th to 5th and 9th to 7th respectively between 1960-63 and 1970-73. The district of Ladakh continued to be on the top in 1970-73 followed by Anatanag and Baramula. The lowest ranking disitricts in 1970-73 were Undhampur. Doda and Poonch. Likewise there were no significant changes the relative positions of districts between 1970-73 and 1980-83, except for Baramula goint down from 5th to 8th position and Doda improving its position from 8th to 5th. This is largely confirmed by the high values of coefficient of rand correlaltion between ranks of 1970-73 and 1980-83 with the base year.

Again between 1960-63 and 1980-83 there hasn't been any major changes only Baramula has come down from 4th to 8th rank. It shows that disparities in the availability of Irrigation has narrowed down in the 1st decade because the (co-efficient of variation has declined from 29.01% to 25.9%). The coefficient of variation was 29 per cent in 1960-63, which declined to 25.9 per cent in 1970-73 and then

again increased to 33 per cent. This indicate that the inter-district disparity in the availability of irrigation facilities narrowed down between 60-63 and 70-73 but then it went up. Another point to be noted is that the level of disparity during 1980-83 was very high as compared to that in 1960-63.

Ladakh is found out to be the most developed in terms of Irrigational facilities. It doesn't give the true picture. Although the percentage of area irrigated by canals is nearly cent percent, while the percentage of gross irrigated area to gross cropped area is also nearly 100%. This type of result emerges due to the non consideration of quality of irrigation and giving equal weightage to all the sources.

C. Livestock and Animal Husbandry

Animal husbandry is a very important sector of rural economy and plays a very important role in the development of traditional agriculture based on bullocks. It also leads to the diversification of agricultural activity and gives impetus to milk, mutton and wool Industry.

Livestock is an important source of income for an economy. In fact, pastoral production is far more resilient than crop production and more renumerative too. In India, the gross value of output from livestock sector was Rs.

10,860 crores (1981-82) which was 18% of the total agricultural output.

The significance of animal husbandry in the Indian economy arises also because its assistance to tackle the serious problems of unemployment and under employment for the weaker sections in the country and for providing subsidiary occupation for Inc. generation. It plays a dominant role in dryland agriculture in the semi arid and arid areas of the country.

Expansion of agricultural machinery such as tractors, power tillers pumpsets operated by power etc. is reducing the dependence of farmer on animal power. The only obstacles is that the small and fragmented agricultural holdings necessities the maintenance of too many heads of cattle. The development is animal husbandry will help the livestock enterprise to catch up with the increasing demand and consumption and consumer preference.

In this section we will try to see how much this sector has developed over the years. Here we will try to measure the development with the help of two indicators i.e., no. of livestock/000 rural population and no. of veterinary units/lakh livestock.

We found that livestock per '000 rural population decreased at the rate of .44 per annum. This decrease is well distributed amongst all the district except that of

Table No. 3.3

Animal Husbandary

Sl. No.	Districts	Live Stock per 1000 rural populaltion			Vetenary Units per lakh of livestock		
		60-63	70-73	80-83	60-63	70-73	80-83
1.	Anantnag	10.82	947.17	933.46	2.8	3.9	14.1
2.	Srinagar	1035.2	933.87	985.64	3.6	5.8	26.3
3.	Baramula	974.22	838.78	916.46	3.5	4.5	127
4.	Ladahh	371.7	2258.11	3426.76	1.2	4.0	219
5.	Doda	2027	1382.77	1512.41	1.5	3.5	99
6.	Udhampur	2260.17	1836.18	1766.12	1.8	2.6	9.2
7.	Jammu	1614.09	1053.66	974.91	2.5	2.6	13.9
8.	Kathua	1870.72	1552.971	1701.75	1.6	2.0	9.1
9.	Poonch	1068.0	1095.201	1694.60	2.1	3.0	0.6
10.	J and K	1377.03	1140.021	1259.91	2.4	3.5	12.9
	C.V				35%	31%	40%

Poonch district where there was an increase of 2.3% per annum.

In 1960-63, Ladakh is the no. 1 ranking district with the largest population of livestock and it maintains its rank in the next 2 decades also here the ratio was nearly three times the state's average of 1377. Apart from Ladakh, Doda and Poonch too occupied high ranks. With more than 2000 livestock per 1000 rural population. The lowest ranking districts were Baramula Anantnag and Srinagar. It gives an idea of the development of veterinary facilities for the livestock. The other indicator that we have taken is the no. of veterinary units per lakh of livestock. It increased from 2.4 in 1961-62 to 3.5 in 1971-72 and further to 12.9 in 1980-81.

In the 1960's Srinagar and Baramula were on the top with 3.6 and 3.5 veterinary units per lakh of livestock population followed by Anantnag and Jammu. The lowest ranking district is Ladakh, Doda and Kathua. In the 2nd decade there wasn't much change in this pattern of the 1960's. In the 1960's veterinary facilities network for the livestock was very weak with more than one district having just 1 veterinary hospital for 1 lakh of livestock population. Even this weak veterinary base was marked by interdistrict variation.

In the 1970's all the district improved their

performance with respect to spreading the veterinary network. But this spread has not been uniform. As against the state's figure of 3.5 vet. units/lakh livestock only Baramula and Srinagar have more than 4.5 vet. units.

Over the period of 20 years, i.e., between 1960-63 and 1980-83, the state experienced a growth of 2.7% per annum and there was a positive growth in all the district. Though the highest growth rate is experienced by Ladakh district (15.6%) and apart from Baramula (6.6%) all the other districts have a growth rate of 8% and above.

The coefficient of variation in the distribution of veterinary units was 35% showing that there isn't much interdistrict disparity in the year 1960-63 and it was fairly low in 1980-83 also at 40% but the trend shows that between 1960-63 to 1980-83, the interdistrict disparities have tend to grow.

There is a very strong relationship between these two indicator as we see that the fall in the livestock population has led to the growth in the no. of veterinary units. So there fore their number as such haven't increased at such a rapid growth but it the fall in livestock population that has pushed the figures for veterinary units up.

From the above analysis we come to the conclusion that livestock rearing is a very integral part of the rural

Table No. 3.3

Index of Animal Husbandary

	1960-63		1970-73		1980-83	
Districts	Scores	Rank	Scores	Rank	Scores	Rank
Anantnag	1.290	IX	1.340	VII	2.176	III
Srinagar	1.384	VIII	1.543	VI	1.288	VII
Baramula	1.373	VIII	1311	IX	0.837	IX
Ladakh	1.564	VI	2.013	IV	2.001	IV
Doda	2.005	V	1.875	V	1.096	VIII
Udhampur	2.969	I	2.921	I	1.819	VI
Jammu	2.236	IV	2.169	VIII	4.203	I
Kathua	2.929	II	2.543	II	2.361	II
Poonch	2.352	III	2.392	III	1.851	V
Rank Corr. with base Yr.			0.78		0.43	
C. V.	31.38		26.39%		47.10%	

economy of J & K especially in places like Ladakh and Poonch which don't show much progress in other agricultural activities. Developing this sector still further can lead to the establishment important industries like that of wool, milk products and mutton. In Ladakh Pashmina wool is produced but its only done on a small scale and this industry has a future. Apart from the two indicators that we discussed we have taken 2 more indicator to check the development of animal husbandry i.e., buffaloes per 1000 and cattle per thousand of rural population. And by combining all the form indicators we have found out the composite indices of block - D needless to mention that equal weightage has been given to all the indicators.

In the 1960-63's the maximum factor scores are obtained by Udhumpur followed by Kathua, Poonch and Jammu and they occupy the rank I, II, III and IV. While the lowest ranks are obtained by Anantnag (IX) Baramula (VIII) and Srinagar. (VII).

Between 1960-63 and 1970-73 there are some changes in the ranking. There was some improvement in ranking in case of Anantnag, Srinagar and Ladakh. The correlation of the ranks of the two year was .78 showing almost the same ranks in both the years.

Between 1960-63 and 1980-83, a lot of changes has taken place, there is a major resuffling of ranks as is shown by coefficient of rank correlation which is as low as

while Udhumpur has fallen from the 1st position to 6th one. Jammu has move up from 4th position to 1st Poonch has gone down to 5th position.

Between 1960-63 and 1970-73 the coefficient of variation fell down showing narrowing of disparities while in 80's it increased from 26% to 47% showing very high degree of disparity in the availability to livestock, cattle and veterinary units per lakh of rural population.

Block D: Agricultural Development

Table 4.A1 shows the NSA/cultivator and the cropping intensity for various districts of J & K. The NSA/cultivator for the state as a whole was 0.59 hect in 1961-62 which increased to 0.77 hect in 1970-73 and declined marginally to 0.69 in 1980-83. There is not much of variation in this ratio across various districts of the state in 1960-63. All the districts of the state with the exception Jammu and Kathua had less than the state's average of 0.59 hectare NSA per cultivator. Between 1960-63 and 1970's there was a marginal increase in the ratio and this increase is reflected at the district level data also. In the districts of Doda and Kathua NSA/cultivator increased by more than 2 times. In all other districts rise in the ratio of NSA/per cultivator is very marginal over the same period. Similarly, the marginal fall in the NSA per cultivator for the state as a whole is also reflected at the district

Table No. 3.4

Agricultural Development

Sl.	Districts	Net Sown Area per cultivator			Cropping Intensity % age		
		60-63	70-73	80-83	60'50	70's	80's
1.	Anantnag	0.556	0.684	0.618	105	112	122
2.	Srinagar	0.513	0.804	0.778	110	107	108
3.	Baramula	0.557	0.737	0.682	100	100.0	109
4.	Ladahh	0.318	0.452	0.461	107	106.5	106
5.	Doda	0.418	1.246	0.536	116	121	122
6.	Udhampur	1.050	1.066	0.934	155	177	191
7.	Jammu	1.050	1.066	0.934	155	177	191
8.	Kathua	0.920	1.863	0.940	137	140	180
9.	Poonch	0.589	0.714	0.680	129	147	155
10.	J and K	0.590	0.771	0.694	121	127	137

Compound growth rate

Sl.	District	Net Sown Area per cultivator			Cropping (% age) Intensity		
		(A)	(B)	(C)	(A)	(B)	(C)
1.	Anantnag	2.09	-1.009	0.53	0.64	0.85	0.75
2.	Srinagar	4.59	-0.32	0.41	-0.27	0.097	-0.09
3.	Baramula	2.83	-0.77	-101	0	0.867	0.43
4.	Ladahh	3.57	0.19	1.87	-0.04	-0.04	-0.04
5.	Doda	11.54	-8.08	1.25	0.42	0.08	0.25
6.	Udhampur	3.49	-2.40	0.50	0	0.08	0.40
7.	Jammu	0.15	-1.31	-0.58	1.33	0.76	1.04
8.	Kathus	7.31	-6.61	0.10	0.21	2.54	1.37
9.	Poonch	1.94	-0.48	0.72	0.137	0.53	0.92
10.	J and K	36	42	22	14.9	18.7	22.1

level. In all the districts excepts Ladakh, the ratio has come down. This fall is more pronounced in the district of Jammu and Kathua. Thus it can be said that barring a few exceptions like Jammu and Kathua the inter district variation in NSA per cultivator was not very high. Its is thus noted that NSA per cultivator is very low at all the three points of time showing the growing pressure of population on agriculture and lack of employment opportunity outside agricultural sector.

The next indicator which we have taken show the levels of disparity among regions is the cropping intensity (GCA/NSA x 100).

Between 1960-63 and 1980-83 the average cropping intersity for the state of J & K increased steadily from 121 to 127 (1970-71) to 137 (1980-81). However, there exists large inter district variations in the cropping intensity. The cropping Intensity of Jammu, Kathua, Poonch and Udhampur is higher than the state average. Incidentally these are the areas which are having facility of tubewell irrigation. Between the sixties and the seventies there was a marginal increase in the state average which is reflected in the district level data also. There was a sharp increase in the cropping intensity of Jammu and Poonch and a slight increase in Kathua, Anantnag and Doda while there was a sharp decline in the cropping intensity of Ladakh and Srinagar.

