REGIONAL DISPARITY IN AGRICULTURAL DEVELOPMENT OF KARNATAKA – AN ECONOMIC ANALYSIS

Thesis submitted to the
University of Agricultural Sciences, Dharwad
in partial fulfillment of the requirements for the
Degree of

Master of Science (Agriculture)

In

Agricultural Economics

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JUNE, 2014

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INTRODUCTION

When an economy is poised to develop, it is desirable that development to be inclusive. The development effort should not bypass certain areas of the groups. If the growth process excludes certain regions or groups, the sustainability of development itself is threatened. Therefore, now increasing emphasis is laid on inclusiveness, so that growth can be sustainable economically, socially and politically in the long run. Balanced regional development should be the guiding principle of development planners and practitioners.

India is a large federal nation which has a unique culture and greatest civilization of the world. It stretches from snow-capped Himalayas in the North to sun drenched coastal villages of the South, the humid tropical forests on the South-west coast, the fertile Brahmaputra valley on its East to the Thar Desert in the West. It covers about an area of 32,87,263 sq. km. It has achieved all-round progress during the last 64 years of its independence. India is seventh largest country in the world and ranks second in the population.

Indian economy at the dawn of 21st century finds itself at the cross-roads. Last few years have seen its transformation from an ailing agricultural economy to a rapidly growing one with service sector emerging as the power house for the economy. The economy has experienced an average annual growth rate of approximately 6 to 8 per cent during the last two decades. As is to be expected, improvement in economic growth and per capita income has translated, at least partly, into reduction in the level of poverty in the country and accelerated improvement in various indicators of human development. However, there is a broad consensus among critics as regards growth not being inclusive and balanced. It is claimed that there exist huge diversity and regional disparity across the economy at state level. The gap between rich and poor regions that existed even at the time of independence has widened over the years and significantly intensified during the period of reforms.

Agriculture is the mainstay of economy. Agriculture not only provides food and raw material but also employment opportunities to a very large proportion of population. In the course of economic development, agriculture employs majority of population (upto 52%). This means raising the level of the national income and standard of living of the common man. The rapid rate of growth in agriculture sector gives progressive outlook and further motivation for development. As a result, it helps to create proper atmosphere for general economic development of the economy. Thus, economic development depends on the rate at which agriculture grows. Agriculture in India has a significant history. Today, India ranks second worldwide in farm output. Agriculture contributes nearly 13.70 per cent of Gross Domestic Product (GDP) of India. While about 52.10 per cent of population is dependent on agriculture, for their livelihood and the sector accounts for 10 per cent of India's export earnings. The growth of agriculture is prerequisite for overall development of Indian economy. It contributes significantly to the export earnings and affects the performance of other sectors of the economy through forward and backward linkages. The performance of the agriculture sector during the past three decades is satisfactory. The rapid increase in population and standard of living as a result of economic development exerts pressure on the demand which can be met only through adequate supply of agricultural output. Despite many advances in technology, the efforts to reduce hunger are at standstill. This calls for enormous efforts for sustained growth of agricultural output which can be achieved mainly through the appropriate technological adoptions.

Indian agriculture is known for its diversity, which is mainly the result of variations in resource endowments, climate, topography, historical, institutional and socio economic factors. Policies followed in the country and nature of technology that became available over time has reinforced some of the variations resulting from natural factors. As a consequence, production performance of agriculture sector has followed an uneven path and large gaps have developed in productivity between different geographic locations across the country.

Accelerated growth in agricultural production and productivity is essential for overall stability of the Indian economy. Agricultural performance was found to be based on the total cropped area, yield per hectare, irrigation water, closely followed by regulated markets and road network. There exists good scope to exploit the unexploited regions of the country to increase their agricultural performance in the future. The role of agricultural development in overall economic growth, food security, generation of employment opportunities through numerous direct and indirect linkages, alleviation of rural poverty and in improving overall quality of life of the population is well accepted. For rapid, inclusive, equitable and sustainable development, it is therefore crucial not only to put the

agriculture on fast growth trajectory but also to reduce the persisting widespread disparities across regions. Whatsoever welfare policies the country may adopt, it would be almost impossible to provide a sustainable decent livelihood to a large segment of small and marginal farmers and landless workers, which constitutes bulk on rural poor, without rejuvenation of agriculture in the chronically underdeveloped regions. Left to them, a large number of districts trapped in very low level of development may never be in a position to catch up with the districts on the frontier of agricultural development.

The concept of regional disparity

An understanding of the concept of a region is the first requirement of any regional analysis. The term 'region', in general, has been used to mean a geographical area or space. But, in the field of regional economics this term has been used with a specific focus. An eminent scholar such as Boudeville (1960) has given a specific meaning to the term 'region' with the following three criteria. On the basis of homogeneity criterion, there are regions with homogeneous spatial and economic characteristics. Secondly, the nodality criterion analyses polarization around an urban or a market centre within a given region. Finally, there are regions with the system of interrelated administrative and political missionary based on the programming criterion.

There are also different regions classified on the basis of their size for planning purposes. At the local level, there are micro-regions, which are very small spatial units. In the Indian context, it consists of a Taluk or a District. Next in order is the meso-region comprising a State or group of States. At the highest order there is the macro-region composed of the previous two types of regions.

There are several empirical studies, which have tried to classify regions on the basis of their potential for future development. Some of these regions possess natural advantages such as good quality soil and adequate rainfall, which give them immediate growth potential. At the same time, there are other regions without such advantages and thus remain backward. Their problems are further compounded by the absence of good infrastructure and easy accessibility. But these regions may also possess certain advantages such as good climate, which can be quite favourable for their future development. Against these regions with some potentiality, there are other regions also which remain backward mainly on account of technical factors. These regions are mainly agriculture-oriented without substantial improvement in production technologies. Naturally, the productivity level of these regions is quite low.

The problem of regional disparities in the levels of economic development is a universal phenomenon. Both developed and under-developed economies have witnessed this problem in the path of their economic progress but its adverse impact has been felt more in the latter. This phenomenon is a natural outcome of the development process itself, wherein certain regions develop faster than others due to a number of factors. Regional disparities refer to uneven growth of primary, secondary and tertiary sectors in a nation, state or district. Disparity is found common, irrespective of the level of development. Even within the developed nations, there is disparities and amidst poverty also. There prevail less poor and more poor groups. Apart from the level of development, disparity is visualized in respect of different sectors of economy also.

Balanced regional development implies an even growth of different regions to the extent of their development capabilities and needs. It does not mean exact equal development or equal level of, or uniform pattern of economic activities. It simply refers to the fullest development of the potentialities of an area according to its capacity so that the benefits of overall economic growth are shared by the inhabitants of all regions.

There are various physical and socio-economic variables influencing the level and pattern of growth. There cannot be homogeneity of factors responsible for disparities in all countries. Broadly the factors affecting the disparities can be identified as geographical, historical, political, administrative, social, economical and others. These factors have combined effects on the level of disparities.

It is well known that there are widespread disparities in the levels of economic and of social development between the different regions of the Indian nation. The country has grater regional disparities in the sectors of agricultural, economy, industry, education, social *etc.* Widespread inter-state disparities in levels of economic and social development can have serious economic, social and even political consequences, this being particularly so if these have persisted over long periods of time. These regional variations have remained a subject of concern for couple of reasons. Large variation in productivity leads to regional disparities and is generally considered as discriminatory. It is

against the democratic policy to leave some regions behind other in making economic progress. Identification of various levels of productivity helps to analyse the reasons for variation in performance and in developing location specific strategies for future growth and development. Variation in productivity also indicates scope to raise production and attain growth.

It is notable that the north western states of Punjab, Haryana and Uttar Pradesh which have recorded consistently high growth rates since mid-sixties. On the other hand the Eastern region comprising of Orissa, Bihar and West Bengal has had a dismal performance. Except for Andhra Pradesh the recent performance of the southern region has not been very satisfactory. The central region has demonstrated a high degree of instability in its growth performance.

Uneven regional development results in numerous complications such as wastage of resources increase in public costs, social injustice, deceleration of economic growth, threat to national integration and political instability. There is an urgent need to tackle these problems; otherwise, these will further aggravate the imbalances in the economy. Political, economic, social and ethical considerations also call for measures to attain greater parity in the levels of development. Many experts in the field of regional economics and development economics have graphically narrated the adverse consequences of persisting disparities in various studies.

Reduction in regional disparities would pave way for greater national integration, increase in economic growth and political stability. On the contrary, if the disparities are widening, a sense of unfairness and injustice may kindle regional and parochial movements, as seen in many countries. Reduction in income disparities is also in line with the noble goal of social justice. There is a general agreement that there should be greater equality in the living standards of people residing in different parts of the country. Reduction in disparities is also crucial to accelerate the growth of economy as a whole. This is particularly relevant in the under-developed economies. Myrdal (1957) and Williamson (1965) in their studies have highlighted the fact that regional disparities are more prominent in under-developed economies than in the developed ones. Moreover, national income can be increased only when the resources and potentialities in backward regions are used for productive activities.

Regional disparity in agricultural development

The variations in agriculture performance and productivity in India have been studied mostly at the state level, although a few district–level studies also exist. States are the appropriate administrative unit to study regional variations in many aspects. However, agriculture performance generally differs widely within state due to varying regional characteristics in terms of resource endowments and climate. Therefore, need for lower administrative unit becomes apparent.

The issues of regional economic growth and disparity have attracted considerable attention among the researchers, planners and policy makers. Since independence, the Indian government has been concerned about how to strengthen national unity and promote economic growth with regional equity. Balanced growth of all regions of the country has been considered essential for political stability, national integration and economic viability of the nation itself. Naturally, the issue of regional balance has been given sharp focus in all the plans and various policies and programmes have been adopted for achieving high economic growth and fostering regional balance with the primary objective of achieving all-round development of the economy.

In a predominantly agrarian economy like India where a substantial amount of gross domestic product (GDP) comes from the agriculture and a large proportion of the population depends on it, achievement of these objectives depends largely on the performance of agricultural sector. With a view to accelerating agricultural growth, India has undertaken land reform measures and large investment programmes in irrigation, power, roads and rural infrastructure. The introduction of new high-yielding variety (HYV) technology in the mid-1960s was instrumental in bringing about unprecedented growth in the output and yield in major cereal crops like wheat and rice. The adoption of new technology has ushered in an era of Green Revolution in agriculture and agriculture in several parts of the country has undergone significant transformation.

Indian agriculture is however, characterised by large inter-regional disparities. The disparities in agricultural development have often been attributed to inter-regional variations in agro-climatic conditions and resource endowment (*viz.*, availability of irrigation ad other rural infrastructure). Being highly irrigation intensive, the new technology was initially adopted on a large scale in the irrigated areas of Punjab, Haryana and western Uttar Pradesh, which recorded significant acceleration in crop output. This resulted in accentuating the existing disparities in the levels and growth of agricultural output across various regions. However, the new technology was gradually disseminated to several

other regions. This led to significant acceleration in the growth rate of agricultural output in those regions.

Since the contribution of agricultural sector to GDP is large in developing country like India, it is often argued that regional disparities in the per capita income has been largely due to regional variations in agricultural development. For example, Das and Barua (1996) have argued that regional variations in agriculture and infrastructure are the largest sources of inequality among the regions of the country and regional inequalities in agriculture have been persisting.

One of the approaches to assess the performance of agricultural sector usually in the practice would be by a way of estimating the growth patterns of certain relative sensitive physical indicators. This not only helps in future planning but also in a way to evaluate past performance. At the current phase of agricultural transformation in the country vis-à-vis scarcity of production resources, measurement of productivity and technical change assumes great importance. In this context, it is necessary to understand the levels of resource use, productivity of different inputs and efficiency in production.

Agrarian economy of Karnataka

Karnataka state lies in the south-west corner of the Indian peninsula. The state has a total land area of 1, 91,791 km² and accounts for 5.83 per cent of the total area of the country (measured at 3,288,000 km²). This puts it in eighth place in terms of size, which supports about a population of 6 crores (2011 census) which is 3.7 per cent of the national population. The land resources are highly diversified in its physical features and agro-ecological conditions with a undulating topography ranging in altitude from below mean sea level (MSL) to 2694 M above MSL. Ten unique agro-climatic regions have been identified within the state (Karnataka at a Glance-2012-13).

Karnataka is primarily an agricultural economy. The state has 60 per cent (114 lakh Ha) cultivable land and 72 per cent of which is rainfed and 28 per cent is under irrigation. Agriculture sector contributes nearly 15.3 per cent to the Gross State Domestic Product (GSDP), about 58 per cent of total main workers are engaged in agriculture including 38 per cent of cultivators and 21.9 per cent agricultural laboures.

Karnataka just like other Indian states having advanced agriculture with marked diversities in agro-climatic conditions, resource endowments and population density is likely to be characterised by uneven economic and agricultural development among various districts.

Regional disparity in agricultural development of Karnataka

The inter-district or regional differences in agricultural development arises out of these varied conditions tend to get further accentuated because of varying levels of investment in rural infrastructure and adoption of new technology. Greater the heterogeneity in the different parts of the State, more striking can be the deficiencies in comparison with an average level of facilities. If a State is carved out of areas taken from different adjoining states all of which are at various levels of development, the newly formed State cannot expect to have inherited a balanced economy. This is the story of the imbalances in the State of Karnataka.

Karnataka is endowed with varied agro-ecological, agro-climatic, bio-diversity, socio-economic conditions across the state. The state has prominent regional diversity as well as regional disparity. There is diversity in natural resources like, the soil type, climate, rainfall, minerals, rivers, forests, coastal zone, hills and so on. There is also disparity caused by the socio-economic policies pursued in the past and present. Concerted efforts have been made since the inception on Second Five-Year Plan to reduce the regional disparities in Karnataka.

Karnataka, which is regarded as a moderately developed State in the Indian Union, is facing the problem of inter-regional and intra-regional disparities since its reorganization in 1956. The problem of disparities is a source of great concern for administrators, planners and most importantly, the people residing in such regions. Many historical and economic factors are responsible for these disparities along with the influence of regional diversities seen across the two major regions of the State. The old Mysore state which comprised most of the southern parts of present Karnataka state had dynamic rulers and administrators, which led to the development of the region, prior to the State reorganization.

At the time of the State Reorganization in 1956, many Kannada speaking regions which belonged to the then neighboring states were integrated and the new enlarged state of Mysore (now

Karnataka) was established. Presently Karnataka consists of 30 districts and 220 taluks. Till recently there were 19 districts, some of the districts were bifurcated now and new districts were formed. Though this integration fulfilled the aspiration of both Kannada speaking people and their leaders, it brought in numerous economic problems along with it. The newly integrated areas presently known as Hyderabad-Karnataka, Bombay-Karnataka were substantially neglected by the erstwhile states which they belonged before reorganization. The Malnad region and Northern Coastal areas were also lagging behind inspite of their rich natural and capital resource base.

Many times it is alleged that old Mysore area is fully developed while the areas which joined new Karnataka remained backward. About this the High Power Committee on Redressal of Regional Imbalances (HPCFRRI) in 2002 expressed, "While Mysore-Karnataka has for historical reasons registered relatively a higher level of development, this is not so in respect of intra-Mysore-Karnataka region. There are disparities from one district to another and also from one taluka to another. Similarly, if we take Hyderabad-Karnataka or Bombay-Karnataka region, it cannot be asserted that the entire region has not registered any development at all. Very substantial improvements in output, income and infrastructure have taken place between 1956 and 2000. But due to lower base with which they started in 1956 and for historical reasons, the relative development registered through the Annual Five-Year Plans and also Externally Assisted Projects implemented in those areas and the rate of growth have not been adequate to reach the Mysore-Karnataka level though the increase in output and income have escalated several fold."

The natural resource diversities are often disadvantageous for harmonious development of all the regions of the state. Most of these natural constraints have to be accepted as such. Apart from the diversity factors, there are severe disparities which emerged as consequences of alarming rise in the growth of population, unemployment, low literacy rate, low productivity, lopsided concentration of industries and infrastructure and modern civic amenities in few metropolitan centres.

For balanced regional development of Karnataka, state government has taken various steps like setting up of Hyderabad Karnataka Development Board, Bayaluseeme Development Board, Boarder Area Development Board, Malnad Area Development Board and so on. Among the initiative taken by state government, setting up of High Power Committee for Redressal of Regional Imbalances, under the chairmanship of late Dr. D. M. Nanjundappa, popularly known as Nanjundappa Committee is the most major step.

The High Power Committee for Redressal of Regional Imbalances (HPCFRRI) emphasized the issue of regional disparity and constructed a Comprehensive Composite Development Index (CCDI). As per this index, taluks (blocks) in North Karnataka lagged behind those in South Karnataka. As many as 114 out of 175 taluks in Karnataka were declared backward, of which 59 were from North Karnataka. In a further sub-classification, 26 out of the 39 "Most Backward" taluks were from North Karnataka.

The disparity between taluks highlighted by the CCDI persists in terms of the Human Development Index (HDI) also. Seven out of eight districts having HDI lower than India's HDI level of 0.621 are in North Karnataka, whereas all seven districts having HDI greater than the State average of 0.65 are in South or Coastal Karnataka. In terms of basic infrastructure, overall performance of the State is poor – only 35 per cent households had access to the basic services. Even within this, eight out of nine worst performing districts were in North Karnataka.

As far as agricultural backwardness is concerned in Karnataka, as many as 50 taluks from North Karnataka and 38 from South Karnataka were below the state average. Among them, about 21 in North Karnataka and 16 in South Karnataka were seriously backward in both infrastructure and development. A special development package on agriculture and allied activities is to be specifically addressed to these taluks. There exits disparity in irrigation, credit, marketing and other infrastructural facility between North and South Karnataka.

Several recommendations of the HPCRRI have been acted upon by successive Governments and the last, major recommendations to be taken up for implementation were the Eight Year Special Development Plan (SDP) which was introduced in the budget of 2007-08. In view of the high priority attached to development of backward regions in the State particularly in northern parts of Karnataka, Government have constituted a High Power Committee (HPC) with members representing academia, administrators, persons in public life *etc.* to take stock of the implementation of the recommendations of the HPCRRI and suggest such actions as were appropriate to accelerate the reduction of regional imbalances.

Special Development Plan was implemented with an objective to reduce the regional imbalances in Karnataka. A total of Rs. 30725 crores, from 2007-08, to be invested over a period of 8 years. The main aim of the plan is to building infrastructure for agriculture and other sectors of economy, accelerate growth in backward regions through additional investments in various sectors/areas and providing location specific sectoral schemes in backward regions.

It is proposed to allocate funds in the ratio of 10, 20, 15, 15, 15, 10, 10 and 5 per cent, respectively in the eight years. In the 2nd and subsequent years, the allocations have been enhanced by 5 per cent annual inflation. Within the allocated amount to the sector, the amount is to be distributed among the Most Backward, More Backward and Backward Taluks in the ratio of 50:30:20.

1.1 Significance of the study

Majority of studies pertaining to the performance of agriculture in Karnataka have addressed the issue raised above at the aggregate level and these studies mainly related to growth and instability of Karnataka's agriculture (Nadkarni and Deshpande 1983 and Dadibhavi 1990). No comprehensive studies have so far been conducted in Karnataka on the imbalances of agricultural development among different districts. There is a need of comprehensive study on development of agriculture in different regions of the state in relation to regional imbalances. So, the present study is intended to fill this void. Being biological in nature, the agriculture production shows well variation across different regions, as influenced by natural and socio-economic factors. The study aims at assessing the development with special focus on agricultural productivity, infrastructure facility, land use dynamics and other socio-economic factors. The findings of the study, it is hoped, would help planners and policy makers to formulate appropriate agricultural development and stabilization policies for the state.

1.2 Objectives of the study

1. To analyse the disparity in land use dynamics between north and south regions of Karnataka.
2. To compare the trends in area, production and productivity of major agricultural and horticulture crops between the two regions.
3. To assess the disparity in infrastructural facilities between the two regions.
4. To analyse the flow of funds between the two regions.
5. To compare the present position of selected taluks with bench mark survey.
6. To ascertain the opinions of farmers, officials and policy makers about regional disparity and suggest appropriate policy measures.

1.3 Hypotheses of the study

1. Land use pattern is different between north and south regions of Karnataka.
2. There exists a disparity in area, production and productivity trends of different agricultural and horticulture crops between the two regions.
3. Infrastructure facilities vary between the two regions.
4. There is a disparity in the flow of funds for development between the two regions.
5. There is a difference between classifications of selected taluks with bench mark survey.

1.4 Presentation of the study

The study is presented under the following chapters.

Introduction: In the introductory chapter, the nature and importance of research problem and specific objectives of the study have been depicted.

Review of Literature: It deals with the review of the relevant past studies related to the specific objectives of the present study.

Methodology: This chapter gives an overview of the study area, the nature and sources from where relevant data have been collected, the analytical tools employed for evaluating objectives of the study for meaningful conclusions and definitions of various concepts used in the study.

Results: The results of the study and their analysis have been presented in this chapter in the form of tables.

Discussion: It emphasizes on interpretation of the results and attempts to establish relationships between certain variables and their outcomes.

Summary and Policy Implications: Brief summary of the main findings of the study along with policy implications drawn from the findings have been presented.

References: The list of the referred books and journals are presented in this section.

REVIEW OF LITERATURE

A review of concepts and empirical studies related to the present study would be helpful to project the current thinking on the subject matter of study as well as to formulate relevant concepts and design of the study to draw meaningful conclusions. This would help the researcher to have better and precise understanding of the current research problem and would also facilitate to modify and improve the present study. The chapter briefly reviews the concepts, analytical tools and findings of the past studies, which are relevant for the present study. The reviews of the past studies are classified under the following headings.

2.1 Disparity in land use dynamics.

2.2 Trends in area, production and productivity of major agricultural and horticulture crops.

2.3 Disparity in infrastructural facilities for agricultural development.

2.4 Flow of funds between the regions for agricultural development.

2.1 Disparity in land use dynamics

Singh (1990) studied the land use pattern in the problematic areas of all the five agro-climatic regions of Uttar Pradesh, during the year 1988-89. The study revealed that the hill region had the highest area under forest, permanent pastures, grazing land, tree crops and groves, non-cultivable wastelands and land under non-agricultural uses. The area sown more than once and the total cropped area, as well as the intensity of cropping had been found to be the highest in the eastern region and the lowest in the hill region. He concluded that the slopes of the hilly areas of UP could be successfully developed for the plantation of temperate fruits.

Singh and Kaur (1991) studied the changing pattern of land utilization in Punjab since the inception of new farm technology in the mid sixties *i.e.* from 1966-67 to 1987-88. The study revealed that the reported area for land utilization remained constant while the area under forests, area not available for cultivation and net area sown increased during the period. Due to intensification of agriculture, gross cropped area and cropping intensity increased. He concluded that Punjab agriculture had recorded drastic structural changes since the beginning of the green revolution.

Sharma and Pandey (1992) followed the method of Land use dynamics to examine the trends and dynamics of annual shifts among different land use classes in Indian States which might have adverse implications for agricultural growth and ecological balance. A general declining trend was observed in the area under permanent pastures and grazing lands and barren and uncultivable lands. The area under non-agricultural uses, cultivable wastes and fallow showed a positive growth in most of the States. Inter-sectoral land budgeting revealed that area shifts were occurring from both desirable and undesirable ecology sectors towards agricultural as well as non- agricultural sectors.

Pandey and Tewari (1996) investigated the regional agricultural land use pattern for a period of 1970-71 to 1990-91 and the results revealed that the net sown area at the all India level, as also in the states of Gujarat, Haryana, Maharashtra, Rajasthan and Uttar Pradesh is found to have remained constant during the aforesaid period. Only the five states namely, Karnataka, Kerala, Madhya Pradesh, Orissa and Punjab have shown growth in net area sown. At the country level, both current fallows and other fallows showed positive growth, while, cultivable wastes has shown negative growth during the period.

Smriti (1996) studied 88 blocks of five districts in Uttar Pradesh to indicate inter-district imbalance in development of agriculture. The study advocated a technique for establishing agricultural development and reveals that the diversity in sectoral development. However, land use efficiency and carrying capacity are the main factors controlling the agricultural development of the blocks.

Shaban and Bhole (1997) used Principal Component Analysis, Cluster Analysis and Multiple Regression Analysis to identify pattern and determinants of land utilization in district of Maharashtra for the year 1988-89. The study showed that land utilisation pattern in districts of Konkan and Eastern Vidarbha were different from the districts of other regions in the state because of physiographic and socio-economic factors and the extent of irrigation plays very important role in determining cropping intensity. The study suggested to tap vast agricultural potential of Western Maharashtra, Western Vidarbha and Northern Maharashtra by increasing irrigation facilities and to exploit the potential of Konkan through tree cropping and orchard farming.

Pragathi and Ramanaiah (1999) conducted the study on regionalisation of agricultural land use efficiency in Andhra Pradesh. Here a modified Kendall's 'Ranking Efficiency' namely the 'Standard Coefficient' method of Reddy Ramanaiah (1985) was employed to evaluate the agricultural land use efficiency in study area with ten variables at mandal level and five agricultural land use efficiency regions have identified. About 80 per cent of the mandals in Telangana and Rayalaseema and 45 per cent of the coastal plain have been found under low and very low efficiency which were mainly the drought prone areas.

Borbora and Mahanta (2002) identified that inter-district disparities in agricultural development are very high in Assam. Sibsagar district of the state has the highest level of agricultural development in the state as a evident from the weighted average component score. The least agriculturally developed district was North Cachar Hills. Out of 13 indicators, highest inter-districts disparity was found in percentage of gross irrigated area and the least is found in terms of proportion of area under cultivation.

Lambin *et al.* (2003) conducted research on dynamics of land-use and land-cover change in tropical regions. The study summarizes recent estimates on changes in cropland, agricultural intensification, tropical deforestation, pasture expansion and urbanization and identifies the still unmeasured land-cover changes. Climate-driven land-cover modifications interact with land-use changes. Land-use change is driven by synergetic factor combinations of resource scarcity leading to an increase in the pressure of production on resources, changing opportunities created by markets, outside policy intervention, loss of adaptive capacity and changes in social organization and attitudes. The changes in ecosystem goods and services that result from land-use change feedback on the drivers of land-use change. A restricted set of dominant pathways of land-use change is identified. Land-use change can be understood using the concepts of complex adaptive systems and transitions. Integrated, place-based research on land-use/land-cover change requires a combination of the agent-based systems and narrative perspectives of understanding.

Prashantkumar (2003) studied the land use pattern in three dry zones of northern Karnataka and the results showed that there was a decline in the area under non-agricultural uses, cultivable waste, current fallow and other fallow land in the case of zone-I and in the area under non agricultural uses, cultivable waste and net are sown in zone-II. There was a positive growth in barren and uncultivable land, current fallow and other fallow lands in zone-III. The share of area under cereals increased in the case of zone-II and zone-III.

Goswami and Challa (2004) reported the land use pattern in India for the period 1950-51 to 1997-98. The results showed that forest area has increased to 28.57 million hectares and the area under non-agricultural uses showed a significant increase by 2.94 million hectares. Furthermore, it was also revealed that the net area sown increased during the study period.

Xia and Anthony (2004) studied on analyzing spatial restructuring of land use patterns in a fast growing region using remote sensing and GIS. This study analyzed urban expansion and spatial restructuring of land use patterns in the Pearl River Delta of south China by using remote sensing and GIS. The region has pioneered the nation in economic development and urbanization process. Tremendous land use changes have been witnessed since the economic reform in 1978. Land use changes over two time periods, 1988–1993 and 1993–1997, were analyzed to demonstrate how enforcing land use policies can influence the direction and magnitude of landscape change. The adoption of a market economy has resulted in the internal restructuring of agricultural land use from traditional paddy production to more diversified agricultural activities, such as growing cash crops, fruits and aquaculture. Spatial dependency of land use changes and variations of land development can be identified between the eastern development corridor and the western development corridor. The measurement of spatial patterns was accomplished by using the indicators of compactness index and entropy. This study provides new evidence with spatial details about the uneven land development in the Pearl River Delta.

Ramasamy *et al.* (2005) analysed the dynamics of land use pattern with special reference to fallow lands in Tamil Nadu. The study identified that there was a marginal increase in forest land from 14 to 16.50 per cent which was mainly due to the afforestation efforts undertaken by government. Lands such as barren and uncultivable lands, cultivable wastes, permanent pastures and grazing lands have all shown a declining trend. Their total share in geographical area of the state has declined from 17 per cent to 7.28 per cent during the last five decades. Lands diverted for non-agricultural uses increased from 9.80 per cent to 14.73 during the same period. Current fallows

hovered around 8 per cent, the share of other fallows increased from about 5 per cent to 8.50 per cent. The net sown area has almost remained constant and was around 43 per cent.

Chengwu and Xiubin (2006) studied the regional disparity in the changes of agricultural land use intensity in China. This paper was based on the cost-benefit data (1980-2002) of farm products and China yearbooks. The study has taken into consideration of three aspects, the degree of intensity, the sown area and the abounded farmland. The findings were revealed that the degree of intensity of land, in the western region during the study period has a strong uptrend, but in the eastern and central regions, the degree of intensity descends obviously and has shown a continuous downward since 1997. The total sown area shrinks notably in the eastern region, while it enlarges constantly in the western region has gone through a similar cyclic process: down (1980-89) - up (1985-91) - down (1991-94) - up (1994-99) - down (1992-2002). However, there were obvious differences in amplitude variation and tendency among them. The sown area shrunk in the eastern region and expanded in the central and western region especially before 1999. Further, they found that, the most cases of abandoned farmland are reported in the central region, the second in the eastern region and the least in the western region.

Neogi (2006) studied on land utilization, agricultural growth and poverty: a cross-sectional analysis of Arunachal Pradesh. The study indicated that with rise in the size of the average land holding agricultural growth accelerates but at the same time, level of poverty rises. A conglomeration of these three facts points to the raising inequality in land holding and consequent inequality in the income.

Wani *et al.* (2009) examined the land use dynamics in Jammu and Kashmir from 1966-67 to 2004-05. Compound growth rates and percentage changes in each class were estimated. The percentage changes have revealed a marginal decline (0.08%) in the total reported area. The area under forest has decreased at an annual compound growth rate of 0.04 per cent. The area under non-agricultural uses showed a substantial increase due to increasing demand of over 6 per cent land per annum for infrastructural development and urbanization. The barren and uncultivable land has exhibited an increasing trend of 6.6 per cent per annum. The land under miscellaneous trees revealed significant declining trend. The fallow land and cultivable wastes have shown a decline of over 35 per cent and 3 per cent respectively. The net sown area has shown an increase of about 11 per cent during the study period.

Bardhan and Tewari (2010) investigated the land use dynamics in India and land under utilization for the period of 1992-93 to 2005-06. The results witnessed that among all land use categories, the area under non-agricultural uses registered the highest growth rate at the aggregate country level. The increasing trend in the non-agricultural sector might significantly be explained by increasing population, urbanization and industrialization. Current fallows have remained stagnant during the period while, barren and uncultivable land showed a declining trend. However, declining trend in cultivable wastelands was enhanced by the land development and their reclamation for agricultural use. The study concluded that there have been land use shifts from permanent pastures and grazing land, miscellaneous tree crops and groves and barren and uncultivable land towards area under non-agricultural uses and to a smaller extent towards forest.

Maitima *et al.* (2010) studied on Land use changes, impacts and options for sustaining productivity and livelihoods in the basin of lake Victoria. The study revealed that Land use in the basin of lake Victoria like other parts of East Africa is changing fast. While some areas are undergoing expansion of cultivation and grazing, others are intensifying. Common to all is that there are impacts on sustainability of the natural systems on which productivity depends. The nature of landscapes and the geomorphologic processes in the lake basin make land use change highly sensitive to erosion and degradation. There is an urgent need for a regional framework and guidelines for sustainable land management including all sectors of land use like cropping, grazing and urbanization. Land degradation is most rapid during the conversion of land use towards continuous cropping. The poverty/ land degradation relationship is real, reinforced by gender disparities.

Gairhe (2011) conducted study on land use dynamics in Karnataka by using the secondary data from 1980-81 to 2007-08. Tabular analysis, growth rate, Markov chain analysis, instability index, multiple linear regression and annual rate of change were employed to arrive at meaningful results. Area under forest showed a marginal increase and a considerable growth in land put to non-agricultural uses and area sown more than once were observed. Barren and uncultivated land, permanent pastures, cultivable wastes and miscellaneous tree crops showed significantly negative growth over study periods. Current fallows witnessed positive growth for the entire period. The results

revealed that the major factors responsible for the changes in land use pattern over years were net irrigated area, road length, population density, literacy rate, number of factories and number of land holdings. Land put to nonagricultural uses and other fallows were the land use categories to exert pressure on cropping intensity. Study noticed that land use shift has been occurring from desirable (14,552 ha) and undesirable (1,518 ha) ecological sectors towards agricultural (5,600 ha) as well as non-agricultural sector (10,447 ha) annually. The study suggested to increase forest cover by afforestation, stabilization of irrigated acreage and to check land shifts from ecological sector to other sector.

2.2 Trends in area, production and productivity of major agricultural and horticulture crops

Sharma (1990) attempted to study inter-state disparities in growth of agriculture in India from 1966-67 to 1987-88. It was observed that four states viz, Punjab, Haryana, Uttar Pradesh and Maharashtra experienced growth rate of food grains production higher than the national average of 2.72 per cent per annum. Increase in production was statistically non-significant in Gujarat, Tamil Nadu and Rajasthan states. The remaining states witnessed growth rate in food grains lower than the national average. He suggested that interstate disparities in growth performance of agriculture in India can be minimized by bringing the farmer in the ambit of efficient extension education and training activities, sound government policies and efficient supply network of various inputs.

Satyasai (1992) examined the regional disparities among major states of India. The study also identified the factors responsible for these disparities. The disparities in development of technological and technology supporting factors reflected ultimately in disparities in output gains from agricultural development. The regions with fast expanding irrigation ratio, short term credit supply, rural electrification, regulated markets, rural roads tends to be those which have shown larger aggregate output gains per net sown hectare.

Sawant and Achutan (1995) in the research paper 'agricultural growth across crops and regions' remarked that state or regions which lagged behind considerably during the period 1968-69 to 1981-82 were able to push up their share considerably during the period 1981-82 to 1990-91. Thus, they have shown regional disparities in agricultural growth tended to decline in the period 1980s. Researchers computed CAGRs of State Domestic and found that except in western region (Gujarat, Maharashtra) and Andhra Pradesh from Southern region the process of acceleration in agricultural growth was almost universal across the states in period 1981-82 to 1990-91. Moreover, the north-western region, which spear headed. India's green revolution continued to be the high growth region even during period II (1981-82 to 1990-91).

Sharma *et al.* (1997) conducted research on regional disparities in agricultural development with reference to mountainous states in India. A wide range of disparities in area, production and productivity was observed among the mountainous states. The results have shown that there is a direct relationship between the cultivated area and area under the HYVs. The variations were particularly distinctive between the northern and eastern states. The compound rates were found to be higher in eastern states. These may be because of topography, climate, accessibility, economic background of the population, besides other socio-economic features. Finally, they have suggested that to overcome problems of disparity efforts needs to be made for enhancing location-specific research and putting more emphasis on agricultural extension facilities.

Singh *et al.* (1997) studied on regional variations in agricultural performance in India by using the secondary data. The results revealed that there were wide imbalances in acreage, production and productivity of foodgrain and non-foodgrain crops among the states of the nation. Increased use of irrigation water, fertilizers and HYV seeds could further increase the yield of foodgrain crops in most of the states. The main determinant of agricultural performance were found to be the total cropped area, yield per hectare and irrigation water, closely followed by regulated markets and road network. Relatively less agriculturally prosperous states like Bihar, Madhya Pradesh and Rajasthan showed good potential for improving their agricultural performance.

Hurakadli and Patil (1999) conducted the study on regional Imbalance in the level of food crop productivity in Karnataka. The study based on district wise data collected from the Bureau of Economics and Statistics, Govt. of Karnataka. The study attempted to investigate productivity regions and causes for interregional disparities of selected crops and overall food crop productivity in Karnataka state. Finally, it was suggested that the attention should be given to the regions of medium and low productivity regions, so that the inter-regional disparities can be minimized. It is also

necessary to bring about the changes in attitude of the farmers and to disseminate knowledge about the new methods of farming and selection of crops for a smooth and healthy development of agriculture.