Between the 70's and 80's there was a 10% increase in the cropping intensity (area down more than oonece) which was well distributed among all the districts except for Ladakh where the area down more than once decrease marginally.

So we find that the % age more than once is very high in the Jammu division and is very low in Kashmir division because the valley is covered by snow and so winter cropping is not possible where as the Jammu region has the facility of tubewell irrigation.

We have worked at the composite indices of overall agricultural development for three points of time under study on the basis of four indicators namely cropping intensity, net sown area per cultivator, percentage of area under food crops and agricultural productivity.

In the 60's Jammu ranks no. 1 followed by Baramula, Anantnag and Srinagar while at the lower bottom we find Doda at rank IX and Ladakh at rank VIII.

Some major changes were noticed in the relative ranking of various districts on the scale of composite indices between 1960-63 and 1970-73 with Jammu and Doda improving their respective positions from 4th to 1st and 9th to 5th respectively. However apart from these two instances of major shifts in the relative position, no other movements among groups were noticed. This is also confirmed

Table No. 3.4

Index of Agricultural Development

Districts	1960-63 Scores	Rank	1970-73 Scores	Rank	1980-83 Scores	Rank
1		2		3		4
Anantnag	2.290	III	2.212	IV	2.291	III
Srinagar	2.236	IV	2.318	I	2.433	I
Baramula	2.335	II	2.280	II	1.992	V
Ladakh	1.560	VIII	1.530	IX	1.616	VIII
Doda	1.518	IX	1.907	V	1.569	IX
Udhampur	1.746	VII	1.730	VIII	1.756	VII
Jammu	2.477	I	2.229	III	2.338	II
Kathua	2.130	V	2.174	VII	2.166	IV
Poonch	1.790	VI	1.761	VI	1.875	VI
CV	16.99%		13.83%		15.14%	
Coeff of rank Correlation with the base year			0.70		0.68	15.14%

by the values of the coefficient of rank corelation between ranks of 1970-73 and 1980-83 with base year, that were very high.

There were some major changes between 1960-63 to the 1980's. Districts like Baramula and Jammu went down in ranking from 2nd to 5th position and 1st to 2nd position respectively. On the other hand many districts have improved their ranking. In this we have Srinagar and Bathua 1st and 4th rank.

Between 60's and seventies, interdistrict disparities have slightly narrowed down as coefficient of variation declined from 17% to 14%. But between 70's and 80's there was a slight rise in the disparities.

Poonch, Ladakh, Doda and Udhampur are backward districts with low level of development in this field and they remain in low class for all the three points of time. While Srinagar, Baramula and Jammu are highly developed in this sector.

Economic Development

In this section we will measure the disparities existing in the state in fields apart from agriculture. We will try to see whether disparities in the availability of social amenities have widened or narrowed down over time.

To study the level of development in this field we have taken the following indicators.

1) No. of banks per lakh population
2) No. of hospitals per lakh population.
3) No. of telephone connections per lakh population
4) No. of Post offices per lakh population
5) Length of road length per 000 hectares
6) Literacy level

Here we will analyse the performance of just 2 indicators i.e. the percentage of literates to the total population, number of banks per lakh population. Among the other 4 remaining indicators includes the Road length per 1000 hectare and the no. of hospitals and post offices which is negligible when its stretched over a lakh of population while the last indicator i.e., no. of telephone connection just shows the degree of urbanization and apart from the two districts of Srinagar and Jammu which have 2 major urban centres i.e., Srinagar city (the summer capital of the state) and the Jammu city (the winter capital of the state) rest all the other districts fare very low compared to these in respect of telephone connections. So these 3 indicators have been left out through we have taken them for compiling the composite index.

Table shows that the percentage of literates to total population has increased from 11.13% to 18.58% to 26.17% in the year 1960-63 to 1970-73 to 1980-83. In the

Table No. 3.5

Social and Economic Infrastructure

	Literacy level			No. of Banks/per lakh population		
	60-63	70-73	80-83	60-63	70-73	80-83
Anantnag	8.04	14.18	21.3	0.6	1.5	5.3
Srinagar	14.5	22.71	25.09	1.7	3.1	8.7
Baramula	7.98	13.16	17.78	1.3	1.9	51.5
Ladakh	8.31	12.7	20.62	1.1	1.8	7.4
Doda	8.69	13.88	18.2	.7	1.7	5.4
Udhampur	8.82	15.62	23.5	.3	1.7	6.3
Jammu	18.51	30.34	43.01	2.1	3.5	11.8
Kathua	11.52	21.64	31.44	.9	2.5	8.1
Poonch	7.8	14.52	10.92	.3	1.2	5.5
J and K	11.13	18.58	26.17	1.4	2.2	7.1

	Compound Growth Rate					
	Literacy level			No. of Banks/per lalkh populs.		
	(A)	(B)	(C)	(A)	(B)	(C)
Anantnag	6.4	4.5	4.99	9.59	13.45	11.50
Srinagar	4.5	1.0	2.78	6.19	10.87	8.50
Baramula	5.1	3.0	4.08	3.86	39.09	20.19
Ladakh	4.3	4.9	4.65	5.04	15.18	9.99
Doda	4.7	2.7 8	3.76	9.27	12.25	10.75
Udhampur	5.8	4.1	5.02	18.94	13.99	16.44
Jammu	5.0	3.5	4.30	5.24	12.92	9.01
Kathua	6.5	3.8	5.14	10.75	12.47	11.61
Poonch	6.4	3.7	5.05	14.86	16.44	15.65
J and K	5.2	3.4	4.36	4.62	12.43	8.45

first decade i.e., from 1960-63 to 1970-73 there was an 5.2% increase in the growth rate which in the second decade the growth rate was only a 3.4% growth rate.

Compared to the all India figures and when compared to states like Kerala, J & K cuts a sorry figure. In the year 1960-63, Apart from Jammu all the other districts had less than 15% literacy. Lowest level of literacy was in Poonch where out of 100 only 7.8 were literates.

From 60's to 70's the state showed a growth of 5.2% which was not equally distributed. In this period the highest growth rate was recorded by Anantnag and kathua (6.4% each) while Ladakh recorded the lowest growth rate. In the second decade too there is more or less the same pattern as can be see from the table.

Over the period of 20 years we find that Anantnag and Kathua have recorded the highest growth rate while Srinagar has recorded the lowest. it is also seen that the percentage of the literates to the total population is higher in the Jammu division than in the Kashmir division.

Ladakh is a unique case as the literacy level doesn't project the true picture of human resources development in the district. There are hardly 2 government middle schools and just one high school in the whole district and the no. of primary school is also very low

when compared to the other district. Due to the paucity of data we couldnot use it as an indicator of development.

So more than 75% of the total literates of Ladakh district are the lamas or monks who stay in the monasteries and know only the local language i.e., Bodhi which they are not taught in schools but in the monasteries. This is in sharp contrast to the literates of other areas where more than 70% are professionals and know the national and the inter national language (Hindi and English).

The next indicator that we have taken is the road length per 1000 hectares of total reported area.

It is found from the table that over the period of 20 years i.e., from improvement in the road length as it increased from 3.08 sq. km to 3.99 sq km at the growth rate of 1.3%.

In 1960-63, Srinagar, Anantnag and Baramula had road length/000 hect above the state average. Srinagar was at the top with 6.4 sq. km followed by Anantnag (5.47) while Udhampur was at the bottom of the scale with just .794 sq kms per 1000 hect of TRA. In Poonch and Kathua too it was very low (< 2 sq km) while in Doda and Jammu it was first 2.10 sq. km.

Over the period of 20 years we find that except Poonch all the other districts have shown positive growth. In Poonch there was a negative growth of -1% which was due

to same problems which had arisen during the reorganising of the district when Rajouri and Poonch got clubbed into one district.

Rest in all district there has been a more than 2% increase in the growth rate except for Doda and Baramula where the growth rate was lesss than one percent.

We have compiled all these indicators and the composite picture which come up is as follows: In 1960-63, Jammu stands 1st followed by Srinagar and Kathua at rank 2 and 3. At the bottom of the scale are Poonch and Ladakh at no. 9 and 8.

There were not any significant chagne in the relative positions of various districts between 1960-63 and 1970-73. Whatever little changes had taken place they were mostly confined to movements within the groups there were hardly any case of district moving from a very low to very high rank or the vice-versa. The correlaltion between the ranks of 60's and seventies is faily high at .92 showing g that not much change has taken place. The only change is that Srinagar has now attained 1st rank while Jammu has been neglated to 2nd position.

In 1980-83, some change has taken place. The backward and low developed districts of Poonch and Ladakh remained at the bottom. Baramula has attained rank I while Srinagar has been pushed back to rank 4th. Jammu has maintained its no. 2 position.

Table No. 3.5

Index of Social and Economic infastructure

	1960-63		1970-73		1980-83	
Districts	Scores	Rank	Scores	Rank	Scores	Rank
Anantnag	2.322	V	2.847	IV	2.141	III
Srinagar	3.163	II	4.262	I	2.054	IV
Baramula	2.752	III	2.910	III	7.503	I
Ladakh	1.280	VIII	1.290	VIII	1.11	VIII
Doda	2.080	VI	1.345	VII	1.318	VI
Udhampur	1.542	VII	1.605	VI	1.538	V
Jammu	4.323	I	3.808	VI	2.437	II
Kathua	2.894	III	2.261	V	1.827	V
Poonch	1.241	IX	1.250	IX	1.316.	IX
Rank Correlation with base Yr.			.92		.80	
C.V.	39.76.		44.15%		77.68%	

The coefficient of variation has increased over time showing widening of disparities over time as it increases from 39% to 44% to 77.68% in the sixties, 70's and the 80's respectively.

TABLE 3.6

INDEX OVERALL DEVELOPMENT

	1960-1963		1970-1973		1980-1983	
Districts	Scores	R	Scores	R	Scores	R
1	2		3		4	
Anantnag	2.367	V	2.556	III	2.389	III
Srinagar	3.557	I	3.042	II	5.088	I
Baramula	2.411	IV	2.540	IV	2.197	V
Ladakh	2.034	VIII	2.163	VI	1.743	VIII
Doda	2.157	VI	1.733	IX	1.547	IX
Udhampur	2.055	VII	2.054	VII	1.753	VI
Jammu	3.206	II	3.501	I	2.867	II
Kathua	2.519	III	2.518	V	2.210	IV
Poonch	1.790	IX	1.896	VIII	1.910	VII
X	2.4		2.4		2.4	
X	Rank correlation		.80		.48	
SD	.54		.53		.99	
CV	.22		.21		.35	

Index of Overall development

Table3.6 gives the overall composite indices of the six broad groups of developmental indicators which have been discussed in the preceding sections. Composite measures of these developmental indicators not only simplifies ranking of the regional units by reducing a large among of data into a single measure, it also incorporates many qualitative aspects in a quantitative measures. It, however, gives a highly aggregate picture. There is another reason as to why we should have a overall index of development. The various brad groups of developmental indicators interact with one another and are complementary in nature. The lack of development in one particular field can nullify the beneficial effect of development in another.

The overall development index of 1960-63 shows that during this decade Srinagar was no. 1 ranking district followed by Jammu and Kathua as the most developed areas whereas Poonch, Ladakh and Udhampur occupies the last three ranks. We find that during this period except for Poonch, all the scores are nearly same. There is very little variation among districts. The C.V. is very low (22%) showing very low disparity.

In the next decade, there isn't much major changes except for small ones. Anantnag has improved its position from 5th to 3rd rank, Ladakh too has moved up from rank 8 to

6th, Jammu too has improved its position from 2nd to 1st while Poonch has gone up to 8th rank.

The districts that have been pushed down are Srinagar (1st to 2nd) Dada (6th to 9th) and Kathua travels to 5th position from 3rd.

There is high correlation between ranks of 1970-73 with that of 1960-63. The disparities over years have fallen down as is shown by the C.V..

Between 1970-7 and 1980-83, a lot of shifting has taken place during this time Srinagar has come to rank 1, Ladakh has come down to rank 8th from 6th rank in 1970-73. Kathua came upto rank 4 while Poonch improved its position by climbing upto rank 7th from 8th.

So we find that over the period of 20 years, the C.V. for the 1st 10 years narrows but changes dramatically in the next years showing high degree of disparities. Over the period of 20 years a lots of has taken place Srinagar, Jammu and Anantnag occupy 1st, 2nd and 3rd rank while Doda, Udhumpur and Poonch occupy the last 3 ranks.

Many districts have really improved then position over the years Anantnag bettered its rank from 4th to 3rd, and Poonch has improved its position from 9th to 7th. There were the districts +which had improved their lot. During the same period the districts which low growth on a downward movement like Baramula, Ladakh, Doda, Udhumpur and Kathua.

CHAPTER - IV

DISTRICT LEVEL SPATIAL PATTERN OF GROWTH OF AGRICULTURAL OUTPUT

Study of cropping pattern is an important indicator to determine the extent to which efficient use of land is made.

Cropping pattern means the proportion of area under different crops at a point of time. A change in cropping pattern implies a change in the proportion of area under different crops. Cropping pattern of an area is determined by many factors i.e., economic, technological and physical etc. Economic motivations are the most important in determining the cropping pattern of a country. A study of intercrop price priorties under taken by the ministry of Food and Agriculture shows how price variations exert an important influence on shifts of area under different crops. Cropping pattern also depends on the use of technological inputs like improved seeds, fertilizers, water storage, irrigational facilities etc. But the most important factor which influences cropping pattern are the physical characteristics like soil, climate, rainfall etc.

Though all the above mentioned factors contribute towards the setting of agriculture in Jammu and Kashmir, it is the physical factors which really determine the cropping

pattern. And from among these physical factors, climate plays a very important role as it sets limit to the extent of cropping pattern changes within an area. There ae wide variations in climate soil and rainfall amongst different regions of Jammu and Kashmir, hence one expects different coping patterns in the different regions of Jammu & Kashmir. One finds that in the Kashmir valley, and the lowlands, rice is the most important crop accounting for 42% of the cropped area. Although there is a scanty rainfall however, there is continuous flow of water throughout the year due to the melting of snow. The valley of Kashmir experiences negative climatic impact and that is why only one season is available for cultivation.

Jammu region with a subtropical climate has a more diversified cropping pattern. Here cultivation takes place in both the seasons (Rabi and Kharif). This is a region of low rainfall where water is a major constraint and is having a different land use patterns as well as the average yield of foodgrains as compared to Kashmir Valley.

Ladakh region has 100% irrigation however, cultivation is carried on a limited area which is insignificant when compared to the total cultivable area of the region. In this region as winters are severe and only one season is available for cultivation.

Another important factor which determines the cropping pattern of the state is the nature of soil. There

is a marked homogeneity in the soil ratings but the productivity of land varies, because of availability of soil moisture of different levels in each region of the state. In Jammu, the soil has a high rate of evaporation and low moisture retaining capacity. This region is suitable for double cropping provided irrigation is available in rabi season. All these physical factors are responsible for variations in productivity across different regions.

In this chapter attention has been focused to examine the change which have come about in the two decades in the cropping pattern of the various districts. This will be followed by a study of the changes that has taken place in the state agriculture in terms of total area, production and yield of the five major crops accounting for about 90% of the cropped area. The 3rd section will deal with the agricultural productivity at district level. We will see how agricultural productivity has changed over time and will classify the nine districts of the state into productivity classes. The last section deals with inter district variations in productivity and the interrelationship between productivity and input use.

SECTION - I

CROPPING PATTERN

The table (1) gives the percentage of area under the major crops of the state in 1960-63, 1970-73 and 1980-83 trienniums respectively for the different districts of the state as well as for the three divisions. The distribution of areas for various crops is such that around 46% of the total area is covered by rice and wheat while 32% is covered by coarse grains in a manner that barley has 1.2%, maize 28.13% and bajra 1.5% of the total area. The table reveals that over the period of twenty years, important changes have taken place in the cropping pattern.

Rice is the main crop of the Kashmir region where nearly half of the area is under the cultivation of rice. In Kashmir region, over the period of 20 years, area under rice has shown a declining trend. It has fallen from 45% to 42% between 1960-63 to 1980-83.

But this trend is not observed in all districts of the Kashmir region. One finds that over the years it is only Anantnag where the area under rice has fallen drastically during all the three period of time while Baramula region experienced no change at all. Srinagar, the third district of the region experienced decline in area under rice in the first decade but in the second decade there was an increase in area which was much more than the decline it experienced in the first decade.

TABLE 4.1

Area Under different crops

	Rice			Wheat			Maize			Barley		Millet			Bajra			Foodcrops			Fruits & Vegetables		
	60-63	'70-73	80-83	'60-63	'70-73	'80-83	'60-63	'70-73	80-83	'60-63	'70-73	'60-63	'70-73	'80-83	'60-63	'70-73	80-83	'60-63	'70-73	'80-83	60-63	70-73	80-83
ANANTNA	52.0	45.0	44.54	4.89	4.95	0.42	26.07	30.32	21.33	0.09	0.06	0.28	0.03	Neg	-	-	-	91.33	89.20	80.81	4.51	5.67	1064
SRINAGA	46.44	42.0	47.04	8.65	9.08	2.99	23.21	25.93	21.66	0.07	0.06	0.54	0.56	0.14	-	-	-	91.91	94.34	90.29	8.14	10.35	12.93
BARAMULA	36.76	36.45	36.59	8.81	5.33	0.48	34.42	37.78	32.44	0.54	0.11	3.84	1.29	1.03	-	-	-	94.32	95.85	88.96	4.41	6.90	13.56
KMR REG	45.0	41.45	42.11	7.49	6.45	1.29	27.90	31.37	25.14	0.23	0.07	1.5	0.62	0.39	-	-	-	92.49	93.1	86.68	5.68	7.67	12.37
LADAKH	-	-	-	16.81	21.43	19.53	-	-	-	5.53	4.6	5.96	46.34	46.09	-	-	-	80.29	82.77	82.87	1.30	2.87	1.64
DODA	6.71	6.07	5.87	11.03	10.35	10.27	47.55	51.85	58.66	11.58	10.29	14.90	9.95	8.58	-	-	-	97.83	97.52	96.08	0.74	0.6	0.80
UDHAMPU	11.89	10.60	11.14	28.04	20.19	31.00	41.63	46.88	44.95	3.68	2.42	2.43	0.69	0.16	0.21	0.07	0.15	96.38	96.71	94.90	0.86	0.29	0.23
JAMMU	19.82	19.24	25.46	39.51	43.40	41.98	7.63	10.42	6.94	2.13	1.12	1.01	0.96	0.17	11.75	9.43	6.40	93.27	92.80	89.16	1.04	0.960	0.92
KATHUA	22.96	23.40	21.71	29.60	33.30	37.66	16.04	18.43	15.89	4.18	3.10	1.14	0.18	0.44	3.39	2.90	2.81	88.90	89.36	87.91	0.59	0.45	0.40
POONCH	9.24	4.55	9.75	29.87	27,38	29.82	56.04	58.41	52.06	0.98	0.27	0.21	NeG	Neg	0.07	0.06	0.04	98.19	97.07	94.34	0.12	Neg	0.08
JAMMU	14.12	12.77	14.78	27.72	28.72	30.14	33.77	37.19	4.5	4.3	2.25	2.3	1.86					94.87	94.6	92.4	0.67	0.46	0.44
J & K	27.46	25.8	26.8	25.57	21.8	20.48	28.11	31.73	28.12	2.54	1.69	2.71	2.18	1.76	2.48	2.08	1.46	93.41	93.65	90.37	2.5	3.30	5.22

Rice was not the only crop where this decline was felt. Area under wheat also declined drastically from 7.4% in 1960-63 to 1.29 percent in 1980-83 All the three districts reported decline. Other crops which reported a decline were millets and barley and to some extent even maize. But this decline was uniform in case of maize where the area under maize increased dramatically between 1960-63 to 1970-73 and declined sharply between 1970-73 and 1980-83.

All the three valley districts showed the similar pattern as that of Kashmir region. Maximum increase in the area under foodcrops was recorded by Srinagar while Anantnag experienced a slight fall in the area under food crops. After recording an increase in area under food crops in the first decade, there was a steep fall in the area under foodcrops as it fell down to 86.68 percent from 92.49 percent. This fall was not shared equally by all the three districts as maximum decrease in area under food crops was felt in Anantnag.

This fall in area under food crops was accompanied by a rise in other non foodcrop groups. The most important being the area under fruits and vegetables. Horticulture made a tremendous improvement in the decades of 1960-63 to 1980-83, as the Kashmir region experienced a more than double increase in area i.e., from 5 percent to 12.37 percent in 1980-83. The maximum increase was recorded in Baramula followed by Srinagar and Anantnag. This tremendous

increase in the area under fruits and vegetables was due to the commercial value of these crops which more than ten times than that of the other crops. The trend shows that most of the food crops are fast losing area to fruits and vegetables and in years to come it can overtake all the major crops in fields of both area and production.

Apart from fruits and vegetables, very little commercial farming is carried on in Kashmir region. Commercially, the most important crop of Kashmir division is Saffron in which the value of output per hectare is phenomenal but it is grown only in one village i.e. Pampore so at state level its not an important crop showing commercialization of agriculture.

Another profitable proposition is the cultivation of mushroom. As people are realising its importance and profitability more and more farmers are turning towards it. Jammu and Kashmir is the principle source in the country to supply Guchhi.

We find that over the period of twenty years i.e., from 1960-63 and 1980-83, from among the districts of Kashmir region, Anantnag shows the maximum decline in foodgrains. This decline is well distributed in all the crops as there is 4 to 6 percent decline in the share of area under the major crops. So have the area is shifting towards commercial crops. There is a steady increase in the

area under fruits and vegetables. Pulwana in Anantnag has made tremendous progress in the field of saffron cultivation and mushroom cultivation.

In Ladakh region, the cropping pattern is more or less same in the two decades. This is due to the fact that agriculture is practiced on a limited area which is due to its rough and rocky terrain, harsh climate and insufficient availability of water. Due to the scarcity of water, cultivation of rice is not possible and the climate doesn't allow the growth of tropical crops. So the main crops of this region are millets, wheat and barley. One finds that between 1960-63 and 1970-73 area under millets and other cereals has increased dramatically from 5.96 percent to 46 percent which means that it grew at a growth rate of 22.59 percent per annum but after that it remained static. Wheat is the other crop under which there was an increase in the area. This increase was very sharp between 1960-63 to 1980-83, area under wheat increase by nearly 3 percent per annum. Barley is the only crop which showed decline in area in all the three time period from 5.53 percent to 4.6 percent.

The most interesting point about Laddakh is that it is the only district in the state which showed a steady increase in the area under foodcrops. The remaining districts showed a decline in the area under food crops and indicating an increase in the area under nonfood crops. Apart from these crops, some area is devoted to fruits and

vegetables also which is only 3 percent o the districts total but it is growing at a steady rate. With its commercial value and high profits fruits and vegetables will/can occupy a very important position in district's cropping pattern in the coming years. Apart from these, in Ladakh nearly 15 percent of the area is devoted to the cultivation of alfa alfa grass (Oal). It is used as fodder and its commercially viable as it takes very less investment and the growing period is also very short. It is an integral feature of the rural economy of Ladakh.

So one finds that due to increase in irrigational facilities more and more area is being brought under cultivation and that area under all the crops are growing at more or less an equal pace.

The third important division of the state i.e., Jammu shows a very complex cropping pattern as a number of major and minor crops are being grown. But except for wheat which has shown a steady increase in the area, all the other crops show a declining trend or a mixed or unstable trend i.e., increasing in first period and decreasing in the second decade and vice versa.