Rajagopalan (2000) could able to note that the diverse resource complex of Tamil Nadu and its wide variation across the districts have given rise to different crops and farming systems. The North-east coastal gained its importance in food production, the Central districts with diversified agriculture with dominance of industrial crops, fruits and vegetables, the Cauvery Delta stabilizing with rice under high technology productivity regime, the South-east and Western regions developing with a crop and non-crop system with additional irrigation potential through investment in tank and groundwater.

Roy and Bezbaruah (2000) carried out a comparative analysis of performance of agriculture in the Barak Valley region during mid 1970s to mid 1990s. The pattern of agricultural growth in the region has marked difference from that observed in the Brahmaputra Valley of the state. However, despite less developed irrigation infrastructure the region performed much better compared to the other parts of the state in terms of yield growth and application of modern inputs. To enhance the further production capability, strengthening of irrigation facilities in the region is an imperative need as suggested by the researchers.

Dutta *et al.* (2001) conducted a study in order to identify inter-district backwardness in the agricultural sector in Assam with the help of Principal Component method. The exercise established the existence of regional disparities in the level of agricultural productivity of Assam. Productivity varied substantially across the districts of Assam and such a variation is explained by the infrastructural factors like irrigation, literacy, fertilizer, *etc.*

Narain *et al.* (2001) conducted the study on regional dimensions of disparities in crop productivity in Uttar Pradesh. The data on yield rates of rice and wheat crops were analysed at tehsil level in Uttar Pradesh for all 244 tehsils where crop cutting experiments on randomly selected fields were conducted on both rice and wheat crops. Wide disparities and variations in the rice and wheat productivity were observed among different tehsils and regions. Western and Hilly regions were found to be better developed in rice and wheat productivity in comparison to other regions of the State. In order to reduce the disparities in the yield rates, strategies for improvement of productivity levels have been suggested. The tehsils having low yield rates require improvements in the infrastructural facilities regarding irrigation and application of fertilizers *etc.*

Deosthali and Nikam (2004) attempted to study the regional growth trends of rice crop in Maharashtra. According to them, the growth in rice could achieve over the year by bringing more and more area under cultivation of it. They concluded that, the production and area of rice in Maharashtra have increased by 47.5 per cent and 12 per cent respectively indicating increase in production mainly yield led, the development of out-spread of the High yield variety-led technology. In the entire control region, high vertical growth has seen with low concentration of rice area in the GCA (less than 60%). It was matter of concern that the spread of improved technology is in pockets around the university, research centre or the district headquarters where diversification of land use is resulting in limited area under rice cultivation. Lastly, they suggest that about half of the rice cultivators taluka's are required to be attended by agricultural scientist and extension officers a priority basis for promoting rice cultivation vertically.

Hurakadli (2005) aimed at assessing the dynamics of agricultural crop productivity in Raichur district of Karnataka state. The study was based on primary as well as secondary data. The data required for the year 1966-67 and 1996-97 have been obtained from DES and District Statistical Office, Raichur. The areas of different crops and their production have been obtained from annual crop seasonal report and plan statistics. The study has revealed that, there exists disparity in agricultural productivity in the district. The South western parts of the talukas have showed lower ranking co-efficient but higher level of agricultural productivity as compared to other regions due to good irrigation facilities. The profitability of agriculture has been greatly increased due to the impact of canal irrigation, improved seeds and fertile soil in the district. Educational facilities and extension services should be created at the grass root levels so as to reduce regional disparities in the crop yields and an improvement may be achieved in agricultural productivity.

Li *et al.* (2008) carried out research under the title study of agricultural productivity and its convergence across China's regions. Using data envelopment analysis, researchers decomposed productivity into pure technical efficiency change, scale efficiency change and technological progress. Hence, thereby found that annual growth of agricultural productivity in China was about 2.2 per cent.

Technological progress improved agricultural productivity at a rate of 4.2 per cent annually from 1980 to 2005, but the technology efficiency dampened it by an average of 1.9 per cent per year. TFP growth and technological progress were faster in eastern provinces than for those in central and western regions. Relative technology efficiency was stable in eastern provinces but declined in the central and western provinces during the study period. Thus, it was technological progress that boosted the TFP growth in China's agriculture. Finally, researchers recommended that China's government should continue to increase subsidy for agricultural technology to generate greater growth in agricultural productivity and technology exchange and cooperation as well as diffusion of know-how should be encouraged among the various regions of China. This will also help to reduce rural-urban income disparities induced by the deterioration of agricultural technological efficiency in Eastern and Central regions of the country.

Munir and Rukhsana (2008) made an attempt to demonstrate the trend in foodgrains supply vis-a-vis agricultural development in western Uttar Pradesh. The district has chosen as the unit of analysis. The per head availability of foodgrains has computed to illustrate the relationship between foodgrains availability and agricultural development. The study clearly revealed that there was an uneven distribution of foodgrains availability and agricultural development in the study area. Foodgrains availability was high due to high yielding variety, fertiliser consumption, irrigation facilities and net sown areas while recorded in the districts of Ramapur, Badam, Shahajanpur, Meeerut etc,. Some of the areas like Mathur, Aligarh, Mainpuri, etc, are high in foodgrains availability due to high productivity and infrastructural facilities. Finally, foodgrains availability was found low owing to high density of population, high rate of urbanization and smaller size of land holdings. Population and food availability should be the basic criteria to identify the agricultural backward areas.

Chand *et al.* (2009) concluded that there was a vast variation in productivity of crop sector across districts in the country and in most of the states and cross classification of districts according to their productivity levels and other characteristics would help to understand the link between productivity and other factors. The analysis highlighted important features of those districts that have been in low productivity. These include 191 districts where productivity is low and 66 districts where productivity is very low. In general very low and low productivity districts were characterised by low rainfall, low irrigated area which also results a lesser amount of fertiliser use. Area under fruits and vegetables in these districts is also generally low. Fertiliser use, irrigation and rainfall were found to cause significant variation in productivity across districts. Most of the districts that were in very low or low productivity range offers immense opportunities for raising agricultural production in the country.

Quddus (2009) used secondary data to evaluate the progress and regional variations of crop production in Bangladesh. The data were collected for the years 1980-81 to 2002-03 from the 'Statistical Yearbooks of Bangladesh', 'Yearbook of Agricultural Statistics' and population census of different years. An analysis was done for twelve mutually exclusive agro-ecological zones by assigning various indicators of crop sector development. The remarkable progress of rural literacy rate, ratio of agricultural workers to population, number of farmer's co-operative societies and per capita regional domestic agricultural products in two decades was observed in different regions. Wide disparities in the level of crop sector development had been observed across the regions. The overall results revealed that some of the regions were in better positions in respect of socioeconomic progress, land use pattern, input use, growth performance of HYV rice and food-grains production. The developed regions were 'Old Himalayan Piedmont Plain and Tista Floodplain', 'Karatoya Floodplain and Atrai Basin', 'Brahmaputra-Jamuna Floodplain' and 'Middle Meghna River Floodplain' on the basis of land utilization pattern, input use and food-grains production. Analysis of regional disparities revealed that 'Sylhet Basin and Surma-Kusiyara Floodplain', Greater Dhaka', 'Middle Meghna River Floodplain' and 'Lower Meghna River and Estuarine Floodplain' regions has developed remarkably in the last twenty years.

Adhikary and Hoque (2010) analysed the inter-district variation in growth and stability of rice production in North region of West Bengal, during the period 1980-81 to 1999-2000 with the help of linear-trend equation. In the reform period, both average production of rice and production stability have increased in all the districts of North Bengal. The growth rate of rice production has been negative in Darjeeling and Coachbehar in the reform period. In Coachbehar fluctuation in production decreased and in Darjeeling fluctuation in production increased in the reform period. Darjeeling and Jalpaiguri, the two-hill districts, have had different impact of economic reform.

Vasile (2011) carried out the study to analyse the performance of Romanian agriculture in relation to the agriculture in the European Union and to highlight the recorded regional disparities in order to fully exploit the potential of agriculture. Data Envelopment Analysis was the method used,

which provides information for the relative assessment of performance in relation to the decision-making units, considered a gauge. The results of the analysis showed the poor performance of agriculture in Romania and which was uneven on development regions. The West region recorded the lowest agricultural performance due to inadequate yields of production factors, particularly technical capital. In most regions, the yield of production factors was increasing returns to scale, which proves there were opportunities to improve agricultural performance in the regions by making new combinations between production factors and increasing their yield.

Yanbing *et al.* (2011) studied regional agricultural production efficiency disparity and efficiency decomposition of China's pastoral area based on the C2R model and super-efficiency DEA model. The time variance and provincial diversity of the China's pastoral areas and agricultural production efficiency among provinces from 2000 to 2008 were investigated empirically in this paper. The results indicated that: (1) since the western development, the efficiency of agricultural production in both nation's pastoral areas and all provincial pastoral areas had grown evidently, except that in Tibet autonomous region; (2) according to the efficiency decomposition, the variance in efficiency of agricultural productivity was mainly caused by technical efficiency and the improvements of scale efficiency were relatively limited; (3) according to the spatial structure distribution of time changes, the differences of efficiency of agricultural production in each province were very obvious.

Burja (2012) conducted the study on determinants of the agricultural productivity growth among Romanian regions. The spatial and dynamic analysis of agricultural productivity emphasized a few aspects that explain the performance differences recorded in the Romanian development regions and the main influence factors. The analysis used relational modeling of economic and financial indicators with impact over productivity and the efficiency scores were determined with the help of DEA. The dynamic analysis of labour productivity highlighted the representative factors that have a decisive effect on the evolution of the indicators, such as: technical endowment of labour, the share of direct technical capital and its productivity. The performance of each region was studied on the basis of absolute variation of productivity compared to the level of the indicator in the previous period and the level of the productivity variation resulted from the individual action of influence factors. The results illustrated the manifestation of an upward trend of agricultural performance in all the Romanian regions, with a more pronounced dynamic in the Bucharest-Ilfov, South-East and South-Muntenia regions.

2.3 Disparity in infrastructural facilities for agricultural development

Rama *et al.* (1996) observed wide disparities in fertilizer use across different agro-climatic zones of Andhra Pradesh. North Telangana and Krishna Godavari zones revealed higher use of fertilizers. The intra-zonal variations in fertilizer use were most prominent in high altitude and Tribal Zones. Area under irrigation and commercial crops, distance to fertilizer dealers and availability of credit influenced fertilizer use significantly.

Sardana *et al.* (1997) conducted the research to examine the agricultural performance of different regions of Haryana during the green revolution and post-green revolution periods, its growth and variability and the important factors determining its performance. They have noticed that there has been reduction in disparities among the districts of Haryana with regard to agricultural performance (value of agricultural produce per hectare) during the study period. The potential for the growth in agricultural performance with the existing technology lies in the backward districts only. Though the agricultural performance was dependent on HYVs and fertilizer consumption, the level of dependence has reduced over the period.

Ghosh and De (1998) revealed the impact of public investment and physical infrastructure on both private investment behaviour and regional economic development. Latter hypothesis was tested on Indian states using OLS regression. For this purpose, a physical infrastructure development indicator was formulated with the help of principal component analysis. Finally, they concluded that regional disparity has been rising in recent period and Plan outlay has not played any major role in this regard; regional imbalance in physical infrastructure has been found to be responsible for rising income disparity across the states.

Saxena and Sahoo (1998) made an attempt to examine the impact of major infrastructures, viz, transport, electricity, gas and water supply on the output, income and employment generation of the Kanpur economy through Input-Output technique. It was found that infrastructure services have low output and income generating capacities but high employment generating effects. This may be due to the existence of a huge informal sector among other infrastructures in the city.

Kohli and Jain (1999) concluded that there were regional disparities in the level of development of Tribal Sub Plan (TSP) area of Rajasthan. The development of all the sectors was also very poor to have any impact on the quality of life of the people. This area needs special consideration of planners. Proper development of all the sectors and also the topography of the region should be kept into consideration while framing policies.

Kundu *et al.* (1999) studied about the regional distribution of infrastructure and basic amenities in urban India, According to them a state and size class wise analysis of the levels of urban basic amenities reveals that disparities were extremely high in the nineties. They used population census, NSSO reports, policy and project documents and performance assessment of the organization operating on the urban sector. The availability of selected infrastructure and amenities like water supply, toilets, electricity in urban has been analyzed at the state level. To done it, they have built comparable indicator for the early eighty, late eighty and early nineties and made comparative assessments. Further, an attempt has been made by them to identify social-economic factors that explain spatial variation. They overviewed the changes in the organizational and financing system for the provision of infrastructure and basic amenities and the efforts made it recent years.

Bhattacharya and Sakhtivel (2000) studied about Regional Growth and Disparities in India, a comparison of Pre and Post Reform decades. They took data of 20 year period for their study *i.e.* 1980-81 to 1999-2000 and they divided this period into two sub-periods as 1980-90 and 1999-2000 *i.e.* pre-reform period and post-reform period. According to their study, the development process has been uneven across states. While the advanced industrial states have tended to leapfrog in the reform years, other states have lagged behind. The regional disparity in the growth rates becomes sharper in terms of per capita income. They also mentioned that, the tertiary sector rather than industry has become the engine of growth in the last two decades. The problem was compounded by the negative relationship between population growth and incomes during the 1990's. Efforts should be made to restrain population growth especially in backward states. Finally, the quality of governance and in particular the efficiency of investment should be given more attention at the state level. Moreover, they suggested that, if the inverse relationship between income and population growth persist longer, then eventually there would be a serious conflict between states in terms of sharing of resources.

Dasgupta *et al.* (2000) presented a paper which offered an analytical description of the economic performance of Indian states as reflected in their per capita (net) state domestic product. Statistical analysis of data for the period 1960-61 to 1995-96 showed a clear tendency for Indian states to diverge in per capita SDP, but in terms of the shares of different sectors in the SDP, however, there seems to be a tendency for overall convergence towards the national average. In other words, the structural parameters show - convergence, though per capita SDP does not.

Rehman and Routray (2000) conducted the research to analyse regional imbalance in agricultural development over two decades in Bangladesh by selecting some important indicators representing crop productivity, technology, agro-ecology, population pressure, human capital, institutional as well as infrastructure that are assumed to explain regional variation using a Stepwise Forward Regression procedure. Thereafter, a composite index of weighted standard score was constructed utilizing the results from regression analysis to rank regions in descending order off agricultural development level for each of the three time periods, Period 1 (1973-75), Period 2 (1981-83) and Period 3 (1991-93), respectively. The ultimate purpose of the study was to categorize regions into "very high", "high", "medium", "low" and "very low" levels, respectively. Results revealed the persistent stagnancy of regions over time and the dominance of crop productivity and technology factors in explaining inter-regional variations. From a total of 20 regions, Chittagong was ranked top (very high) followed by Comilla (high). Next seven and nine regions were grouped under "medium" and "low" categories, respectively. The least developed regions were Khulna and faridpur. The analysis also highlighted the significance of non-conventional factors i.e infrastructure and population factors influencing agricultural growth.

Md. Minhajul and Khan (2002) found that markets were unevenly distributed in time and space on account of regional, physical and socio-economic variations. However, spatial pattern indicated that market centres were randomly distributed throughout the study area due to inherent natural economic laws and the temporal distribution of markets was also uneven.

Bhakar and Bhargava (2003) presented a paper on disparities in infrastructural development in Rajasthan by using district level secondary data for their study. In order to measure the inter-district disparities in infrastructural development seven Sectoral indices have been calculated and then at the

second stage Composite index of in infrastructural development has been calculated by using the first Principal component for four time periods. The results indicated that indices of infrastructural development of the state have increased from 29.44 in the period 1970-71 to 59.80 in the period 1977-78. The relative position of the districts regarding their level of development was almost the same throughout the period under study. The CV reduced from 25.40 per cent in 1970-71 to 13.55 per cent in 1977-78, thus lending support to researcher finding that the inter-district disparities in infrastructural development have reduced however backward districts have registered no change.

Ingale and Pawar (2003) conducted a study to assess the regional disparities in the levels of human resource development in South Plateau region of Maharashtra. For the investigation they have used tahsilwise secondary data which have been collected from Socio-Economic Review and District Statistical Abstracts. Composite Development Index method has been used to find out the levels of development. The analysis revealed that there were four distinct zones in levels of human resource development in the region. Relatively high level of development was observed in the tahsils having high urbanization and high industrialization whereas very low level of development was confined to the tehsils belonging to drought prone areas having mostly rural population and inadequate education and medical facilities. Agriculture was the mainstay of these people has been adversely affected due to inadequate and irregular rainfall. To minimize the regional imbalances, this was the priority area for creating various developmental plans by State and Central Government as well.

Majumder (2003) made an attempt to study regional distribution of infrastructural facilities in India. He has observed that there exists considerable regional disparity in infrastructural facilities in India, not only among the states, but within the states also. It was also noted that the relative hierarchy has remained quite sticky over time. Relative progress of districts remained fairly similar over time for infrastructural levels. Proper identification of necessary projects, smooth and quick completion of construction, proper operation and management of the services and regular maintenance of them would help the economy in creation of efficient infrastructure on which to build up 'super structure' and to fulfill the objective of balanced regional development.

Venkatachalam (2003) studied on Infrastructure and agricultural development in Karnataka state and concluded that the agricultural infrastructure development was not evenly distributed within the State. Assuming that the level of agricultural growth rate has a positive strong correlation with the overall development in general and the agricultural development in particular, the unequal distribution of infrastructure would result in regional imbalances affecting the welfare of the individuals.

Fan and Zhang (2004) implied that rural infrastructure and education play a more important role in explaining the difference in rural non-farm productivity than agricultural productivity. Because the rural non-farm economy was a major determinant of rural income, investing more in rural infrastructure was key to an increase in overall income of the rural population. The lower productivity in the western region was explained by its lower level of rural infrastructure, education and science and technology. Therefore, improving both the level and efficiency of public capital in the west was a must to narrow its difference in productivity with other regions.

Hiremath and Katarki (2004) used Mahalananobis D^2 analysis (Distance Statistics) to study agricultural development and regional disparity in Karnataka. The study revealed that among the various factors considered to know the extent of regional disparity in the districts based on agricultural development, the per cent net irrigated area, number of regulated markets and sericulture production were found to be the major factors affecting regional disparity. Among the 20 districts Bangalore (R), Kolar, Shimoga, Bangalore, D. Kannada were found as highly developed, Mandya, Mysore, Chitradurga, Hassan, Bellary, Raichur, Tumkur, Chikmagalure, Gulbarga, Uttar Kannada, Belgaum and Kodagu were found to be moderately developed and Bijapur, Bidar and Dharwad were found to be low developed based on the agricultural development index formed.

De and Ghosh (2005) concluded that after a long period of state planning and a protected industrial regime since the Second World War, South Asia as a region has failed to foster a balanced regional development. The available evidence showed that inter-South Asia disparity in both basic infrastructure facilities and per capita income has been raising over the years. Rising inequality in major infrastructure facilities across the countries might be responsible for the widening income disparity over time. On the whole, there have been enormous differences in individual performance among the countries in terms of all the basic indicators of development. However, the relative positions of the countries have remained unchanged during the past quarter century in terms of the conventional definition of development.

Andersen and Shimokawa (2006) studied on rural infrastructure and agricultural development. The study revealed that productivity increase in agriculture was an effective driver of economic growth and poverty reduction both within and outside agricultural sectors. Such productivity increase depended on good rural infrastructure, well functioning domestic markets, appropriate institutions and access to appropriate technology. While the state of rural infrastructure varied widely among developing countries, most lower-income developing countries suffered severe rural infrastructure deficiencies. Deficiencies in transportation, energy, telecommunication and related infrastructure translate into poorly functioning domestic markets with little spatial and temporal integration, low price transmission and weak international competitiveness. In spite of the well documented importance of rural infrastructure to promote growth and poverty alleviation, high economic rates of return to investments in rural infrastructure and significant deficiencies of rural infrastructure in most developing countries.

Hassan *et al.* (2007) examined the performance of Orissa's economy as well as the direction of change in regional inequality in the state during the post-reform period. The study revealed that Orissa's position in the country has deteriorated drastically during the period and poverty levels have gone up by a significant margin despite a decline in the same at the national level. It has been found that despite the presence of divergence at state level in terms of most of the indicators of development, the analysis of district level data clearly indicated towards some kind of convergence in regional inequality within the state.

Kurian (2007) studied about widening economic and social disparities: Implications for India. He noted that, India suffers from acute economic and social disparities. His article addressed four dimensions of such disparities *viz.* regional, rural-urban, social and gender. Because of economic reforms, the southern and western states experienced accelerated economic and social development as a compared to northern and Easter states. This has led to widening gap in income, poverty and other indicator of development between the two regions. The rural-urban divide widened in the wake of reforms. While large and medium cities experience unperfected economic prosperity and the rural areas experience economic stagnation. As a result there was a widespread agrarian distress which results in farmers suicides. He has also noted about social and gender disparity. He also stressed on regional disparity, but it has not showed inter-regional disparity particularly in agricultural development. He has shown regional disparity in overall economic development.

Tiwari (2008) analysed two major components of development, *viz.* the agriculture and economic infrastructure sector at district level in the state of Himachal Pradesh. It was the factorial analysis based on 23 indicators and helped to indentify the lagging districts. Agricultural productivity in these districts was extremely low compared to its counterparts in the state mainly because of lack of irrigation facilities, limited use of modern agricultural inputs and lower degree of commercialization. Hence, in view of the existing inter-district differentials in agricultural productivity, there exists a wide scope for agricultural development in the less-developed districts in the state.

Khan *et al.* (2009) conducted the study on spatial patterns of agricultural development in Murshidabad district of West Bengal. The study deals with modern technological diffusion and its impact on agricultural development at micro level. It also attempted to recognize the spatial variation of agricultural development with the help of the variables like, net sown area, irrigated area, cropping intensity, crops productivity under HYV, agricultural labourers and gramin and commercial banks for determining the status of each block separately on each variable. This analysis have been measured the transforming and combining the data related to variables using Z-score. On the basis of Composite Score the developments of block have been again categorized into three classes- high, medium and low. Results showed that the modern technological inputs have reciprocal relationship with agricultural development in study area.

Mohanty (2009) studied about regional disparity in agricultural development in Maharashtra. He concluded that the process of agricultural development in Maharashtra over the last three decades indicated regional inequality, which western Maharashtra remained much ahead of other regions in terms of major developmental indicators. However, compared to Vidarbha the Marathwada region experienced better improvement in some respects. The Marathwada and Vidarbha regions were unable to compete effectively for a larger share of states resources due to the absence of a well-articulated structure of factions and alliances. As a result, the influential elites of western Maharashtra remained in an advantageous position to divert the developmental resources of the state to their region. The relatively better performance of the Marathwada region was mainly due to the socio-cultural proximity of its local elites with those of western Maharashtra.

Nayak and Narayankar (2009) analysed the level of regional development and correlation between different factors which lead to regional disparities. To assess the regional disparities of nine taluks of Bellary district, 32 social, economic and demographic indicators have been selected. The identification of regional disparities was made with the help of Composite Index for the year 2000-2001. The research revealed that there exist high disparities in the district in case of agricultural as well as economic development. Finally, they were suggested to develop infrastructural facilities through public investment in irrigation, rural electrification, roads and others was expected to distribute the gains from economic growth widely by providing opportunities to the less developed regions.

Rukkhsana (2009) concluded that the rural development is positively associated with agricultural development while agricultural development is strongly correlated with infrastructural development. For the rural development, the emphasis should be given on infrastructure as well as agricultural development.

Sandeepkumar (2009) used Composite Index to measure the inter-regional and inter-district disparities in agricultural development in Uttar Pradesh. The study revealed that all the districts of developed category are from western region, both in case output-based and input-based indicators of agricultural development. Districts of Eastern and Central regions were found mostly in moderately developed and less developed category. Agriculture is the backbone of the economy of U.P., so the disparities and less developed status of almost 34 districts of Eastern and Bundelkhand regions, out of 70 districts of U.P., were a matter of serious concern.

Gaur (2010) presented in his paper that there has been a huge gap between active and vibrant regions during pre-independence period in terms of availability of facilities and this has resulted in the form of unequal levels of development both in terms of economic and human. Inter-state disparity in total as well as per capita SDP for 20 major Indian states for the period 1980-2002 has been examined with the help of inequality indices that were based on properties of Lorenz Curve, Atkinson's social welfare function, Herfindahl's Concentration indices *etc.* Inter-state inequality trend has examined through 'convergence-hypothesis' as β-convergence and σ-convergence. Empirical results revealed disparity among states in terms of total/per capita SDP has risen sharply as inequality indices like Gini, Theil's index, RMD, Kakwani's as well as Atkinson's indices have shown surge, especially after the economic reforms of 1991. Widening gap in terms of income among rich and poor states, especially after 1991 has also been established through empirical results based on β-convergence and σ-convergence.

Hangaragi (2010) concluded that striking disparities, concurrent with a low level of development in general was marked feature of the development map of India. In spatial terms, peripheral region coinciding largely with the coastal areas, were more developed than the interior heartland of Hindi speaking areas. Western India is relatively more developed than under developed eastern India whose backwardness can be seen in low infrastructural base, tribal concentration and physical constraints.

Patra (2010) made an attempt to examine the inter-regional variation in infrastructural facilities across 30 districts of Orissa. He employed 'Principal Component Analysis' to compute 'Composite Index of Infrastructure' by integrating various components of infrastructure services. Empirical evidences showed that the position of the districts, except four identified, remains same over the period of analysis. The position of each district showed that there was a high degree positive relation between Composite Index of Infrastructure (CII) and Human Development Index (HDI).

Debapriya and Hota (2011) tried to analyse the inter-districts variation in the level of agricultural development in Orissa at two period of time indicating a decadal gap. The variation in indicators of agricultural development being influenced by many factors has been found to be perpetuating the inter-district variation as revealed by the developmental index constructed for the purpose. In the process of development transformation some districts were found stagnant and others were either moving forward or backward in the state of Orissa over a decade. Given such a scenario, the study recommended for support to the highly backward and backward districts to bring them at with the average rate of agricultural development of the state and simultaneously to developing, developed and highly developed districts to be at par with the agriculturally developed regions of the other states of the country.

Patra and Acharya (2011) made an attempt to examine the spatial disparities in infrastructural facilities across 16 major states of India and in turn analyse its impact on regional economic growth. They examined the effect of the former on the latter at an aggregate level considering state as a unit of analysis, using a simple multivariate method to compute a composite Infrastructure Development

Index (IDI) by combining various infrastructural services available at the state level. The effect of different infrastructural variables on economic growth is observed using Correlation matrix and Path regression analysis. Empirical evidence suggested that there wass a positive relationship between Infrastructure Development Index and Per Capita Net State Domestic Product and negative relationship between Infrastructure Development Index and Poverty. Hence, effort should be directed to create more infrastructure facilities at the state level to raise the state domestic product and reduce the level of poverty and unemployment of the people concerned.

Sahoo *et al.* (2011) investigated the role of infrastructure in promoting the economic growth in China for the period 1975 to 2007. Overall, the results revealed that infrastructure stock, labour force, public and private investments have played an important role in economic growth in China. More importantly, they found that infrastructure development in China has significant positive contribution to growth than both private and public investment. Further, there was a unidirectional causality from infrastructure development to output growth justifying China's high spending on infrastructure development since early nineties. The experience from China suggested that it was necessary to design an economic policy that improves the physical infrastructure as well as human capital formation for sustainable economic growth in developing countries.

Singha (2011) concluded that India's North Eastern region, identified as most backward region in the country, requires more physical infrastructure, especially the road and communication. Further, he noticed the relative variations of different indicators were same for almost all states. The role of basic physical infrastructure is very significant in NER. Despite heterogeneity in socio-economic structures of the states within the region, the need for and the type of infrastructure deficiencies in the states are more or less same.

Tripathy *et al.* (2011) by taking the indicators of agricultural development visualized that there was unevenness among the districts in agriculture. The districts of Ganjam, Puri, Sambalpur, Cuttack and Balasore were the relatively developed district in the field of agriculture in 1980-81. These districts attained a higher level of agricultural development than that of state average while, Dhenkanal, Keonjhar, Sundargarh, Kalahandi witnessed least agricultural growth.

Veena (2012) conducted the study on regional disparity in sericulture development in Karnataka. The Mahalanobis D^2 analysis (distance statistics) was employed to know the extent of regional disparity, factors affecting regional disparity and to classify the districts based on sericulture development. The results revealed that districts were highly despair with respect to sericultural development and the area under mulberry production, egg production, cocoon production and raw silk production were the major factors affecting regional disparity followed by number of mulberry producing villages, number of grainage centers and number of markets. All the 20 districts were grouped into three clusters and the three clusters were categorized into three groups as highly developed, moderately developed and low developed using the sericultural development index formed. With this optimistic scenario, priority should be given to major development indicators and there is need to undertake developmental measures in low developed and moderately developed districts to reduce regional disparity in the state.

Ahmed and Hussain (2013) revealed interesting insight into the issue of regional disparities in term of development in Malda district. There was a wide micro-regional disparities existed within the district. There were mixed signals on the whole the blocks of Malda district convey a sense of vigorous disparities in sectoral and spatial development. The analysis further revealed that English Bazar and Bamangola blocks of the study area were developed. Harishchandrapur-II and Kaliachak-III blocks of the study area lie under the low level of development in each broad group of socio-economy *i.e.*, education, health, communication and transportation, market, electricity and drinking water, agro-economy, finance and recreation. These areas have failed to impulses of development at the grass root level.

2.4 Flow of funds between the regions for development

Khan (2004) examined the regional disparities in per hectare flow of institutional credit to different farm-size groups and share of different farm-sizes in the per hectare institutional credit flow to agriculture. Study covered all the six regions of India and was based on the published data for the period 1980-81 to 1999-2000 from RBI publications. The study revealed that inter-regional disparities in per hectare flow of institutional credit to small farms as well as to non-farms as measured through coefficient of variation (CV) exhibit a cyclical trend for small farms and a distinct declining trend for non-small farms during the pre-liberalization period (1980-81 to 1990-91). During the post-

liberalization period (1991-91 to 1995-96), the direction of change in CV has been found to be reversed, decreasing in small farms and increasing in non-small farms. In addition, it was evident that both flow-wise and rate of growth-wise, the southern region has been well placed, followed by northern region. The eastern and north eastern regions have not been found placed well in this context.

Rakesh (2004) observed that among the striking features of the agricultural credit scene in India are the wide regional disparities in the disbursement of agricultural credit by scheduled commercial banks (excluding RRBs). The Southern states of India stood out with a substantially higher share of agricultural credit followed by the Northern and Central regions. Whereas, the ratio for the Southern region increased during the latter part of the 1990s, it remained stationery for the Northern, Central and North-Eastern regions. It was also notable that the Southern States have a much more active co-operative movement and hence their share of agricultural credit was higher. The low share of the Western region is surprising, but could be because of the less active role of cooperatives in this region. The East and North-Eastern regions clearly get a very low share.

Singh (2004) attempted to examine equity in fertilizer subsidy distribution. Researcher examined the issue of inter-crop, inter-regional and inter-class equity in fertilizer distribution in terms of shares of different farm classes, crops and states in total fertilizer use as well as per hectare fertilizer use across the farm. Researcher found that, interstate disparity in fertilizer consumption remains high, though it has been reducing over the years. More significant finding was that there prevails a fair degree of inter-class equity in distribution of fertilizer subsidy, contrary to the widely prevalent impression. Moreover, a uniform approach to reduction of all types of subsidies is justified.

Jadhav *et al.* (2006) have made an attempt to estimate the extent of inter-regional and intra-regional inequality in the flow of short-term credit flow from the DCCBs with the help of measures of inequality like Coefficient of variation, Theils entropy, Gini concentration ratio and Lorenz curve analysis. The CV and Theils entropy coefficient for short-term credit flow across the years indicated that there were moderate inequalities in the disbursement of short-term credit flow by the DCCBs in Maharashtra. The average inter-regional inequality in short-term credit flow showed the minimum inequality in Vidarbha region and maximum in Western Maharashtra over the years. The results of Gini coefficient for short-term credit flow showed an increase in intra-regional inequality in the average year and subsequently reduction in inequality in the terminal year of the study.

Khan *et al.* (2007) conducted research on effect of liberalization on institutional agricultural credit flow and its relationship with average cost of cultivation in Indian agriculture. The study has revealed that inter-state disparities in the short-term institutional credit flow to agriculture increased during the pre-liberalization period, but declined during the post-liberalization period. The percentage coverage of average cost of cultivation by short-term institutional credit flow in most of the states has been found abysmally low during the pre-liberalization period. The coverage improved in all the states in the post-liberalization period but it still remained, by and large, very low, except in the four states of southern region and Punjab and Himachal Pradesh in northern region in the year 2001-02. In the other 11 states out of the 17 states included in the study, the coverage has been below 20 per cent of the cost on cultivation in 2001-02. Under such circumstances, the institutional credit agencies should make concerted efforts in the disbursement of production credit to keep pace with the rising cost on cultivation so as to provide an incentive to the farmers to adopt the latest agro-techniques for achieving higher productivity.

Gandhimathi and Sumathi (2008) used Gini concentration ratio to examine the extent of disparity between Karamandai and Thanda Muthur blocks of Tamil Nadu. They have observed that in Karamandai block, the flow of credit was maximum in the year 2001-02, amounted to Rs. 692.13 lakh, while in Thanda Muthur block, it was Rs. 1046.58 lakh during 1999-2000. Similarly there was wide variation in the minimum amount of loan sanctioned by the commercial banks between the blocks. Finally, they have concluded that bank advances were concentrated in some areas and this uneven distribution of advances has resulted in disparity in the flow of credit. This in turn has also affected agricultural productivity.

Sidhu *et al.* (2008) used a simultaneous equation model to estimate the contribution of institutional credit towards use of production inputs, private investments and agricultural growth. The relationship between use of variable inputs and production credit disbursement has been found highly significant. A similar relationship has prevailed between private capital formation and investment credit. The demand-supply situation in terms of short-term institutional credit has undergone a change over time, with the demand exceeding supply by 49 per cent in 1995-96, but later, the supply has

been found exceeding demand by 122 per cent in the year 2005-06. It, therefore, became imperative that first the demand for agricultural credit in each state/region be assessed, depending on crop patterns and current inputs and capital requirements in relation to targeted output growth-rate and then, policy framework should be put in place to meet those requirements, instead of increasing the credit supply uniformly across the board in all the states/regions of the country.

Kumar *et al.* (2010) conducted the study on institutional credit to agriculture sector in India: status, performance and determinants. The study has examined the performance of agricultural credit flow and has identified the determinants of increased use of institutional credit at the farm household level in India. The study revealed that the institutional credit to agriculture in real terms has increased tremendously during the past four decades. The structure of credit outlets has witnessed a significant change and commercial banks have emerged as the major source of institutional credit in recent years. But, the declining share of investment credit in the total credit may constrain the sustainable agricultural growth. The quantum of institutional credit availed by the farming households was affected by a number of socio-demographic factors which include education, farm size, family size, caste, gender, occupation of household, *etc.* The study has suggested simplification of the procedure for a better access to agricultural credit of smallholders and less-educated/illiterate farmers.

Gandhimathi *et al.* (2012) conducted research on regional disparity in the distribution of agricultural credit. The secondary data on state wise distribution of agricultural credit and determinants of disparity in the distribution of agricultural credit were collected from the different sources. The Theils inequality index was calculated to estimate the regional disparity in the distribution of agricultural credit among states. The region wise analysis reveals that the Southern region dominated the Northern region, Central region, Western region, Eastern Region and North-eastern region. The state domestic product alone contributed 98.85 per cent in discriminating the high credit intensive and low credit intensive states. It showed that the states with higher state domestic product had greater amount of agricultural credit distribution.

Kaur (2013) conducted the study on regional disparities of agricultural finance in India to study the regional distribution and growth rates of agriculture credit among different states. State-wise distribution of agricultural credit showed that the distribution of agricultural credit did not follow the normally expected pattern of distribution, *i.e.* distribution of agricultural credit according to total cropped area, gross and net irrigated area. Invariably the States like Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Punjab, etc, with less percentage of total cropped area, gross and net irrigated area got a higher percentage of agricultural credit from the commercial banks. The States like Assam, Bihar, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Orissa, Uttar Pradesh, *etc.* with higher percentage of total cropped area, gross and net irrigated area got a less percentage of agricultural credit and the total cropped area from 1995-96 to 2009-10. The study further revealed that the States like Bihar, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Rajasthan, Uttar Pradesh, West Bengal, *etc.* with a higher percentage of total cropped area and a lower percentage of total agricultural credit, recorded an increase in the percentage share of total agricultural credit from 1995-96 to 2009-10. Finally, researcher concluded that the states with lower percentage share in the total cropped area, gross and net irrigated area were still getting a higher percentage share of total agricultural credit as compared to their corresponding percentage share of total cropped area, gross and net irrigated area.