Maize is the most important crop of this region and nearly 35 percent of the area is devoted to it. Between 1960-63 and 1970-73, there was a sharp increase in area under maize and it was recorded in all the districts of this region. But Doda has recorded the highest growth rate. In

the second decade there was an substantial fall but it was higher than the 1960-63 figure. Among the districts area under maize increased in case of Doda but decreased in all the other districts.

In case of wheat also one finds that though there was a steady increase, it was not so in all districts Udhampur, Kathura and Jammu experienced an steady increase in both the decades while Doda and Poonch, recorded a decline in both the decades. Area under foodcrops in Jammu region has shown only a slight decline whereas in Kashmir region, area under foodgrains declined sharply from 92.5 percent to 86.6 percent. In the latter years of the study, there is a positive shift towards non food crops which are more profitable while in Jammu region there is not much change. But there is a significant change in the food crop sector as one find that area under coarse grains like barley, millets bajra and jowar is decreasing while area under rice, wheat and maize is increasing indicating a positive shift from minor to major crops which are more paying and bring higher profits. From among the different districts of Jammu Region, between 1960-63 an 1980-83, Poonch is the only district which does not show any change in the cropping pattern. The only notable change is the decline of area under maize which again is not much. Apart from Poonch, all the other districts of this region show change in their cropping pattern. Doda emerges out to be a

totally maize dominated area as area under maize increases while area under all the other crops is shrinking.

Jammu and Kathua are the only major rice producing districts of this region over the years, while area under rice in Jammu has increased, it declined in Kathua. In the second decade i.e., from 1970-73 to 1980-83 Kathua devoted more area to wheat as area under wheat increased at compound growth rate of 2.4 percent per annum. But in case of Jammu area under rice and wheat both increased over the study period at the compound growth rate of 1.2 percent and 60 percent per annum.

OUTPUT ADJUSTMENT

For the present study, we have adjusted the output of the 5 major crops in order to account for the excluded crops area. For this we calculated for each district the proportion of area under these 5 crops to total gross cropped area during the three periods. The value of output for each district was inflated accordingly on the assumption that the average productivity of the left out crops equals the average productivity of the 5 major crops. This is no doubt a heroic assumption and has imparted some bias as this procedure results in underestimating or overestimating the excluded crops productivity. However, for most of the districts, the 5 crops cover more than 90 percent of the GCA the extent of error is hopefully sufficiently limited so as not to affect our conclusions qualitatively.

SECTION - II

AREA PRODUCTION AND YIELD OF FIVE MAJOR CROPS

At the state level, the total output of the five major crops recorded a growth rate of 4.4 percent per annum between the period 1960-63 to 1980-83. It seems that the yield raising technology has become the main source of growth is clear from the fact that the major portion of growth of output during this period is accounted for by yield increases and only a small percentage by increase in area.

The uneven nature of spatial spread of new technology is brought out by wide variations in the growth rate of the output. the growth rates of area, output and yield of different crops are brought out by the table. From the table, it is evident that except for rice and maize which have shown a slight increase in area over the period of 20 years, all the other crops are loosing ground.

Rice is the staple food of the bulk of population and is cultivated in a little more than one fourth of the total cropped area in the state. Over the period of twenty years, a marginal increase of 0.76 percent in area under rice has been accompanied by a 4.2 percent increase in the output due to substantial rise in the yield levels. During this period, the yield level for rice went up from 1063 kgs./per hectare in 1960-63 to 2106 kgs. in 1980-83. The

Area, Output and Yeild of 5 major Crops of the state 1960-63, 1970-73, 1980-83.

	Area under Crops and its %age of GCA			%age annual compound growth rate			Output (000 tonnes)			%age annual (growth rate)			Yield Kgs/hect.			%age annual Growth rate		
CROPS	1960-63	1970-73	1980-83	A	B	C	1960-63	1970-73	1980-83	A	B	C	1960-63	1970-73	1980-83	A	B	C
Rice	227213 (27.5)	225440 (25.8)	264539 (26.8)	-0.07	1.6	0.76	241.72	369.93	557.20	4.34	3.9	4.2	1063	1640	2106	4.4	2.5	3.4
Wheat	211576 (25.6)	184397 (21.8)	201039 (20.4)	-1.36	0.8	-0.25	95.26	155.13	211.53	4.9	3.1	4.0	450	841	1052	6.4	2.2	4.3
Maize	232584 (28.11)	277566 (31.73)	276870 (28.12)	1.78	-.025	0.87	203.77	374.53	453.83	6.2	1.9	4.0	876	1349	1639	4.4	1.19	3.1
Barley	21035 (2.54)	14826 (1.69)	11038 (1.12)	-3.4	-2.9	-3.7	12.81	9.42	7.23	-3.02	-2.61	-2.81	608	635	655	.43	.31	.37
Bajra	20551 (2.48)	18255 (2.08)	15443 (1.56)	-1.17	-1.65	-1.41	8.23	10.0	9.01	1.96	-1.03	1.0	400	592	583	3.9	-0.15	1.90

Compound Rate of Growth :

A 1970-73 over 1960-63.

B 1980-83 over 1970-73.

C 1980-83 over 1960-63.

main rice producing area is Kashmir region and the two districts of Jammu region i.e., Jammu and Kathua.

Apart from rice, the two other major crops are maize and wheat and they have also shown interesting trend over the years. Maize is another major food crop when there was nearly one percent increase in the area accompanied by 3.4 percent increase in the production. This increase was not uniform throughout the reference period of the study. During the first decade of study i.e. 1960-63 to 1970-73, there was an production of maize grew at 6.4 percent per annum while in the second decade the growth rate showed down to just 0.44 percent.

Same is the case with wheat which is the third major crop of the state. From the given table one finds that within the foodgrains category of crops, maximum increase in production was experienced by wheat where output increased at a rate of 3.8 percent per annum for twenty years inspite of there being a shrinkage of -0.25 percent in the area. This was attributed to the impact of new technological inputs. Like maize, wheat too shows that the major changes have taken place in the first decade as the growth in production was not uniform. During the year 1960-63 and 1970-73 there was an increase of 6.0 percent in production while area under wheat shrank at the rate of -1.36 percent . In the next decade output grew at the rate of 1.8 percent per annum pushing the yield level up from a mere

450 kgs. per hectare in 1960-63 to 926 kgs./hect. in 1970-73 and 1016 kgs./hect in 1980-83. This phenomenal increase in yield levels are the result of the adoption of the technological innovations and through provision of necessary infrastructural facilities. Before the new technology was introduced, yield levels were primarily influenced by the availability of irrigational facilities as the whole state is water deficient.

In the early sixties, there was a big difference in the yield level of rice region and the wheat region. the reason was purely geographical as rice was grown in the alluvial tract of Kashmir region which had assured water supply while wheat was mostly grown in the subtropical tract of Jammu region which is water deficient and irrigation is not assured. After the introduction of new technology, more and more inputs were intensively applied and it is a known fact that from among all the crops, it was wheat which benefited the most from the technological breakthrough. And so here too we find the same case. though even in the seventies, the yield of wheat (926 kgs/hect.) was very low compared to the yield of rice (1520 kgs/hect.) but the growth rate was very high in case of wheat i.e., 7.5 percent when compared with that of rice i.e. 3.6 percent. And we have seen that the increase in case of output to some extent was due to increase in area and of course the rise in the yield level but in case of wheat, there have been a shrinkage in area, it is only the yield levels which have

pushed the output up. It means that area under wheat because more productive and it is the new technological breakthrough which played an important role in the state's agricultural development. Maize too benefited from these improve inputs though the increase in the yield levels was not as impressive as that of wheat, nevertheless there was some improvement.

Apart from these three major crops a number of minor crops like barley, bajra and millets are grown. these are low value crops and one finds that in these twenty years, area under all these three crops is declining more sharply in case of barley. And the negative growth rate in area is accompanied by a negative growth rate in production also. Between 1960-63 and 1980-83, there was a sharp fall in the production of barley from 12.81 (000 tonnes) to 7.23 (000 tonnes) though yield had risen up from 608 kgs/hect to 655 kgs/hect. Compared to crops like rice and wheat this growth is very low.

Here special mention must be made of Bajra which is the only crop which shows a negative trend in all the three aspects of agriculture i.e. area, production and yield. Between 1960-63 and 1970-73, there was an impressive growth of 3.9 per annum in the yield of bajra but it fell down from 592 kgs. to 583 kgs/hect in 1980-83 and this decline took place at the rate of -0.15 percent.

The above analysis shows that area under low value and low yield crops are sharply declining while area under major crops like rice, wheat and maize and slowly declining as in case of wheat or marginally increasing as in case of rice and maize. So over the year changes are taking place in the cropping pattern.

Inspite of the impressive yield levels of these crops, the area under these crops is not increasing, it is infact declining as more and more area is devoted to non food crops. This is due to the high productivity as well as the high profit from the these commercial crops which is due to the steep price difference.

SECTION - III

LEVELS AND GROWTH OF AGRICULTURAL PRODUCTIVITY

Productivity is generally used to express the power of agriculture in a particular region to produce crops without regards to whether that power is due to the bounty of nature or to the efforts of man.

According to Dewett, "productivity expresses the varying relationship between the agricultural output and one of the major inputs, like land, labour and capital other complementary factors remaining the same....(1)

The connotation of agricultural productivity engaged the attention of many an economists at the 23rd Annual Conference of the Indian society of Agricultural Economists.(2) After a thorough discussion, it was generally agreed that the yield per acre may be considered to represent the agricultural productivity in a particular region. Pandit has defined productivity in economics as the output per unit of input and the out of getting the same output from a smaller input or of securing an increase in output from the same input. (3)

Sudhir Mukhopadhyaya in his book entitled 'Pounces of variation in Agricultural productivity classifies the sources of variation in output into three categories:

(1) **Input effect:**

Output may vary due to difference in the levels of known input used; a region or a year with a lower level of inputs is likely to produce a lower level of output.

(2) **Region Effect**

It is often observed that even though the same levels of the known inputs are used in two regions, there are still differences in output levels. This may be due to the differences other than input use in the very nature of the regions and that are stable over time. For e.g., one region may have a more fertile land than the other or the quality of other inputs used may differ between the two regions. The regions may be on different technological levels or even the history and tradition of one region may be more conductive to greater efficiency in the use of identical inputs.

(3) Temporal Effect

Output might vary from region to region and from year to year as a result of factor that are stochastic (governed by law of probability) in nature and change over space and time. The table gives details about the area, output and value of productivity per hectare in various districts of Jammu and Kashmir for the year 1960-63, 1970-73 and 1980-83 along with the growth rates in productivity.

Productivity per hectare of the district is = $\frac{\sum_{j=1} Aij\ Yij\ Poj}{\sum_{j=1} Aij}$

Where Aij is the area under crop j in District i,
Yij is the physical yield of crop j in district i,
Poj is the constant price of crop j at the state level.

The table gives details about the area, output and the value of Productivity per hectare in the various districts of Jammu & Kashmir for the years 1960-63, 1970-73 and 1980-83 along with the growth rate of productivity.

The agricultural productivity per hectare steadily increased from Rs. 1095 per hectare in 1960-63 to Rs. 1788 per hect in 1970-73 to 2376 per hect in 1980-83 at the rate of 4 percent (compound growth rate). But this increase was not uniform in all the districts. That there existed large interdistrict variations in the value productivity per hectare even before the introduction of new seed, fertilizer technology during the early sixties is clear from the table.

The introduction of new seeds fertilizer technology and increased application of improved inputs completely changed the picture. Between 1960-63 and 1970-73, we notice that the value of output of all the districts recorded a rise. From the previous table, we have seen that though it was rice which recorded an increase in the area under cultivation and maize which recorded an increase in

TABLE 4.3

AREA, VALUE OF OUTPUT AND AGRICULTURAL PRODUCTIVITY OF MAJOR CROPS IN THE YEAR 1960-63, 1970-73, 1980-83.

	Area (hect.)			Value of Out put (lakh Rs)			Productivity (Rs./hect.)			% age annual compared growth rate of productivity output		
	1960-63	'70-73	'80-83	'60-63	'70-73	'80-83	'60-63	'70-73	80-83	(A)	(B)	(C
ANANTNAG	137053	143421	160917	2546.44	3522.5	5923.4	1558	2456	3681	2.82	4.1	3.4
SRINAGAR	77136	82827	86728	1309.76	1960.84	2368.8	1698	2368	2731	3.3	1.4	2.4
BARAMULA	133541	13098	145208	2131.3	2451.30	3694.2	1596	1872	2544	1.6	3.1	2.3
KNR REG	347730	357156	392853	5987.5	7034.6	11986	1717	2232	2985	2.6	2.9	2.8
LADAKH	17034	17272	19550	121.14	153.85	212.72	709	890	1088	2.2	2.0	2.1
DODA	60082	65302	70163	535.26	1143.73	140.01	890	1737	1999	6.9	1.4	4.1
UDHAMPUR	82054	87794	102781	735.92	1321.5	190.16	896	1505	1857	5.3	2.1	3.7
JAMMU	158566	164635	189294	1322.30	2436.6	3655.6	833	1479	1931	5.9	2.7	4.3
KATHUA	81027	89162	109070	674.45	112.95	1687.56	832	1248	1547	4.1	2.1	3.1
POONCH	80671	93337	112858	175.75	1887.4	235.92	718	2022	2085	10.9	0.30	5.6
JAMMU	462400	500230	492166	3847.68	7893.18	11009.25	834	1598	1883	6.7	1.6	4.1
J & K	827187	874658	984654	9059.60	15647	23759.55	1095	1788	2376	5.0	2.8	3.9

% age Aunual Compound growth rate

A) 1970-73 over 1960-63

B) 1980-83 over 1970-73

C) 1980-83 over 1960-60

the output but it was the wheat growing regions which showed highest growth of yields. Yield level jumped up in these districts. Though there was an overall rise in the value of output per hectrare in all the districts, the rate of growth was very high in the wheat dominated districts. This increase was due to the intensification of agriculture as more and more areas were brought under irrigation and the percentage of area sown more than once also increased more in these districts. It is a well known fact that wheat reaped maximum benefit from the new technology.

Between 1970-73 and 1980-83, though the value productivity increased for all the districts, at the state level it showed an increase of 2.8 percent which was very low compared to the growth rate of 5 percent during the previous period. the highest productivity was recorded in Anantnag (Rs. 3681/-). This is much above the productivity levels in any other districts and nearly Rs. 1000/- per hectare higher than the next productivity region i.e. Srinagar (Rs. 2731/-).

During this period, the three districts of valley recorded a growth rate of 2.86 percent per annum in productivity on the other hand, Jammu division showed an growth rate of 2.1 percent which was very low compared to the growth rates of the previous periods when it was nearly 6 percent. All the districts of Jammu region have undergone a notable change as they recorded a sharp deceleration in

the growth rate during 1970-73 to 1980-83 compared to the early period of 1960-63 to 1970-73.

When we compare the region wise productivity we find that Kashmir region tops as there is a steady increase in the growth rate. The growth rate for the study period is less than 3% but there are not as many fluctuations but there are not as many fluctuations as in case of Jammu Region where the growth in the first decade was 6.7 percent while that in the 2nd decade was just 1.6 percent.

In any given state there is regional variation in agricultural productivity and the gap between high and low agricultural productivity region may either tend to get accentuated over time or may get reduced.

The changes in agricultural productivity over the years indicates patterns of changes in agricultural sector as a result of increased investment and introduction of agricultural technology.

Disparity in agricultural productivity constitutes an important factor in explaining variations in regional pattern in India as well as in various states. So it is necessary to know the levels of agricultural productivity of various regions because some of the regions have developed at faster rates while others have remained backward.

In Jammu and Kashmir, there is a lot of variation

in agricultural productivity because of variation in physical endowments.

The potential for productivity is greater if the advantages of modern scientific knowledge of increasing productivity of land are available and if this low level of intensity of land use and cultivation practices and if the fragmented social organisation inhabiting communal action are taken into account.

PRODUCTIVITY REGIONS

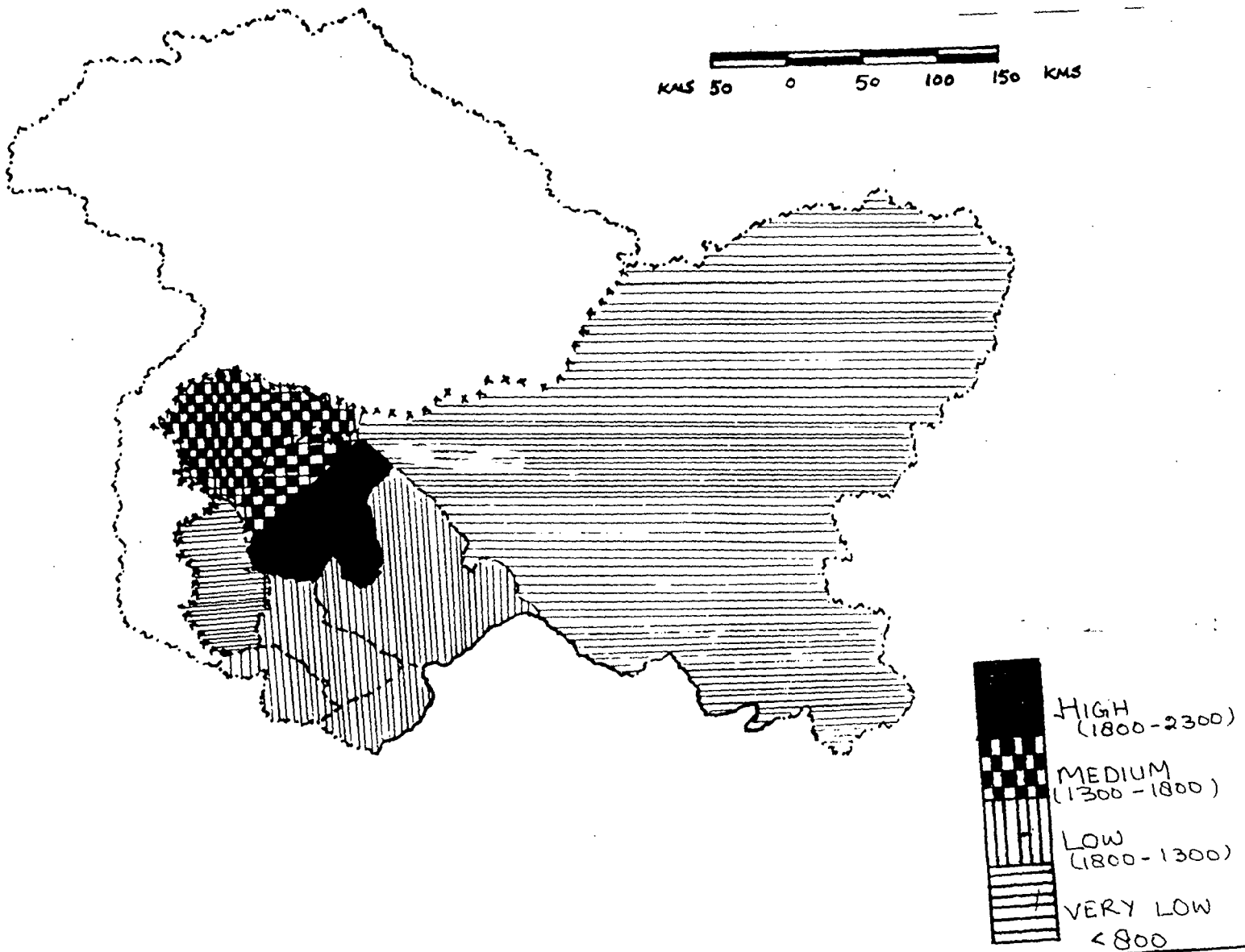
To study the problem of spatial variations in productivity, the nine districts of Jammu and Kashmir have been consolidated into five productivity classes on the basis of level of agricultural production obtained by them at thee three point of time.

In the first triennium i.e., in 1960-63, the wide variation in the productivity per hectare is brought out by the fact that with an average value of productivity of Rs. 1095/ hect., the productivity value varies between Rs. 1858/hectares and Rs. 709/hectares. The three districts of Kashmir division i.e., Anantnag, Srinagar and Baramula recorded an above average productivity. They account for 39.5 percent of the area and 62.2 percent of the total output of the 5 major crop region.

During the sixties, there was only one high productivity district i.e. Anantnag with a productivity

JAMMU AND KASHMIR

VALUE OF PRODUCTIVITY MAJOR CROPS 1960 - 63



level of Rs. 1858/hect. It accounted for 16 percent of the area and 27 percent of the output in the state.

On the other extreme there were two districts whose productivity was less than Rs. 800 per hectare. these very low productivity districts were that of Poonch and Laddakh. With 12.5 percent of the area they produced only 7.6 percent of the total output. In addition there were 4 low produ. districts that had a productivity ranging between Rs. 800/hect. and Rs. 1300/hect.

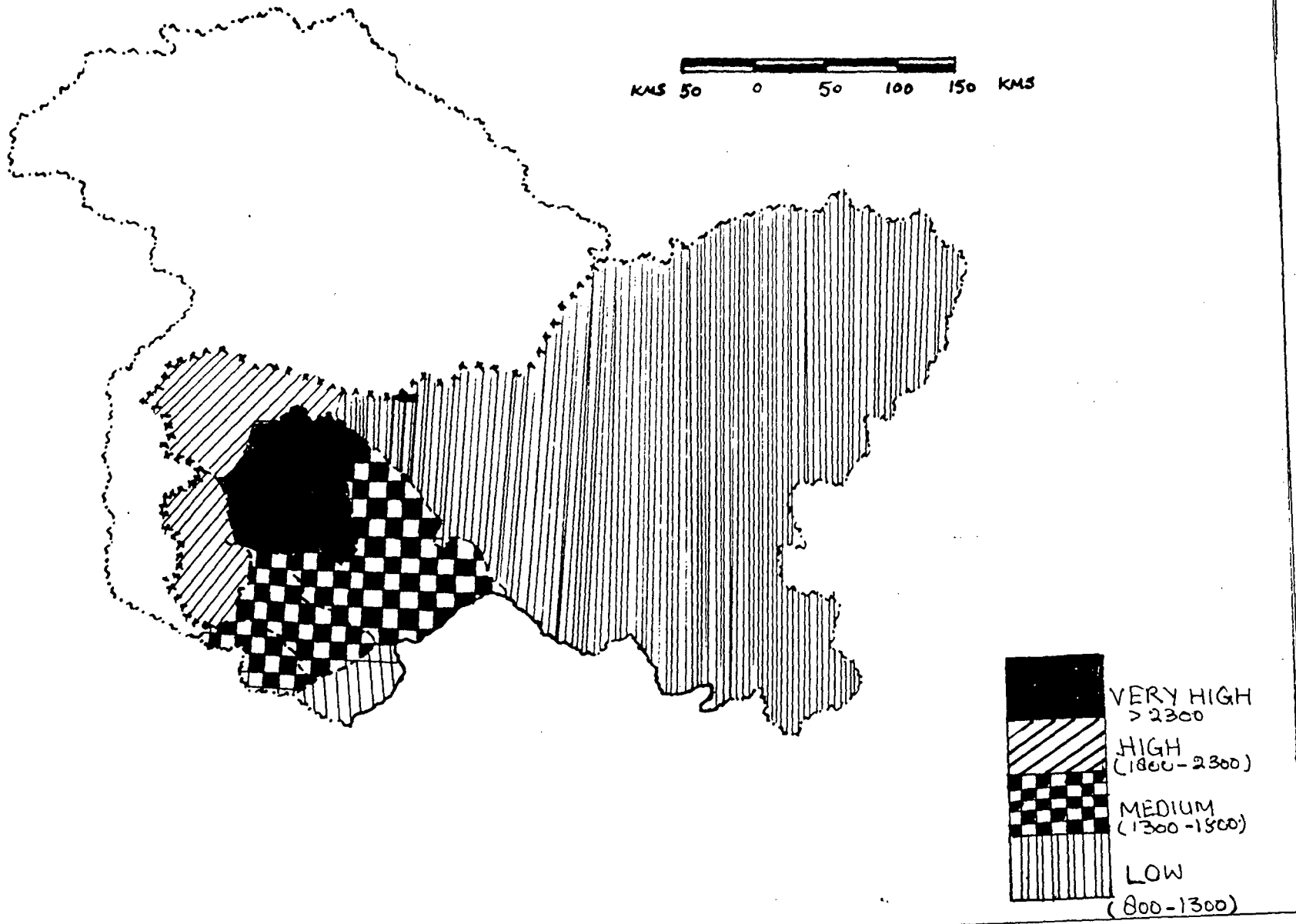
In between these two extreme groups there were two mid productivity districts of Srinagar and Baramula with productivity varying from Rs. 1300/hect. to Rs. 1800/hect. They account for 49 percent of area and 33.5 percent of output in the region.