Maan and Kaur (2013) made an attempt to find how far commercial banks have succeeded in reducing the regional gaps in supply of farm finance in India. In order to evaluate and understand the impact of various factors on the inter-regional distribution of agricultural credit, multiple regression analysis technique was used. The study revealed that by all large, the States with proportionately less cropped area, gross irrigated area, net irrigated area and population got proportionately more of all kinds of agricultural advances given by the commercial banks. However, one redeeming feature was that as the commercial banks gained experience and confidence of dealing with agricultural sector, the distribution of all kinds of agricultural advances tended to become equitable or disparity over time narrowed down. From rural development point of view, it is a healthy trend, which ought to be upheld and strengthened in future.

METHODOLOGY

This chapter deals with the description of the study area, the sampling procedure employed, the nature and sources of data and the various tools and techniques employed to quantify and evaluate the objectives.

The methodology is presented under the following major heads.

3.1 Description of the study area

3.2 Sampling procedure

3.3 Nature and sources of data

3.4 Analytical techniques employed

3.1 Description of the study area

The study on regional disparity in agricultural development was taken up for the entire Karnataka.

3.1.1 Delineation and general description of the state

The general features of Karnataka are presented in Table 3.1. The total geographical area of the Karnataka is 1,91,791 Sq. Kms. According to census 2001 the total population of the state was 5,28,50,562 of which 1,79,61,529 urban and 3,48,89,033 rural. The population density was 276 per sq. Km and literacy rate was 66.64 per cent. Agricultural holding were 62.20 lakh and average size of holding was 1.74 hectares while, operational holdings were 1,23,07,453. The total cropped area was 1,16,69,750 hectares and cropping intensity was 118.10 per cent. The normal rainfall was 1,189 mm while, actual rainfall was 1,055 mm. Road length was 154,20,000 Km. Per capita income was Rs 18,344. According to census 2011, the total population of the state was 6,10,95,297 (2,68,98,918 males and 2,59,51,644 females) with a rural population of 61.33 per cent and an urban population of 38.67 per cent while, population density per square kilometer was 319. Literacy rate of the state was 75.60 per cent (82.84 per cent male and 68.15 per cent female). According to 2010-11, total number of agricultural holdings were 78.32 lakh. Average size of the holding was 1.63 hectare while operational holdings were 1,21,61,457. The actual rainfall of the state was 1,094 mm where normal rainfall in the state was 1,198 mm. The total cropped area of the state was 130.6 lakh hectares while, cropping intensity of the state was 124.13. In 2010-11, per capita income of the state was Rs 40,699 and the road length was 2,31,030 km.

3.1.2 Physiography

The study area, Karnataka State, is situated between 11° 40' and 18° 27' North latitude and 74° 5' and 78° 33' East longitude in the centre of western peninsular India covering an area of 19.1 m.ha and it accounts for 5.8 per cent of the country's total geographical area. It has a 350 km long coastline, which forms the western boundary. The map of Karnataka is depicted in Fig. 1.

3.1.3 Soils

The soils of Karnataka broadly classified into six types *viz.*, 1) Red soils 2) Lateritic soils 3) Black soils 4) Alluvial soils 5) Forest soils and 6) Coastal soils.

3.1.4 Climate

The varying geographic and physiographic conditions of the state is responsible for the climatic variation in the state from arid to semi-arid in the plateau region, sub-humid to humid tropical in the Ghats and humid tropical monsoon type in the west coast plains. For meteorological purposes, the state has been divided into three sub-divisions:

i. Coastal Karnataka consisting of Dakshina Kannada, Udupi and Uttara Kannada districts.

ii. North interior Karnataka consisting of Belgaum, Bidar, Bagalkot, Bijapur, Dharwad, Haveri, Gadag, Gulbarga, Koppal and Raichur districts.

iii. South interior Karnataka consisting of Bangalore Rural, Bangalore Urban, Bellary, Chikmagalur, Chitradurga, Kodagu, Hassan, Kolar, Mysore, Chamrajnagar, Shimoga and Tumkur districts.

Table 3.1: General features of Karnataka

Sl. No.	Particulars	2001-02	2010-11
1	Total geographical area (Sq. Kms)	1,91,791	1,91,791
2	Total population (No.)	5,28,50,562	6,10,95,297
3	Total urban population (No)	1,79,61,529	2,35,81,413
4	Total rural population (No)	3,48,89,033	3,74,69,335
5	Population density (persons/sq. km)	276	319
6	Literacy rate (%)	67.04	75.60
7	Agricultural holdings (No)	62,20,798	78,32,189
8	Average size of land holdings (Ha)	1.74	1.63
9	Area under operational holdings (Ha)	1,23,07,453	1,21,61,457
10	Total cropped area (Ha)	1,16,69,750	1,30,62,163
11	Cropping Intensity (%)	118.10	124.13
12	Actual rainfall (mm)	1055	1094
13	Normal rainfall (mm)	1189	1198
14	Per capita income (Rs.)	18,344	40,699
15	Road length (000' sq. Km)	154.20	231.03

Source: Karnataka at a Glance 2002-03 and 2011-12

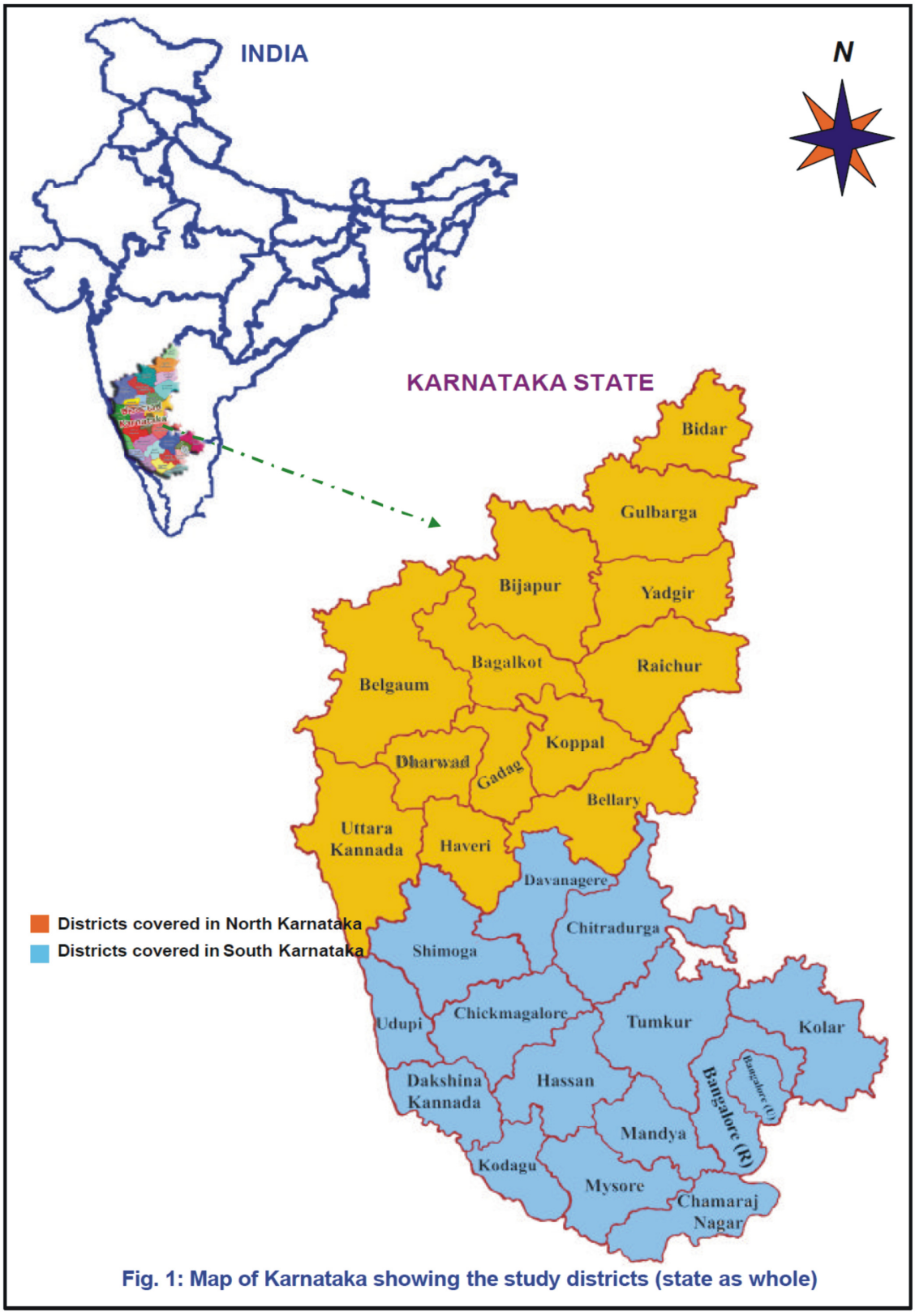

Fig. 1: Map of Karnataka showing the study districts (state as whole)

Fig 1: Map of Karnataka showing the study districts (state as whole)

3.1.5 Rainfall

The state receives an average rainfall of 1198 mm with minimum of 356 mm in Bijapur district and maximum of 5113 mm in Udupi district. The actual rainfall of the state was 1375 mm in 2011.

3.1.6 Temperature

Temperature is the lowest in the beginning of January and increases thereafter gradually at first and rapidly after the middle of February or the beginning of March. In the Southern Malnad region, the highest temperature occurs in April while, in the Northern Malnad and the coastal areas it occurs in May. In January, the mean daily temperature is 31-32 ° C in the coastal areas and slightly above 30 ° C in the Northern Malnad area except in Bidar district where it is 28-29 ° C. The highest maximum temperature in May reaches 43 °C in Gulbarga-Raichur region. In Ghats and Malnad areas, it is about 20-24 ° C. It is seen that the mean annual range of temperature (difference between highest mean daily maximum temperature and the lowest mean daily minimum temperature) is smallest in the coastal region (6 ° C) and greatest in the Bellary-Raichur region.

3.1.7 Land use pattern

Land use pattern in Karnataka state (2001-02 and 2010-11) is presented in Table 3.2. It could be observed that in 2001-02 the net area sown accounted for 51.64 per cent of total reported area. Forest covered 16.12 per cent while, land put to non- agricultural uses occupied share of 6.99 per cent of total reported area. Current fallows, fallows other than current fallow and cultivable wastes accounted for 9.62 per cent, 2.69 per cent and 2.21 per cent respectively. Barren and uncultivable land occupied around 4.14 per cent and permanent pastures and other grazing land covered 5.00 per cent area. Land under miscellaneous tress and groves accounted 1.60 per cent of the total reported area. In 2010-11, it can be observed that net area sown accounted for 55.24 per cent of total reported area. Forest covered 16.13 per cent while, land put to non- agricultural uses occupied share of 7.51 per cent of total reported area. Current fallow, fallow other than current fallow and cultivable wastes accounted for 6.29 per cent, 2.24 per cent and 2.18 per cent respectively. Barren and uncultivable land occupied around 4.13 per cent and permanent pastures and other grazing land covered 4.79 per cent area. Land under miscellaneous tree crops and groves accounted 1.50 per cent of the total reported area.

3.1.8 Cropping pattern

The area under major crops in Karnataka state (2001-02 and 2010-11) is presented in Table 3.3. It can be observed from the table that in 2001-02, sorghum was the major cereal crop which occupied 14.58 per cent followed by paddy with 11.54 per cent of the total cropped area. Ragi was in third position with 7.76 per cent area. Similarly, maize, wheat, bajra and minor millets covered 4.72 per cent, 2.12 per cent, 1.71 per cent and 0.57 per cent respectively. Chickpea covered 3.90 per cent while, pigeon pea and other pulses covered 3.92 per cent and 8.94 per cent of the total cropped area respectively. Commercial crops like groundnut, sugarcane and cotton occupied 6.96 per cent, 3.31 per cent and 4.93 per cent, correspondingly of the total cropped area. It can be observed from the table that in 2010-11, paddy was the major cereal crop which occupied 11.73 per cent fallowed by maize with 9.65 per cent of the total cropped area. sorghum was in third position with 9.51 per cent area. Similarly, ragi, bajra, wheat and minor millets covered 5.75 per cent, 2.37 per cent, 1.95 per cent and 0.20 per cent respectively. Chickpea covered 7.34 per cent while pigeon pea and other pulses covered 6.81 per cent and 7.09 per cent of the total cropped area respectively. Commercial crops like groundnut, sugarcane and cotton occupied 6.42 per cent, 4.93 per cent and 4.17 per cent, correspondingly of the total cropped area.

3.1.9 Irrigation

The net area under different sources of irrigation in Karnataka state is presented in Table 3.4. In 2001-02, Karnataka had a total irrigated area of about 24.50 lakh hectares. The canals constituted an important source of irrigation and accounts about 31.53 per cent of the total irrigation area. Areas irrigated by bore wells constitute about 30.08 per cent of net irrigated land followed by wells 18.27 per cent, other sources 8.53 per cent, tanks 7.47 per cent and lift irrigation 4.12 per cent. In 2010-11, Karnataka has a total irrigated area of about 34.89 lakh hectares. The bore wells constituted an important source of irrigation and accounts about 36.69 per cent of the total irrigation area. Areas irrigated by canals constitute about 33.15 per cent of net irrigated land followed by wells 12.53 per cent, other sources 8.93 per cent, tanks 5.65 per cent and lift irrigation 3.05 per cent.

Table 3.2: Land use pattern in Karnataka

(Area in '000' hectares)

Sl. No.	Particulars	2001-02	2010-11
1	Total Reported Area	19,050 (100.00)	19,050 (100.00)
2	Area under forests	3,070 (16.12)	3,072 (16.13)
3	Barren and uncultivable lands	788 (4.14)	787 (4.13)
4	Land put to non-agricultural uses	1,332 (6.99)	1,430 (7.51)
5	Permanent pastures and other grazing lands	952 (5.00)	912 (4.79)
6	Cultivable wastes	421 (2.21)	414 (2.18)
7	Miscellaneous tree crops and groves	305 (1.60)	286 (1.50)
8	Current fallows	1,832 (9.62)	1,199 (6.29)
9	Fallows other than current fallow	513 (2.69)	426 (2.24)
10	Net area sown	9,838 (51.64)	10,523 (55.24)

Note: Figures in the parentheses indicate percentages to reported area
Source: Karnataka at a Glance 2002-03 and 2011-12

Table 3.3: Area under major crops in Karnataka

(Area in '000' hectares)

Sl. No.	Particulars	2001-02	2010-11
1	Paddy	14,17,724 (11.54)	15,32,261 (11.73)
2	Ragi	9,53,430 (7.76)	7,50,588 (5.75)
3	Sorghum	17,90,835 (14.58)	12,42,071 (9.51)
4	Bajra	2,09,505 (1.71)	3,09,227 (2.37)
5	Maize	5,80,035 (4.72)	12,60,018 (9.65)
6	Wheat	2,60,486 (2.12)	2,54,755 (1.95
7	Minor millets	70,091 (0.57)	26,682 (0.20)
8	Chickpea	4,79,702 (3.90)	9,58,704 (7.34)
9	Pigeon pea	4,82,100 (3.92)	8,89,005 (6.81)
10	Other pulses	10,98,799 (8.94)	9,26,079 (7.09)
11	Groundnut	8,54,741 (6.96)	8,38,026 (6.42)
12	Sugarcane	4,06,941 (3.31)	6,44,610 (4.93)
13	Cotton	6,08,479 (4.95)	5,45,288 (4.17)
14	Others	30,71,882 (25.01)	28,84,849 (22.09)
	Total cropped area	**1,22,84,750 (100.00)**	**1,30,62,163 (100.00)**

Note: Figures in the parentheses indicate percentage to total cropped area
Source: Karnataka at a Glance, 2002-03 and 2011-12.

Table 3.4: Net area irrigated by different sources of irrigation in Karnataka

(Area in hectares)

Sl. No.	Particulars	2001-02	2010-11
1	Canals	7,72,674 (31.53)	1,156,782 (33.15)
2	Tanks	1,82,963 (7.47)	1,97,047 (5.65)
3	Wells	4,47,712 (18.27)	4,37,281 (12.53)
4	Bore wells	7,36,991 (30.08)	12,80,523 (36.69)
5	Lift irrigation	1,00,990 (4.12)	1,06,447 (3.05)
6	Other sources	2,09,097 (8.53)	3,11,724 (8.93)
	Total	**24,50,427 (100.00)**	**34,89,804 (100.00)**

Note: Figures in parentheses indicate percentages to the total irrigated area
Source: Karnataka at Glance 2002-03 and 2011-12

3.2 Sampling design and data base

The sampling design of the data base is explained in detail as follows.

3.2.1 Sampling design

The entire state of Karnataka was considered under the study. In order to facilitate the present study, the state was divided into two regions; North Karnataka and South Karnataka based on the geographical demarcation. Northern Karnataka includes 13 districts and Southern Karnataka includes 17 districts. The districts coming under each region are shown below.

Northern Karnataka: Belgaum, Bijapur, Bagalkot, Dharwad, Gadag, Haveri, Uttara Kannada, Bellary, Bidar, Gulbarga, Yadgir, Raichur and Koppal

Southern Karnataka: Bengaluru (U), Bengaluru (R), Ramanagar, Chitradurga, Davanagere, Kolar, Chikkaballapura, Shimoga, Tumkur, Chikmagalur, Dakshina Kannada, Udupi, Hassan, Kodagu, Mandya, Mysore and Chamarajanagara.

The study report conducted in the year 2002 by High Power Committee for Redressal of Regional Imbalance (HPC RRI) under the chairmanship of Late Dr. D. M. Nanjundappa, was considered as bench mark survey. The committee has considered 27 districts and 174 taluks under the study. (Table.3.5)

A multistage sampling procedure was followed for selection of taluks, villages, policymakers, officials and beneficiaries for the study.

3.2.1.1 Selection of taluks

From each north and south regions of the state three taluks were selected based on the Development Index which topped the list of of categories as most backward, more backward and backward. The selected taluks are as follows.

North region: Indi (most backward), Kalghatagi (more backward) and Navalgunda (backward).

South region: H. D, Kote (most backward), Hunsur (more backward) and Periyapatna (backward).

3.2.1.2 Selection of villages

Two villages were selected from each backward category taluks, in which the development programmes have been implemented (Special Development Plan).

3.2.1.3 Selection of farmers

From each village 10 respondents were contacted for eliciting the opinions about disparity and development programmes. Thus the sample size became 120 (Fig. 2).

3.2.1.4 Selection of officials and policy makers

A sample of five each officials and policy makers from each taluka were included in the sample for eliciting their opinion regarding disparity and implementation of the development programmes. Thus the sample size was 60 (Fig. 3).

3.2.2 Data base

The present study was on the basis of both primary and secondary data. Secondary data on area, production and productivity of agricultural and horticultural crops from the year 2001-02 to 2010-11, data on land use pattern, data pertaining to infrastructural indicators *i.e.* market facilities, banks, literacy rate, road network, cold storage units, irrigation facilities, co-operatives, etc and data on flow of funds to agricultural development were collected from various government publications like, the Annual Publications of the Directorate of Economics and Statistics (DES) Govt. of Karnataka, Karnataka State at a Glance, Statistical Abstract of Karnataka, Various journals, Newsletters and other online information sites and websites like indiastat.com, *etc.*

Primary data in the form of opinions, which was enumerated from farmers, officials and policy makers, was also envisaged for the study.

Table 3.5: Identification of regional backwardness based on the comprehensive composite development index, 2002

Sl. No.	District	Most Backward Taluks (Index in the range from 0.53 to 0.79	Index	More Backward Taluks (Index in the range from 0.80 to 0.88	Index	Backward Taluks (Index in the range from 0.89 to 0.99	Index
1	Bellary	Sandur Kudlilgi	0.75 0.74	Siruguppa H. B. Halli Hadagali	0.86 0.84 0.81		
2	Bidar	Bhalki Humnabad Basavakalyan Aurad	0.74 0.73 0.69 0.65				
3	Gulbarga	Sedam Shorapur Yadgir Chittapur Afzalpur Shahapur Aland Chincholli Jevargi	0.72 0.70 0.67 0.65 0.62 0.62 0.61 0.57 0.57			Gulbarga	0.89
4	Koppal	Kushtagi Yelburga	0.64 0.63	Koppal	0.81	Gangavathi	0.93
5	Raichur	Sindhanur Manvi Lingsugur Devdurga	0.78 0.69 0.63 0.53	Raichur	0.87		
I	**Gulbarga Division**	**21**		**5**		**2**	

Note: Blanks in the columns indicate that there are no taluks under concerned groups.

Contd...

Sl. No.	District	Most Backward Taluks (Index in the range from 0.53 to 0.79	Index	More Backward Taluks (Index in the range from 0.80 to 0.88	Index	Backward Taluks (Index in the range from 0.89 to 0.99	Index
6	Bagalkot	Bilagi	0.77	Hunugund Badami	0.85 0.82		
7	Belgaum			Athani Gokak Soundatti	0.88 0.86 0.86	Raybag Bailhongal Radurg Hukkeri	0.97 0.95 0.90 0.89
8	Bijapur	Muddebihal B Bagewadi Indi Sindgi	0.69 0.69 0.66 0.64			Bijapur	0.92
9	Dharwad			Kalghatagi	0.84	Navalgund Kundagol	0.99 0.95
10	Gadag			Mundargi	0.88	Ron Shirahatti	0.92 0.89
11	Haveri			Savanur Shiggaon Hirekerur	0.87 0.84 0.88	Haveri Byadagi Hanagal	0.99 0.97 0.92
12	Uttar Kannada			Supa (Joida) Bhatkal	0.87 0.82	Ankola Saddapur	0.98 0.92
II	**Belgaum Division**	**5**		**12**		**14**	

Note: Blanks in the columns indicate that there are no taluks under concerned groups.

Contd...

Sl. No.	District	Most Backward Taluks (Index in the range from 0.53 to 0.79	Index	More Backward Taluks (Index in the range from 0.80 to 0.88	Index	Backward Taluks (Index in the range from 0.89 to 0.99	Index
13	Bangalore (U)					Anekal	0.90
14	Bangalore (R)	Kanakapur Magadi	0.74 0.79			Hosakote Chennapatna	0.97 0.95
15	Chitradurga	Hosadurga	0.78	Hiriyur Molakalmur Holakere Chalalkeri	0.87 0.84 0.84 0.81		
16	Davanageri	Channageri Harapanahalli	0.78 0.72	Honnali Jagalur	0.86 0.80		
17	Kolar	Bagepalli	0.76	Malbagal Gudibanda Gowribidanur	0.88 0.84 0.83	Srinivasapur Chintamani Bangarpet Malur Sidlaghatta	0.96 0.97 0.96 0.93 0.91
18	Shimoga			Soraba	0.87	Shikaripura	0.92
19	Tumkur	Kunigal Madhugiri Gubbi Sira Pavagada	0.79 0.74 0.73 0.73 0.72	Turuvekere Koralagere C.N. Halli	0.86 0.83 0.83		
III	**Bangalore Division**	**11**		**13**		**9**	

Note: Blanks in the columns indicate that there are no taluks under concerned groups.

Contd...

Sl. No.	District	Most Backward Taluks (Index in the range from 0.53 to 0.79	Index	More Backward Taluks (Index in the range from 0.80 to 0.88	Index	Backward Taluks (Index in the range from 0.89 to 0.99	Index
20	Chamarajanagar	Chamarajanagar	0.78	Gudlupet Kollegal	0.81 0.80		
21	Chikmagalur			Kadur	0.81	Tarikere	0.89
22	Dakshina Kannada						
23	Hassan			Arakalgud	0.84	Holenarasipura Belur Channarayapatna Arasikeri	0.97 0.94 0.92 0.91
24	Kodagu						
25	Mandya			Malavalli Nagamangala Krishnarajpet	0.84 0.83 0.80	Srirangapatna Maddur Pamdavapura	0.98 0.95 0.94
26	Mysore	H.D. Kote	0.79	Hunsur T. Narasipur Nanjangud	0.88 0.87 0.87	Periyapatna K.R. Nagar	0.97 0.92
27	Udupi						
IV	**Mysore Division**	**2**		**10**		**10**	
A	**Northern Region (I+II)**	**26**		**17**		**16**	**59**
B	**Southern Region (III+IV)**	**13**		**23**		**19**	**55**
	Grand Total	**39**		**40**		**35**	**115**

Source: HPCFRRI, GOK, Final Report-2002.
Note: Blanks in the columns indicate that there are no taluks under concerned groups.

Table 3.6: The Division-wise breakup of taluks during 2002

Divisions	Most Backward	More Backward	Backward	Total
Gulbarga	21	5	2	28
Belgaum	5	12	14	31
Bangalore	11	13	9	33
Mysore	2	10	10	22
Total	**39**	**40**	**35**	**114**

Source: HPCFRRI, GOK, Final Report-2002.

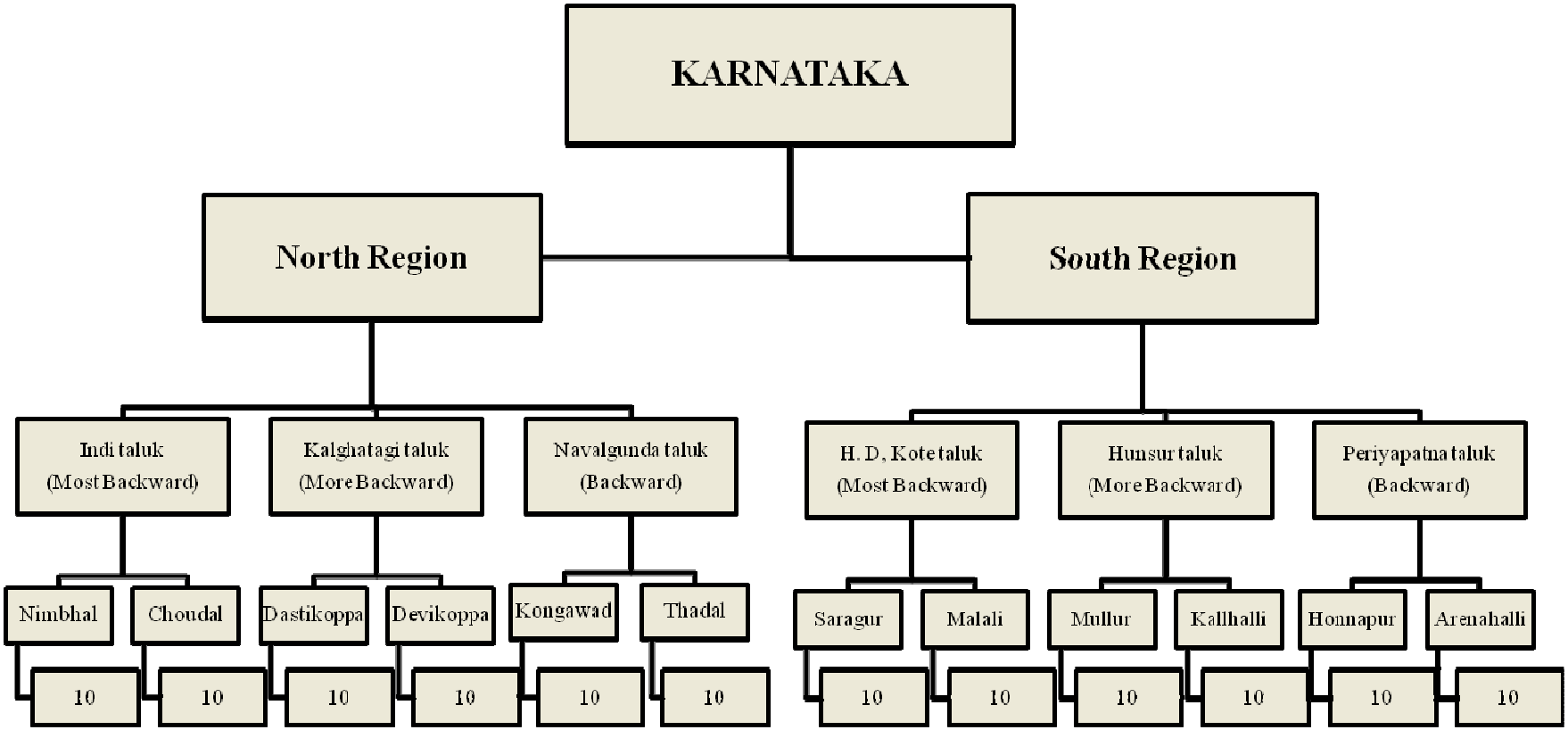

Fig. 2: Sampling design for farmers

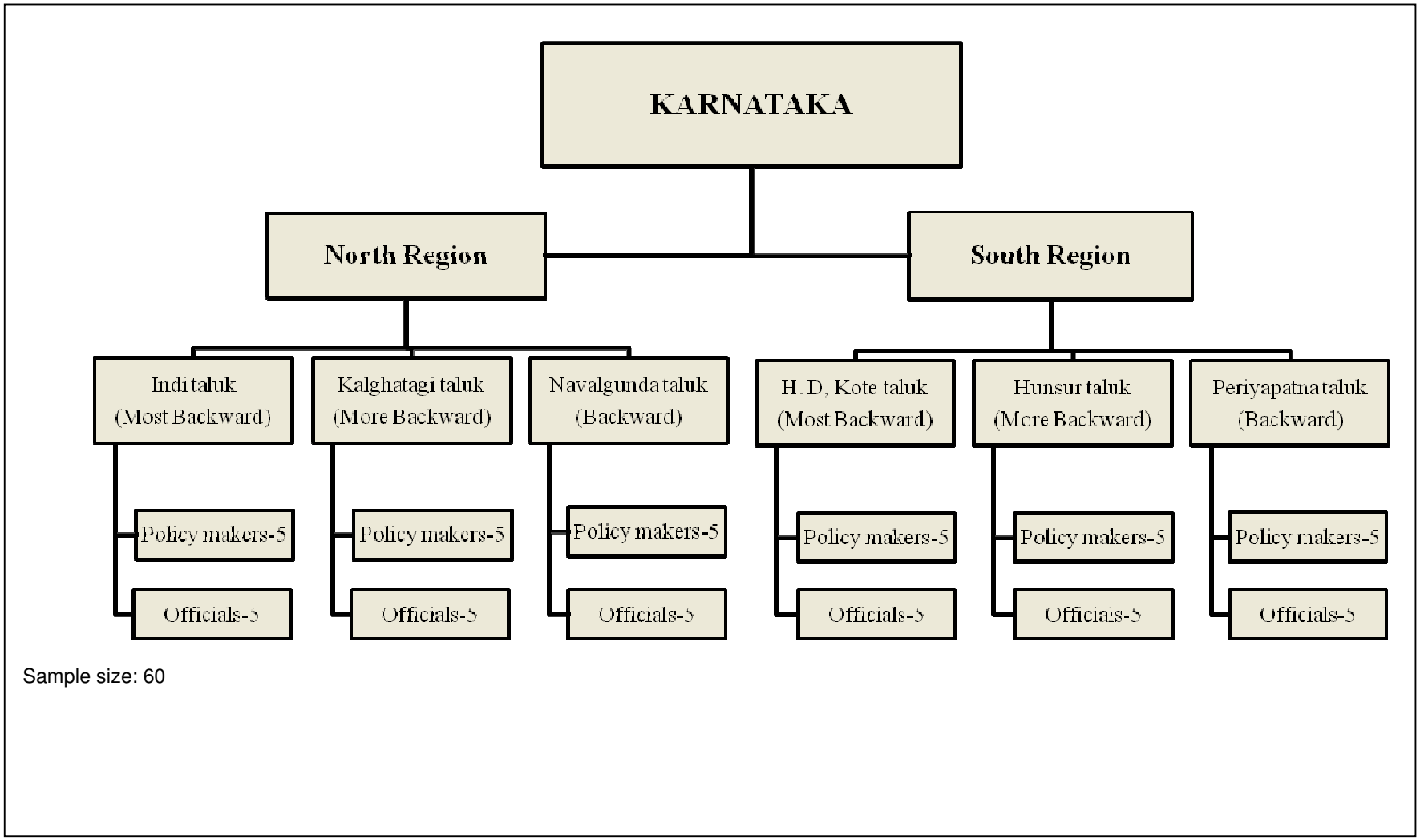

Fig. 3: Sampling design for policy makers and officials

3.3 Analytical tools and techniques

The details on the methods and tools employed for the analysis of the data are presented as under.

1. Tabular analysis
2. Land use Index
3. Compound growth rate analysis
4. Multiple regression analysis
5. Discriminant analysis
6. Theils entropy
7. Comprehensive Composite Development Index (CCDI)
8. Cluster analysis

3.3.1 Tabular analysis

For the meaningful interpretation of the changes in land use pattern, comparison of availability of infrastructural facilities and flow of funds for development between the two regions in the state tabular analysis was employed. Appropriate percentages and averages were worked out and presented in the form of tables.

3.3.2 Land use Index

To study the intra and inter-sectoral land use dynamics, the methodology as described by Pandey and Tewari (1987) was adopted in the study. The authors grouped the various land use classes in to three broad sectors, *viz.* (i) Ecological sector (E), comprising forests (F), Permanent pastures and grazing land (P), miscellaneous tree crops and grooves (M) and Barren and uncultivable land (U) ; (ii) Non-Agricultural sector (N) and (iii) Agricultural sector (A), comprising cultivable wastes (W), Net sown area (C), Current fallows (F_c) and other fallows (F_o).

Land area of the state being constant, it was assumed that land use changes can only occur through inter-class transfers and, hence the land use changes over time were linearly additive. The accounting identity for land use was thus, expressed as:

$$\Delta R = (\Delta F + \Delta P + \Delta M + \Delta U) + (\Delta N) + (\Delta W + \Delta F_c + \Delta F_o + \Delta C) \quad \text{..... (1)}$$

$$\text{or } \Delta R = \Delta E + \Delta N + \Delta A \quad \text{..... (2)}$$

Where,

R = Total reporting area

ΔE = Net change in ecological sector

ΔA = Net change in agricultural sector

ΔN = Net change in non-agricultural sector

Possible land use shifts within the ecological sector were postulated. Land may shift from M and P to F; from F to P and from U to F. Shifts from M and P to F would have no adverse ecological implications, while shift from U to F is highly desirable. However, a shift from F to P and F and M to U would have serious adverse ecological effects.

Thus, in this context, the ecological sector (E) was further divided in to the desirable sub sector (E_1) and the undesirable sub sector (E_2). The net change in the ecological sector can thus be budgeted as:

$$\Delta E = \Delta E_1 + \Delta E_2 \quad \text{..... (3)}$$

Where,

$\Delta E_1 = \Delta F + \Delta P + \Delta M$

$\Delta E_2 = \Delta U$

The net change in the agricultural sector, if positive (+□A), was at the cost of the ecological sector, since there is little change of land shift from the non-agricultural sector to the agricultural sector. If however, the net change in the agricultural sector is negative (-□A), the land use shift may

occur due to either the ecological (desirable and /or undesirable sub sector) or non-agricultural sector or both.

Land use dynamics within the agricultural sector was also have important implications. If there is positive net change to the agricultural sector (+□A) and also an increase in the net sown are a (+□C), the situation would be favorable for agricultural growth. But, if there is no addition to the net sown area (□C = 0), it would imply a situation where there is addition to cultivated area, on the one hand and depletion in cultivated area by means of land use shifts to F_c, F_o and W, on the other hand, thereby leaving the net sown area (NSA) constant. This situation connotes a very adverse situation as an increase in the agricultural sector could occur at the cost of the desirable ecological sector. Further, this situation would require large investments and efforts to reclaim such waste lands.

The overall inter-sectoral land use shifts were then budgeted as:

$\Delta R = \Delta E_1 + \Delta E_2 + \Delta N + \Delta A$

3.3.3 Compound growth rate analysis

To analyze the growth in area, production and productivity of agricultural and horticultural crops, an exponential form of growth function as specified was employed.

$$Y_t = A B^t U_t \quad \text{..... (4)}$$

Where,

Y_t = Agricultural and horticultural crops area, production and productivity in the t^{th} year.