Fig. (1) shows the spatial distribution of the productivity regions. the high and medium productivity districts are the rice growing districts while the low districts are the wheat producing regions. Ladakh region producets barley and Poonch, the other very low productivity region is the main producer of maize.

In the second triennium i.e., 1970-73 and the contribution of the wheat districts has increased dramatically. Fig. 2, shows the change in the distribution of the productivity regions. In this decade we find that Anantnag and Srinagar districts crossed the Rs. 2300/-

JAMMU AND KASHMIR

VALUE OF PRODUCTIVITY
MAJOR CROPS
1970 - 73



mark and have become highly productive regions as yield has grown at a growth rate of nearly 3.5 percent.

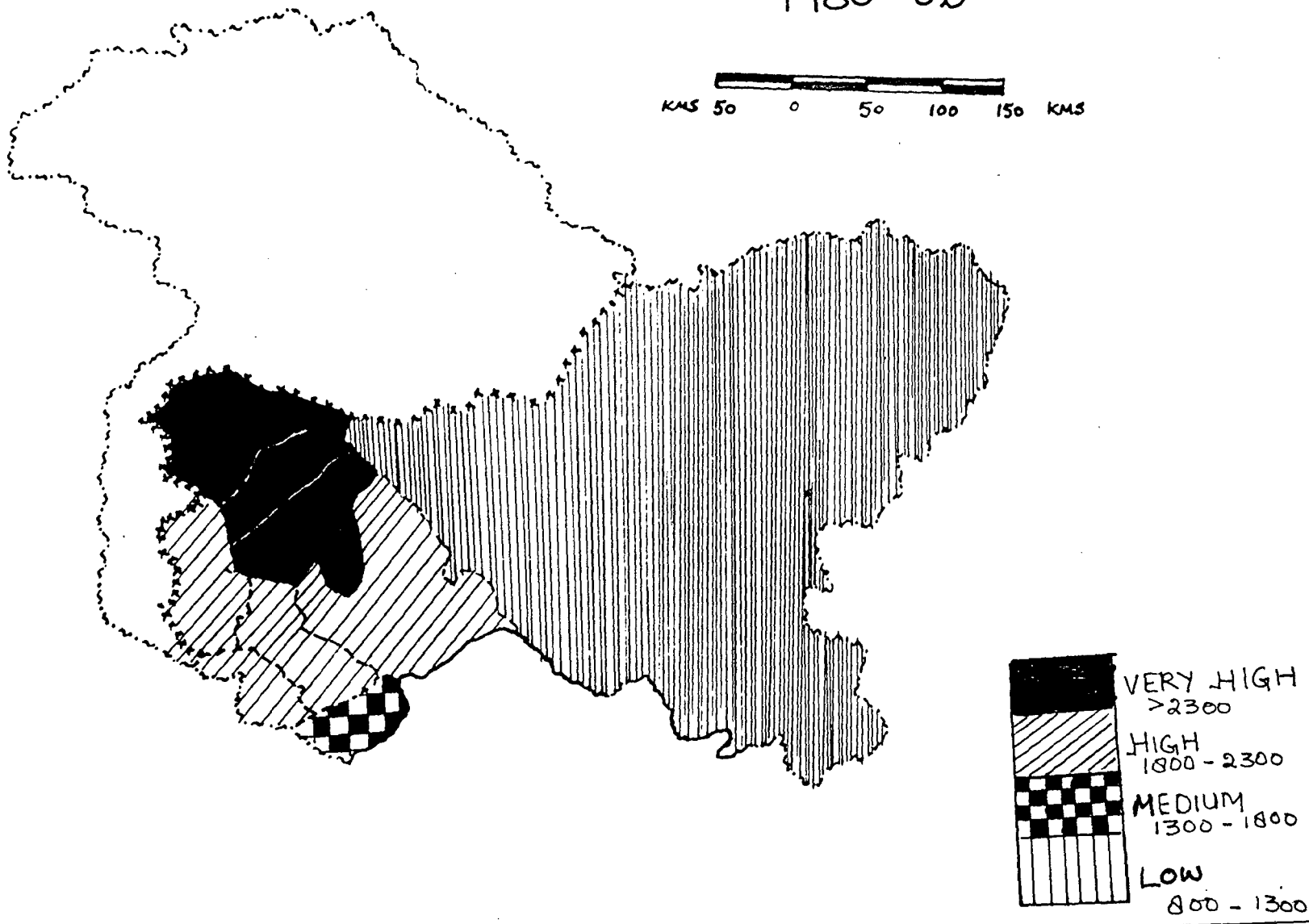
Poonch has shown tremendous growth and joined the high productivity group. Poonch acquired this with a phenomenal growth rate of 10 percent per annum. The other district which joined the high productivity class was Baramula where due to decline in area under the 5 major crops the rate of growth was very less. So while the other two valley districts crossed the Rs. 2000/- hect. mark it lagged behind with Rs. 1872/hect but still it graduated from being a medium productivity to high productivity region. there was a lot of movement in the other districts of Jammu division as well apart from that of Poonch. Jammu, Doda and Udhampur moved up in the medium productivity class with a value productivity of Rs. 1439/- Rs. 1737/- and Rs. 1505/- per hectare respectfully.

In this decade, Ladakh and Kathua moved up from being very low productive regions to low productivity regions.

Even between these two districts there was a lot of variations. Ladakh crossed the very low productivity bar with just Rs. 90/hect., (Rs. 890/hect\) and Kathura with a productivity value of Rs. 1248/hect just missed the medium productivity region by Rs. 52/hect. So Ladakh was somewhere on the bottom of the class of Rs. 800-1300 while Kathua was somewhere on the top.

JAMMU AND KASHMIR

VALUE OF PRODUCTIVITY
MAJOR CROPS
1980-83



In the 3rd triennium i.e., in the eighties (1980-83) further shiftings have taken place. Baramula with a value of productivity of Rs. 2544/hect has joined the very high productivity class along with Anantnag and Srinagar while the medium productivity districts of Doda Udhampur and Jammu have really shown upward movement and joined the high productivity class.

Out of the two low productivity districts, Kathua with a productivity value of Rs. 1547/hect. has moved to the medium productivity class while Laddakh district with a productivity value of less than Rs. 1300/hect. has remained a low productivity district.

Going by these productivity regions and after studying the chapter 2nd i.e., Introduction to the region, we find that the high productivity districts are relatively better placed in terms of physiographic characteristics climatic conditions, texture of soil, irrigational facilities and infrastructure. As a result of all these factors these districts (valley districts) have enjoyed relatively higher agricultural productivity per hectare of gross cropped area.

On the other hand, low productivity districts of Laddakh is characterised by rugged and rocky typographical attributes with hard sandy surface, poor infertile soil, scanty rainfall and insufficient irrigation facilities. All these factors are unfavorable for intensive cultivation.

Another main reason for its low productive nature is that its soil is not suitable for the cultivation of high value crops like rice and maize. Apart from geographical features there are many ;other factors which causes the low productivity of this region.

SECTION - IV

PRODUCTIVITY AND USE OF MODERN AGRICULTURAL INPUTS

Now that we have already seen how levels of productivity differs in different districts of Jammu and Kashmir, we will attempt to analyse the causes which are responsible for differences in levels of productivity and the reasons for narrowing down of these differentials over the years.

The difference, in productivity per hectare can be due to difference in cropping pattern coupled with difference in physical yield levels arising due to differential use of inputs. T he differences can also occur due to different prices for different crops. Thus, it is possible for a district to have a higher level of productivity than another district, even when it has lower physical yield in most of the crops, provided its share of area under high value crops is much higher. Cropping pattern, to a great extent, gets determined by physical conditions of production like soil types, pattern of rainfall, topography and elevation from sea levels etc. No doubt, the yield levels of a crop are also influenced by these physical conditions, however, the degree of maneuverability in raising the yield levels through technological innovations and through provisions of necessary infrastructural facilities in much higher than in

changing the cropping patter. For e.g., under the given state of technology, it is difficult to develop a cropping pattern similar to Anantnag in a district like Laddakh located in the arid zone. But, by making investments in electricity power, pumpsets or by increasing the application of yield augmenting inputs like fertilizers, seeds, etc it is possible to increase the yield level of a crop in both the districts by differing magnitudes.

Thus, if one has to understand the role that the provision of modern farm inputs have played in accentuating the regional disparities in productivity levels across districts, one must first assess and understand the reasons for differences in the productivity levels before the introduction of new seed, fertilizer technology. One has to clearly assess to what extent these difference were due to difference in cropping pattern and to what extent due to difference in the physical yield of different crops. From the table we can see that in the sixties, before the advent of new technology, yield levels were primarily influenced by availability of irrigation. Kashmir region has a very high level of productivity per hectare as compared to Jammu and Laddakh. A special note must be made about the 100 percent irrigation in Ladakh. This figure is a misnormer as it has been already explained, Laddakh is a water deficient area and due to the lack of assured water supply, only 6 percent of the total reported area is cultivated and this limited cultivation is due to the limited water supply since this

TABLE NO 4.4.