A = Intercept indicating Y in the base period.

t = Time period in years

U_t = Error term

On taking the logarithms so as to facilitate the use of linear regression, above equation becomes

$$\text{Log } Y_t = \log A + t \log B + \log U_t \quad \text{..... (5)}$$

Which can be written as

$$Q_t = a + bt + V_t \quad \text{..... (6)}$$

Where,

$Q_t = \log Y_t$, $a = \log A$, $b = \log B$ and $V_t = \log U_t$

The values of 'a' and 'b' were estimated by using the OLS technique.

Then compound growth rate was obtained by

$$g = (B-1) * 100 \quad \text{..... (7)}$$

Where, B is the antilog of 'b'

3.3.4 Multiple regression analysis

The determinants of yield levels of agricultural and horticultural were examined by fitting multiple regression equations of the following form using time-series data for period 2001-02 to 2010-11.

$$Y=a+b_1X_1+b_2X_2+b_3X_3 \quad \text{..... (8)}$$

Where, Y is yield in kg/ha

X_1 is area irrigated in thousand hectares

X_2 is fertilizer consumption in thousand tonnes

X_3 is area under high-yielding verities (HYV) in thousand hectares

'a' is a constant and

'b_i's are respective regression coefficients of the independent variables

The constraints limiting acreage of a crop are the extent of irrigation, total cropped area, yield and basic infrastructure in agriculture. In order to ascertain the extent and magnitude of these variables in the growth of acreages of agricultural and horticultural crops multiple regression equation of the following form was fitted to data relating to the period from 2001-02 to 2010-11.

$$Y=a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where Y is area in thousand hectares

X_1 is area irrigated in thousand hectares

X_2 is gross cropped area in thousand hectares

X_3 is yield of respective crops in kg/ha

X_4 is road length per 100 sq. km. of area

X_5 is number of regulated markets

'a' is a constant and

'b_i's are respective regression coefficients of the independent variables

3.3.5 Discriminant analysis

In order to assess the relative importance of infrastructure facilities *viz.*, literacy rate, gross irrigated area to gross cropped area, distribution of total fertilizers, length of roads, commercial bank branches, Regional Rural Banks, regulated markets and sub-markets, cold storage units, agricultural co-operative societies and electricity consumption for irrigation pump sets, the Discriminant analysis was carried out. The specific form of the Discriminant function used to evaluate the relative contributions of different factors to the total distance measured between the two groups, *viz.*, infrastructural indicators between South and North Karnataka, is given below:

$$Z = L_1 X_1 + L_2 X_2 + L_3X_3 + L_4 X_4 + L_5 X_5 + L_6 X_6 + L_7 X_7 + L_8 X_8 + L_9X_9+L_{10} X_{10}\ldots\ldots (10)$$

Where,

Z = Total discriminant score for the two groups, *i.e.*, South Karnataka and North Karnataka Development Indicators

Li = Linear Discriminant Coefficients (i = 1……10) ;
Xi = Infrastructural indicators (i = 1……10).

3.3.6 Theils entropy

Theil (1967) evolved the measure of inequality to assess the income inequality, which was given by Zeratsion (2001).

$$\mathbf{H\,(Yi)} = \sum_{i=1}^{N} \mathbf{Yi}\left(\log \frac{\mathbf{1}}{\mathbf{Yi}}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

Where

H (Yi) = Theils entropy

Yi = Proportion of i^{th} region in the total flow of funds from developmental programme (Special Development Plan) in the state

H (Yi) has been modified and given by

$$I\,(Yi) = \log N - H\,(Yi) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Where, I (Yi) Theils entropy co-efficient which ranges from 0 to log N

N= Number of regions

Taking I (Yi) as independent variable a linear trend equation was fitted to examine the region-wise inequality over a period of 10 years (2007-08 to 2012-13).

$$I\,(Yi) = a + bt + u$$

3.3.7 Comprehensive Composite Development Index (CCDI)

To compare the present level of development of some selected taluks with bench mark survey in the state the similar methodology followed by Dr, D. M. Nanjundappa Committee has

followed in the study in order to find the status of development of these taluks. The Nanjundappa Committee has adopted the indexing method to construct the Comprehensive Composite Development Index (CCDI). In this method the indicator for each region is expressed as: (i) a proportion of sample average of the indicator or (ii) a number which ranges between 0 and 1 where these limits are determined by the minimum and maximum values, respectively of the indicator. In both case, the inverse of the standard deviations of the each (normalized) indicator can be used as the weight of the concerned indicator. However, later method implied tht the resulting index is sensitive to extreme values in the series, the former method followed by the Committee which is more robust of two, where each indicator was expressed as a proportion of the state average. Thus, if the resulting aggregate indicator for a given taluk is less than unity, it can be assumed that the concerned taluk is below the state average in terms of relative development and listed in backward category, HPCFRRI 2002, pp.162.

Thirty five different indicators have been considered from five different sector of economy *viz.*, agricultural and allied sector, industry, trade and finance, economic infrastructure, social infrastructure and population characteristics.

The Nanjundappa Committee used the data set from different sectors initially to construct sectoral indices as well as CCDI for each of 175 taluks. These steps have been followed in this exercise.

i. Raw data have been expressed as a number which ranges between 0 and 1 where these limits are determined by the minimum and maximum value, respectively of the indicators.

ii. Computation of weights for each set of sector-specific indicators on the basis of the inverse of standard deviation for each of these series.

iii. Raw data has been normalized with corresponding to state average.

iv. Sector-specific weights and normalized data was used to construct an overall index for each sectoral development for each taluk.

v. Finally, five sectoral indices were used to construct the CCDI.

Considering that an index of '1' indicates the state average, the committee was able to identify 114 taluks whose CCDI values are less than '1' as "Backward Taluks". Further, these taluks were sub-divided into (i) Backward taluk: 0.88<CCDI<1; (ii) More backward taluks: 0.79<CCDI< 0.89; (iii) Most backward taluks 0.52<CCDI<0.80.

3.3.8 Cluster analysis

Cluster analysis was used to analyze the opinions of farmers, officials and policy makers about regional disparity and developmental programmes in southern and northern regions of the state. Officials who are involved in implementation of SDP were considered for the study, policy makers in the sense the non-officials like president, vice-president and members of Taluka Panchayath were also considered. Farmers who are the beneficiaries under SDP were interviewed to elicit the opinions about the SDP programme.

Cluster analysis, a formal multivariate technique that has been an important technique to classify the characteristics into meaningful sets, known as clusters. It is a simple form of correlation analysis, which provides a measure of similarity among different independent variables. The analysis commences with the data set of independent variables of the sample, later on which leads to the formation of homogeneous groups.

The technique of cluster analysis *i.e.* Hierarchical agglomerative method was adopted to analyze the opinion of the policy makers, officials and farmers of the selected taluks Special Development Plan Implemented in these taluks and about the performance of the programme. Clusters were formed, by following minimum distance method also known as single linkage method. To begin with each variable was considered as a separate cluster. This process of grouping was continued until a single cluster was formed containing all the variables. The absolute values of correlation coefficient were used as measure of similarity and the coefficients were converted in to the scale of 0 to 100. It was presumed that higher the similarity values of the cluster, greater were the degree of association of that cluster. The values of degree of similarity between 70-100 were considered as high aggregates, 50-70 were medium and values below 50 were considered as low aggregates clusters.

RESULTS

Keeping in view the objectives the data collected were subjected to statistical analysis and the results are presented under the following headings:

4.1 Regional imbalances in land use pattern between north and south regions of Karnataka

4.2 Disparity in growth rates of area, production and productivity of agricultural and horticultural crops

4.3 Regional disparity in availability of infrastructural facilities for agricultural development

4.4 Disparity in the flow of funds between the regions for development

4.5 Comparison of present level of development of taluks with bench mark survey of the state

4.6 Opinion survey of the policymakers, officials and farmers about Special Development Plan (SDP) implemented for the development of backward category taluks

4.1 Regional imbalances in land use pattern between north and south regions of Karnataka

The details of imbalances in land use pattern between the two regions are presented as follows.

4.1.1 Land use pattern in south and north regions of Karnataka

Land use pattern in Karnataka, south and north regions with their share for the period 2001-02 to 2010-11 is presented in Table 4.1.

It could be observed from the table that for Southern Karnataka in 2001-02, net area sown accounted for 45.49 per cent of total reported area and around 17.59 per cent of area was covered by forest. Land put to non-agricultural uses and barren and uncultivable land occupied 9.44 per cent and 5.19 per cent respectively. Current fallows and fallows other than current fallow accounted 4.80 per cent and 2.57 per cent respectively. Permanent pastures, cultivable wastes and land under miscellaneous tree crops and groves covered 8.57 per cent, 3.49 per cent and 2.85 per cent correspondingly to total reported area. Comparatively in Northern Karnataka it was observed that in 2001-02, net area sown accounted for 63.27 per cent of total reported area. Forest covered an area of 14.71 per cent. Barren and uncultivable land and land put to non-agricultural uses occupied 3.20 per cent and 4.48 per cent respectively. Current fallows and fallows other than current fallow accounted 9.42 per cent and 1.75 per cent respectively. Permanent pastures, cultivable wastes and land under miscellaneous tree crops and groves covered 1.70 per cent, 1.06 per cent and 0.43 per cent corresponding to the total reported area of Northern Karnataka. Overall for the state of Karnataka net sown area occupied the highest usage of land with a percentage of 54.65 of total reporting area followed by area under forest (16.10%). Current fallows and fallows other than the current fallows accounted for 7.18 per cent and 2.14 per cent respectively. Barren and uncultivable lands and land put to non- agricultural uses were occupied an area of 4.16 per cent and 6.89 per cent respectively. The area under permanent pastures and grazing lands, cultivable waste lands and area under miscellaneous tree crops accounted for 5.04 per cent, 2.24 per cent and 1.60 respectively.

In the year 2010-11, for southern region of Karnataka forest covered 17.63 per cent, barren and uncultivable land and land put to non-agricultural uses occupied 5.18 and 10.13 per cent respectively. Permanent pastures, cultivable wastes and land under miscellaneous trees crops correspondingly covered 8.10 per cent, 3.39 per cent and 2.64 per cent. Current fallows and fallows other than current fallow accounted 4.36 per cent and 2.95 per cent respectively. Net sown area occupied 45.63 per cent of the total reported area. In the same year *i.e.* 2010-11 for Northern Karnataka, forest covered 14.71 per cent, barren and uncultivable land and land put to non-agricultural uses occupied 3.14 per cent and 4.64 per cent area respectively. Permanent pastures, cultivable wastes and land under miscellaneous tree crops and groves covered 1.67 per cent, 1.03 per cent and 0.43 per cent correspondingly. Current fallows and fallows other than current fallow accounted 8.11 per cent and 1.57 per cent respectively. Net sown area occupied 64.28 per cent of the total reported area. As far as the entire state of Karnataka is concerned forest covered an of 16.13 per cent of total reported area, barren and uncultivable lands and land put to non-agricultural uses covered 4.13 per cent and 7.51 per cent respectively. Permanent pastures, cultivable wastes and land under miscellaneous trees crops correspondingly covered 4.79 per cent, 2.18 per cent and 1.50 per cent. Current fallows and fallows other than current fallow accounted 6.29 per cent and 2.24 per cent respectively. Net sown area occupied 55.24 per cent of the total reported area.

Table 4.1: Changes in land use pattern in Karnataka between 2001-02 to 2010-11

(Hectares)

S. N.	Land use category	2001-02			2010-11			Per cent change		
		South	North	State	South	North	State	South	North	State
1	Area under forest	1624888 (17.59)	1443465 (14.71)	3068353 (16.10)	1627977 (17.63)	1443856 (14.71)	3071833 (16.13)	0.19	0.03	0.11
2	Barren and uncultivable lands	479708 (5.19)	314278 (3.20)	793986 (4.16)	478376 (5.18)	308251 (3.14)	786627 (4.13)	-0.28	-1.92	-0.93
3	Land put to non-agricultural uses	872393 (9.44)	439767 (4.48)	1312160 (6.89)	935352 (10.13)	455011 (4.64)	1430363 (7.51)	7.22	3.47	9.01
4	Permanent pastures and other grazing lands	791951 (8.57)	167273 (1.70)	959224 (5.04)	748040 (8.10)	164345 (1.67)	912385 (4.79)	-5.54	-1.75	-4.88
5	Cultivable wastes	322507 (3.49)	104077 (1.06)	426584 (2.24)	312974 (3.39)	101423 (1.03)	414397 (2.18)	-2.96	-2.55	-2.86
6	Miscellaneous tree crops and groves	263378 (2.85)	41919 (0.43)	305297 (1.60)	243512 (2.64)	42474 (0.43)	285986 (1.50)	-7.54	1.32	-6.33
7	Current fallows	443077 (4.80)	924106 (9.42)	1367183 (7.18)	402988 (4.36)	796146 (8.11)	1199134 (6.29)	-9.05	-13.85	-12.29
8	Fallows other than current fallow	237011 (2.57)	171494 (1.75)	408505 (2.14)	272615 (2.95)	153843 (1.57)	426458 (2.24)	15.02	10.29	4.39
9	Net area sown	4201807 (45.49)	6208645 (63.27)	10410452 (54.65)	4214886 (45.63)	6307767 (64.28)	10522653 (55.24)	0.31	1.60	1.08
10	Total reported area	9236720 (100.00)	9813116 (100.00)	19049836 (100.00)	9236720 (100.00)	9813116 (100.00)	19049836 (100.00)	0.00	0.00	0.00

Note: Figures in the parentheses indicate percentages to the total reported area.
Source: Karnataka at Glance 2002-03 and 2011-12.

4.1.2 Changes in land use pattern between south and north regions of Karnataka

The average of land use pattern was worked out for the period from 2001-02 to 2010-11, along with the changes in land use patterns between the two regions and the same is presented in Table 4.1.

The results showed that the area under forest in the state increased marginally by 0.11 per cent between the two periods *i.e.* 2001-02 and 200-11. Barren and uncultivable land registered a decrease in area of 0.93 per cent, over the period. Land put under non–agricultural uses has increased by 9.01 per cent. There was a considerable decline in the case of land under permanent pastures and grazing lands in the state by 4.48 per cent and reduction of 2.86 per cent and 6.63 per cent each in case of cultivable wastes and miscellaneous tree crops and groves could be seen from the analysis. The area under current fallows exhibited a sharp decline of 12.29 per cent while, fallows other than current fallow increased marginally by 4.39 per cent. The net sown area increased by 1.08 per cent while, no change was occurred in total reported area over the period.

The change in different land use classes of Southern Karnataka showed that area under forest was increased by 0.19 per cent where as area under barren and uncultivable land decreased by 0.28 per cent. There was a huge increase of 7.22 per cent of area of land put to non-agricultural uses. Area under permanent pastures, cultivable wastes and miscellaneous tree crops were decreased by 5.54 per cent, 2.96 per cent and 7.54 per cent respectively. There was decrease in area under current fallows at 9.05 per cent and huge increase in area under fallows other than current fallows at 15.02 per cent. Net sown area in south region increased by 0.31 per cent for the study period.

In northern region of Karnataka the land use changes were quite different from southern region. There was almost negligible increase of area under forest (0.03%) in North Karnataka. Area under barren and uncultivable land decreased and land put to non-agricultural uses was increased at the respective rates of 1.92 per cent and 3.47 per cent. There was a decrease of 1.75 per cent and 2.55 per cent of area under permanent pastures and grazing lands and cultivable wastes respectively where as area under miscellaneous tree crops and grooves increased by 1.32 per cent. Sharp decrease in area under current fallows and increase in area under fallows other than the current fallows at 13.85 per cent and 10.29 per cent respectively was observed in the study period. There was also an increase in net sown area of about 1.60 per cent.

4.1.3 Growth rates in area under different land use categories in southern and northern regions of Karnataka

The growth rate in different land use classes in both the regions and different districts of the regions are presented in Table 4.2 and 4.3. The area under different categories of land use over the period of 10 years (2001-02 to 2010-11) was analyzed using the compound growth rate and annual rate of change.

In southern region of Karnataka the growth rate under forest area is increasing at the rate of 0.02 per cent per annum and area put to non-agricultural uses also increasing at the rate 0.81 per cent. There were decline in the growth rate of barren and uncultivable land, permanent pastures and grazing lands, land under miscellaneous tree crops and cultivable waste land at 0.02 per cent, 0.62 per cent, 0.98 per cent and 0.28 per cent respectively. Fallow land other than current fallows increased at the rate of 0.93 per cent where as current fallows decreased at the rate of 3.15 per cent per annum. There was marginal increase in the rate of growth of net sown area over the years at the rate of 0.37 per cent per annum (Table 4.2).

Within the south region of Karnataka different districts have showed different growth rate for different land use classes. Area under forest was significantly increased in Bengaluru urban and Hassan district at the rate of 6.38 per cent and 0.10 per cent respectively. Except in Chitradurga all the districts of Southern Karnataka were showed significant increase in growth rate in the case of land put to non-agricultural uses. Highest growth rate of land put to non-agricultural uses was seen in Bengaluru (U) district *i.e.* 3.53 per cent per annum. Decreasing growth rate was seen in the case of barren and uncultivable lands in the districts of Bengaluru rural, D. Kannada, Udupi and Mandya districts at 0.08 per cent, 0.05 per cent, 0.05 per cent and 0.02 per cent respectively, whereas Bengaluru Urban district showed positive growth rate of 0.23 per cent per annum. Almost all the districts of Southern Karnataka showed the negative growth rate in the case of permanent pastures and grazing lands and land under miscellaneous tree crops. In major districts growth rate of cultivable waste lands were decreased but it was increased in Udupi with 1.23 per cent per annum. Current

fallows were decreased in all the districts except in Mysore where current fallows were increased at the rate of 8.38 per cent per annum. Fallows other than the current fallows were increased in the districts of Bengaluru (U), Bengaluru (R), Kolar, Dakshina Kannada, Hassan districts. A sharp decline in the growth rate of net sown area was seen in Bengaluru (U) district with 5.19 per cent per annum. A significant increase in the growth rate of net sown area was noticed for Davanagere (1.02%), Shimoga (0.37%), Kodagu (1.81%) and Chamarajanagar (2.41%) districts.

Comparatively in Northern Karnataka the growth rate under forest area is decreasing at the rate of 0.003 per cent per annum and area put to non-agricultural uses increasing at the rate 0.23 per cent. There were decline in the growth rate of barren and uncultivable land, permanent pastures and grazing lands, cultivable waste land at 0.10 per cent, 0.25 per cent and 0.30 per cent respectively. Growth rate of miscellaneous tree crops and grooves were seen positive (0.80%). Fallow lands other than current fallows decreased at the rate of 0.22 per cent but current fallows increased at the rate of 2.38 per cent per annum. There was marginal increase in the rate of growth of net sown area over the years at the rate of 0.34 per cent per annum (Table 4.3).

As far as district wise estimation of growth rate was concerned, the districts of northern region showed a lot of variation in growth rate for different land use categories. Significant decline in the growth rate of forest was seen in Uttara Kannada district with 0.01 per cent per annum, no other significant trend was seen for any of the districts in Northern Karnataka. Increasing trends were noticed for land put to non-agricultural uses in all the districts of the region, where the highest growth rate of area put to non-agricultural uses was seen in Bijapur district with 0.79 per cent followed by Uttara Kannada with 0.76 per cent per annum. No significant trends were observed for barren and uncultivable land among the districts. Growth in the class of permanent pastures and grazing land were negative in Haveri and Uttara Kannada districts at the rate of 0.21 per cent and 2.26 per cent per annum respectively. Growth rate of land under miscellaneous tree crops were increased in the districts of Belgaum (14.69%), Bijapur (0.11%), Bagalkot (3.71%), Dharwad (3.23%), Gadag (2.29%), Haveri (2.50%), Uttara Kannada (0.50%) and Gulbarga (0.48%). Cultivable waste lands were decreased in the districts of Belgaum (1.35%) and Uttara Kannada (2.30%), but increased in Bidar (0.05%) district. Fallow lands other than current fallows were decreased in the districts of Gadag, Gulbarga and Koppal districts at the rate of 17.8 per cent, 5.52 per cent and 18.79 per cent respectively, but increased in the districts of Uttara Kannada, Bellary and Bidar districts at the rate of 3.23 per cent, 17.66 per cent and 5.73 per cent per annum respectively. Except Dharwad (7.68%), Bidar (5.06%) and Raichur (4.83%) almost all the districts of north region showed negative growth rate in the category of land under current fallows. Net sown area was increased in the districts of Bijapur, Bagalkot, Haveri and Gulbarga at the rate of 1.49 per cent, 0.99 per cent, 0.40 per cent and 0.59 per cent respectively.

Table 4.3 showed that for the state as a whole, the area under forest has increased at the rate of 0.01 per cent per annum. The area under barren and uncultivable lands has declined by 0.05 per cent while, land put to non-agricultural uses increased by 0.77 per cent annually. Land under permanent pastures and other grazing land, cultivable wastes and miscellaneous tree crops and groves decreased by 0.56 per cent, 0.31 per cent and 0.75 per cent per annum respectively. Current fallows showed the decline at the rate of 2.60 per cent, whereas, fallows other than current fallows showed a positive growth rate of 0.48 per cent. The net sown area increased at the rate 0.35 per cent, per annum. Except current fallows, fallows other than the current fallows and net sown area, the growth rates in all land use categories were statistically significant at 1 per cent probability level.

4.1.4 Intra-sectoral dynamics of land use in south and north regions of Karnataka

The results furnished in Table 4.4 and 4.5 elicit the annual rate of change in various land use categories for the south and north regions of Karnataka for the period (2001-02 to 2010-11).

Table 4.4 has revealed that in Southern Karnataka the annual rate of change have showed that in the ecological sector, forest was the only sector in which annual growth of area was increasing at the rate of 309 hectares per year. On the contrary in respect of other ecological sub-sectors such as permanent pastures and other grazing lands, land under miscellaneous tree crops and groves and barren and uncultivable lands declined annually by 4,391 ha, 1,987 ha and 133 hectares respectively. In the agricultural sector, the net sown area and fallow lands other than current fallows have increased at an annual rate of 1,308 ha. and 3,560 hectares respectively. The cultivable wastes and current fallows showed an annual decline by 953 and 4,009 hectares respectively. However, in the case of non-agricultural sector there was a substantial increase in the area at the rate of 6,396 hectares annually.

Table 4.2: Compound growth rates of land use classes in different districts of Southern Karnataka during 2001-02 to 2010-11

(per cent per annum)

Sl. No.	Districts	Area put to non-agril. uses	Area under forest	Permanent pastures & grazing land	Land under misc. tree crops and grooves	Barren & uncultivable land	Cultivable waste land	Fallow land other than current fallows	Current fallows	Net sown area
1	Bengaluru (U)	3.53**	6.38**	-0.44	-3.29*	0.23*	-2.18	5.89**	-0.64	-5.19**
2	Bengaluru (R)	1.83**	0.00	-0.67**	-3.21*	-0.08**	-1.62*	12.98*	-5.12	-0.34
3	Ramanagar[#]	--	--	--	--	--	--	--	--	--
4	Chitradurga	0.00	0.00	0.00	0.00	0.00	0.00	-2.21	-1.15	-1.07
5	Davanagere	0.01*	0.00	0.00	-0.26*	0.00	-1.12**	-7.60**	-11.11*	1.02*
6	Kolar	0.73**	0.00	0.00	0.00	0.00	0.00	8.06*	-6.71	1.11
7	Chikkaballapur[#]	--	--	--	--	--	--	--	--	--
8	Shimoga	0.05**	0.00	-0.14*	-0.06*	-0.02	-0.59**	-2.08*	1.07	0.37*
9	Tumkur	0.14**	0.02	-1.14**	0.65**	0.00	-0.001	-3.95*	2.34	0.005
10	Chikmagalur	0.09*	0.00	-1.32**	-0.14**	0.00	-1.22**	-5.79**	-2.44	8.10
11	D. Kannada	1.22**	0.00	-0.18**	-0.23*	-0.05**	-0.57*	1.78**	-1.79*	6.90
12	Udupi	0.30**	0.02	-0.04*	-0.40**	-0.05*	1.23*	-1.41*	-11.36*	0.05
13	Hassan	0.14**	0.10*	-0.001	0.95*	0.01	-1.22	5.03*	-1.95	-0.35
14	Kodagu	0.25**	0.00	-3.03**	-5.18**	0.00	-3.93**	-1.87	-7.17**	1.81**
15	Mandya	0.02**	0.00	-2.21**	0.93**	-0.02**	0.00	8.70**	-11.71**	1.92
16	Mysore	1.15*	0.00	-1.66*	-1.16*	0.00	0.00	4.40	8.38*	2.41
17	Chamarajanagar	0.06**	0.00	0.00	0.04	0.00	0.00	-7.70**	-13.77**	2.41**
	Southern Karnataka	**0.81****	**0.02****	**-0.62****	**-0.98****	**-0.02****	**-0.28****	**0.93**	**-3.15**	**0.37**

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively

[#] Newly formed districts for which time series data is not available

Table 4.3: Compound Growth Rates in land use classes in different districts of Northern Karnataka during 2001-02 to 2010-11

(per cent per annum)

Sl. No.	Districts	Area put to non-agril. uses	Area under forest	Permanent pastures & grazing land	Land under misc. tree crops and grooves	Barren & uncultivable land	Cultivable waste land	Fallow land other than current fallows	Current fallows	Net sown area
1	Belgaum	0.10**	0.00	0.00	14.69**	0.00	-1.35**	-0.48	-1.74	0.59
2	Bijapur	0.79*	0.00	0.00	0.11**	0.00	0.00	0.00	-8.51*	1.49*
3	Bagalkot	0.00	0.00	0.00	3.91**	0.00	0.00	0.31	-7.09*	0.99*
4	Dharwad	0.42**	0.00	0.00	3.23*	0.00	0.00	-2.16	7.68*	-0.70
5	Gadag	0.17*	0.00	0.00	2.29**	0.00	0.00	-17.8**	-4.75	0.06
6	Haveri	0.56**	0.00	-0.21**	2.50**	0.00	0.00	0.27	-9.70**	0.40*
7	U.Kannada	0.76**	-0.01**	-2.26**	0.50*	-1.03	-2.30**	3.23*	-2.08	0.40
8	Bellary	2.62	0.00	0.00	-2.13	0.00	0.00	17.66*	-3.51	-0.12
9	Bidar	0.01	0.37	0.00	0.13	-0.64	0.05*	5.73**	5.06*	-1.01*
10	Gulbarga	0.10*	0.00	0.08	0.48**	-0.01	0.00	-5.52*	-4.17*	0.59*
11	Yadgir[#]	--	--	--	--	--	--	--	--	--
12	Raichur	0.00	0.00	0.00	0.00	0.00	0.00	3.03	4.83*	-1.46*
13	Koppal	0.03*	0.00	0.00	-3.71	0.00	0.00	-18.79**	-0.97	1.70
	Northern Karnataka	**0.23****	**-0.003**	**-0.25****	**0.80***	**-0.10**	**-0.30****	**-0.22**	**2.38**	**0.34**
	State	**0.77****	**0.01****	**-0.56****	**-0.75****	**-0.05***	**-0.31****	**0.48**	**-2.60**	**0.35**

Note: ** and * indicates significant at 1 per cent and 5 per cent probability level respectively

[#] Newly formed districts for which time series data is not available

Table 4.4: Annual rate of change in different land use classes in different districts of Southern Karnataka during 2001-02 to 2010-11

(000' ha)

Sl. No.	Districts	Area put to non-agril. uses	Ecological Sector				Agricultural Sector			
			Area under forest	Permanent pastures & grazing land	Land under misc. tree crops and grooves	Barren & uncultivable land	Cultivable waste land	Fallow land other than current fallows	Current fallows	Net sown area
1	Bengaluru (U)	2.869	0.175	0.007	-0.057	0.016	-0.028	0.231	0.308	-3.520
2	Bengaluru (R)	0.815	0.000	-0.207	-0.542	-0.020	-0.115	1.319	-0.804	-0.447
3	Ramanagar[#]	--	--	--	--	--	--	--	--	--
4	Chitradurga	0.000	0.000	0.000	0.000	0.000	0.000	-0.157	-2.069	2.226
5	Davanagere	0.004	0.000	0.000	-0.009	0.000	-0.071	-0.360	-0.405	0.841
6	Kolar	0.374	0.000	0.000	0.000	0.000	0.000	0.400	-2.475	1.700
7	Chikkaballapur[#]	--	--	--	--	--	--	--	--	--
8	Shimoga	0.050	0.000	-0.255	-0.012	-0.006	-0.089	-0.679	-0.001	0.992
9	Tumkur	0.120	0.019	-0.979	0.089	0.000	-0.004	-0.465	5.612	-4.393
10	Chikmagalur	0.049	0.000	-0.918	-0.021	0.000	-0.211	-0.145	-0.358	1.604
11	D. Kannada	0.842	0.000	-0.029	-0.117	-0.030	-0.334	0.053	-0.092	-0.294
12	Udupi	0.108	0.053	-0.006	-0.193	-0.009	0.524	-0.031	-0.355	-0.091
13	Hassan	0.111	0.061	-0.054	0.065	0.001	-0.340	0.256	-1.960	1.860
14	Kodagu	0.051	0.000	-0.392	-1.111	0.000	-0.281	-0.048	-0.476	2.258
15	Mandya	0.011	0.000	-0.614	0.021	-0.005	0.000	1.486	-1.432	0.533
16	Mysore	0.882	0.000	-0.945	-0.100	-0.079	-0.004	2.910	2.199	-4.862
17	Chamarajanagar	0.011	0.000	0.000	0.000	0.000	0.000	-1.210	-1.701	2.901
	Southern Karnataka	**6.396**	**0.309**	**-4.391**	**-1.987**	**-0.133**	**-0.953**	**3.560**	**-4.009**	**1.308**

Note: [#] Newly formed districts for which time series data is not available

Table 4.5: Annual rate of change in different land use classes in different districts of Northern Karnataka during 2001-02 to 2010-11

(000' ha)

S. N.	Districts	Area put to non-agril. uses	Ecological Sector				Agricultural Sector			
			Area under forest	Permanent pastures & grazing land	Land under misc. tree crops	Barren & uncultivable land	Cultivable waste land	Fallow land other than current fallows	Current fallows	Net sown area
1	Belgaum	0.060	0.000	0.000	0.185	0.000	-0.130	-0.003	3.869	-3.981
2	Bijapur	0.474	0.000	0.000	0.001	0.000	0.000	0.000	-13.296	12.820
3	Bagalkot	0.001	0.000	0.000	0.006	0.000	0.000	0.055	-2.512	2.450
4	Dharwad	0.105	0.000	0.000	0.004	0.000	0.000	-0.304	2.222	-2.025
5	Gadag	0.027	0.000	0.000	0.004	0.000	0.000	-0.553	-0.794	1.316
6	Haveri	0.158	0.000	-0.019	0.037	0.000	0.000	0.068	-1.357	1.114
7	Uttara Kannada	0.409	-0.145	-0.299	0.005	-0.339	-0.148	0.541	-0.031	0.007
8	Bellary	4.169	0.000	0.000	-0.187	0.000	0.000	0.635	-0.315	-4.493
9	Bidar	0.004	0.184	0.000	-0.006	-0.239	0.012	1.088	0.207	-1.250
10	Gulbarga	0.105	0.000	0.025	0.006	-0.018	0.000	-0.733	-8.320	9.455
11	Yadgir[#]	--	--	--	--	--	--	--	--	--
12	Raichur	0.000	0.000	0.000	0.000	0.000	0.000	0.362	6.406	-6.768
13	Koppal	0.013	0.000	0.000	0.000	0.000	0.000	-1.771	1.128	1.268
	Northern Karnataka	5.524	0.039	-0.293	0.056	-0.603	-0.265	-1.765	-12.796	9.912
	State	11.820	0.348	-4.684	-1.931	-0.736	-1.219	1.795	-16.805	11.220

Note: [#] Newly formed districts for which time series data is not available

Table 4.6: Budgeting of inter-sectoral land use shifts in different regions of Southern Karnataka from 2001-02 to 2010-11

Sl. No.	Districts	Annual rates of change ('000 Ha.)				
		Desirable Ecological sector (E_1)	Undesirable Ecological sector (E_2)	Non-Agril. Sector (N)	Agril. sector (A)	Net sectoral changes*
1	Bengaluru (U)	0.125	0.016	2.869	-3.010	0.000
2	Bengaluru (R)	-0.749	-0.020	0.815	-0.047	0.000
3	Ramanagar#	--	--	--	--	--
4	Chitradurga	0.000	0.000	0.000	0.000	0.000
5	Davanagere	-0.009	0.000	0.004	0.005	0.000
6	Kolar	0.000	0.000	0.374	-0.376	-0.002
7	Chikkaballapur#	--	--	--	--	--
8	Shimoga	-0.267	-0.006	0.050	0.224	0.000
9	Tumkur	-0.870	0.000	0.120	0.750	0.000
10	Chikmagalur	-0.939	0.000	0.049	0.890	0.000
11	Dakshina Kannada	-0.146	-0.030	0.842	-0.666	0.000
12	Udupi	-0.146	-0.009	0.108	0.048	0.000
13	Hassan	0.073	0.001	0.111	-0.184	0.000
14	Kodagu	-1.503	0.000	0.051	1.453	0.000
15	Mandya	-0.593	-0.005	0.011	0.587	0.000
16	Mysore	-1.044	-0.079	0.882	0.243	0.002
17	Chamarajanagar	0.000	0.000	0.011	-0.011	0.000
	Southern Karnataka	**-6.069**	**-0.133**	**6.396**	**-0.094**	**0.100**

Note: * The net sectoral changes equal algebraic sum of $\Delta N+\Delta E_1+\Delta E_2+\Delta A$

newly formed districts trends of data on which is not available

Desirable ecological sector (E_1) = area under forest + permanent pastures and grazing lands + land under miscellaneous tree crops

Undesirable ecological sector (E_2) = Barren and uncultivable land

Agricultural sector (A) = Cultivable waste land + current fallows + fallows other than current fallows + net sown area

Table 4.7: Budgeting of inter-sectoral land use shifts in different regions of Northern Karnataka from 2001-02 to 2010-11

Sl. No.	Districts	Annual rates of change ('000 Ha.)				
		Desirable Ecological sector (E_1)	Undesirable Ecological sector (E_2)	Non-Agril. Sector (N)	Agril. sector (A)	Net sectoral changes*
1	Belgaum	0.185	0.000	0.060	-0.245	0.000
2	Bijapur	0.001	0.000	0.474	-0.475	0.000
3	Bagalkot	0.006	0.000	0.001	-0.007	0.000
4	Dharwad	0.004	0.000	0.105	-0.107	0.002
5	Gadag	0.004	0.000	0.027	-0.031	0.000
6	Haveri	0.019	0.000	0.158	-0.176	0.000
7	Uttara Kannada	-0.439	-0.339	0.409	0.370	0.000
8	Bellary	-0.187	0.000	4.169	-4.173	-0.191
9	Bidar	0.178	-0.239	0.004	0.057	0.000
10	Gulbarga	0.031	-0.018	0.105	0.402	0.520
11	Yadgir#	--	--	--	--	--
12	Raichur	0.000	0.000	0.000	0.000	0.000
13	Koppal	0.000	0.000	0.013	0.624	0.638
	Northern Karnataka	**-0.198**	**-0.603**	**5.524**	**-4.914**	**-0.191**
	State	**-6.267**	**-0.736**	**11.820**	**-5.008**	**-0.191**

Note: * The net sectoral changes equal algebraic sum of $\Delta N+\Delta E_1+\Delta E_2+\Delta A$

newly formed districts trends of data on which is not available

Desirable ecological sector (E_1) = area under forest + permanent pastures and grazing lands + land under miscellaneous tree crops

Undesirable ecological sector (E_2) = Barren and uncultivable land

Agricultural sector (A) = Cultivable waste land + current fallows + fallows other than current fallows + net sown area

In northern region of Karnataka the annual rate of change (Table 4.5) have showed that in the ecological sector forest and area under miscellaneous tree crops and grooves were the sectors in which annual growth of area was increasing at the rate of 39 and 56 hectares per year respectively. On the contrary in respect of other ecological sub-sectors such as permanent pastures and other grazing land and barren and uncultivable lands declined annually by 293 ha and 603 hectares respectively. In the agricultural sector, expect the net sown area all the other sub sectors have decreased. The net sown area has increased at annual rate of 9912 hectares, whereas the other sub sectors like cultivable wastes, current fallows and fallows other than the current fallows deceased at the annual rate of 265, 12796 and 1765 hectares respectively. However, in case the of non-agricultural sector there was a substantial increase in the area at the rate of 5524 hectare annually.