PRODUCTIVITY AND INPUT USE

(A)

District	Productivity level/hect.			Fertilizer Consumption kg/hect.		
	60's	70's	80's	60's	70's	80's
Anantnag	1858	2456	3681	2.68	12.71	66.28
Srinagar	1698	2368	2731	1.90	11.14	43.89
Baramula	1596	1872	2544	1.37	5.68	37.27
Kashmir Region	1717	2232	2985	1.98	9.84	49.14
Doda	890	1737	1999	2.36	0.65	7.72
Udhampur	896	1505	1857	0.32	0.61	9.43
Jammu	833	1479	1931	1.89	4.65	38.12
Kathua	832	1248	1547	0.56	3.71	13.15
Poonch	718	2022	2085	0.23	0.33	2.46
Jammu	834	1598	1883	1.07	1.99	14.17
Laddakh	709	890	1088	NA	NA	NA
J & K	1095	1788	2376	1.48	5.39	30.79

(8)

	Tractors/Lakh hectares			Pumpset and Tubewells/lakh hec		
	60's	70's	80's	60's	70's	80's
Anantnag	4.3	19.5	134	2.1	10.4	29.8
Srinagar	NA	2.4	5.7	11.6	67.6	156
Baramula	.7	3.0	4.1	10.4	42.7	123
Kashmir Region	2.5	8.3	47.9	7.8	40.23	102.93
Doda	x	x	x	x	x	x
Udhamput	x	4.5	10.7	2.4	6.8	3.8
Jammu	27.7	186	249	24.5	65.5	245
Kathua	1.2	71.7	84.3	16.0	7.8	165
Poonch	1.2	x	12.4	1.2	X	3.5
Jammu Region	6.0	52.54	71.28	8.82	16.02	83.46
Laddakh	x	5.7	856.2	x	x	x
J & K	12.8	46.8	83.9	9.7	28.3	103

(C)

	Agricultural Work/hect.			Percentage of GIA to GCA		
District	60's	70's	80's	60's	70's	80's
Anantnag	1.74	1.35	1.37	61.01	63.81	67.76
Srinagar	1.79	1.24	1.28	63.36	63.33	66.73
Baramula	1.80	1.40	1.44	47.14	48.11	45.82
Kashmir Region	1.77	1.33	1.36	56.21	57.95	59.42
Doda	2.07	0.68	1.58	14.70	13.14	10.99
Udhampur	1.27	0.91	1.07	9.78	6.97	6.75
Jammu	0.63	0.58	0.63	32.87	38.28	47.79
Kathua	0.80	0.56	0.64	14.80	21.85	24.95
Poonch	1.32	0.96	0.97	10.69	10.51	10.90
Jammu	1.21	0.73	0.97	16.55	18.11	20.26
Laddakh	2.95	2.15	2.18	100	99.9	99.6
J & K	1.39	1.06	1.11	36.46	37.80	40.38

place is deficient in rainfall, cultivation is taking place with the help of local stream and Nallahs and only that much of land is cultivated for which water is available so more land can be brought under cultivation if we provide proper irrigation facilities to this area. In the sixties there was a huge difference in the productivity level of the districts of Jammu region and Kashmir region. And it has been attributed to the difference in irrigation facilities as is clear from the table No. 4.4. In Kashmir region, nearly 56.21 percent of the area was irrigated while in Jammu 16.55 percent of the area was irrigated. Apart from this, consumption of fertilizers was very low in both the region.

But in the seventies, when agriculture was mechanised in Jammu division and more and more mechanical components like pumpsets, tubewells, and tractors were used, the yield level started increasing. The growth in yield level was very high in case of Jammu as compared to that of Kashmir region. Though the productivity level per hectare of Jammu was much lower than that of Kashmir region, but the disparities have started narrowing since sixties. As the productive capacity of land was utilised to the full extent in the seventies in Jammu region it was not able to sustain the high growth rate so in the second decade there was only a slight increase in the yield level. So while Kashmir region has maintained its pace of growth at all the three points of time it is Jammu region where yields have grown at

a comparatively faster rate due to modernization of agriculture especially mechanisation. Ladakh division, too has marginally improved the productive capacity of its land due to insufficient agricultural infrastructure.

The analysis in the preceding sections suggested that the intensity of resource use and overall productivity levels of important crops differ quite significantly among the various districts of the state of Jammu and Kashmir such findings, are based, however, on simple averages and offer no guideline to simultaneous operations of various factor determining productivity levels of various districts. In other words, the findings do not tell us the contribution to output of individual factors in a situation where many resources interact with one another.

In this section, we seek to determine the extent to which the important factors determine and explain the variability in the average productivity per hectare. We have adjusted the out put of five crops in order to account for the excluded crops. For this we have calculated for each district, the proportion that these crops constitute out of the total gross cropped area during the three points of time i.e. 1960-63, 1970-73 and 1980-83. The value of output for each district was inflated accordingly on the assumption that the average productivity of the excluded crops is the same as that of the five major crops, taken into consideration, under study.

Since for most districts the 5 crops cover above 90 percent of the gross cropped area in the respective districts, extent of over estimation and understimation is hopefully limited. The variations in the per hectare productivity levels across the various districts of the state are sought to be explained by five explanatory or independent variables namely per hectare use of fertilizers, agricultural workers per hectare, the percentage of gross irrigated area to gross cropped area, number of tractor per lakh hectares of NAS, and number of pumpsets and tubewells per hectares of NAS. Since our main purpose is to identify the main determinants of variations in agricultural productivity across various districts, a stepwise multiple regression procedure was thought to be the most appropriate as the problem of multicollinearity is taken care of.

The stepwise regression method helps to identify the best set of explanatory variables according to their importance for maximum variations in the dependent variable. In practice the method keeps an adding an independent variable at a time and generating a series of intermediate relationships until all relevant variables are arrived at.

The choice of specific functional form is essentially guided by the economic theory. We fitted both linear and double log linear relationships to the relevant data. The linear relationship was found to be rather weak, however, the signs of the coefficients were as expected .

The double log relationship gave better results as the explanatory power of the model turn out be 89 percent which is signifacnt at .01 level.

$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5$

The regression coefficients gives in the productivity elasticity of various inputs.

Stepwise Regression Results 1960-63

The analysis of the simple correlation matrix. Table A(1) reveals that fertilizer consumption (.72) agricultural workers (.73) and irrigation (.89) are all positively related to agricultural productivity whereas the correlation coefficient for irrigation was significant at 1 percent level. The other two variables are significant at 5 percent level. The correlation matrix also gives the intercorrelation among the explanatory variables.

The stepwise regression results for 1960-63 are given in table A(ii). The table shows that the first variable introduced is irrigation and the second variable is fertilizer consumption. The order by which the explanatory variables are introduced is given in the table. Adjusted R^2 indicates the percentage of variation in dependent variable i.e. agricultural productivity, explained by the explanatory variables. All the variables put together were able to explain as high as 89 percent of the variations in

Factors Associated with Agricultural Productivity

(i) Correlation Matrix (60-63)

Variables	LA	LX_1	LX_2	LX_3	LX_4	LX_5
LA	1.000	.721**	.730**	895*	-.132	-.140
LX_1		1.000	.093	.919*	.538	.350
LX_2			1.000	.435	-.585	-.653***
LX_3				1.000	.230	.174
LX_4					1.000	.329
LX_5						1.000

ii) Regression Coefficients step wise (60-63)

Steps/ Variables	1	2
LX_3	.49**	.39**
	(3.84)	(3.81)
LX_2		.38**
		(3.95)
Intercept	5.33	5.61
R^2	.73	.88
F	12.12	17.07

productivity levels of various districts in Jammu and Kashmir in 1960-63.

Stepwise Regression Results 1970-73

Table B(i) gives the correlation matrix for 1970-73. It reveals that fertilizer consumption (.66), irrigation (.86) and agricultural workers (.68) are positively related to agricultural productivity. the correlation coefficients are significant at 10 percent, one percent and 5 percent respectively. As regards multicollinearity it is found that GIA/GCA and fertilizer consumption are strongly related and are significant at one percent level.

The stepwise regression results for 1970-73 are given in table B(ii). It reveals that the R^2 is .68 meaning that only one variable fertilizer is explaining 68 percent of the variations. Addition of the second variable further increases were explanatory part of the model to 81 percent which is significant at 5 percent level of significance. Addition of the third variable brings down the explanatory power of the model due to multicollinearity amongs the independent variables. That is to say in 1970-73, agricultural workers and fertilizer consumption are significantly related to and are important in explaining the inter district variations in agricultural productivity. Fertilizer consumption is significant at 10 percent and agricultural workers are significant at one percent level.

Correlation matrix (70-73)

Variables	LA	LX_1	LX_2	LX_3	LX_4	LX_5
LA	1.000	.668***	.866*	.683**	-.544	.319
LX_1		1.1000	.381	.980	.043	.501
LX_2			1.000	.430	-.800*	.156
LX_3				1.000	-.004	.628**
LX_4					1.000	-.080
LX_5						1.000

ii) Regression Coefficients step wise (70-73)

Steps/ Variables	1	2
LX_2	.569**	.470**
	(3.45)	(3.34)
LX_1		.099***
		(2.85)
Intercept	7.51	7.35
R^2	.683	.805
F	11.95	11.32

Regression Results 1980-83

Table C(i) gives the correlation matrix for 1980-83. It reveals that agricultural workers (.79) and irrigation (GIA/GCA) are positively related to agricultural productivity. They are also significant at 5 percent and 10 percent respectively.

Table C(ii) gives the stepwise regression results for 1980-83. It shows that R^2 increases upto the fifth step, thereby indicating that all the five variables put together explained 99 percent of the interdistrict variations in the levels of agricultural productivity in 1980-83. Of these five variables, agricultural workers, irrigation, and tubewells and pumpsets were highly significant at one percent level throughout the steps. The regression equation for 1980-83 is given as follows.

In the preceding section, stepwise regression results are analysed at length and best possible indicator of agricultural productivity are identified for the three points of time. It could be relevant to study the behaviour and importance of significant variables over the period under study that covered pre and post Green Revolution period. In 1960-63 irrigation and use of agricultural workers were significant factors determining of the agricultural productivity. In 1970-73, however, fertilizer become the most significant variable in explaining the

Correlation Matrix

Variables	LA	LX_1	LX_2	LX_3	LX_4	LX_5
LA	1.000	.590	.796**	.614***	-.096	.027
LX_1		1.000	.297	.870*	.246	.703
LX_2			1.000	.222	-.633	-.235
LX_3				1.000	.250	.793*
LX_4					1.000	.280
LX_5						1.000

(ii) Regression Coefficient: Stepwise (80-83)

Steps/ Variables	1	2	3
LX_2	.664*	1.02*	.895*
	(3.94)	(6.40)	(5.7)
LX_4		.119*	.091*
LX_3			.077*
Inter opt	7.713	7.318	7.14
R^2	.560	.868	.907
F	8.641	20.73	20.65

* significant at one percent

** significant at 5 percent

*** significant at 10 percent

figures in the bracket give t values.

interdistrict variations in agricultural productivity. In the 80's, one again finds that the agricultural workers turned out to be the most significant variable which is unexpected. However, irrigation are found to be critical inputs determining the levels of agricultural productivity across states. But fertilizer consumption does not come out to be an important factor in determining the productivity level. This may be due to the problem of multilinearing as that is high correlation between irrigation and fertilizer inputs.

CONCLUSION

The State of Jammu and Kashmir had a weak production base to start with in 1950's, which was the natural outcome of the two hundred odd years of imperialist exploitation. Balanced regional development has been accepted as one of major objectives right from the beginning of the planning process. it is in this background that an attempt has been made in this study and to examine (1) the inter-district disparity in the levels of development of various sector of the economy, the major focus being on agriculture and allied sector and (2) to explain the inter-district variations in agricultural productivity in terms of levels of use of selected inputs in agriculture, at three points of time i.e. 1960-63, 1970-73, and 1980-83.

Our discussions with regard to the variations in levels of development leads to the following conclusions. On the productivity front we find that the three districts of Kashmir region fall in the very high productivity region, Jammu region fall in the medium productive region, Ladakh is the only district which fall in the low productivity category. Ladakh is a problem area which requires special attention on the part of policy makers and administration to develop this district through areas specific programs of development.

Jammu productivity increased sharply and this increased attributed to introduction of new mechanized inputs. In the 60's all the districts of Jammu region in low category. But over the years due to the introdution of new technology and proper irrigation facility this region received a facelift and all districts except for Kathue were in the high productivity category in 1983.

Our study shows that the introduction of new technology after the mid sixties is gradually but surely changing the production structure of Agricultural in Jammu and Kashmir. Whereas in traditional slow growing agricultural regions, labour is the main factor of production, the new technological inputs are gradually emerging as predominant contributors to increase in yield levels particularly in the high growth districts of Jammu region. Infact with the introduction of new technology, even the traditional factors, in combination with modern inputs have tended to become more productive in high growth areas. However, it is notable that with the introduction of new technological inputs like fertilizer, tractors and tubewells and with increase in the intensity of cultivation, elasticity of labour declines and it ceases to be a predominant factor of production.

At the state level, the rate of agricutural development has not been very dramatic while at the district level a lot many changes have taken place. To understand

the interdistrict variation in the pace of agricultural development, a thorough study regarding the disparities in the growth and levels of agricultural sector and other allied sectors was undertaken and it was found that all the development showed improvement over time, it was the new agricultural inputs which explained most of the interdistrict variation in yield level. The new agricultural inputs are a very important component of agricultural development. On the state level, while the number of tractors has increased, more and more villages have been electrified and fertilizer consumption has also increased. This increase is not distributed equally amongest the districts of the state. Jammu benefited the most and Ladakh the least.