During the study period for the Karnataka state as a whole, it was (Table 4.5) depicted that land shifts have taken place from all ecological sub-sectors to other sectors, except forest. Area under forest increased at an annual rate of 348 hectares on the other hand in respect of other ecological sub-sectors such as permanent pastures and other grazing lands, land under miscellaneous tree crops and groves and barren and uncultivable lands declined annually by 4,684 ha, 1,931 ha and 736 hectares respectively. The rate of decline in area in the case of permanent pastures and other grazing land was found to be of extremely high order compared to other ecological subsectors. In the agricultural sector, except net sown area and fallows other than the current fallows there was a shift in land from other two sub-sectors. The net sown area and fallow lands other than current fallows have increased at an annual rate of 11,220 and 1,795 hectares respectively. The cultivable wastes and current fallows showed an annual decline by 1,219 and 16,805 hectares respectively. However, in the case of non-agricultural sector there was a substantial increase in the area at the rate of 11.820 hectares annually.

4.1.5 Budgeting of inter-sectoral land use shift in north and south regions of Karnataka

The inter-sectoral budgeting analysis was carried out to find out the pattern and extent of dynamics in land use shift in the state and between the regions. The analysis was worked out for 10 years (2001-02 to 2010-11) and the same was presented in Tables 4.6 and 4.7.

During the study period overall for the Karnataka state the area under desirable ecological sector and undesirable ecological sector have declined substantially at an annual rate of 6267 ha and 736 hectares respectively. The agricultural sector showed a decreased area under it with an annual deceleration by 5008 hectares while, non-agricultural sector showed a sizeable growth in area at the annual growth of 11820 hectares (Table 4.7).

For southern region of the state during the period 2001-02 to 2010-11, the area under desirable and undesirable ecological sectors have decreased at an annual rate of 6069 hectares and 133 hectares respectively (Table 4.6). The agricultural sector showed an annual decline in growth rate of 94 hectares while, area under non-agricultural sector continued to grow remarkably at an annual rate of 6396 hectares.

In comparison to southern region, in the northern Karnataka region there was a decline in desirable ecological sector and undesirable ecological sector in the annual rate of 198 and 603 hectares respectively (Table 4.7). The annual growth in area under agricultural sector was declining at the rate 4914 hectares per year. And area under non-agricultural sector increased over the years at the rate of 5524 hectares per year.

4.2 Disparity in growth rates of area, production and productivity of agricultural and horticultural crops

The growth in area, production and productivity of agricultural and horticultural crops are given below.

4.2.1 Growth in area production and productivity of cereal and minor millets

For the state as a whole, the resulting growth rates of production of cereals and minor millets were 6.34 per cent per annum for the period 2001-02 to 2010-11 indicating a steady rise over a period of time (Table 4.8). The increasing trends in growth rates over a period was more pronounced in the case of yield 5.63 per cent. But increase in the area was not statistically significant for the period.

Table 4.8: Compound growth rates of area, production and productivity of cereals and minor millets in Karnataka (2001-02 to 2010-11)

(per cent per annum)

Sl. No.	District	Area	Production	Yield
1	Bengaluru (U)	-7.13	-3.60	3.60
2	Bengaluru (R)	-0.70	4.18	5.46
3	Ramanagar#	--	--	--
4	Chitradurga	1.13*	6.12	4.93
5	Davanagere	2.61*	8.95*	6.17*
6	Kolar	3.31	9.24	5.36*
7	Chikkaballapur#	--	--	--
8	Shimoga	1.07	7.03**	12.19
9	Tumkur	0.58	5.48	4.87
10	Chikmagalur	-0.06	4.36*	4.43*
11	Dakshina Kannada	-1.30**	-1.20	0.01
12	Udupi	-1.28**	-0.49	0.80
13	Hassan	-0.56	6.82*	7.43*
14	Kodagu	0.07	2.19*	2.12*
15	Mandya	2.63	5.37	2.67*
16	Mysore	1.38	4.15	2.73*
17	Chamarajanagar	2.29*	5.91*	3.54
	Southern Karnataka	**0.92**	**5.48***	**4.52***
1	Belgaum	0.88	9.46*	8.51*
2	Bijapur	0.22	7.46*	7.22*
3	Bagalkot	1.06	10.0*	8.84*
4	Dharwad	0.88	20.6**	19.6**
5	Gadag	0.77	14.7*	13.8*
6	Haveri	-1.16	8.86*	10.1*
7	Uttara Kannada	-0.40*	5.67**	6.10**
8	Bellary	3.03**	6.07**	2.94*
9	Bidar	-3.19**	-3.16	0.03
10	Gulbarga	-0.45	3.44*	4.20**
11	Yadgir#	--	--	--
12	Raichur	0.18	7.16**	6.96**
13	Koppal	3.29**	6.71*	3.30
	Northern Karnataka	**0.51**	**7.08****	**6.79****
	State	**0.67**	**6.34***	**5.63****

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively
Newly formed districts for which time series data is not available

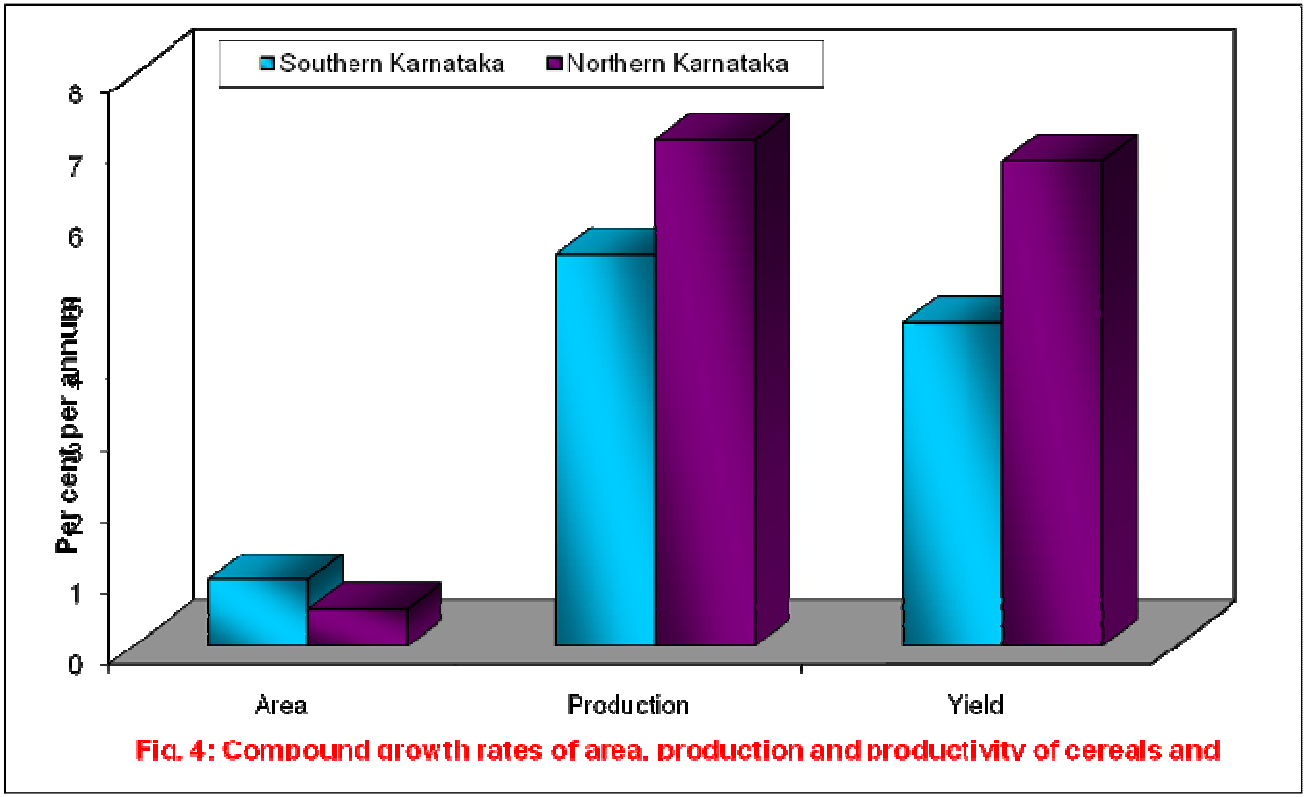

Fig. 4: Compound growth rates of area, production and productivity of cereals and minor millets in Karnataka (2001-02 to 2010-11)

As far as region wise growth rate of cereals and minor millets were concerned north region showed the highest growth rate in production and productivity *i.e.* 7.08 and 6.79 per cent respectively. The south region was lagged behind in growth rate of production (5.48%) and productivity (4.52%). Increase in area under the cereals and minor millets were observed in the study period showed that area under crop increased at the rate 0.92 and 0.51 per cent in south and north regions of the state respectively.

For individual districts of south region of the state, Table 4.8 shows that the overall performance in terms production of cereals and minor millets was relatively much better in Davanagere (8.95%), Shimoga (7.03%), Chikmagalur (4.36%), Hassan (6.82%). Kodagu (2.19%) and Chamarajanagar (5.91%) districts than in other districts. In other districts of the region like Bengaluru urban (-3.60%), Bengaluru rural (4.18%), Chitradurga (6.12%), Kolar (9.24%), Tumkur (5.48%), D. Kannada (-1.20%), Udupi (-0.49%), Mandya (5.37%) and Mysore (4.15%) the production had showed negative rates in some districts and whereas in some districts the growths rates were non-significant.

The significant increase in acreage of cereals and minor millets could be seen in Chitradurga (1.13%), Davanagere (2.61%) and Chamarajanagar (2.29%) districts of south region, where as the districts like Dakshina Kannada and Udupi had showed the negative growth rate about 1.30 and 1.28 per cent respectively. Increase in productivity was seen in almost all the districts of the northern region.

In northern region of the state, it is impressive to see that except Bidar all the other districts have showed significant positive growth in production of cereals and minor millets. The acreage growth of Bellary (3.03%) and Koppal (3.29%) districts of the northern regions were significant and positive and in other districts like Uttara Kannada and Bidar the growth rates of area were declined in the study period. Increase in growth rate of productivity were observed in almost all the regions of northern Karnataka except in Bidar and Raichur,

4.2.2 Growth in area, production and productivity of total pulses

The state as well as inter- regional growth of pulses for the study period were showed a greater inequality in terms of area, production and yield as noticed in the Table 4.9. At the state level the growth rate of area (3.57%), production (8.57%) and productivity (4.82%) of pulses were increased at significant rate. But the similar growth rates were not true for southern region of the state in terms of area. Because, the region showed the negative growth in terms of area (-0.43%), while production and productivity has increased at the rate of 6.53 and 7.00 per cent respectively. Growth rates of area (4.95%), production (9.64%) and productivity (4.47%) of northern region in terms of pulse were highly impressive as significant increase in growth rates were found significant in this region.

There was no significant rate of growth in acreage of pulses among the districts of Southern Karnataka, where growth rate under Bengaluru urban, Davanagere, Shimoga and Udupi were found to be declining at 8.88, 7.96, 7.80 and 5.07 per cent respectively. The growth rate of production of Bengaluru Rural (8.07%), Chitradurga (8.72%), Kolar (16.20%), Tumkur (6.64%), Chikmagalur (10.90%), Dakshina Kannada (8.19) and Chamarajanagar (11.70%) increased significantly. Almost all the districts of the Southern Karnataka expect Udupi, Mandya and Mysore showed a significant growth rate in yield which accounted for increase in the rate of production of pulses in the south region.

As compared to southern region the northern region of Karnataka showed impressive rate of growth in area and production of total pulses. However, growth rate of yield of pulses of northern region was lesser than that of southern region. Bijapur, Bagalkot and Raichur districts of north region showed highest growth rate in area of pulses in the region. The area under pulses in Bijapur, Bagalkot and Raichur districts were increased at a rate of 24.7, 14.6 and 13.6 per cent per annum respectively. The other districts like Belgaum, Gadag, Bellary, Gulbarga and Koppal also showed the significant increase in area under pulses. Area under pulses in the districts of Haveri, Uttara Kannada, Bellary and Bidar districts were decreased at the rate of 9.90, 1.48, 8.57 and 2.26 per cent respectively. There was an increasing trend in productivity of pulses in the districts of Belgaum (8.03%), Bijapur (7.24%), Dharwad (19.6%), Gadag (10.6%) and Koppal (9.99%) of north region. Other districts have not shown significant growth rates in terms of productivity.

Table 4.9: Compound growth rates of area, production and productivity of total pulses in Karnataka (2001-02 to 2010-11)

(per cent per annum)

Sl. No.	District	Area	Production	Yield
1	Bengaluru (U)	-8.88**	3.20	10.8**
2	Bengaluru (R)	-0.94	8.07**	10.7**
3	Ramanagar#	--	--	--
4	Chitradurga	2.54	8.72**	6.02*
5	Davanagere	-7.96*	-3.72	4.61*
6	Kolar	3.44*	16.2**	9.61**
7	Chikkaballapur#	--	--	--
8	Shimoga	-7.80**	-3.40	4.77**
9	Tumkur	-1.49	6.64*	8.16**
10	Chikmagalur	1.34	10.9**	9.45**
11	Dakshina Kannada	-0.05	8.19*	8.25*
12	Udupi	-5.07**	-1.87	3.36
13	Hassan	-2.83	4.10	7.13*
14	Kodagu	-3.74	2.67	6.66*
15	Mandya	-1.60	2.93	4.61
16	Mysore	1.40	5.06	3.61
17	Chamarajanagar	-0.96	11.7**	12.7**
	Southern Karnataka	**-0.43**	**6.53****	**7.00****
1	Belgaum	5.29*	13.8**	8.03*
2	Bijapur	24.7**	33.7**	7.24*
3	Bagalkot	14.6**	17.0*	2.11
4	Dharwad	1.42	21.3*	19.6*
5	Gadag	6.74*	18.1*	10.6*
6	Haveri	-9.90**	-2.54	8.17
7	Uttara Kannada	-1.48*	1.36	2.89
8	Bellary	8.57**	10.9**	2.10
9	Bidar	-2.26**	1.18	3.52
10	Gulbarga	2.52**	6.00*	3.50
11	Yadgir#	--	--	--
12	Raichur	13.6**	13.7**	0.08
13	Koppal	3.48*	13.8*	9.99*
	Northern Karnataka	**4.95****	**9.64****	**4.47***
	State	**3.57****	**8.57****	**4.82***

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively
Newly formed districts for which time series data is not available

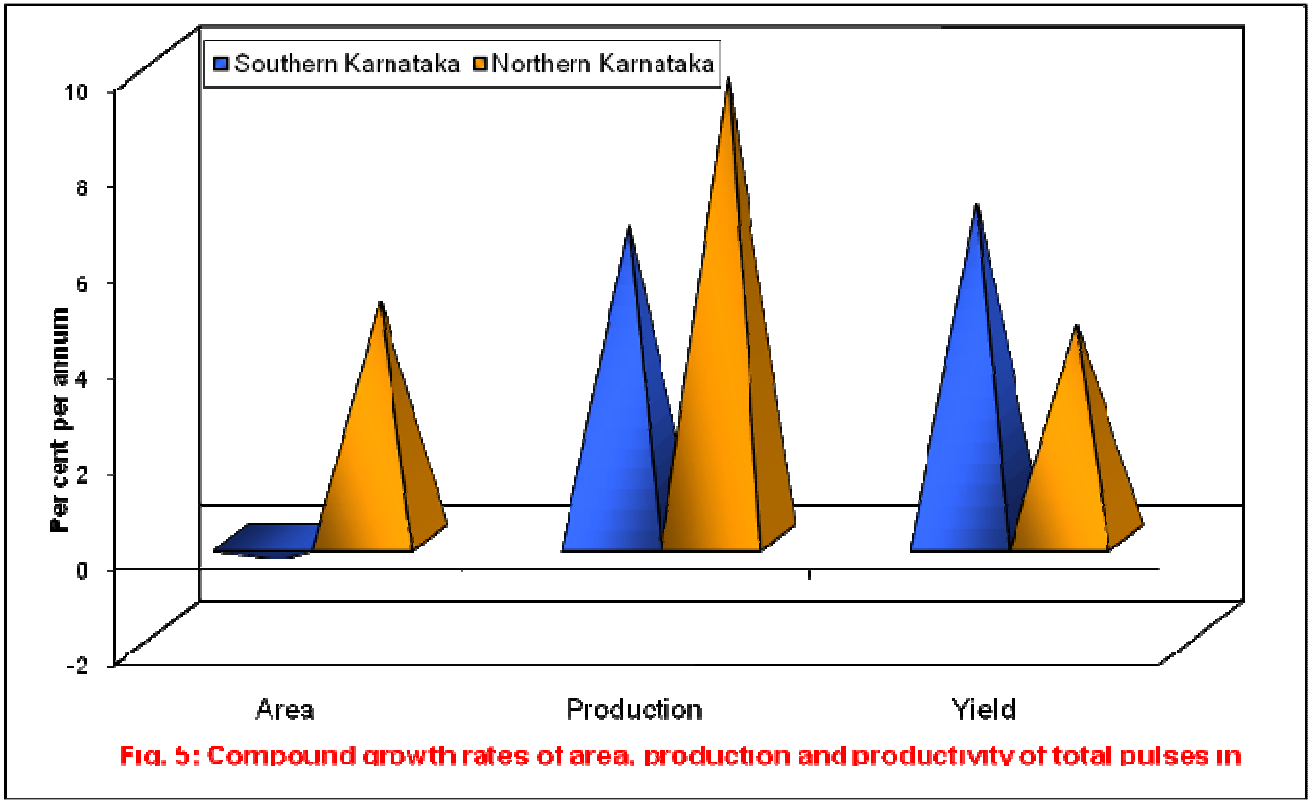

Fig. 5: Compound growth rates of area, production and productivity of total pulses in Karnataka (2001-02 to 2010-11)

4.2.3 Growth in area production and productivity of oilseeds

The growth rates of area and production of oilseeds at the state level showed decline at the rate of 0.92 and 0.006 per cent per annum respectively (Table 4.10). However, growth rate of yield was somewhat on the positive line with a growth rate of 0.93 per cent. Northern region also showed a decreasing trend in area (-1.27%) and production (-0.01 percent), but productivity was increased at a rate of 1.27 per cent and which is non-significant. The results were similar for southern region also because growth rate of area and production of oilseeds declined over the study period at 0.71 and 0.44. but rate of yield was showed an increasing trend with growth rate of 0.27 per cent.

The districts of Bengaluru (U), Shimoga showed a significant decrease in area 7.08 and 7.14 per cent respectively in southern Karnataka whereas, area under oilseeds increased in the districts like Chikmagalur, Dakshina Kannada and Chamarajanagar with 5.61, 5.04 and 5.62 per cent respectively. District wise production of the oilseeds also showed the negative trend in growth rate in most of the districts but growth rate of the production of some of the districts like Chikmagalur, Dakshina Kannada and Hassan is positive and significant. Growth rate in yield is in increasing trend for most of the districts of south region of Karnataka except for Bengaluru Rural (-6.39%) and Chamarajanagar (-6.90%).

As compared to southern region the growth rate of production of oilseeds were declining at lesser rate in northern region with 0.01 per cent, while area decreased at higher rate (1.27%). Dharwad and Bidar were the only two districts showing significant increase in the growth rate of area with 6.64 and 4.93 per cent respectively. In the case of production, Dharwad, Haveri and Bidar showing the highest growth rate in the Northern Karnataka. As far growth rates in yield of oilseeds were concerned most of the districts were showing the positive trend but growth rates were impressive for Dharwad (11.3%) and Haveri (6.36%) districts.

4.2.4 Growth in area, production and productivity of horticultural crops

The regional variation between north and south regions in growth rate of area, production and productivity of horticultural crops can be seen from Table 4.11. It could be worth noting that in terms of area southern region of Karnataka grown faster with a growth rate in area of 2.95 per cent where as growth rate of area of northern region was 2.15 per cent. Production growth rate was also showing the disparity where southern region lagged behind with growth rate of production was 4.47 per cent. Growth rates of productivity also not impressive in southern region but the northern region recorded 3.92 per cent of significant and positive growth rate. Overall, the growth rate in area, production and yield were recorded as 2.69, 5.10 and 2.34 per cent respectively for the state as a whole.

As far as growth rate of area was concerned the districts of southern region established a significant growth as compared to districts of northern region. Bengaluru Rural (1.96%), Davanagere (3.55%), Kolar (3.83%), Shimoga (5.15%), Tumkur (4.52%), Chikmagalur (4.10%), Dakshina Kannada (0.87%), Hassan (3.89%), Mandya (3.12%), Mysore (2.78%), Chamarajanagar (12.6%) districts have shown continuous increase in area over the study period. Except in Bengaluru Urban district (-10.7%) no negative and significant growth rate of area has seen in any of the districts of south Karnataka. Production wise the rates of growth of horticultural crops in southern region were more prominent than northern region. Bengaluru Urban (-12.3%), Udupi (-3.10%) and Kodagu (-8.19%) districts showed significant decrease in production, except these all other districts showed tremendous growth rate in production of horticultural crops. The growth rate of yield in districts of Chitradurga (8.81%), Kolar (2.71%), Tumkur (7.37%), Mysore (4.23%) and Chamarajanagar (7.74%) were significantly more than other districts of the state. Growth in yield in Udupi and Kodagu districts were -2.86 and -9.88 per cent respectively that have decreased the production of those districts over the study period.

The growth rate of area under the horticultural crops were increased significantly at the rate 2.15 per cent per annum in north region, as compared to southern region the growth rate was quite low. Belgaum, Bagalkot, Uttara Kannada, Bidar and Koppal have registered a growth rate of 2.10, 8.20, 4.41, 8.41 and 9.79 per cent respectively. No significant decreases in growth rate of area of horticultural crops in the region have noticed in study period. Production growth rate of northern region (6.16%) was higher than that of southern region (4.47%). Growth rates of yields were comparatively more in northern region (3.92%) than that of southern region (1.47%). The growth rates in production of horticulture crops in the districts of Belgaum (4.09%), Bagalkot (14.70%), Haveri (8.36%), Uttara Kannada (5.59%), Bellary (4.98%), Raichur (14.46%) and Koppal (12.70%) were positive and significant and growth rate of productivity of hitherto mentioned districts were really impressive. No significant decrease in growth rate of productivity was seen in any of the districts of the region except in Bidar where the productivity noticed was -3.39 per cent per annum.

Table 4.10: Compound growth rates of area, production and productivity of oilseeds in Karnataka (2001-02 to 2010-11)

(per cent per annum)

Sl. No.	District	Area	Production	Yield
1	Bengaluru (U)	-7.08**	-6.01*	1.14
2	Bengaluru (R)	-3.28	-9.48*	-6.39**
3	Ramanagar#	--	--	--
4	Chitradurga	-1.37	-3.68	-2.34
5	Davanagere	-2.87	0.40	3.38
6	Kolar	-2.12	0.80	3.33
7	Chikkaballapur#	--	--	--
8	Shimoga	-7.14*	1.51	9.32**
9	Tumkur	-1.56	0.42	2.02
10	Chikmagalur	5.61*	9.81*	3.97
11	Dakshina Kannada	5.04**	7.34*	2.19
12	Udupi	-1.02	1.20	2.25*
13	Hassan	4.58	10.9*	6.10*
14	Kodagu	--	--	--
15	Mandya	-2.70	0.19	2.98*
16	Mysore	2.72	4.86	2.08
17	Chamarajanagar	5.62**	-1.66	-6.90*
	Southern Karnataka	**-0.71**	**-0.44**	**0.27**
1	Belgaum	2.23	3.22	0.96
2	Bijapur	-5.43	-3.77	1.75
3	Bagalkot	-2.76	-0.94	1.87
4	Dharwad	6.64*	18.7**	11.3**
5	Gadag	-0.29	5.61	5.93
6	Haveri	0.72	7.13**	6.36*
7	Uttara Kannada	-1.20	-1.19*	0.01
8	Bellary	-0.31	-4.37*	-4.07*
9	Bidar	4.93*	6.45*	1.44
10	Gulbarga	-3.05	-6.43*	-2.93
11	Yadgir#	--	--	--
12	Raichur	-1.86	-2.00	-0.13
13	Koppal	-1.00	-2.18	-1.19
	Northern Karnataka	**-1.27**	**-0.01**	**1.27**
	State	**-0.92**	**-0.006**	**0.93**

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively
Newly formed districts for which time series data is not available

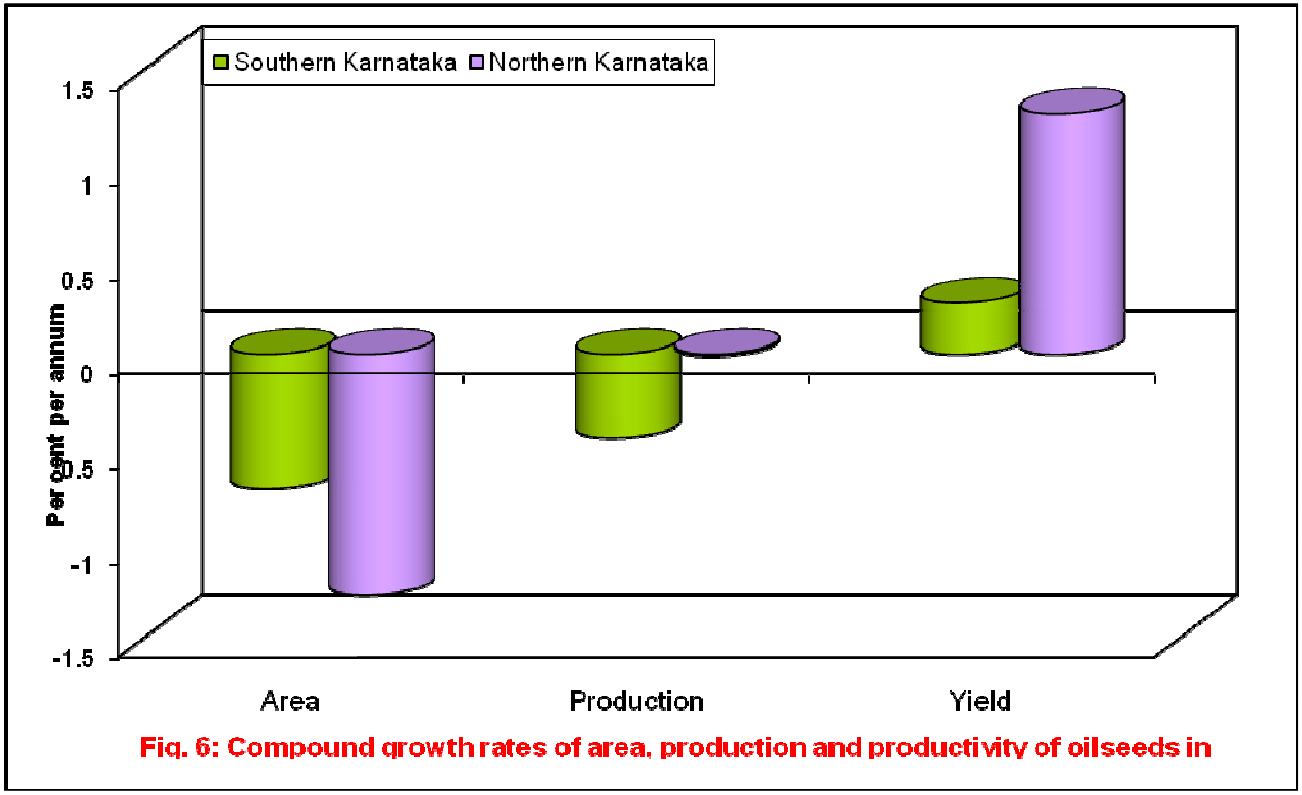

Fig. 6: Compound growth rates of area, production and productivity of oilseeds in Karnataka (2001-02 to 2010-11)

Table 4.11: Compound growth rates of area, production and productivity of horticultural crops in Karnataka (2001-02 to 2010-11)

(per cent per annum)

Sl. No.	District	Area	Production	Yield
1	Bengaluru (U)	-10.7**	-12.3**	-1.85*
2	Bengaluru (R)	1.96**	0.30	-1.62
3	Ramanagar#	--	--	--
4	Chitradurga	0.35	9.20**	8.81**
5	Davanagere	3.55**	5.36*	1.75
6	Kolar	3.83**	6.65**	2.71**
7	Chikkaballapur#	--	--	--
8	Shimoga	5.15**	7.26*	2.01
9	Tumkur	4.52**	12.22**	7.37**
10	Chikmagalur	4.10**	7.81**	3.56*
11	Dakshina Kannada	0.87*	-0.67	-1.53
12	Udupi	-0.24	-3.10**	-2.86*
13	Hassan	3.89**	2.31	-1.52
14	Kodagu	1.86	-8.19*	-9.88*
15	Mandya	3.12**	2.66	-0.004
16	Mysore	2.78*	7.13**	4.23*
17	Chamarajanagar	12.6**	21.3**	7.74*
	Southern Karnataka	**2.95****	**4.47****	**1.47**
1	Belgaum	2.10	4.09*	1.94
2	Bijapur	0.02	4.08	4.06*
3	Bagalkot	8.20**	14.7**	6.01
4	Dharwad	-1.66	3.05	4.80
5	Gadag	3.97*	5.77	1.73
6	Haveri	1.10	8.36**	7.17**
7	Uttara Kannada	4.41**	5.59*	1.13
8	Bellary	3.21	4.98*	1.71*
9	Bidar	8.41**	4.73	-3.39*
10	Gulbarga	2.18	3.02	0.27
11	Yadgir#	--	--	--
12	Raichur	2.28*	14.46**	11.91**
13	Koppal	9.79**	12.7**	2.62**
	Northern Karnataka	**2.15**	**6.16***	**3.92***
	State	**2.69****	**5.10***	**2.34**

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively

Newly formed districts for which time series data is not available

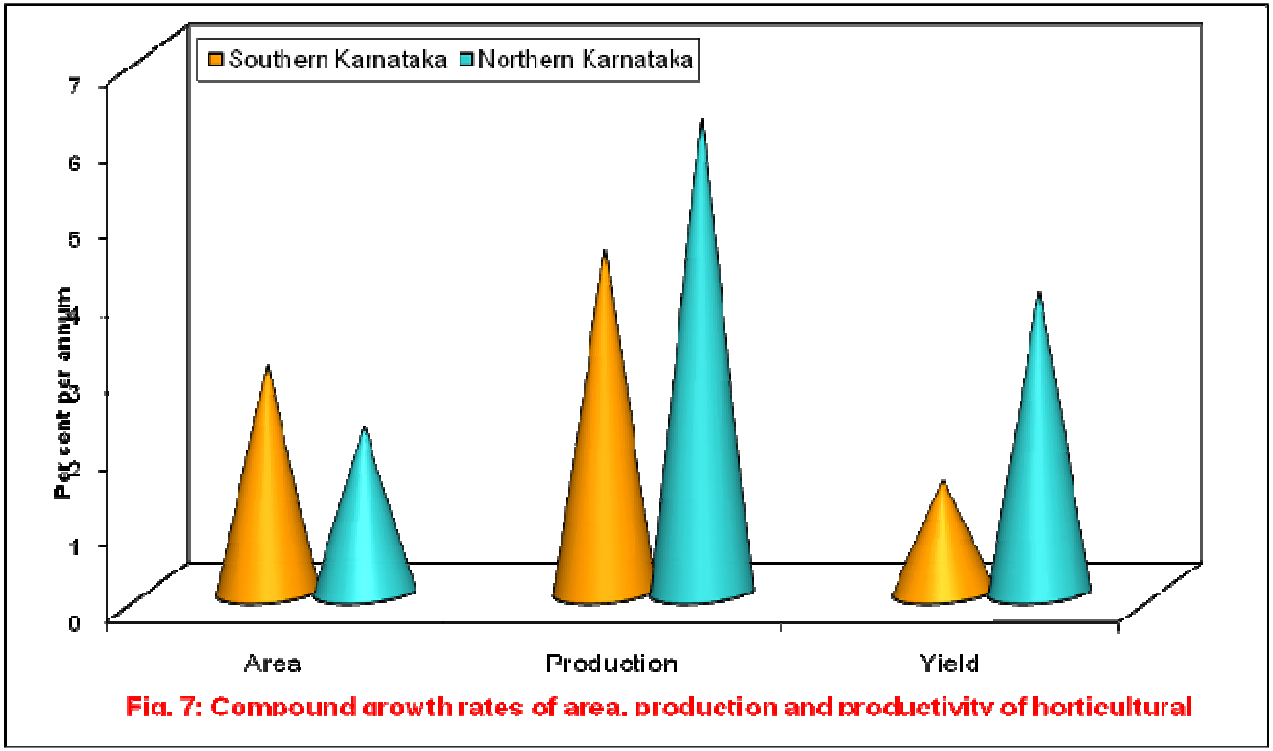

Fig. 7: Compound growth rates of area, production and productivity of horticultural crops in Karnataka (2001-02 to 2010-11)

4.2.5 Determinants of growth rates of productivity between southern and northern regions of Karnataka

The variables, area irrigated, fertilizer consumption and area under HYVs emerged as the most important factors in determining the yield variation between the regions. Table 4.12 for the Karnataka state as a whole it was found that the regression coefficients of irrigated area were significant to yield of cereals and minor millets, total pulses and horticultural crops, coefficients of fertiliser consumption were significant to oilseeds and horticultural crops and area on HYV have significant relation with total pulses.

In southern region the regression coefficients for irrigated area was found significant and positive in the case of total pulses and area on HYV seeds also found significant but negative for total pulses.

For northern region of the state irrigated area was found significant for pulse crops and area under HYV crops found significant for cereals and minor millets.

4.2.6 Determinants of growth rates of acreage between southern and northern regions of Karnataka

The influence of the factors like irrigated area, gross cropped area, yield, road lengths and marketing infrastructure like number of regulated markets on the area of different crops were analysed and presented in the Table 4.13.

Irrigation as a determinant of agricultural performance exercised positive and significance on pulses and oilseed crops in the state. Total gross cropped area found significant influence in the state in the case of cereals and minor millets and oilseed crops. Yield per hectare of respective crops was found to be equally important variable exercising maximum influence on crop acreage; it has significant impact on the acreage of oilseeds and horticultural crops.

In southern region gross cropped area and yield of cereals exercising significant impact on area under cereals and minor millets. Yield rate of horticulture crops significantly put its impact on area under horticultural crops. In determining the agricultural performance, the number of regulated markets was important with significant regression coefficients with horticultural crops. The regression coefficients for road length were negative and statistically significant with area under horticultural crops in southern region of Karnataka.

In northern region the gross cropped area was found significant and positive with area under cereals and minor millets and oilseeds. Area under irrigation had significant impact on acreage of total pulses and oilseeds of northern region.

4.3 Regional disparity in availability of infrastructural facilities for agricultural development

4.3.1 Disparity in availability of infrastructural facilities for agricultural development

The distribution of region wise availability of infrastructural facilities between south and north regions of Karnataka for the period from 2001-02 to 2010-11 has been presented in Table 4.14. Ten infrastructural indicators have been used in order to assess the disparity in availability of these facilities between the regions for the study period.

The existence of number of educational institutions in a particular area would decide the rate of literacy. The literacy rates were 69.50 and 61.00 per cent for south and north regions respectively in the year 2001-02 which have increased to 76.5 and 71.50 per cent in 2010-11 for the south and north regions respectively. Per cent increase in literacy rate observed was higher in northern region (17.21) as compared to that of Southern region (10.07%) for the study period.

Gross irrigated area as per cent of gross cropped area have been increased from 22.13 per cent to 32.87 per cent in south. Where as in northern region, the irrigated area to gross cropped area have increased from 19.85 per cent to 32.68 per cent from the year 2001-02 to 2010-11 respectively. Increase in irrigated area in per cent to gross cropped area was 64.68 per cent in northern Karnataka while the same was lower in south region (48.55%).

Table 4.12: Yield determinants of agricultural and horticultural crops in Karnataka (2001-02 to 2010-11)

District/ Region	Crop	Constant	Regression coefficients			R^2
			Area irrigated (000' hectares)	Fertilizer consumption (000' tonnes)	Area under HYV (000' hectares)	
Southern Karnataka	Cereals and minor millets	122.5	0.75 (2.74)	1.01 (1.79)	0.31 (0.36)	0.68
	Total pulses	-591.4	0.92* (0.724)	-0.02 (0.473)	-0.04* (0.094)	0.75
	Oilseeds	330.8	0.24 (1.559)	-0.18 (1.019)	0.06 (0.202)	0.77
	Horticultural crops	5495.2	-1.23 (4.908)	3.79 (3.208)	-0.45 (0.638)	0.67
Northern Karnataka	Cereals and minor millets	-1205.2	2.06 (0.585)	-1.19 (0.681)	0.06* (0.133)	0.88
	Total pulses	-105.8	0.36* (0.236)	-0.16 (0.274)	0.04 (0.053)	0.66
	Oilseeds	235.3	0.08 (0.383)	0.07 (0.445)	0.10 (0.087)	0.33
	Horticultural crops	2311.7	1.04 (4.144)	4.23 (4.819)	2.07 (0.942)	0.78
State	Cereals and minor millets	1076.5	0.182* (0.004)	-0.01 (0.001)	-0.003 (0.009)	0.84
	Total pulses	-178.1	0.22* (0.132)	-0.06 (0.136)	1.03* (0.030)	0.70
	Oilseeds	395.1	0.01 (0.253)	0.17* (0.261)	-0.01 (0.058)	0.11
	Horticultural crops	5947.1	1.40* (0.168)	2.79* (0.173)	0.42 (0.382)	0.63

Note: * indicates significant at 5 per cent probability level
Figures in the parentheses indicate the Standard Errors

Table 4.13: Area determinants of agricultural and horticultural crops in Karnataka (2001-02 to 2010-11)

State/ Region	Crop	Constant	Regression coefficients					R^2
			Area irrigated (000' hectares)	Gross cropped area (000' hectares)	Yield (Kg/Ha)	Road length (per 100 Sq. Km of area)	Number of regulated markets	
Southern Karnataka	Cereals and minor millets	-2787.9	0.04 (0.529)	1.08* (0.311)	-0.35* (0.223)	-0.18 (3.366)	2.30 (7.759)	0.90
	Total pulses	1108.6	0.18 (0.312)	-0.01 (0.083)	-0.03 (0.256)	0.25 (1.966)	-3.58 (4.200)	0.18
	Oilseeds	-1295.7	-0.66 (0.620)	0.18 (0.269)	0.14 (0.342)	-0.99 (4.653)	7.88 (9.519)	0.43
	Horticultural crops	-1728.2	0.28 (0.248)	-0.02 (0.053)	0.09* (0.023)	-2.99* (1.467)	10.51* (3.744)	0.97
Northern Karnataka	Cereals and minor millets	2560.9	-0.09 (0.305)	0.28* (0.118)	0.04 (0.223)	1.54 (6.634)	5.95 (20.431)	0.77
	Total pulses	-9306.9	0.64* (0.861)	-0.06 (0.337)	0.12 (1.858)	-7.98 (18.42)	41.12 (64.13)	0.72
	Oilseeds	-17978.5	-1.91* (1.035)	0.48* (0.346)	-1.22 (1.289)	11.56 (18.79)	72.99 (73.22)	0.76
	Horticultural crops	-1354.6	-0.14 (0.303)	-0.02* (0.057)	0.04 (0.021)	1.05 (2.993)	7.13 (16.02)	0.78
State	Cereals and minor millets	2423.9	-0.07 (0.409)	0.41* (0.193)	-0.01 (0.449)	2.39 (12.87)	-4.39 (13.68)	0.80
	Total pulses	-3470.8	0.72* (0.628)	-0.14 (0.252)	0.55 (2.001)	-15.9 (20.69)	12.53 (23.48)	0.73
	Oilseeds	-17705.4	-2.12* (0.624)	0.76* (0.276)	-1.62* (1.288)	17.74 (21.70)	32.98 (23.58)	0.82
	Horticultural crops	-3148.4	-0.01 (0.294)	-0.06 (0.068)	0.11* (0.046)	1.68 (5.692)	9.67 (8.271)	0.92

Note: * indicates significant at 5 per cent probability level
Figures in the parentheses indicate the Standard Error

Table 4.14: Disparity in availability of infrastructural facilities for agricultural development between Southern and Northern regions of Karnataka

Infrastructural indicators	Southern region			Northern region			Per cent change between the regions	
	2001-02	2010-11	Percent change	2001-02	2010-11	Percent change	2001-02	2010-11
Literacy rate (%) as indicator of educational institutions	69.50	76.50	10.07	61.00	71.50	17.21	12.23	6.54
Gross irrigated area to gross cropped area (%)	22.13	32.87	48.55	19.85	32.68	64.68	10.30	0.58
Distribution of total fertilizers per ha. gross cropped area (Kg/Ha)	123.12	189.57	53.94	87.95	157.94	79.57	28.57	16.69
Road length per 100 Sq. Km area (Km)	72.00	90.85	26.20	43.70	63.45	45.20	39.31	30.16
Commercial bank branches per lakh of population (Nos.)	9.00	13.00	56.29	5.00	9.00	85.35	44.44	30.77
RRBs per lakh of population (Nos.)	1.66	1.60	-3.63	2.69	2.98	10.96	-62.05	-86.25
Regulated market and submarkets per lakh of population (Nos.)	0.72	0.68	-5.25	1.18	1.03	-12.48	-63.89	-51.47
Cold storage units per thousand Sq. Km area (Nos.)	0.34	0.42	21.88	0.13	0.14	7.69	61.76	66.67
Agricultural Co-operative Societies per lakh of population (Nos.)	7.00	6.00	-9.04	11.00	10.00	-1.10	-57.14	-66.67
Electricity consumption for IP sets per thousand hectare gross cropped area (in lakh units)	10.63	13.72	29.06	4.68	7.62	62.68	55.97	44.46

Distribution of total fertilizer per hectare gross cropped area in southern region was 123.12 Kg/ha in the year 2001-02. For the same year fertilizer distribution was 87.95 Kg/ha in northern region. It was observed from the table that the distribution of total fertilizers over the years have increased in both the regions, but increased rate was higher in northern region (79.57%) as compared to that of southern region (53.94%).

It was observed from the table that availability of road length per hundred Sq. Km. area for the southern region was increased from 72.00 Km to 90.85 km from the year 2001-02 to 2010-11 respectively. But availability of road length in northern region for the same period was 43.70 and 63.45 Km. The per cent increase in the road length of northern region (45.20%) was higher than that of southern region (26.20%).

Commercial bank branches per lakh population were increased from 9.00 to 13.00 in southern region and 5.00 to 9.00 in northern region in the study period. Percentage increase in commercial bank branches per lakh of population were 56.29 and 85.35 for south and north regions respectively.

Distribution of Regional Rural Banks per lakh of population for the southern region were decreased from 1.66 to 1.60 from 2001-02 to 2010-11 respectively at the rate 3.63 per cent. While the number of RRBs have been increased from 2.69 to 2.98 in northern region for the same period at the rate 10.96 per cent.

Availability of number of regulated markets and sub markets per lakh of population were decreased from 0.72 to 0.68 in the southern region at declining rate of 5.25 per cent. Similarly, in northern region also the number of markets and sub markets were decreased from 1.18 to 1.03 at the declining rate of 12.48 per cent for the period 2001-02 to 2010-11 respectively.

Cold storage units per thousand Sq. Km. area were increased from 0.34 to 0.42 in the south Karnataka at 21.88 per cent increasing rate. Similarly, the number of cold storage units in northern Karnataka also increased from 0.13 to 0.14 at the rate of 7.69 per cent in the study period.

The number of Agricultural co-operative societies per lakh of population were 7 and 11 in the year 2001-02 in south and north regions respectively and which were decreased to 6 and 10 at the declining rate of 9.04 and 1.10 per cent in south and north Karnataka respectively.

Electricity consumption for irrigation pump sets per thousand hectares of gross cropped area in the southern region was observed 10.63 and 13.72 lakh units in the year 2001-02 and 2010-11 respectively. Whereas the electricity consumption for northern region was 4.68 and 7.62 lakh units in the year 2001-02 and 2010-11 respectively. The per cent increase of consumption of electricity for IP sets in south region (29.06%) were comparatively lesser rate than that of north region (62.68%) in the study period.

The per cent difference of infrastructural indicators between northern and southern region for the period 2001-02 and 2010-11 has been calculated and presented in last two columns of Table 4.14.

Percent change between the regions for the period 2001-02 indicated that the highest difference of availability of infrastructural facilities was seen in the case of availability of cold storage units (61.76%) followed by electricity consumption for IP sets (55.97%), availability of commercial bank branches (44.44%), roads (39.21%) and distribution of total fertilizers (28.57%) *etc.* in all these above mentioned indicators southern region was dominant. Whereas, in the case of RRBs, regulated markets and Co-operative societies northern region was dominant in these infrastructural facilities. Further, from the table it was observed that in the year 2010-11 the per cent change between the regions was decreased. Difference between the regions in availability commercial bank branches were decreased from 44.44 to 30.77 per cent. Per cent change in gross irrigated area between the regions was very low *i.e.* 0.58 per cent. The per cent difference in availability of cold storage units increased between the regions from 61.76 to 66.67 per cent. On the contrary, in the case of per cent change in availability of RRBs, Regulated markets and Agricultural co-operative societies in which northern region had more share; the per cent difference was increased in the case of RRBs and Agricultural co-operative societies to 86.25 and 66.67 pent respectively and decreased in case of Regulated markets to 51.47 per cent.

4.3.2 Discriminant Function Analysis of infrastructural indicators between south and north regions

It could be seen from Table 4.15 that literacy rate, gross irrigated area, distribution of total fertilizers, cold storage and electricity consumption IP sets were having the negative discriminant coefficients for the south and north regions for the period from 2001-02 to 2010-11. Whereas infrastructural indicators like Road length, commercial bank branches, Regional Rural Banks, Regulated markets and Sub-markets and Agricultural co-operative societies were having positive discriminant coefficients supposed to be positive impact on the development of north and south regions of the state for the study period.

The mean difference of different infrastructural indicators between south and north Karnataka have been given in the second column of the Table 14. The positive mean difference between the regions for literacy rate, gross irrigated area, distribution of total fertilizers, roads, commercial bank branches, cold storage units and electricity consumption for irrigation showing that southern region was comparatively more equipped with these infrastructural facilities than northern region. Highest difference in infrastructural facilities was observed for distribution of total fertilizers (35.21) followed by roads (27.76), literacy rate (8.15) and electricity consumption for IP sets (6.31). Mean difference of infrastructural indicators between south and north Karnataka were negative for Regional Rural Banks, Regulated markets and sub-markets and Agricultural co-operative societies which showed that comparatively from south Karnataka, north Karnataka had more of these infrastructural facilities in the study period.

With respect to relative contribution of the variables for the development of north and south Karnataka in the period from 2001-02 to 2010-11, availability of Regional Rural Banks (47.95%) followed by electricity consumption for agricultural purpose (21.35%), distribution of total fertilizers (16.92%), literacy rate (10.86%) and agricultural co-operative societies (7.66%) were the major discriminating factors between north and south region of the state for development of the entire state for the study period.

4.4 Disparity in flow of funds for development between the regions

4.4.1 Regional inequality in allocation of Special Development Plan fund on agricultural and allied sector in Karnataka

Region wise budgetary allocation of Special development Plan fund to agricultural and allied sector from 2007-08 to 2012-13 were presented in the Table 4.16. The HPCFRRI committee recommended highest (26.30%) share of funds to agricultural and allied sector among five different sectors as the sector plays a major role in development of the economy of the state.

The Table 4.16 revealed that the southern region had recieved 44.24 per cent of funds allotted to agricultural and allied sector in the year 2007-08. For the subsequent years the shares were still reduced and the region had got 27.13, 25.60, 29.13, 40.87 and 29.58 per cent for the 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13 respectively. In the southern region Bengaluru division had received the comparative advantage as the share of SDP was higher in Bengaluru division. The budgetary allocations of SDP funds on agricultural and allied sector to Bengaluru division were 23.25, 16.93, 17.34, 18.50, 11.23 and 15.43 per cent to the state total for the year 2007-08, 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13 respectively. Whereas funds allotted to Mysore division was 20.99 per cent in 2007-08 and it was decreased to 14.16 in the year 2012-13.

The northern region of Karnataka had been allotted with comparatively more share of SDP funds on agricultural and allied sector, the region had received 68.38 per cent of total SDP allotted for all the six years combined together. In the year 2007-08 the budgetary allotments were 55.76 per cent and it had increased to 70.42 per cent of state total in 2012-13. Gulbarga division of northern region was received major percentage of funds allotted, which accounts around 47.85 per cent to the state total for all the years. Belgaum division was next to Gulbarga in the share of SDP to agricultural and allied sector which was 20.54 per cent of overall funds allotted to agricultural and allied sector.

4.4.2 Inter-regional disparity in flow of Special Development Plan fund on agricultural and allied sector- Theils entropy analysis

The inter-regional disparity in flow of SDP funds on agricultural and allied sector across the years assessed by using Theils entropy measure. The findings are detailed as below.

Table 4.15: Discriminant analysis of infrastructural indicators between Southern and Northern Karnataka during the year 2001-02 to 2010-11

Variables	Coefficient (Li)	Mean difference (Di)	Coefficient x mean difference (Li x Di)	F statistics	Percent contribution [(Li x Di)/D^2 x 100]
Literacy rate (%) as an indicator of educational institutions	-0.341	8.15	-2.7792	41.71**	10.86
Gross irrigated area to gross cropped area (%)	-0.196	2.82	-0.5527	2.10	2.16
Distribution of total fertilizers per ha. gross cropped area (Kg/Ha)	-0.123	35.21	-4.3308	6.11*	16.92
Road length per 100 Sq Km area (Km)	0.049	27.76	1.3602	45.58**	-5.31
Commercial bank branches per lakh of population (Nos.)	0.177	3.41	0.6036	11.79	-2.36
RRBs per lakh of population (Nos.)	10.06	-1.22	-12.274	21.62**	47.95
Regulated market and submarkets per lakh of population (Nos.)	0.225	-0.412	-0.0927	526.70**	0.36
Cold storage units per thousand Sq Km area (Nos.)	-0.519	0.2	-0.1038	295.71**	0.41
Agricultural co-operative societies per lakh of population (Nos.)	0.470	-4.174	-1.9618	273.87**	7.66
Electricity consumption for IP sets per thousand hectare gross cropped area (in Lakh units)	-0.866	6.31	-5.4645	140.37**	21.35
Total (D^2)			**-25.5961**		**100.00**

Note: ** and * indicate significant at 1 per cent and 5 per cent probability level respectively

Table 4.16: Region wise allocation of Special Development Plan fund on agriculture and allied sector from 2007-08 to 2012-13

(Rs. in lakhs)

Year	Southern Region			Northern Region			State Total
	Bangalore Division	Mysore Division	Sub Total	Belgaum Division	Gulbarga Division	Sub Total	
2007-08	712 (23.25)	643 (20.99)	1355 (44.24)	686 (22.40)	1021 (33.33)	1708 (55.76)	3063 (100.00)
2008-09	7679 (16.93)	4625 (10.20)	12304 (27.13)	8831 (19.47)	24217 (53.40)	33048 (72.87)	45352 (100.00)
2009-10	8036 (17.34)	3825 (8.26)	11861 (25.60)	8852 (19.10)	25622 (55.30)	34474 (74.40)	46335 (100.00)
2010-11	7651 (18.50)	4396 (10.63)	12047 (29.13)	7519 (18.18)	21788 (52.69)	29307 (70.87)	41354 (100.00)
2011-12	6973 (11.23)	18398 (29.63)	25371 (40.87)	13848 (22.31)	22864 (36.83)	36712 (59.13)	62083 (100.00)
2012-13	1976 (15.43)	1813 (14.16)	3788 (29.58)	3593 (28.06)	5424 (42.36)	9017 (70.42)	12805 (100.00)
All	**33027 (15.66)**	**33670 (15.96)**	**66697 (31.62)**	**43329 (20.54)**	**100937 (47.85)**	**144265 (68.38)**	**210962 (100.00)**

Note: Figures in the parentheses indicate the percentage to state total
Source: HPCFRRI (2013), Planning Cell, GOK, Bangalore.

In order to examine whether or not the flow of SDP fund on agricultural and allied sector uniformly between the regions over the years in the Karnataka state, theils entropy was computed for each year as explained in chapter 3. It could be seen from Table 4.17 that the theils index was 0.007 in 2007-08 rose over years, though unsteadily to be 0.086 in 2012-13. The average value of the coefficients (inequality across years) was 0.072. The trend equations were fitted by taking I (Y) as a dependent variable and time as a independent variable. The regression coefficients were positive but non-significant which indicating that the region-wise inequality in flow of SDP funds did create inequalities over the years.

4.4.3 Regional inequality in allocation of Special Development Plan fund on All sectors in Karnataka

The HPCFRRI committee report estimated the money for five different sectors of all the backward taluks of the state for overall development of these taluks. The shares of different divisions and regions in SDP allotment is presented in the perusal of Table 4.18.

The budgetary allotment of the funds to the southern region were 34.30 per cent from 2007-08 to 2012-13 in the total SDP allotment. The region had received 41.07, 34.32, 31.59, 33.17, 38.54 and 29.56 per cent of funds to the total SDP allotted for the years 2007-08, 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13 respectively. Within the southern region, Bengaluru and Mysore divisions were being allotted with 20.22 and 14.07 per cent of total SDP allotted for six years.

The flow of SDP funds to northern region was comparatively more than southern region. The northern region had received the share of 65.70 per cent of total SDP allotments to all the sectors for six years from 2007-08 to 2012-13. The per cent share to the funds over the years were increased over the study period and the region had received 58.93, 65.68, 68.41, 66.83, 61.46 and 70.44 for the year 2007-08, 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13 respectively. Within the region of northern Karnataka the flow of SDP to the overall sector showed the inequality. Between the divisions of north, Gulbarga division got highest share which accounted for 41.44 per cent of total SDP allotted for the six years. Whereas, the share of the Belgaum division in the total SDP allotments were 24.27 per cent.

4.4.4 Inter-regional disparity in flow of Special Development Plan fund on All sectors- Theils entropy analysis

The inter-regional disparity in flow of SDP funds on all sectors across the years measured by using Theils entropy. The findings are detailed as below.

In order to examine whether or not the flow of SDP fund on all sectors uniformly between the regions over the years in the Karnataka state, theils entropy was computed for each year. It could be seen from Table 4.19 that the theils index was 0.016 in 2007-08 rose over years, though unsteadily to be 0.027 in 2012-13. The average value of the coefficients (inequality across years) was 0.046. The trend equations were fitted by taking I (Y) as a dependent variable and time as a independent variable. The regression coefficients were positive but non-significant which indicating that the region-wise inequality in flow of SDP funds did create inequalities over the year.

4.5 Comparison of present level of development of taluks with bench mark survey of the state

In order to examine the present development of selected taluks as compared to HPCFRRI committee report, the analysis has been carried out and the results obtained are listed as follows.

Sectoral indices of development indicators were selected from the study in order to what is the situation of some selected taluks with respect to development of all the select. The sectoral indices of different sectors (Table 4.20) showed that Navalgunda (1.61) and Kundagol (1.21) taluks of Dharwad showed impressive growth in agricultural and allied sector. Other than this all the other selected taluks were remained backward in the year 2010-11. The sectoral indices of indices of industry, trade and finance showed that Bijapur of Bijapur district and Nanjanagud of Mysore performed impressive in the period. Comparatively in the case of economic infrastructure more number of taluks showed development, *i.e.* Kalghatagi (1.19), Navalagund (1.53), Kalghatagi (1.45) and K. R. Nagar (1.19) of Mysore district. In social infrastructure of Navalagund, Bijapur, Hunsur and K.R. Nagar were more than one showed that increase in social infrastructure of these taluks in the study period. Further, sectoral indices of demographic characteristics of Navalagund (1.08) and Bijapur (1.05) were showed more growth. For the period, 2010-11 except these taluks all other taluks performed not very well in the backward category.

Table 4.17: Theils entropy coefficients of regional disparity in flow of Special Development Plan fund to agricultural and allied Sectors between southern and northern regions of Karnataka

Years	Theils entropy
2007-08	0.007
2008-09	0.109
2009-10	0.124
2010-11	0.090
2011-12	0.017
2012-13	0.086
Average	**0.072**
Log N values	**0.693**

Linear trend function : 3.7308+21.64t

Table 4.18: Region wise allocation of Special Development Plan fund on All Sectors from 2007-08 to 2012-13

(Rs. in lakhs)

Year	Southern Region			Northern Region			State Total
	Bangalore Division	Mysore Division	Sub Total	Belgaum Division	Gulbarga Division	Sub Total	
2007-08	13844 (26.25)	7817 (14.82)	21660 (41.07)	11680 (22.15)	19401 (36.79)	31081 (58.93)	52741 (100.00)
2008-09	28495 (22.24)	15465 (12.07)	43960 (34.32)	30084 (23.49)	54053 (42.20)	84137 (65.68)	128097 (100.00)
2009-10	41644 (19.98)	24178 (11.60)	65822 (31.59)	56315 (27.02)	86254 (41.39)	142568 (68.41)	208390 (100.00)
2010-11	40873 (20.00)	26899 (13.17)	67771 (33.17)	44391 (21.73)	92156 (45.10)	136547 (66.83)	204318 (100.00)
2011-12	45080 (19.78)	42727 (18.75)	87807 (38.54)	53591 (23.52)	86456 (37.94)	140047 (61.46)	227854 (100.00)
2012-13	19174 (17.04)	14083 (12.52)	33257 (29.56)	30138 (26.79)	49116 (43.65)	79253 (70.44)	112510 (100.00)
All	**189110 (20.22)**	**131567 (14.07)**	**320677 (34.30)**	**226924 (24.27)**	**387435 (41.44)**	**614359 (65.70)**	**935036 (100.00)**

Source: HPCFRRI (2013), Planning Cell, GOK, Bangalore

Note: Figures in the parentheses indicate the percentage to state total

All sectors include agriculture and allied sector, industry trade and finance sector, economic infrastructure sector, social infrastructure sector and population characteristics as categorized by HPCRRI committee.

Table 4.19: Theils entropy coefficients of regional disparity in flow of Special Development Plan fund to All Sectors between southern and northern regions of Karnataka

Years	Theils entropy
2007-08	0.016
2008-09	0.050
2009-10	0.069
2010-11	0.058
2011-12	0.058
2012-13	0.027
Average	**0.046**
Log N values	**0.693**

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Note: All sectors include agriculture and allied sector, industry trade and finance sector, economic infrastructure sector, social infrastructure sector and population characteristics as categorized by HPCRRI committee.

Linear trend function : -3.4641+8.21t

Table 4.20: Taluk wise Comprehensive Composite Development Index for selected taluks of Karnataka for the year 2010-11

Sl. No.	District	Taluks	Agriculture and Allied	Industry, trade and Finance	Economic Infrastructure	Social Infrastructure	Demographic Characteristics	CCDI
1	Dharwad	Kalghatagi	0.82	0.54	1.19	0.86	0.91	0.78
		Navalgund	1.61	0.66	1.53	1.02	1.08	1.10
		Kundagol	1.12	0.55	1.45	0.85	0.98	0.89
2	Bijapur	Muddebihal	0.67	0.76	0.99	0.98	0.93	0.83
		B. Bagevadi	0.74	0.73	0.97	0.94	0.88	0.82
		Indi	0.88	0.72	0.85	0.82	0.87	0.81
		Sindgi	0.80	0.75	0.88	0.84	0.89	0.80
		Bijapur	0.84	1.03	0.94	1.24	1.05	1.06
3	Mysore	H.D. Kote	0.78	0.75	0.60	0.82	0.76	0.74
		Hunsur	0.81	0.91	0.81	1.02	0.83	0.90
		T. Narasipur	0.82	0.85	0.77	0.95	0.84	0.86
		Nanjangud	0.74	1.21	0.83	0.97	0.82	0.97
		Periyapatna	0.97	0.91	0.72	0.94	0.87	0.91
		K.R. Nagar	0.87	0.97	1.11	1.19	0.89	1.01

Note: CCDI=Comprehensive Composite Development Index

Table 4.21: Comparison of present level of development of agricultural and allied sector of selected taluks of Karnataka with bench mark survey (HPCRRI Committee Report)

S. N.	District	Taluk	Agriculture and allied sector			
			1999-00		2010-11	
			Sectoral Index	Status	Sectoral Index	Status
1.	Dharwad	Kalghatagi	0.99	Backward	0.82	More backward
		Navalgund	1.26	Developed	1.61	Developed
		Kundagol	1.24	Developed	1.12	Developed
2	Bijapur	Muddebihal	0.59	Most backward	0.67	Most backward
		B. Bagevadi	0.73	Most backward	0.74	Most backward
		Indi	0.80	More backward	0.88	More backward
		Sindgi	0.66	Most backward	0.80	More backward
		Bijapur	0.77	Most backward	0.84	More backward
3	Mysore	H.D. Kote	0.66	Most backward	0.76	Most backward
		Hunsur	0.88	More backward	0.81	More backward
		T. Narasipur	0.90	Backward	0.82	More backward
		Nanjangud	0.78	Most backward	0.73	Most backward
		Periyapatna	1.28	Developed	0.97	Backward
		K.R. Nagar	0.96	Backward	0.87	More backward

Note: Most Backward (index in the range from 0.53 to 0.79), More Backward (index in the range from 0.80 to 0.88), Backward (index in the range from 0.89 to 0.99) and Developed (index 1.00 and above)

4.5.1 Comparison of development in agricultural and allied sector

4.5.1.1 Comparison of development of selected taluks with bench mark survey of the state with respect to agricultural and allied sector

Perusal of the Table 4.21 showed that there was a lot of variation in the sectoral indices of agricultural and allied sector when comparing with bench mark survey period (1999-00) with present period (2010-11). Sectoral indices of the agricultural and allied sector were decreased in Kalghatagi and Kundagol taluks of Dharwad from 0.99 and 1.24 to 0.82 and 1.12 respectively, but it was increased in Navalgund taluk from 1.26 to 1.61. Negative shift in the status of development was observed in Kalghatagi from backward category to more backward category and Navalagund and Kundgol remain in developed category.

The taluks of Bijapur district, *i.e.* Muddebihal, Basavana Bagevadi, Indi, Sindgi and Bijapur showed increase in the sectoral indices of agricultural and allied sector. Sectoral index of Muddebihal was 0.59 in the year 1999-00 and which was increased to 0.67, similarly B. Bagevadi, Indi, Sindgi and Bijapur taluks had the indices as 0.73, 0.80, 0.66 and 0.77 in the year 1999-00 and which were increased to 0.74, 0.88, 0.80 and 0.84 respectively in the year 2010-11. The shift of category of taluks observed only in the case of Sindgi and Bijapur from most backward to more backward.

Taluks of Mysore district also showed shift in sectoral index. Except H. D. Kote all other taluks have shown decreasing sectoral indices. The index increased in H.D. Kote from 0.66 to 0.76, but decreased in taluks like Hunsur from 0.88 to 0.81, T. Narasipur from 0.90 to 0.82, Nanjanagud from 0.78 to 0.73, Periyapatna from 1.28 to 0.97 and K. R. Nagar from 0.96 to 0.87. Negative shift to below backward category was observed in case of T. Narasipur, Periyapatna and K. R. Nagar taluks. T. Narasipur shifted from Backward to more backward category, Periyapatna moved from developed to backward and K.R. Nagar moved from backward to more backward were observed in the study period. No change was observed in category of H. D. Kote, Hunsur and Nanjangud taluks which were remain as most backward, more backward and most backward respectively.

4.5.1.2 Change in the development categories of the taluks in agricultural and allied sector

The comparison of bench mark survey and present development revealed that most of the taluks like Navalgund, Kundagol, Muddebihal, B. Bagevadi, Indi, H. D. Kote, Hunsur and Nanjanagud were not shown development in sectoral indices of development indices. Kalghatagi, T. Narasipur and K. R. Nagar taluks were shifted down to more backward category from backward category and Periyapatna moved below from developed to backward category. The only positive shift in category observed in the selected taluks was most backward to more backward more backward by Sindgi and Bijapur taluks (Table 4.22).

4.5.2 Comparison of development in all sectors

4.5.2.1 Comparison of development of selected taluks with bench mark survey of the state with respect to all sectors

The Comprehensive Composite Development Index of the overall sector which includes agricultural and allied sector, industry, trade and finance sector, economic infrastructure sector, social infrastructure sector and population characteristics is presented in Table 4.23.

The CCDI increased in Navalgund taluk of Dharwad district from 0.99 to 1.10, to shift from backward to developed category but decreased in Kalghatagi (from 0.84 to 0.78) and Kundagol (from 0.95 to 0.90) taluks. Kundgol remains unchanged in backward category while, negative shift was seen in Kalghatagi from more backward to most backward.

It was observed that CCDI of all the selected taluks of Bijapur district was increased in comparison with bench mark survey. The CCDI was changed to 0.83, 0.82, 0.81 and 0.80 in the year 2010-11 in Muddebihal, B. Bagevadi, Indi and Sindgi to move from most backward to more backward category, at the same time the CCDI increased in Bijapur taluk from 0.92 to 1.06 to expel out the taluk from backward category.

Similarly in the Mysore district, the CCDI of H. D. Kote, Hunsur, Nanjanagud and K. R. Nagar was 0.72, 0.88, 0.87 and 0.92 in the bench mark year and it had increased to 0.74, 0.90, 0.97 and 1.01 respectively in 2010-11. But the deceleration in CCDI of T. Narasipur and Periyapatna was seen from 0.87 and 0.97 to 0.86 and 0.91 respectively in the study period.

Table 4.22: Change in the development categories of selected taluks of Karnataka with respect to agricultural and allied sector

Southern region			Northern region		
Improvement	**Decline**	**No change**	**Improvement**	**Decline**	**No change**
--	T. Narasipur and K.R. Nagar (Backward to More Backward) Periyapatna (Developed to Backward)	H. D. Kote, Hunsur and Nanjanagud	Sindgi and Bijapur (Most backward to More Backward)	Kalghatagi (Backward to More Backward)	Navalgund, Kundagol, Muddebihal, B. Bagevadi and Indi.

Table 4.23: Comparison of present level of development of all sectors of selected taluks of Karnataka with bench mark survey (HPCRRI Committee Report)

S. N.	District	Taluk	All sectors			
			1999-00		2010-11	
			CCDI	Status	CCDI	Status
1.	Dharwad	Kalghatagi	0.84	More backward	0.78	Most backward
		Navalgund	0.99	Backward	1.10	Developed
		Kundagol	0.95	Backward	0.90	Backward
2	Bijapur	Muddebihal	0.69	Most backward	0.83	More backward
		B. Bagevadi	0.69	Most backward	0.82	More backward
		Indi	0.66	Most backward	0.81	More backward
		Sindgi	0.64	Most backward	0.80	More backward
		Bijapur	0.92	Backward	1.06	Developed
3	Mysore	H.D. Kote	0.72	Most backward	0.74	Most backward
		Hunsur	0.88	More backward	0.90	Backward
		T. Narasipur	0.87	More backward	0.86	More backward
		Nanjangud	0.87	More backward	0.97	Backward
		Periyapatna	0.97	Backward	0.91	Backward
		K.R. Nagar	0.92	Backward	1.01	Developed

Note: CCDI=Comprehensive Composite Development Index
Most Backward (index in the range from 0.53 to 0.79), More Backward (index in the range from 0.80 to 0.88),
Backward (index in the range from 0.89 to 0.99) and Developed (index 1.00 and above)

4.5.2 2 Change in the development categories of the taluks in all sectors

The similar methodology as followed by HPCFRRI committee was used to calculate the CCDI for selected taluks of Dharwad, Bijapur and Mysore district. The comparison of bench mark survey and present development revealed that most of the taluks have changed in their development indices. Muddebihal, B. Bagevadi, Indi and Sidgi which were in the Most Backward category had been increased to Backward category. The deceleration in development of Kalghatagi was seen from More Backward to Most Backward category, where as Hunsur and Nanjangud taluks of Mysore district have increased their development indices from most backward to Backward. The notable shift in development category of Navalgund, Bijapur and K. R. Nagar was seen from Backward to developed category (CCDI > 1.0). No shifts were observed in Kundagol, H. D. Kote, T. Narasipura and Periyapatna taluks during the study period (Table 4.24).

4.6 Opinion survey of the policymakers, officials and farmers about Special Development Plan (SDP) implemented for the development of backward category taluks

Opinion survey of policymakers, officials and farmers have been carried out in order to assess the performance and working of the Special Development Plan (SDP) which was specially recommended by HPCFRRI committee in order to reduce the regional imbalance in Karnataka.

4.6.1 The performance of SDP in the opinion of policy makers

Opinion of policy makers about working of SDP was analyzed with the help of technique of cluster analysis considering different variables grouped into different clusters and are presented in Table 4.25. The variables were presented under five major groups, *i.e.* awareness, implementation, procedural problems, funds allotted and release and end benefits of SDP. Under each group there were sub-variables concerned with the groups.

It was observed from the table that the variables were grouped under high aggregate clusters were awareness about SDP namely, awareness of officials about SDP, interaction of non-officials with officials and awareness of farmers about SDP. The high aggregate variables under implementation of SDP programmes were timely implementation of programme, supervision of evaluation by officials, planning and execution of SDP by officials, proper utilization of budget and progammes implemented for agricultural development under SDP. The high aggregate variables under procedural problems were official's role in implementation of programme, communication and co-ordination among departments about implementation of SDP. High aggregate variables under funds allotted and release were namely, timely release of funds, availability of funds and management of funds by officials. Finally, effective utilization of funds, growth of basic infrastructure and number of development programmes implemented were found under end benefits of SDP at the level of high aggregates. The degree of similarity values of high aggregate cluster ranges from 85.94 to 99.99.

The similarity value of medium aggregate clusters ranged between 52.27 to 63.12. The variable in the awareness category were farmer's participation in developmental programmes implemented by SDP. The variables in implementations of SDP were co-ordination of activities and horticultural programmes implemented by SDP. Plans fit to local requirement, extent of funds allotted for Agricultural development and impact on agricultural productivity were found in procedural problems, funds allotted and release and end benefits of SDP respectively.

In the low aggregate clusters the similarity values ranged from 44.20 to 49.23 with the variables namely, utilization of local resources in development, infrastructure for agriculture and area coverage of programmes under end benefits of SDP.

4.6.2 The performance of SDP in the opinion of officials

The opinion of officials expressed on the working of SDP was analyzed with a help of cluster analysis technique and the results are presented in Table 4.26.

The similarity values of high aggregate cluster ranged from 74.21 to 99.99 with the variables in awareness category namely awareness of non-officials about SDP, interaction of non-officials with official and awareness of farmers about SDP. Under implementation of SDP, progammes implemented for agricultural development under SDP, timely implementation of programme, planning and execution of SDP, supervision and evaluation, proper utilization of budget and co-ordination of activities. Communication and co-ordination among departments about implementation of SDP, .