Jammu region had a greater percentage of mechanised inputs as compared to Kashmir and Ladakh region and Kashmir region's consumption of fertilizer was must greater than that of the other two districts.

Irrigation facilities were concentrated in the valley districts as only Kashmir region enjoys assured water supply. In Jammu region more and more pumpsets and tubewells were dug as it is water deficient so that it could come up on the agricultural front while in Ladakh, the difficult tarrain and lack of electricity makes it difficult to use these mechanised inputs. Still as more and more irrigation facilities are extended, the gap is narrowing.

When we compare the growth in agricultural development with that of overall economic development we see that districts which are agriculturally developed are also economicually developed. For the whole state, a lot many changes have taken place. Literacy level has increased, road length has improved considerably, number of banks, post offices etc. have increased. But when we go through the share of different districts in the growth we find that over the years disparity has increased. Baramula, Jammu and Srinagar have enjoyed maximum growth while Ladakh and Poonch show the least growth.

When we see the levels of development attained by all the districts we see that a lots of changes have occured over time.

Jammu, Srinagar, Anantnag and Baramula are highly developed region while Ladakh, Ponch and Doda are low developed.

The indices of overall development shows that barring a few exceptions there has not been any major change in the relative positions of various districts, during the periods under study. There is hardly any instance of any district moving from very high to low rank and vice-versa. Whatever changes have taken place they are mostly confined to movements within the groups. The districts of Jammu and Srinagar are the top ranking districts and Ladakh and

Udhampur remained at the bottom end of the scale at all the three points of time under study. The districts of Anantnag and Doda have gradually gone down along the scale and Poonch has improved its position during the periods under study. The picture that emerge with regard to the regional pattern of development with regard to individual sector under study is almost a replica of the picture emerging from our analysis of the overall index of development. There were however, few exception.

The coefficient of variation of the overall index of development has increased over the years indicating, thereby, that the level of dispersity has gone up. It declined marginally from 22 percent to 21 percent between 1960-63 and 1970-73 and the shot up to 25 percent in 1980-83. This is however, not true for all the sectors we have taken into consideration. In case of irrigation and social and economic overheads, the level of inter-district disparity was not very high but it has increased over the years. However, in case of agriculture which is the dominant sector in the state economy and a source of livelihood for most of the people in the state the coefficient of variation has increased marginally in the 1980s. The level of interdistrict disparity in agricultural development was at a very low level as compared to other sectors, at all the three points of time under study.

Our results in terms of regression analysis shows that the various analysis shows that in the levels if agricultural productivity are largely in conformity with the respective headway achieved with regard to levels if inputs workers and irrigation have turned out to be significant in determining levels if agricultural productivity during the period under study. Use of tractors and fertilizer have entered as critical determinant of agricultural productivity only during the 1980s. This shows that the process of mechanisation of farm operation started late in the Jammu and Kashmir, compared to other state.

BIBLIOGRAPHY

BOOKS

Adhyay, M. and Sudhir, K., Sources of Variation of Agricultural Productivity (New Delhi : Macmillan, 1976).

Bamzai, P.N.K., Kashmir and Central Asia (Trivandrum : Light and Life Publishers, 1980).

Bhalla, G.S. and Tyagi, D.S., Patterns in Indian Agrucultural Development - A District Level Study (New Delhi : Institute in Studies in industrial Development, 1989).

Bhatia, B.M., Poverty, Agriculture and Economic Growth (New Delhi : Vikas Publishing House, 1977).

Banifetera, L.I., et. al., Problem of Economic Regionalization in Developing Countries (Moscow : Nanka, 1960).

Chaudhuri, P. ed., The Indian Economy and Development (New Delhi : Vikas Publishing House, 1978).

Chaturvedi, B.K. and Tyagi, B.N., Regional Disparities - A Measure and Role of Power in G.P. Mishra ed. Regional Structure of Development and Growth in India Vol. 1 (New Delhi : Ashish Publishing House, 1985).

Clark, C., Condition of Economic Progress (London : Macmillan, 1971).

Cohen, R.L., The Economics of Agriculture (London : Cambridge, 1956).

Das Gupta, A.K., Agricultural and Economic Development in India (New Delhi : Associated Publishing House, 1973).

Dewett, K.K. and Singh, G., Indian Economics (Delhi, 1966).

Dutta, A.K., India : Resource Potentialities and Planning (New Delhi : Oxford and IBH, 1979).

Eicher, C. and Witt, L., Agriculture in Economic Development (Bombay : Vora, 1970).

Galbraith, V.K., Economic Development (London : Harvard University Press, 1968).

Govind, N., Regional Perspective in Agricultural Development (New Delhi : Concept Publishing Company, 1986).

Hassnain, F.M., Ladakh : The Moonland (Delhi : Light and Life Publisher, 1977).

Heady, E.O., Economic of Agricultural Production and Resources Use (New York : Princeton Hall, 1964).

Hedin, Steven Trans Himalaya (London : Macmillan, 1910).

Hirschman, A.O., The Strategy of Economic Development (New Haven : Yale University Press, 1972).

Kendrew, W.G., The Climates of the Continents (London : Oxford University Press.

Khan, S., Agricultural Modernisation in India (New Delhi Anmol Publishers, 1989).

Koul, P.A., Geography of Jammu & Kashmir State (New Delhi : Right and Lift Publishers, 1925).

Kundu, A., Measurement of Urban Process - A Study of Regionalisation (Bombay : Popular Publishers, 1980).

Kundu, A. and Rasa, M., Indian Economy, The Regional Dimension (New Delhi : Spectrum Publishers, 1982).

Leindleberger, C.P., Economic Development (New York : Mc. Graw Hill Book Co., Students Edition, 1965).

Lewis, A., The Theory of Economic Growth (London : Allen and Unwin, 1955).

Mahmood, A., Statistical Techniques in Geography.

Meier, G.M., Leading Issues in Economic Development (Hong Kong : Oxford University Press, 1975).

Mellor, J.W., Towards a Theory of Agricultural Development, in "South Worth and Johnson eds." Agricultural Development and Economic Growth (New York, 1967).

Mitra, A., Levels of Regional Development in India (Census, 1961).

Myrdal, G., Asian Drama (Pantheon, 1968).

Nanjundapa, D.M. and Sinha, R.K., Backward Area Development : Problem and Prospects Sterling Publishers Pvt. Ltd., New Delhi 1982.

Panda, G.C., Economic Development and Planning (New Delhi : Anmol Publisher, 1989).

Prakash Rao. V.L.S., Urbanisation in India, Spatial Dimensions (Delhi, 1983).

Raina, A.N., Geography of Jammu & Kashmir (New Delhi : National Book Trust, 1971).

Rajput, M.S., Agricultural Productivity in India (New Delhi : Discovery Publishing House, 1985).

Rao, H., Tehnological Change and Distribution of Gains in Indian Agriculture (Delhi : Macmillan, 1975).

Rao, H., Interstate Disparities in Development in India, in Regional Structure of Development and Growth in India, Vol. 1 ed. by C.P. Mishra (New Delhi : Ashish Publishing House, 1985).

Ray, S.K., Intensification of Agriculture, A Study in Plains of Uttar Pradesh (New Delhi : Hindustan Publishing Corporation, 1985).

Schultz, T.W., Transforming Traditional Agriculture (New Haven, 1964).

Sen, B., The Green Revolution in India (New Delhi : Wiley Eastern, 1974).

Siddiq, W., Ladakh Between Earth and Sky.

South Worth and Johnston, B.F., eds., Agricultural Development and Economic Growth (New York : Cornell University Press, 1967).

Spate, O.H.K., Learmonth, A.T.A., Farmer, B.H., India Pakistan and Ceylon, The Regions (London : Methun and Co. Ltd.,).

Swarup. R., and Sikka, B.k., Agricultural Development in H.P. (New Delhi Agricde Publishing Academy, 1983).

Terra, H.De., Studies on the Ice age in India (Washington : Carngie Trust, 1939).

Thorbercke, E., eds., The Role of Agriculture in Economic Development (Calcutta).

Thorner, D., Agrarian Prospect of India (New Delhi : University of Delhi, 1954).

Vardee G., J.P., Introduction to Muthivariate Analysis for Social Sciences (San Francisco : Freeman and Co., 1971).

Articles, Journals etc

Bhat, M.S., "Planning in Jammu and Kashmir" Mainstream, August 28, 1976, pp. 18-22.

Bardhan, K., "The Green Revolution and Socio-economic Tension : The Case Study of India", International Social Review Journal Vol. 25, No. 3, 1973.

Boudhayan, C. and Raza, M., "Regional Development : Analytical Framework and Indicators" Journal of Regional Science Vol. VII, No. 1, 1975.

Gopala Krishnan, M.D. and Rao, R.K., "The Regional Variation and Agricultural Productivity in A.P." Indian Journal of Agricultural Economics, Vol. 19, No. 1, 1964, pp. 227-236.

Hansen, N., "Unbalanced Growth and Regional Development", Economic Journal, Vol. 4, 1965 a, pp. 3-14.

Jha, L.k., Jammu & Kashmir (Development Review Committee), Report, Vol. 6, 1977.

Johnston, B.F., and Mellor, J.W., "The Role of Agriculture in Economic Development", American Economic Review Vo. 51, 1961.

Minhas, B.S. and Vaidyanathan, A., "Growth of crop output in India" 1951-54 to 1958-61 An analysis of Component Elements, Journal of Indian Society of Agricultural Statistics" Vol. 17, pp. 230-252.

Misra, U.N., Growth of Crop Output in Gujrat : A Component Analysis Anvestan Vol. 1 June pp 1-15.

Myint, A., "Demand Approaches to Economic Development" Review of Economic Studies Vol. 27, 1960.

N.C.E.A.R., Techno - Economic Survey of Jammu and Kashmir Delhi, 1970.

Pal. M.H., "Regional Dispartities in the Level of Development in India Indian Journal of Regional Science Vol. 7, No. 1, 1975, pp. 35-52.

Pandit, A.D., "Application of Productivity Concept of Indian Agriculture Productivity" Special Issue on Production Vol. 6,12 and 31, 1965.

Parikh, A., "Cropwise, District Wise, Production Function Indian Journal of Agricultural Economist, Vol. 25(1), Jan/March.

Raj, K.N., "Some Features of Economic Growth of the Last Decade in India" Economic Weekly, Vol. 13, 1961, pp. 253-276.

Rao. A.P., "Size of Land Holding and Productivity" Economic and Political Weekly, November, 1967.

Rao, G.V.K., "Irrigation Development in India Task for Future" Bhagirathi, Vol. 27, No. 3, 1980.

Rao, S.K., "Inter Regional Variations in Agricultural Growth" Economic and Political Weekly, Vol. 16, No. 27, 1971, pp. 1333-46.

Rao, S.K., "Inter Regional Variations in Agricultural Growth 1952-53 to 1964-65 : A Tentative Analysis in Relation to Irrigation" Economic and Political Weekly, July 3, 1981.

Sen, A., "Size of Holdings and Productivity" The Economic Weekly, Vol. 16, Feb. 1964.

Singh, J., "An Agricultural Atlas of India : A Geographical Analysis" Kurukshetra, Vishal Publication, 1974.

Srivastava, U., Crown, R.W. and Heady, E.O., "Green Revolution and farm Income Distabilation" Economic and Political Weekly, Vol. 6, No. 52, Dec. 1971.

Venkataraman, L.S. and Prahalchar, M., "Study of Cropping Pattern Changes in A.P., 1950-75", Indian Economic Review.

Venkatash Worlu, U., Growth in Agricultural Output in A.P. 1952-53 to 1961-62 Arthaniti Vol. 8(2) July, 157-170.

Walter F. P., "The Green Revolution : Generation of Problems" American Journal of Agricultural Economics Vol. 50, Dec. 1971.