Table 4.24: Change in the categories of selected taluks of Karnataka with respect to all sectors

Southern region			Northern region		
Improvement	**Decline**	**No change**	**Improvement**	**Decline**	**No change**
Hunsur and Nanjangud **(**More Backward to Backward**)** K.R. Nagar (Backward to Developed)	**--**	H.D. Kote, T. Narasipur and Periyapatna	Muddebihal, B. Bagevadi, Indi and Sindgi (Most backward to More Backward) Bijapur and Navalgund (Backward to Developed)	Kalghatagi (More Backward to Most Backward)	Kundagol

Table 4.25: Aggregate clusters of variables on the performance of Special Development Plan according to policy makers

(N=30)

Aggregation of clusters	Variables	Sub-variables	Degree of similarity
High (70-100)	Awareness	Awareness of officials about SDP Interaction of non-officials with officials	99.98
		Awareness of farmers about SDP	95.84
	Implementation	Timely implementation of programme	99.99
		Supervision of evaluation by officials	99.92
		Planning and execution of SDP by officials Proper utilization of budget	97.92
		Progammes implemented for agricultural development under SDP	92.65
	procedural problems	Officials role in implementation of programme Communication and coordination among departments about implementation of SDP	85.94
	Funds allotted and release	Timely release of funds Management of funds by officials	99.51
		Availability of funds	92.03
	End benefits of SDP	Effective utilization of funds Growth of basic infrastructure	99.10
		Number of development programmes	99.82
Medium (50-70)	Awareness	Farmers participation in developmental programmes implemented by SDP	52.27
	Implementation	Co-ordination of activities Horticultural programmes implemented by SDP	62.34
		Political interference	57.39
	procedural problems	Plans fit to local requirement	53.99
	Funds allotted and release	Extent of funds allotted for Agricultural development.	53.85
	End benefits of SDP	Impact on agricultural productivity	63.12
Low (below 50)	End benefits of SDP	Utilization of local resources in development Infrastructure for agriculture	49.23
		Area coverage of programmes	44.20

Table 4.26: Aggregate clusters of variables on the performance of Special Development Plan according to officials

(N=30)

Aggregation of clusters	Variables	Sub-variables	Degree of similarity
High (70-100)	Awareness	Awareness of non-officials about SDP	99.00
		Interaction of non-officials with official Awareness of farmers about SDP	89.58
	Implementation	Progammes implemented for agricultural development under SDP Timely implementation of programme	95.89
		Planning and execution of SDP	93.78
		Supervision and evaluation	85.21
		Proper utilization of budget	84.17
		Co-ordination of activities	83.78
	Procedural Problems	Communication and coordination among departments about implementation of SDP	99.25
		Officials role in implementation of programme	97.69
	Funds Allotted And Release	Timely release of funds Availability of funds	99.24
		Management of funds by officials	86.86
		Extent of funds allotted for agriculture development	74.21
	End Benefits Of SDP	Effective utilization of funds Growth of basic infrastructure	99.99
		Number of development programmes	93.89
Medium (50-70)	Awareness	Interaction of farmers with official Farmers participation in developmental programmes implemented by SDP	69.30
	Implementation	Political interference	63.71
		Plans fit to local requirement	51.32
	End Benefits Of SDP	Infrastructure for agriculture	61.42
		Impact on agricultural productivity	64.16
Low (below 50)	Implementation	Horticultural programmes implemented by SDP	47.93
		Top to bottom approach of programmes and target oriented	33.21
	End Benefits of SDP	Area coverage of programmes	45.35
		Utilization of local resources in development	20.62

Table 4.27: Aggregate clusters of variables on the performance of Special Development Plan according to farmers

(N=120)

Aggregation of clusters	Variables	Sub-variables	Degree of similarity
High (70-100)	Awareness	Participation in developmental programmes implemented by SDP Awareness about SDP	85.30
		Interaction of farmers with officials	81.72
	Implementation	Supervision of evaluation of programmes by officials Implementation of programme by officials	99.54
		Transparency in SDP Planning and execution of SDP	74.77
	Procedural problems	Lack of expected awareness of officials in monitoring SDP Officials role in implementation of programme	98.74
	End benefits of SDP	Infrastructure for agriculture Growth of basic infrastructure Impact on agricultural productivity	99.99
		Facilities available under SDP	81.24
Medium (50-70)	Implementation	Progammes implemented for agricultural development under SDP	68.97
	End benefits of SDP	Number of development programmes	57.35
Low (Below 50)	Awareness	Interaction of farmers with non-officials	49.85
	Implementation	Horticultural programmes implemented by SDP	30.97
	Procedural problems	Plans fit to local requirements	16.21
	End benefits of SDP	Area coverage of programmes	34.53

official's role in implementation of programme were the variables found with high aggregated category. Under the category funds allotted and release, the variables like timely release of funds, availability of funds, management of funds by officials and extent of funds allotted for agriculture development and end benefits category involves effective utilization of funds, growth of basic infrastructure and number of development programmes.

The variables like Interaction of farmers with official farmers participation in developmental programmes implemented by SDP, political interference, plans fit to local requirement, infrastructure for agriculture and impact on agricultural productivity were found in medium aggregate cluster.

In the low aggregate clusters the similarity values ranged from 20.62 to 47.93 with the variables namely, horticultural programmes implemented by SDP and top to bottom approach of programmes and target oriented under implementation category. And the variables like, area coverage of programmes, utilization of local resources in development under end benefits of SDP category were also listed under low aggregate clusters.

4.6.3 The performance of SDP in the opinion of farmers

The opinion surveys of the farmers were carried out with regard to awareness, implementation and procedural problems and ends benefits of SDP. The same are presented in Table 4.27.

It was observed from the table that the variables were grouped under high aggregate clusters under awareness about SDP namely, awareness about SDP, participation in developmental programmes implemented by SDP and interaction of farmers with officials. The high aggregate variables under implementation of SDP programmes were supervision of evaluation of programmes by officials, implementation of programme by officials, transparency in SDP and planning and execution of SDP. The high aggregate variables under procedural problems were lack of expected awareness of officials in monitoring SDP and officials role in implementation of programme. Finally, infrastructure for agriculture, growth of basic infrastructure, impact on agricultural productivity and facilities available under SDP were found under end benefits of SDP at the level of high aggregates. The degree of similarity values of high aggregate cluster ranges from 74.77 to 99.99.

The similarity value of medium aggregate clusters ranged between 57.35 to 68.97. The variable in the implementation of SDP category was progammes implemented for agricultural development under SDP and under ends benefits of SDP category number of development programmes was found.

In the low aggregate clusters the similarity values ranged from 16.21 to 49.85 with the variables namely, interaction of farmers with non-officials, horticultural programmes implemented by SDP, plans fit to local requirements and area coverage of programmes.

DISCUSSION

The results presented in the previous chapter are discussed in this chapter under following headings.

5.1 Regional imbalances in land use pattern between north and south regions of Karnataka

5.2 Disparity in growth rates of area, production and productivity of agricultural and horticultural crops

5.3 Regional disparity in availability of infrastructural facilities for agricultural development

5.4 Disparity in the flow of funds between the regions for development

5.5 Comparison of present level of development of taluks with bench mark survey of the state

5.6 Opinion survey of the policymakers, officials and farmers about Special Development Plan (SDP) implemented for the development of backward category taluks

5.1 Regional imbalances in land use pattern between north and south regions of Karnataka

The study on the spatial changes in land uses over the period gives the picture that how the land use is changing over the years in different regions, what are the different sectors and sub-sectors loosing the land, which categories are gaining the land, how the land under agriculture sector is changing over the years in different regions as well as in the state and whether there is any disparity in land use pattern between the regions. The results of the analysis are discussed below.

5.1.1 Land use pattern in south and north regions of Karnataka

Land use pattern in Karnataka with their share to total reported area was calculated to examine the extent of land allocated under different types of land use classes in the state and for the regions as well, the results are presented in Table 4.1.

A perusal of the Table 4.1 showed that there was a marginal increase in the share of forest area from 16.10 per cent in 2001-02 to 16.13 per cent in 2010-11, which was far below the norms set under the National Forest Policy (1952) envisaging about one-third of the geographical area under forest for ecological regions. The share of barren and uncultivable land has declined over time. The share of land put to non-agricultural uses increased substantially over the years due to increasing demand for land for industrial, housing and infrastructure developments. Ramasamy *et al.* (2005) and Bardhan and Tewari (2010) found the similar trends while studying the share of different land use categories. The permanent pastures and other grazing lands, cultivable wastes and land under miscellaneous tree crops and grooves showed the declining shares due to increase in demand for bringing more area under agriculture uses to meet mounting requirement of food grains and to meet the need for land put to non-agricultural uses consequent to increase in population. Moreover, the share has declined sharply in the case of permanent pastures and other grazing land. Even though the share of current fallows showed declining share, it mainly depends on rainfall distribution and was most unstable land use category. Fallows other than current fallow showed irregular trend in the share over the years. The net sown area showed an increasing share in order to bring more and more area under agriculture as a result of larger demand for agricultural products and commercialization of agriculture in the last decade.

As far as regional variation in land use share between south and north regions of Karnataka is considered, area under forest was the highest in southern region in both the periods than in northern Karnataka. It was because southern region was blessed with natural rainy forests in Western Ghats and frequency and availability of rains in this region made possible the good share of area under forests in this region than in northern region. The area share under barren and uncultivable land was more in southern region than in north. It was noticed that soil status and fertility of northern region was good comparatively to south. The plain lands of northern Karnataka though not getting more rains but are good fertile black soils, so the share of barren lands was less in northern Karnataka. Land put to non-agricultural area got a larger share in southern Karnataka than in northern Karnataka as the southern region was more developed and moving faster with industrialization, the demand for land for commercial activity, industrial parks made to increase the land under non-agricultural use to increase in its share. The share of area under permanent pastures and grazing lands, cultivable wastes and miscellaneous tree crops and grooves was more in southern region than that of northern region as the

region getting more rains. On the contrary the share of current fallows was more in northern region than in southern region. But in the fallow lands other than current fallows the southern Karnataka got the highest share. In the case of share of land under net sown area, northern region has got more area compared to south for both the periods, as area available for cultivation in the region was more as all the other land use classes were less and fertile, plain lands will make possible the share of land under net sown area higher in this region.

5.1.2 Changes in land use pattern between southern and northern regions of Karnataka

The average area under different land use categories and the percentage changes (Table 4.1) showed that at the state level the area under barren and uncultivable land, permanent pastures and cultivable wastes, miscellaneous tree crops and groves and current fallows have decreased considerably during the study period. The forest area increased at a very minute per cent, could be because of awareness among the people ecology and planting of tree in different areas of the state and establishment of gardens in many places. There was remarkable increase in the land put to non-agricultural uses. This shift towards land put to non-agricultural uses was mainly attributed to the increase in demand for land for industrial uses, development of infrastructure, urbanization and housing. The decline in barren and uncultivable lands could be due to the increasing pressure on land caused by increase in population and increasing demand for land for non-agricultural purposes. The sharp decline in common lands (permanent pastures and grazing land, cultivable wastes and land under miscellaneous tree crops and groves) which might be due to the increasing population pressure especially on common lands, which are more prone for encroachment and privatization. There was an increase in the net sown area (1.08%) during study period which was reflected by a sharp decline (12.29%) in current fallows. This could be generally due to more and more area was used in cultivation as a result of commercialization of agriculture and demand for foodgrains and commercial crops as a result of increase in the population. Fallows other than current fallows increased over the years due to variability of rains the more and more area added to older fallows.

When comparing of percentage change in land use dynamics between the southern and northern regions of Karnataka, the forest area showed little more growth in southern Karnataka than in northern Karnataka because of establishment of gardens and planting of trees was more in this region, especially in metropolitan city like Bengaluru (U), where the planting of trees and establishment of gardens have taken place in recent years as a result of awareness of government as well as people about consequences of environmental pollution. The declining percentage of permanent pastures and cultivable wastelands was more in southern Karnataka than northern Karnataka, this could be due to shift of these lands into non-agricultural sector was more in southern region. The per cent area under barren and uncultivable area in southern region was declined more in northern Karnataka. The per cent increase of land put to non-agricultural uses in southern region was more than that of northern region because as the region had number of metropolitan cities, the rate of urbanization was comparatively more in the region, more percentage of area under permanent pastures and grazing lands, cultivable wastes and miscellaneous trees were decreased as a result of high population pressure in southern region than in northern region. The per cent decrease of current fallows was more in northern region than that of southern region could be due to increased use of irrigation in recent years more and more area under current fallows was converted to agricultural lands. Contrary to that the per cent increase in fallow lands other than current fallows was more in southern region due to variability in climate, decreased rainfall *etc.* The per cent increase in land under net sown area increased comparatively more in northern region than south. As the northern region of Karnataka graced with ample of fertile land, the people were induced towards commercial agriculture and growing of commercial crops in the region was more. The cultivation of commercial crops like sugarcane, cotton, chilli, *etc.*, were increased in northern region under large area. The percent net sown area was also increased in southern Karnataka; but as compared to population growth, urbanization and industrial development in last decade it was very less.

5.1.3 Growth rates of area under different land use categories in southern and northern regions of Karnataka

Growth rates were worked out for state level, regional level and at district level on land use pattern to get a more detailed picture on spatial and temporal dimensions of the dynamics of land use pattern between the south and north regions of Karnataka.

The Table 4.3 revealed that there was a marginal increase in the forest area in the state due to the afforestation efforts undertaken by government in the recent period. Ramasamy *et al.* (2005) reported the similar results of increase in area under forest while studying the dynamics of land use pattern in Tamil Nadu. The government and non-governmental organizations with public partnership should implement strong afforestation and efficient forest resource management programmes to bring in the desired result in enhancing the forest area in the state. Land under non-agricultural uses showed a sizeable increase in its area. This was mainly because of rapid growth in urbanization and industrialization in the state consequent increase in population pressure in the study period. Similar trend of increase in the area with respect to land put to non-agricultural uses was witnessed in the study conducted by Wani *et al.* (2009) in Jammu and Kashmir and at the all India level by Bardhan and Tewari (2010). On the other hand, area under barren and uncultivable land has shown a declining trend because most of the barren and uncultivable lands were diverted for non-agricultural uses after its development through reclamation measures. Goswami and Challa (2004) and Ghaire (2011) also noticed the similar results in their studies. The area under current fallows showed a negative growth in the state for the study period. This will lead to increase in the net sown area as rain fall and irrigation facilities in the state have increased in the last decade thereby more and more current fallow lands were being used as cultivable lands. The increasing rates of fallow lands other than current fallow were non-significant. The area under barren lands, permanent pastures and other grazing lands, cultivable wastes and land under miscellaneous tree crops and grooves which was not included in the net sown area decreased significantly over the study period implying the diversion of the area from these categories, towards non-agricultural sector. The results of analysis on net area sown revealed that the area in this category has increased substantially during the period. This was mainly because of extensive cultivation over the years and diversion of land from common lands (Permanent pasture and other grazing lands, cultivable wastes and land under miscellaneous tree crops), current fallows and fallows other than current fallow. Pandey and Tewari (1996) also found similar results of increase in net sown area in Karnataka.

Region-wise comparison of growth rate in land used for different purpose has shown that area under forest is increasing in southern region because of lot of afforestation measures taken in the region than in northern region. The area under forest significantly increased in Bengaluru Urban and Hassan districts. The growth rate of non-agricultural sector showed that in southern region the land put to non-agricultural category was more than that of northern region as the districts of south i.e Bengaluru (U), Bengaluru (R), Udupi, Mysore, Dakshina Kannada growing towards industrialization. Due to increase in population, urbanization, industrial development and creation of infrastructures in these districts more and more land from other sector had moved towards non-agricultural sector. Though the districts of northern Karnataka like Belgaum, Bijapur, Dharwad, Uttara Kannada and Haveri showed the positive growth in area under non-agricultural sector, the growth rate was lesser than that of southern districts. Of course, being industrially developing, these districts seem to have not experienced much the demand pressure for land for industrialization and infrastructural developments as southern districts. Permanent pastures and grazing lands were decreasing at a faster rate in southern region than that of northern region, the areas of which converting towards non-agricultural sectors. Almost all districts of Southern Karnataka showed significant and negative growth in permanent pastures and grazing lands; whereas, in Northern Karnataka the districts like Uttara Kannada, Bellary showing decline rate in this category could be due to increased mining activities in these districts. The area under miscellaneous tree crops and grooves of the southern region decreased while that of northern region was increased. The decline rate of cultivable waste lands of south and north regions were almost same and cultivable waste lands were shifted towards non-agricultural category of respective regions. In fact, the developmental factors through rise in demand for land for urbanization, industrialization and infrastructures are causing substantial land use shifts from permanent pastures and grazing lands, area under miscellaneous tree crops and grooves and area under cultivable wastes to non-agricultural uses. Both permanent pastures and grazing lands and area under miscellaneous tree crops and grooves significantly contribute to local village economy and the ecology, and are quite vulnerable to land demand pressure for non-agricultural uses. Hence, the declining trends in both these land use classes need to be checked. The current fallows of southern region had been declined and might be moved towards the net sown area of that region as the net sown area has showed the positive trend. Rate of increase in the area under current fallows of northern region showed positive growth due to adverse rainfall condition in the region. However, the area under net sown area had increased at the positive growth rate due to increase in commercialization of agriculture in the region. Increase in the growth rate of fallow lands other than the current fallows was not significant in both the regions.

5.1.4 Intra-sectoral dynamics of land use in south and north regions of Karnataka

Table 4.4 and 4.5 elicit the annual rate of change in various land use categories for the period (2001-02 to 2010-11).

In the study period for the state as a whole, it could be observed that except forest, land shifts have been taken place from all ecological sub-sectors to the other sectors namely agricultural sector and non-agricultural sector. The decline in barren and uncultivable land is desirable, while, decline in permanent pastures and other grazing land and area under miscellaneous tree crops and grooves is a matter of concern. Sharma and Pandey, 1992 and Bardhan and Tewari, 2010 found similar shifts from ecological sub-sectors i.e., barren and uncultivable land, permanent pastures and other grazing lands and miscellaneous tree crops and grooves to other sectors (agricultural and non-agricultural) when analyzed for entire India. Results for the study period had revealed that decline in the area under permanent pastures and other grazing land and area under miscellaneous tree crops and grooves have contributed towards the net sown area, which is reflected by a huge increase in the net sown area.

In agricultural sector, except net sown area and fallow lands other than the current fallows, the other two sub-sectors of land use have declined in the period and similar results were reported (Bardhan and Tewari, 2010) in Karnataka while studying the changes in land use classes for post liberalization period. The analysis of the agricultural sector for entire period showed that except for fallows other than current fallow, the lands from other sub-sectors have declined. Changes in other land use classes within the agricultural sector revealed that cultivable wastes have declined, while, the other fallows have increased consistently. The decline in cultivable wastes points towards the beneficial effects of waste land development through reclamation efforts from time to time. Decrease in area under cultivable wastes (-1,219 ha) was seen due to reclamation efforts. Increase in net sown area witnessed a considerable change of 11,220 hectare per year. Current fallows also decreased in the study period.

The intra sectoral dynamics of land use in southern and northern regions of Karnataka has showed that forest area had increased more in southern region as compared to northern region. Though the area under forest area was increased a little in both the regions as a result of afforestation measures taken by the government, the efforts were too low to keep up the growth rate of area under forest. Therefore, special attention and programmes are needed to increase the area under the forest by the afforestation on denuded forest lands. The sub-sectors of ecological sectors other than forest were declined at faster rate in southern region than that of northern Karnataka but decline of barren and uncultivable lands was more in northern region and area under miscellaneous tree crops and grooves were declined with faster annual rate in southern region while area under miscellaneous tree crops and grooves increased in northern region. The annual rate of increase of non-agricultural sector was higher in southern region than in northern region, the districts of southern region like Bengaluru urban, Bengaluru rural, Dakshina Kannada and Mysore contributed a lot to increase in area added to non-agricultural sector as a result of increased urbanization, population pressure, creation of infrastructural facilities *etc.* It can be noticed that area added to non-agricultural sector in some of the districts like Bijapur and Bellary of Northern Karnataka was very high as the mining activities in these districts were considerably more. Area under cultivable wastes and current fallows were the two sub-sectors of agricultural sector declining in both the regions and declining rate of cultivable waste land was higher in southern Karnataka while current fallows were declined more in northern region because more and more area of fallow lands were being converted into cultivable lands in northern Karnataka. Older fallows were increased in southern region while the same were declined in northern region because more and more other fallows were used in cultivation by using the available input facilities such as irrigation and HYV seeds *etc.*

5.1.5 Budgeting of inter-sectoral land use shift in southern and northern regions of Karnataka

The possible land use shifts within the ecological sector may occur as follows. The land use shifts from miscellaneous tree crops and groves and permanent pastures and other grazing land to the forest which has no adverse ecological implications as it promote ecological concerns. The shift from forest to permanent pastures and other grazing land, which may possibly occur in some hills, does have some adverse ecological implications. The shift from barren and uncultivable to forest has favorable ecological consequences. However, the shift from forest and miscellaneous tree crops and groves to barren and uncultivable land will have serious adverse ecological effects.

The inter-sectoral budgeting analysis was carried out to find the pattern and extent of dynamics in land use shift in the state (Table 4.7). It has been observed that in the state the land use shift has occurred from desirable ecology (E_1) and undesirable ecology (E_2) sectors to non-agricultural sector and from agricultural sector to non-agricultural sector. The shifts from desirable ecological sector to other sectors require immediate check. These sectoral land use shifts towards the non-agricultural sector can be attributed to urban and industrial expansion, the other part was due to the expansion in irrigation networks, rural roads, market yards, *etc.*, which basically form the supporting infrastructures for agricultural growth.

The inter-sectoral shift in land use between south and north region as showed in the Table 4.6 and 4.7 revealed that in southern region, the desirable ecological sector (6069 ha) was the major sector which was moved towards non-agricultural sector, a marginal area of 133 and 94 hectare per year of undesirable sector and agricultural sector had moved towards non-agricultural sector respectively. But in the case of northern Karnataka highest area from agricultural sector (4914 ha. per annum) was moved towards non-agricultural sector. The land use shifts from agricultural sector to non-agricultural sector observed were would have harmful consequences on the development of agriculture in the region. While the shift of desirable ecology and undesirable ecological sectors were quite less. The land use shift from desirable ecological sector to other sectors will have serious economic as well as ecological implications. These patterns of land shifts, particularly the shift from desirable ecological sub-sector to non agricultural sector needs to be checked in the state. Sharma and Pandey (1992) and Bardhan and Tewari (2010) also reported that land use shift from desirable ecological sector to other sectors while studying the dynamics of land use in different states of India and considered as unfavorable dynamics which need to be controlled. The unfavorable declining trend of desirable and undesirable ecological sectors (together ecological sector) and the vicious land use dynamics lead to the degeneration of this important natural resource and hence need to be controlled.

5.2 Disparity in growth rates of area, production and productivity of agricultural and horticultural crops

5.2.1 Growth in area, production and productivity of cereal and minor millets

The growth rates of area, production and productivity analysis revealed that in the case of cereals and minor millets for the state as a whole, yield witnessed higher growth rate as compared to acreage in the study period. This has helped maintaining a rising trend in cereals and minor millets at the state level in the study period (Table 4.8). The increase in the area under the cereals was not statistically significant. With the increasing demand for commercial crops and agricultural development in the state, farmers slowly moved towards cultivation of commercial crops like sugarcane, cotton, tobacco, chilli, *etc.* But, increasing trends of growth rates of productivity were observed in the state as a result of use of improved technology, HYV seeds, fertilizers and increased use of irrigation in agriculture in recent years.

For southern region of Karnataka yield showed the impressive growth, even though area under cereals and minor millets has not shown significant growth, the trends of production of cereals and minor millets increased because of significant increase of productivity in the study period. It is true that the occurrence of good monsoons, use of high yielding verities and increased fertilizer consumption in the period might have played a supporting role in the emergence of this type of trend. For individual districts, the districts of Davanagere, Shimoga, Chikmagalur, Hassan and Chamarajanagar performed much better than the other districts in the region as rice, ragi and some of the coarse cereals were major crops of these region performed significant increase in production. Even the growth rates of yield were in these districts was much more impressive than those of production. As compared to southern Karnataka growth trends of production and productivity of cereals and minor millets were more in northern Karnataka. Again, it could be because of increase in adoption of HYV, area under irrigation and increased fertilizer consumption in the study period. Except Bidar all the other districts of northern region have showed positive growth rate of production and productivity of cereals and minor millets. Earlier the districts of the northern region were comparatively not as developed as the southern region of the state. Agriculturally less developed districts of northern Karnataka were showed the impressive growth in productivity in recent years by utilizing the available input facilities as it is reflected in the increased growth rate in production of cereals and minor millets in the region.

5.2.2 Growth in area, production and productivity of total pulses

The growth rate of pulse production was significantly increased in Karnataka over the study period (Table 4.9). The expansion in production of total pulses was totally induced by growth in their productivity which was accompanied by increase in the area. In recent years it could be seen that the area under cereals and oilseeds were replaced towards high valued crops like pulses and commercial crops. The area under pulses was increased in the study period might be due to better relative prices in the market for the pulses. Still, increase in the productivity is observed in case of pulse might also be due to the efforts of the research projects at the national and state level in improving productivity of pulses over years; availability of good quality seeds that minimize the incidence of soil borne diseases and availability of improved package of practices.

It is interesting to note that the less developed northern region of Karnataka has shown higher growth rates of area and production than that of southern Karnataka. Increase in the adoption of different technologies like improved varieties, adoption of IPM and use of bio-fertilizers have helped a lot in the productivity of pulses in the region. Gulbarga and Bidar account for major portion of land allotted for tur and other pulses. Increasing demand for pulses and market prices induced the farmers to grow more and more pulses in this region. Such increasing trends in area and production in the northern region shows that the impact of the drivers of capital formation in agriculture and use of agricultural credit as well as issue of input use and concern for soil fertility among the farmers in the region in recent decade. Though the growth rates of productivity in southern region was more impressive, the decreasing trend in area in the region has made an impact on the production that growth rate of production in the region comparatively less. Technologies used in the southern region pulses production as compared to that of northern region were more superior, as a result of that yield showed better performance in southern region as compared to that of north. But, no significant increase in growth rate of area has seen in any of the districts in southern region in the study period. On the contrary, except in some of the districts like Udupi, Mandya, Mysore, Davanagere and Shimoga, the growth rate of productivity of all other districts were above the state average; as major portion of these districts well established for cultivation of cereals, particularly rice. The growth rate of productivity in northern region has not increased as much as that of southern Karnataka. The increasing trend in area has made to increase trend in production. Certainly, relatively higher real prices of pulses along with improved market intervention might have played an important role in inducing higher expansion in their output in less developed region like Northern Karnataka. The districts like Belgaum, Bijapur, Bagalkot, Gadag, Bellary, Gulbarga, Raichur and Koppal have shown positive trends in area under total pulses in northern region that shows the area under cereals in the region was replaced by pulses to some extent. In addition, advances in production technology for pulses and crop pattern in these regions must also have played an equally important role. Hence, it is important to aim at progressively higher expansion in the output of pulses with adequate support of technological advances, marketing and processing infrastructure in this region would be a highly desirable strategy to follow in future.

5.2.3 Growth in area, production and productivity of oilseeds

The area and production of oilseeds in the state was decreased and increase in the growth rate of productivity was not statistically significant as indicated in the Table 4.10. The decreasing trends in area under groundnut and sunflower were observed in the last decade. It was clear from the observation that the decrease in the area and production of major oilseeds were due to the fact that the oil seed crops in Karnataka were mainly covered under rainfed conditions, which in turn has to depend on the arrival of monsoon, climatic changes and drought. Similarly, the productivity level under oilseed crops was erratic.

As far the growth rate of oilseeds is concerned the southern region of Karnataka showed the negative growth rate in production and area indicated that the area and production under the oilseed crops decreased over the study period. As compared to southern region the northern region showed lesser declined in growth rate of production but declined more in the case of growth rate of area. The districts of southern region *i.e.* Chikmagalur, Dakshina Kannada and Hassan were showed the significant positive growth in the case of growth rate of area and production of oilseeds while the other districts have shown negative growth rate. Comparatively in north Karnataka Belgaum, Dharwad, Haveri and Bidar districts have shown positive growth rate in area and production of oilseeds. Traditionally, major sunflower and groundnut growing districts in Karnataka were Bijapur, Bellary, Gulbarga and Raichur. These districts, including the districts of Dharwad showed gradual increase in sunflower and groundnut acreage in the past decade. The growth rate of area, production and

productivity of Dharwad district was really impressive in the case of oilseeds. Apart from sunflower and groundnut, the production of soybean also increased in some parts of northern region. Though, increase in growth trends of oilseeds crops in some of the districts showed positive growth, the increase in the use of palm as oil purpose induced reduction in the demand for oilseeds like groundnut and sunflower. Again, change in climatic condition and persistent drought in the recent years have also affected the acreage under oilseeds by reducing the productivity mainly in both the regions.

5.2.4 Growth in area, production and productivity of horticultural crops

The state as well as inter-district growth rates of area, production and productivity of horticultural crops for the period from 2001-02 to 2010-11 were increased significantly. These findings reveal an overall impressive performance of horticultural crops over the years in the state. The growth rates production of the horticultural crops increased because of increase in area under the horticultural crops over the years, even though the growth trend in productivity have not seen much more impressive growth (Table 4.11). Increased potential for export of horticultural products, improved value addition, post harvest technologies and increased demand for horticultural products in the domestic market in both fresh and value added form have induced growth trends of area under horticultural crops in the state. Still, area under major commercially viable horticulture crops like, banana, potato, mango, plantation crops and some of the spices have performed exceptionally well in the study period. Again, establishment of transport and cold storage facilities in the state also have contributed to increase in the area under horticultural crops. As the horticultural industry has a tremendous employment potential, by the help of state government in collaboration with the private sector, number of industries have been established in the state. This also adds a lot to increase in the area under horticultural crops in the state.

The area under the horticultural crops in southern Karnataka was increased with the higher growth rate than that of northern Karnataka because of ample of scope for growing of horticultural crops in south region as compared to north, almost all districts of the south region can grow most of the horticultural crops as the climate and topography in the region is suitable to horticultural crops. Bengaluru rural, Davanagere, Kolar, Shimoga, Tumkur, Chikmagalur, D. Kannada, Hassan, Mandya, Mysore and Chamarajanagar districts have shown increasing trend in area under the horticultural crops in the region, particularly in plantation crops and spices. Even, commercial cultivation of flowers in some of the districts of the region was also well established. This type of trend was observed might be due to increased export potential of horticultural crops, value addition, increased demand and contract farming under horticultural crops. It has been observed that the more and more wastelands in the region have been used for cultivation of horticultural and plantation crops in the last decade. Growth rates of production of horticultural crops were found increased in northern region much more than southern region. It is mainly because of productivity trends of the horticultural crops were more impressive than that of southern region. Belgaum, Bijapur, Bagalkot, Uttara Kannada, Raichur and Koppal districts have shown significant growth in production. Growing of fruit crops like pomegranate, grapes, guava, sapota, mango, *etc.,* by using the improved production technologies have made positive growth rate of productivity. Further, Belgaum and Bijapur districts were performed really well in production and productivity of the vegetables in the state as compared to other districts.

5.2.5 Determinants of growth rates of productivity

The variables, area irrigated, fertilizer consumption and area under HYVs emerged as the most important factors in determining the yield variation between the regions (Table 4.12). Amongst the variables for state of Karnataka as a whole, area irrigated was the most important factor exercising maximum influence on crop yields. The coefficients of these variables found positive and significant in large number of cases. Regression coefficients of area irrigated found significant and positive in the case of cereals and minor millets, total pulses and horticultural crops in Karnataka state. Fertiliser consumption was found significant in the case of oilseeds and horticultural crops and regression coefficients for area under HYV seeds were found significant for total pulses. The positive and significant coefficients of these variables indicating that an increasing use of these variables would increase the yield of cereals and minor millets, pulses, oilseeds and horticultural crops. Increase in yield directly affects on production to uplift the production of these crops in the state.

The region wise comparison of determinants of productivity of agricultural and horticultural crops showed that in southern region the regression coefficients for irrigated area was found significant and positive in the case of total pulses indicating that increase in irrigation would increase

the yield of the pulses. Area under HYV seeds found significant but negative for total pulses indicating that sub-optimal use/poor management imbalanced use of HYV seeds.

For northern region of the state irrigated area was found significant for pulse crops as the region had got comparatively lesser rainfall the irrigation plays a very important role. And none of the variables found significant in this region for other crops and other variables.

5.2.6 Determinants of growth rates of area

The effect of irrigation on pulses and oilseeds was found to be significant and positive for the state as a whole. In most of the pulses and oilseeds growing districts the pulses and oilseeds are mainly irrigated crops. Increase in the irrigated area would increase the acreage under pulses and oilseeds in the state. Yield of the oilseed and horticultural crops showed positive and significant on acreage of the respective crops in the state (Table 4.13).

In southern region gross cropped area and yield of cereals exercising significant impact on area under cereals and minor millets indicating that more than once cultivation of crops and increase in yield of the cereals and minor millets would definitely increase the area under these crops. Yield rate of horticulture crops were significantly put its impact on area under horticultural crops, as there are lot of scope for cultivation of horticulture crops in the northern region, yield of these crops plays a predominant role in increasing the area under horticultural crops. The positive and significant regression coefficients of marketing infrastructure like regulated markets and road length have revealed that increase in number of these infrastructure facilities would increase the area under the horticultural crops in southern Karnataka.

Gross cropped area was found significant and positive with area under cereals and minor millets revealed that more than once growing of these crops would increase the area under respective crops. Area under irrigation was significantly impact on acreage of total pulses and oilseeds of northern region as the northern region of Karnataka is getting lesser rains in comparison with southern region; increase in number of irrigation sources would increase the area under pulses and oilseed crops.

5.3 Regional disparity in availability of infrastructural facilities for agricultural development

5.3.1 Disparity in availability of infrastructural facilities for agricultural development

Perusal of Table 4.14 has revealed that there has been lot of disparities in infrastructural facilities for agricultural development in the study period between the southern and northern regions of Karnataka. Availability of infrastructural facilities was observed more in southern region of Karnataka as compared to northern region. But, it was good to see that the agricultural infrastructural indicators in northern Karnataka had been increased at faster rate than south region in the study period. Establishment of irrigation channels, road network, educational institutions, banks, co-operatives, marketing infrastructures, *etc.,* were took place in the region more faster rate as compared to southern region. As a result of recommendation of HPCFRRI committee the state government has took number of measures under which establishment of basic and agricultural infrastructure was the major step; as per the recommendation of the Committee, the Special Development Plan (SDP) programme was established in order to develop the most backward, more backward and backward taluks of northern and southern regions of Karnataka. The SDP fund released, given more emphasis to development of social and economic infrastructure. Northern Karnataka, the region with more number of backward category taluks had got more funds as compared to that of southern Karnataka and a portion of funds were effectively used in the development of the infrastructural facilities (both basic and agricultural) in the region.

As far as literacy rate, gross irrigated area, distribution of total fertilizers, road lengths, commercial bank branches, cold storage units and electricity consumption for IP sets were concerned the southern region was more equipped with these resources in 2001-02 and 2010-11 as compared to that of northern region. But in the case of Regional Rural Banks, Regulated markets and sub-markets and Agricultural co-operative societies northern region has been provided with more facilities. Further, it was observed from the table that all the infrastructural indicators had been increased during the study period except Regional Rural Banks, Regulated markets and Co-operative societies. It could be because the numbers of these indicators were not increased as fast as increase in population in last decade. Percent change in infrastructural indicators over the years have shown that,

for almost all indicators northern region showed comparatively higher rate of growth in percentage than that of southern Karnataka. Because as per the recommendations of HPCFRRI committee the government had allotted lot of funds to northern regions in order to develop the infrastructure in the region. Construction of roads, buildings, marketing infrastructures like godowns, cold storages, warehouses, educational infrastructures, irrigation channels, banks, *etc.,* were established at faster rate in the previous decade had supported a lot for increase in infrastructural facilities for agricultural development. Still, northern region lagged behind in major infrastructural indicators as compared to southern region; hence, the policy options may go in such a way to decrease the disparity in both the regions by establishing infrastructural facilities in the matter of concern.

The per cent difference in infrastructural indicators between the regions for the year 2001-02 and 2010-11 indicated that over the years difference was narrowed down in the case of most of the indicators. Literacy rate in both the regions of the state has improved over the study period. Further, the improvement was observed in growth of literacy rate in northern region may be due to increase in the educational infrastructure *viz.* schools, colleges could be due to increase in the attraction of the people towards the education and its benefits, increased standard of living of people and induced demand for education and increased urbanization of districts of the region.

It is interesting to see that the percent change in irrigated area has become almost equal. Earlier, the southern region was facilitated with more irrigation infrastructure as a result of more aid of the government towards the establishment of irrigation infrastructure in the region. After realization by the government that the northern region was lagging behind in irrigation infrastructure, and as per the recommendations of various Committees, the government has created number of various irrigation schemes by granting more and more funds towards the northern Karnataka for development of irrigation infrastructure. Northern region of the state mainly depends on the rains and rainfall in the region is comparatively less. Keeping in a view, the large number of backward taluks and also predominance of agriculture whose foundation has to be strengthened further to improve the conditions of the peoples of the region, all taluks coming within Krishna, Godavari, Cauvery and other river basins had brought under assured irrigation by creating number of major and minor irrigation projects, creation of tanks, lift irrigation, bore wells, *etc.,* in the recent decade.

As a result of commercialization of agriculture farmers were induced towards a improved technologies which will yield a higher productivity; that has resulted in increase in consumption of more quantity of fertilizers. Crop response to the fertilizers applied has implied the farmers in use of more and more fertilizers, particularly in the northern region.

Establishment of banking networks, co-operative societies, marketing infrastructures like cold storage units, regulated markets facilities, road networks and electricity consumption for agricultural purpose were also induced the development of northern region. In fact, the government had lot of scope in creation of infrastructural facilities in the northern region because the region was comparatively less developed and created infrastructural facilities in the region have performed better than that of southern region could be because of a less population pressure on the facilities available as compare to that of southern region.

5.3.2 Discriminant Function Analysis of infrastructural indicators between south and north regions

It could be seen from Table 4.15 that literacy rate, gross irrigated area, distribution of total fertilizers, cold storage and electricity consumption IP sets were had negative impact on development of the North and South Karnataka, where as the variables like road length, commercial bank branches, Regional Rural Banks, Regulated markets and Sub-markets and Agricultural co-operative societies were had positive impact on the development of north and south regions of the state for the study period from 2001-02 to 2010-11.

With respect to relative contribution of the variables for the development of north and south Karnataka in the period from 2001-02 to 2010-11, availability of regional rural banks (47.95%) followed by electricity consumption for agricultural purpose (21.35%), distribution of total fertilizers (16.92%), literacy rate (10.86%) and agricultural co-operative societies (7.66%) were the major discriminating factors between north and south region of the state for development of the entire state for the study period.

As Northern Karnataka had always received unfair share in infrastructural development and this resulted in suppression of economic activities. The HPCFRRI suggested various ways and means in order to increase the infrastructural development in the Northern Karnataka by providing large

share of additional resources. It is however necessary to daily need these resources across the regions and infrastructure component in proportion of existing backlog. A few important components emerge from the analysis namely, regional rural banks, electricity for agricultural purpose, distribution of total fertilizers, literacy rate, agricultural co-operative societies and road networks. Further, it is necessary to compute the futuristic trends for these components and provide investment for such purposes.

5.4 Disparity in flow of funds between the regions for development

5.4.1 Regional inequality in allocation of Special Development Plan fund on agricultural and allied sector in Karnataka

As per the HPCFRRI committee recommendations the government had released funds under the name of Special Development Plan fund in order to develop the most backward, more backward and backward taluks in the state. The present study tried to examine the status of disparity in flow of funds between the regions. The committee recommended that the funds have to be distributed to different sectors of economy in order to reduce the disparity in development among all the sectors of economy. Among the sectors to which funds have been recommended, agriculture and allied sector was the major sector which got 26.30 per cent of funds.

The flow of SDP funds to agriculture and allied sector has showed the disparity between the north and south regions of the state over the study period (Table 4.16). The northern region had received comparatively more funds towards the sector; as per the recommendations of HPCFRRI committee the funds were allotted to the regions which were in backward category. About 210,962 lakh rupees have been allotted in the six years for agricultural development; the share of northern region in the total funds allotted was about 68.38 per cent. Within north region, the budgetary allotments were more to the Gulbarga division as the highest numbers of backward taluks were existed in the division. Even the Belgaum division comprises of more number of backward category taluks, correspondingly the division had been allotted with overall 20.54 per cent of funds. Over the years the allotment of funds were shown lot of inequality in the region. On the contrary, the budgetary allocation of SDP funds to the south was lesser than that of north Karnataka. The share of the region in the total SDP was about 31.62 per cent. Within the region, Bengaluru and Mysore divisions were equally allotted with the Special Development Plan funds in overall budgetary allotment of money. The differences have seen in the division wise flow of credit in the state, Gulbarga division has received 47.85 per cent of funds, followed by Belgaum (20.54%), Mysore (15.96%) and Bengaluru division (15.66%). According to the number of the backward taluks, for the above mentioned regions the funds were released. It is interesting to note that flow of funds to northern region have increased as compared to the southern region from 55.76 per cent to 70.42 per cent from 2007-08 to 2012-13 respectively, whereas the flow of funds to southern region has been decreased from 44.24 to 29.58 per cent in the same period. This variation may be because of the development of the taluks of southern regions of Karnataka were more as compared to that of northern Karnataka. But, as per the recommendations of HPCFRRI committee it is recommended that regular calculation of CCDI and Cumulative Deprivation Index is necessary. But for recent period, the flow of funds to the different regions was not on the actual basis of recommendations of the HPCFRRI committee.

5.4.2 Inter-regional disparity in flow of Special Development Plan fund on agricultural and allied sector- Theils entropy analysis

Theils entropy index of regional inequality of flow of Special Development Plan fund to agricultural and allied sector has revealed that over the years the disparity in funds flow were increased as showed by the increase in the Theils entropy over the years. The trend equations fitted by using the coefficients of Theils index have revealed that the disparities over the years had increased, however the increase in the inequality is non-significant. Increase in the disparity of the flow of funds to the agricultural and allied sector attributed by lot of variation in the agricultural development of the taluks. Government of Karnataka has concentrated more on northern region of the state as compared to southern region. Still, the Gulbarga division continuously allotted with more funds and the gap of recommendation and allotted money were also increased in the state.

5.4.3 Regional inequality in allocation of Special Development Plan fund on All Sectors in Karnataka

A sum of Rs. 9,35,036 lakh have been allotted to all the sectors *i.e.*, agricultural and allied sector, industry trade and finance sector, economic infrastructure sector, social infrastructure and population characteristics from 2007-08 to 2012-13 in order to bring improvement of backward category districts. The funds have been released every year according to the degree of backwardness to those taluks which have been considered as most backward, more back ward and backward districts by the High Power Committee for Redressal of Regional Imbalances (HPCFRRI).

The Table 4.18 shows the budgetary allotment of SDP funds to north and south regions of Karnataka and the division wise distribution of the funds as well. It could be seen from the table that there exist huge disparities in the flow of funds in the study period.

A total of Rs. 9,35,036 lakh have been allotted in the six years period *i.e.* 2007-08 to 2012-13 for all sector development of backward taluks in the state. The south and north regions have been allotted with 34.30 and 65.70 per cent of funds respectively. It was observed that the northern region of Karnataka had received the higher share of funds which have been allotted to the development of backward taluks of the region than that of southern region. Within northern region Gulbarga division had received 41.44 per cent share in the total credit allotted for all the divisions, whereas the Belgaum division had received about 24.27 per cent of funds. It could be because the number of backward taluks in Gulbarga division was more than that of Belgaum division. There were 21 most backward taluks and total of 28 taluks have been considered as backward category taluks in Gulbarga and Belgaum division respectively. Bengaluru division in southern region was allotted with more funds as compared to Mysore division because as per the recommendations of HPCFRRI, Bengaluru division comparatively comprised more number of backward categories of taluks. Hence, it was understood that the flow of funds to Bengaluru division were more in the study period. It was further revealed from the table that the flow of funds to both the divisions of southern region had decreased over the years and at the same time the flow of funds to the northern region had increased. It could be because of the comparatively more number backward taluks which were present in the Bengaluru and Mysore division were moved to the developed category as compared to that of northern region.

Though HPCFRRI in Karnataka has estimated Rs. 16,000 crores as net additional outlay required as Special Development Outlay. But the method of arriving at this estimate was not very systematic. The Committee did not succeeded in getting the required cost estimates from the concerned departments. However, the Committee had to depend upon the rough estimates or cost norms (Deshpande, 2014). Therefore, it is clear that these estimates did not take into consideration the actual requirements of the Most Backward, More Backward and Backward taluks individually and arrived at sum total of requirements. The Committee computed a Cumulative Index of Disparity, as a tool to allocate resources. After categorizing the taluks of Karnataka into three groups namely, 'Most Backward', 'More Backward' and 'Backward', it was expected from the committee that the allocation scheme would be based on these categories. But after collaborate exercise of classify the taluks into three groups, The Committee provides a rather simple allocation as 40 percent for Gulbarga division, 20 percent for Belgaum division (overall 60 percent for Northern region), 25 percent for Bengaluru division and 15 percent for Mysore division (overall 40 percent for Southern region). The Committee recommended that the State government consider the CDI values updated suitably every year to allocate resources. Further, the Committee stressed that the taluks which were having CCDI less than '1' should be allotted additional resources which should be directly proportional to the 'distance' of the CCDI value from ht State average which is unity (1). But, the government could not able to allocate the funds as far and extent to the recommendations of the HPCFRRI Committee. Deshpande (2014) reported the similar findings in his study. Hence, the disparities in flow of funds for development through SDP showed lot of inequality in the state, between the regions and within the regions also.

5.4.4 Inter-regional disparity in flow of Special Development Plan fund on All sectors- Theils entropy analysis

Theils entropy index of regional inequality of flow of Special Development Plan fund to all sector has revealed that over the years the disparity in funds flow were increased as Theils entropy has positive growth. The trend equations fitted by using the coefficients of Theils index have revealed that the disparities over the years had increased, however the increase in the inequality was non-significant.

The disparity in flow of increased over the years to the sectors indicated that the funds allotted in the earlier period were exactly as per the recommendations of SDP, but for recent years it reflected that the government have not followed the criteria of the HPCFRRI committee for the allocation of funds. Further, calculation of CCDI for the present period also became necessary factor in order to allot the funds, as the taluks have shown lot of changes in the development index and category as well. In order to reduce the disparity in development of different region the flows of funds have to be made available as per the recommendation. The allotment of funds not made on actual lines of the recommendations of the committee. Among the divisions Gulbarga division has lower gap in recommended allotments and budgetary allotments followed by Belgaum, Mysore and Bengaluru divisions, that has caused the reason for such increased disparity over the years (Siddhalingaswamy, 2014). Further, government has done well in attracting external assistance for its various plan projects. However, HPCFRRI would recommend to the State Government to seek greater share of external assistance from World Bank, Asian Development Bank, NABARD, HUDCO and various other bilateral country assistance for implementing some of the medium and long-term projects proposed in the Special Development Plan. Government was urged to accept and honour the federal principles of transferring resources from better off regions to worse off regions for maximizing the total welfare of the people of the state.

5.5 Comparison of present level of development of taluks with bench mark survey of the state

5.5.1 Comparison of present level of development agricultural and allied sector of selected taluks with bench mark survey of the state

The sectoral indices of agricultural and allied sector for selected taluks were presented in the Table 4.21 have revealed that except in Navalagund, the other two taluks have not shown any development in the sectoral index in Dharwad, where as all the selected taluks of Bijapur districts were showed the positive growth in sectoral indices; it could be because of implementation of developmental programmes under SDP fund as recommended by HPCFRRI committee. Further, it can be noticed from the table that except H. D. Kote the sectoral indices of all the selected taluks of Mysore were decreased. Finally, it could be revealed that the taluks which were not showed the positive development in the sectoral indices of agricultural and allied sector were revealed that either the development programmes were not performed well in the region leading to backwardness of agricultural sector growth or the credit facilities available under different programmes were less as compared to other regions.

From the Table 4.22 it could be concluded that in the development of agricultural and allied sector in most of the selected taluks were very weak. Only two selected taluks showed impressive development and shift in categories of the taluks in the study period namely Sindgi and Bijapur was mainly because of increased irrigation facilities in these districts for agricultural and allied sector has showed developed and shifted to next above category. On the contrary most of the taluks were stunt in development. May be because of the agricultural and allied sector in these taluks have not got lot more importance as compared to the other sectors and credits flow under the development programmes were also less. Lack of infrastructure facilities in agriculture in the taluks of Kalghatagi have created problem and development have shown negative growth in the taluk. So, it is necessary to make provision under Special Development Plan to create more and more agricultural infrastructure in these regions in order to improve the pattern of development.

5.5.2 Comparison of present level of development of all sectors of selected taluks with bench mark survey of the state

The overall sector Comprehensive Composite Development Index has revealed that the overall development was stunted in Kalghatagi and Kundagol taluks and improved in Navalagund taluk. All the selected taluks of Bijapur districts had showed increase in development indices and it was interesting to note that Bijapur taluk has moved out from the backward category. In Mysore district, though some of the selected taluks have shown a decline in CCDI, the deceleration was very minute as compared to that of Kalghatagi taluk of Dharwad district. No taluks in Mysore were shifted to below backward category in the study period. The improvement of K. R. Nagar was impressive and the taluk no way remained in the backward category (Table 4.23).

Table 4.24 has revealed that only one taluk (Kalghatagi) out of 14 selected taluks had showed negative shift in the category, mainly because the implementation of development programmes under different schemes have not implemented at the best. The provision of SDP funds allotment was not satisfactory as per the recommendations of the Committee. Four taluks have showed stagnation in

development and the remaining nine taluks showed improvement in development index and jumped to higher categories. It could be concluded from the table that most of the taluks have showed improvement, which could be because of developmental measures taken by the Government in hitherto mentioned taluks as per the recommendations of Dr. D. M. Nanjundappa Committee. The taluks which were shown the positive shift in the backward category taluks have showed good response to the development programmes conducted in the taluks. Hence, it became necessary that more and more funds in order to increase the development of the taluks which were under backward category.

5.6 Opinion survey of the policymakers, officials and farmers about Special Development Plan (SDP) implemented for the development of backward category taluks

The opinions sought from the policy makers, officials and farmers were analyzed separately and the outcomes had been discussed as under.

5.6.1 The performance of SDP in the opinion of the policy makers

The opinions sought from the policy makers were subjected to cluster analysis in which an inter correlation matrix was designed to accommodate the variables identified pertaining to the performance of the SDP. The similarity measures or degree of association between all possible variables was computed for the purpose of comparison.

It could be seen from the Table 4.25 that a decreasing trend was observed in the similarity measure from the first cluster to last cluster within the category, which implied relatively lower degree of agreement among the variables. The similarity values ranged from 99.99 to 44.20, when the clusters were formed. A cluster with lower similarity value implied the lower important of that cluster in performance of the SDP and vice-versa.

The selected variables were accommodated in three different clusters based on their similarity measures. The first cluster which was designated as high aggregate cluster whose similarity values ranged between 99.99 to 85.94 reflected that awareness of officials about SDP, awareness of farmers about SDP and interaction of non-officials with officials was excellent. Policy makers have good opinion that the awareness of the officials about SDP and their interaction with policy makers in different procedure, planning and utilization of funds were excellent. In the opinion of the policy makers the implementation of SDP programme, supervision of evaluation, planning and execution of SDP by officials, proper utilization of budget, progammes implemented for agricultural development under SDP, were excellent as per their perception. The procedural problems like, problems of communication and co-ordination among different departments about implementation of problems were absent as per the opinions of the policy makers. Further, they have opined that officials role in implementation of programmes were excellent in implementations of SDP programmes. As pet the opinions of the policy makers timely releases of funds, management of funds by officials, availability of funds were timely, adequate and excellent. The end benefits of SDP like effective utilization of funds, growth of basic infrastructure and number of development programmes implemented trough the Special Development Programme (Table 4.25).

The second cluster, which was designated as medium cluster, had similarity values ranging from 52.27 to 63.12 highlighted the policymaker's opinion about farmers participation in developmental programmes implemented by SDP is satisfactory. Under the category of implementation of SDP co-ordination of activities conducted by officials, horticultural programmes implemented by SDP, political interference in SDP are moderately present in programmes. Extent of funds allotted for Agricultural development and impact of SDP on agricultural productivity is satisfactory as perceived by policy makers.

The third cluster which was termed as the low aggregate cluster included variables of the category namely, opinions of the policy makers about end benefits of the progammes implemented by the SDP. Policy makers pointed out that utilization of local resources in development were very poor; infrastructure facilities created for agriculture development were poor in the selected taluks of north and south regions. Further, area and coverage of programmes implemented were poor as per the opinions of the policy makers. This cluster indicated the need for bringing about improvement in the variables for better performance of the SDP, since they had comparatively lower similarity values compared to other variables found in other clusters.

5.6.2 The performance of SDP in the opinion of the officials

Based on the similarity values of opinion obtained from the officials relating to the performance of SDP was grouped into different clusters and the results were presented in the Table 4.26. It was observed from table that the variables in high aggregate cluster reflected the high degree of awareness of non-officials and farmers about SDP, interaction of non-officials with official also excellent. As far as implementation of progammes were concerned agricultural development programmes implemented under SDP were excellent as opined by the officials. Under the SDP programme numbers of agricultural development programmes have been implemented as distribution of seeds, machineries, and the infrastructures like road network, agricultural processing *etc.* The development programmes were timely implemented and planning and execution of the programmes implemented under SDP were excellent. Officials further opined that funds allotted under the programme will be utilized properly and supervision and evaluation of the programmes which were implemented done at regular intervals, ansd the different activities coming under the programme were well co-ordinate. With regard to allotment and release of SDP funds the officials perceived that timely release of funds, availability of funds, management of funds, and extent of funds allotted for agriculture development were found excellent. Finally, end benefits of the SDP namely effective utilization of funds, growth of basic infrastructure, number of development programmes were also excellent. It could be revealed that as per the opinions of the officials the funds given under SDP were effectively utilized for the development of the taluks and the basic infrastructures in the taluks were improved by utilizing the funds. There were number of development programmes in different taluks selected under SDP programme.

The opinions of the officials were found satisfactory for Interaction of farmers with official, farmers not often meet the officials regarding the developmental programmes and their participation in developmental programmes implemented by SDP was satisfactory. In the implementation of programmes the officials found political interference but, the interference was not more. Plans prepared at the higher level i.e. taluk level was satisfactorily fit to local requirement. Further, infrastructures for agriculture were not as excellent as basic infrastructures created. Impact on agricultural productivity was also found satisfactory as per the opinions of the officials.

The low aggregate cluster indicated the need for bringing about improvement in the variables for better performance of SDP. Horticultural programmes implemented under SDP were very poor, the programmes implemented were target oriented and planned at the top level were perceived as the problems in the SDP. the area coverage of programmes were poor and utilization of local resources in development programme was not satisfactory.

5.6.3 The performance of SDP in the opinion of the farmers

The similarity values of opinion obtained from the farmers relating to the performance of SDP was grouped into different clusters and the results were presented in the Table 4.27. It was observed from table that the variables in high aggregate cluster reflected the high degree of awareness of farmers about SDP, while, participation of farmers in developmental programmes implemented by SDP and interaction of farmers with officials regarding SDP was excellent. As per the opinion of the farmers in regard with supervision of evaluation of programmes by officials implementation of programme by officials were at timely basis, the programmes implemented were transparent in SDP and planning and execution of SDP was excellent. While, procedural problems like, lack of expected awareness of officials in monitoring SDP was less and officials role in implementation of programme was excellent. With regard to the end benefits of SDP programmes implemented infrastructure for agriculture, growth of basic infrastructure, impact on agricultural productivity and facilities available under SDP were excellent.

As per the opinions of the farmers, progammes implemented for agricultural development under SDP and number of development programmes was found in the medium aggregates clusters showed that agricultural development programmes were implemented not excellent. And the end benefits like number of programmes implemented were just satisfactory.

The third cluster which was termed as the low aggregate cluster included variables namely, interaction of farmers with non-officials, horticultural programmes implemented by SDP, plans fit to local requirements and area coverage of programmes were poor in the selected taluks as perceived by farmers. This cluster indicated the need for bringing about improvement in the variables for better performance of the SDP, since they had comparatively lower similarity values compared to other variables found in other clusters.

SUMMARY AND POLICY IMPLICATIONS

When an economy is poised to develop, it is desirable that development to be inclusive. The development effort should not bypass certain areas of the groups. If the growth process excludes certain regions or groups, the sustainability of development itself is threatened. Therefore, now increasing emphasis is laid on inclusiveness, so that growth can be sustainable economically, socially and politically in the long run. Balanced regional development should be the guiding principle of development planners and practitioners.

India is a large federal nation which has a unique culture and greatest civilization of the world. It is well known that there are widespread disparities in the levels of economic and of social development between the different regions of the Indian nation. There are greater regional disparities in the sectors of agricultural, economy, industry, education, social *etc.* Widespread inter-state disparities in the levels of economic and social development can have serious economic, social and even political consequences, this being particularly so if these have persisted over long periods of time.

Regional disparities, the differences between economic performance and welfare between countries or regions and it express the scope of difference of intensity manifestation of economic phenomena under investigation observed within regions of given country. Territorial disparity indicates the scope the intensity of given economic phenomena differs to between regions within given country.

Agriculture is the mainstay of economy. Agriculture and allied sector contributes nearly 13.9 per cent of Gross Domestic Product (GDP) of India. While about 52.1 per cent of population is dependent on agriculture, for their livelihood. Indian agriculture is known for its diversity which is mainly the result of variations in resource endowments, climate, topography and historical, institutional and socio economic factors. Policies followed in the country and nature of technology that became available over time have reinforced some of the variations resulting from natural factors. As a consequence, production performance of agriculture sector has followed an uneven path and large gaps have developed in productivity between different geographic locations across the country.

The regional variations have remained a subject of concern for couple of reasons. Large variation in productivity leads to regional disparities and is generally considered as discriminatory. It is against the democratic policy to leave some regions behind other in making economic progress. Identification of various levels of productivity helps to analyse the reasons for variation in performance and in developing location specific strategies for future growth and development.

Accelerated growth in agricultural production and productivity is essential for overall stability of the Indian economy. The role of agricultural development in overall economic growth, food security, generation of employment opportunities through numerous direct and indirect linkages, alleviation of rural poverty and in improving overall quality of life of the population is well accepted. For rapid, inclusive, equitable and sustainable development, it is therefore crucial not only to put the agriculture on fast growth trajectory but also to reduce the persisting widespread disparities across regions.

Karnataka is primarily an agricultural economy. Agriculture is the dominant sector in the state. The state has 60 per cent (114 lakh ha) cultivable land and 72 per cent of which is rainfed and 28 per cent is under irrigation. Karnataka is endowed with varied agro-ecological, agro-climatic, bio-diversity, socio-economic conditions across the state. Karnataka just like other Indian states having advanced agriculture with marked diversities in agro-climatic conditions, resource endowments and population density is likely to be characterised by uneven economic and agricultural development among various districts. The inter-district or regional differences in agricultural development arises out of these varied conditions tend to get further accentuated because of varying levels of investment in rural infrastructure and adoption of new technology. Greater the heterogeneity in the different parts of the State, more striking can be the deficiencies in comparison with an average level of facilities.

The High Power Committee for Removal of Regional Imbalances (HPCFRRI) headed by Late Dr. D.M. Nanjundappa emphasized the issue and constructed a Comprehensive Composite Development Index (CCDI). As per this index, taluks (blocks) in North Karnataka lagged behind those in South Karnataka. As many as 114 out of 175 taluks in Karnataka were declared backward, of which 59 were from North Karnataka. In a further sub-classification, 26 out of the 39 “Most Backward” taluks were from North Karnataka.

As per as agricultural backwardness is concerned in Karnataka, as many as 50 taluks from North Karnataka and 38 from South Karnataka were below the state average. Among them, about 21

in North Karnataka and 16 in South Karnataka were seriously backward in both infrastructure and development. A special development package on agriculture and allied activities is to be specifically addressed to these taluks. There exits disparity in irrigation, credit, marketing and other infrastructural facility between North and South Karnataka.

Differential natural resource endowments across the state have resulted in an uneven agricultural development and some regions have developed well whereas other regions seem to be underdeveloped. In fact, today this issue of inter-regional variations in development is being discussed much more seriously in Karnataka. Specific mention is being made about the north-south disparity within the state. Therefore, a detailed analysis of regional development and disparity and their causes is timely. Regional variation in land use dynamics, agricultural productivity, infrastructural facilities, credit flow to agricultural development and other socio-economic factors have definite impact on agricultural development.

Hence, an effective research every now and then in the assessment of status of disparity between the regions in the state can alone provide an answer in this regard. Keeping this in view, an attempt was made to assess the disparity particularly in terms of agricultural development between the northern and southern regions of Karnataka state with the following specific objectives.

1. To analyse the disparity in land use dynamics between north and south regions of Karnataka.
2. To compare the trends in area, production and productivity of major agricultural and horticultural crops between the two regions.
3. To assess the disparity in infrastructural facilities between the two regions.
4. To analyse the flow of funds between the two regions.
5. To compare the present position of selected taluks with bench mark survey.
6. To ascertain the opinions of farmers, officials and policy makers about regional disparity and suggest appropriate policy measures.

Special features of the study

The study determines the present agricultural development in the state of Karnataka by using the selected indicators of development. It ascertains the disparity in land use dynamics, agricultural productivity, infrastructural facilities and credit flow for agricultural development between the north and south regions of the state. The study also encompasses the opinions of the policy makers, official and farmers regarding regional disparity and development programmes implemented to develop the backward category districts in the state. The study highlights the effectiveness of implementation of Dr. Nanjundappa Committee report. Output of such comprehensive study would greatly aid in evolving appropriate policy options in order to accelerate agriculture development in different regions of the state.

Methodology

The entire state of Karnataka has considered under the study. In order to facilitate the present study, the state has divided into two regions; North Karnataka and South Karnataka based on the geographical demarcation.

The study conducted in the year 2002 by High Power Committee for Redressal of Regional Imbalance (HPCFRRI) under the chairmanship of Late Dr. D. M. Nanjundappa, will be considered as bench mark survey. The committee had considered 27 districts and 174 taluks under the study.

The study was conducted mainly on the basis of secondary data. Data on land use dynamics, data pertaining to area, production and productivity of agricultural and horticultural crops from the year 2001-02 to 2010-11, data regarding infrastructural indicators *i.e.* literacy rate, irrigation facilities, market facilities, roads, banking infrastructure, cold storage units, etc and data on flow of funds (Special Development Plan funds) for development were also collected from various government publications like, the annual publications of the Directorate of Economics and Statistics, Govt. of Karnataka, Karnataka State at a Glance, Statistical Abstract of Karnataka, *etc.*

Primary data in the form of opinions used ascertained for the study. Policy makers, officials and farmers were considered for elicitation of the opinion on regional disparity and development programmes in backward category taluks. A multi-stage sampling was adopted for the opinion survey. Totally six taluks of were selected out of which three taluks from northern region and another three

taluks from southern region. Three taluks in each region representing most backward, more backward and backward category were selected. Then five each officials and policy makers from each taluka were included in the sample for eliciting their opinion regarding disparity and implementation of the development programmes. Further, to elicit the opinion of the farmers regarding disparity and development programmes from each taluka two villages were taken to select 10 farmers from each village randomly. Thus the sample size has become 120 and combined sample size of policy makers, officials and farmers was 180.

Analytical tools employed

The statistical tools employed in the study were tabular analysis, land use dynamics, compound growth rates, multiple regression technique, discriminant analysis, Theils entropy, comprehensive composite development index and cluster analysis.

To analyse disparity in land use shift the Land use Index (Pandey and Tiwari, 1987) was used. Compound growth rate analysis was used to analyse the growth rates of area, production and productivity of agricultural and horticultural crops and multiple regression technique used to find out the determinants of area and productivity of crops in different regions. To analyse the disparity in infrastructural indicators and flow of funds between the regions the discriminant analysis and Theils entropy were used respectively. Comprehensive Composite Development Index calculated to compare the present level development of selected taluks with bench mark survey of the state. The cluster analysis variable was adopted to analyse the scores obtained from policy makers, officials and farmers on development programmes. Tabular analysis was also used in the study order to proper representation of data and comparison of disparity.

Findings of the study

1. Disparity in land use dynamics between north and south regions of Karnataka

a. Growth rate of land use categories between north and south regions of the state

Comparative study between southern and northern region for growth rate of land use revealed that marginal growth rates of area under forest and considerable growth rate of area put to non-agricultural uses were higher in southern region. Decline in the growth rates of area under permanent pastures and grazing lands and area under miscellaneous tree crops were more in southern region but declining rate of barren and uncultivable lands and area under cultivable waste were more in northern region. The decreasing rate of current fallows, increasing rate of fallows other than the current fallows and net sown area were found non-significant for both the regions.

b. Dynamics of land use in northern and southern regions of Karnataka

It has been observed that land use shift has been occurring from desirable ecology (E1), undesirable ecology (E2) and agricultural sectors to non-agricultural sector in both southern and northern regions. It was further observed that a considerable area under ecological sector was moved towards non-agricultural sector in southern region. On the contrary a large magnitude of area under agricultural sector was moved towards non-agricultural sector in northern region.

2. Disparity in growth rates of area, production and productivity of major agricultural and horticultural crops between the two regions

a. Growth rates of area, production and productivity of cereals and minor millets

In the case of cereals and minor millets, northern region of Karnataka has showed higher growth rates of production and productivity than that of southern region in the study period. However, growth rate of area was found non-significant.

b. Growth rates of area, production and productivity of total pulses

Growth rates of area, production and productivity of pulses were increased in northern region of Karnataka, while only growth rates of production and productivity increased in southern region. Comparatively higher growth rates were observed in production of pulses in northern region was mainly due significant increase in growth rates of area under pulses in the study period. Whereas, growth rates of area under pulses found declining non-significantly in southern region.

c. Growth rates of area, production and productivity of oilseeds

Growth rates of area and production of oilseeds declined over the years in both the regions, but higher decline of growth rates of production were observed in southern region than that of northern region. While, growth rates of area declined more in northern region. The growth rate of productivity was found to be increased more in northern region. However, all the results found non-significant in the study period.

d. Growth rates of area, production and productivity of horticultural crops

The results for area, production and productivity of horticultural crops in southern and northern region has revealed that the growth rate of production of horticultural crops were comparatively higher in northern region than that of southern region which was mainly attributed by higher rate of growth of productivity of horticultural crops in this region as compared to the southern region. However, increasing trend of growth rates of area under horticultural crops was higher in southern region as compared to that of northern region.

e. Determinants of area and productivity of agricultural and horticultural crops

It was found that area under irrigation, fertilizer consumption and area under the HYV were major determinants of productivity in both the regions. In southern region the regression coefficients for irrigated area was found significant and positive in the case of total pulses and area on HYV seeds also found significant but negative for total pulses. Whereas, for northern region irrigated area was found significant for pulse crops.

It was further noticed that in southern region gross cropped area exercised influence on area under cereals and minor millets as its coefficients were positive and significant for area under cereals and minor millets. Yield per hectare of horticulture crops and number of regulated markets were found to be influencing the area under horticultural crops as these variables were positive and significant. Yields of cereals and minor millets and road lengths were found negative and significance on the area of cereals and minor millets and horticultural crops respectively showing sub-optimal utilization of resources. For northern region of Karnataka gross cropped area exercised influence on area under cereals and minor millets and area under oilseeds. Area irrigated had influence on acreage of pulses as these variables were found positive and significant in this region. Finally, area irrigated and gross cropped area were found to be significant and negative for oilseeds and horticultural crops respectively.

3. Disparity in infrastructural facilities for agricultural development the regions

Huge amount of disparity in availability of infrastructure for agricultural development was observed between southern and northern regions of Karnataka. Southern region was leading with highest share in availability of these infrastructural facilities *viz*., commercials bank branches, cold storage units, electricity consumption for agricultural purpose, road length, distribution of total fertilizers, literacy rate and gross irrigated area while the availability of infrastructural facilities like RRBs, agricultural co-operative societies and regulated markets were more in northern region. Further, it was found that the disparity in terms of infrastructural availability was narrowing down over the years.

From the discriminant analysis of infrastructural indicators, it was found that mean difference for distribution of total fertilizers per hectare gross cropped area (35.21 kg/ha), road length per 100 sq. km. area (27.76 km), literacy rate (8.15%) and electricity consumption for agricultural purpose (6.31 lakh units) were showing the major differences between the regions. With respect to relative contribution of the variables for the development of northern and southern Karnataka in the study period availability of Regional Rural Banks (47.95%) followed by electricity consumption for agricultural purpose (21.35%), distribution of total fertilizers (16.92%), literacy rate (10.86%) and agricultural co-operative societies (7.66%) were the major discriminating factors of development of the entire state.

4. Disparity in flow of funds for development between the two regions

The flow of funds under Special Development Plan to agricultural and allied sector showed that northern region (68.38%) has received comparatively more share than that of southern region (31.62%). Further, division wise result revealed that Gulbarga division (47.85%) had received the highest share followed by Belgaum (20.54%), Mysore (15.96%) and Bengaluru (15.66%) divisions.

Theils entropy coefficient showed that disparity in flow of the SDP funds to agricultural and allied sector increasing over the years.

The flow of funds under Special Development Plan to all the sector showed that northern region (65.70%) had received comparatively more share than that of southern region (34.30%). Further, division wise result revealed that Gulbarga division (41.44%) had received the highest share followed by Belgaum (24.27%), Bengaluru (20.22%) and Mysore (14.07%) divisions. Theils entropy coefficient showed that disparity in flow of the SDP funds to all sectors increasing over the years.

5. Present level of development of selected taluks as compared to bench mark survey

The comparison of present development of selected taluks with bench mark survey with respect to agriculture and allied sector has showed that except Sindgi and Bijapur taluks none of the taluks have showed considerable positive shift to next developed category in agriculture and allied sector. Most of the taluks have showed stagnation in growth in the study period.

As per as development of all sector was concerned, except Kalghatagi most of the selected taluks showed positive shift to next developed category, whereas, development was hindered in Kalghatagi. Navalgunda, Bijapur and K.R. Nagar taluks have been moved out of backward category. Stagnation in development was observed in the taluks *viz*., Kundagol, H.D. Kote, T. Narasipur and Periyapatna.

6. Opinion survey of the policy makers, officials and farmers about working of Special Development plan

Opinion survey of the policy makers, officials and farmers revealed that in case of infrastructure for agriculture, area coverage of developmental programmes, horticultural programmes implemented by SDP, top to bottom approach and target oriented programmes, utilization of local resources in development programme were poor in the backward category taluks of the state.

Policy implications

1. The results of inter-sectoral budgeting indicated that, in general land use shifts are occurring from both the desirable ecology (E1), undesirable ecology sector (E2) and agricultural sector (A) to non-agricultural sectors. The shift from desirable ecological sector to non-agricultural sector in southern region and agricultural sector to non-agricultural sector is a matter of serious concern and considered as unfavourable dynamics which need to be controlled. This could be achieved by using land for non-agricultural uses vertically than through horizontal expansion to cope up with the increasing demand of urbanization and industrialization.
2. Northern region of Karnataka showed a lot of potential in the growth rates of production and productivity of the cereals and minor millets, pulses and horticultural crops. Hence, efforts are to be made to maintain the growth rate in the region by effective utilization of the available input and facilities under the guidance extension services of development departments. Better marketing opportunities has to be created to encourage farmers
3. The main determinants of agricultural performance were found to be increased use of irrigation water, total cropped area, fertilizers, HYV seeds and yield per hectare, closely followed by regulated markets and road network. Relatively less prosperous northern region showed good potential of improving its agricultural performance by increasing growth rates of area, production and productivity of agricultural and horticultural crops. Thus, there exists a good scope to exploit these unexploited regions of the state to increase the agricultural performance in the future.
4. Disparity in infrastructural facilities showed that northern region lagging behind in infrastructural facilities for agricultural development as compared to southern region. So, there is a necessity to increase the agricultural infrastructures like fertilizer outlets, road network, educational infrastructures, regional rural banks, agricultural co-operative societies and electricity for agricultural purpose in this region to increase the performance of agriculture.
5. The disparity in flow of funds for development showed that northern region has got relatively higher percentage. But, the inequality over the years to the flow of funds increased. Hence, the policies may be formed in such a way that the flow of funds to the taluks would be on the

basis of backwardness. In order to do this, calculation of CCDI and cumulative Deprivation Index of the taluks on regular basis is necessary.

6. The Comprehensive Composite Development Index of agricultural and allied sector of selected taluks showed that the sector has not showed impressive development as compared to all sectors. In order to increase the development of agricultural and allied sector, more funds though Special Development Plan may be allocated to the sector in order to increase the infrastructure facilities in agriculture and allied sector.
7. The programmes planned may be on the basis of local requirement and utilization of local resources to increase the agricultural development as there are ample scope for development.

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Appendix I: INTERVIEW SCHEDULE

Research Topic: Regional disparity in agricultural development of Karnataka

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Part-A

Date:

Schedule No:

Schedule for policy makers

Name :

Designation :

Taluka :

District :

I. Components of variables influencing the agricultural development by SDP

Sl. No.	Variables	Opinions		
I	**Awareness**			
1	Awareness of farmers about SDP	Fully Aware	Partial Aware	Not at all
2	Awareness of officials about SDP	Fully Aware	Partial Aware	Not at all
3	Farmers' participation in developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
II	**Implementation**			
1	Implementation of programmes	Timely	Irregular	Not at all
2	Programmes implemented for agricultural development under SDP	Excellent	Satisfactory	Poor
3	Horticultural development programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Implementation of the Special Development programme (Planning and execution)	Excellent	Irregular	Not at all
5	Co-ordination of activities	Excellent	Satisfactory	poor

Sl. No.	Variables	Opinions		
6	Supervision and evaluation of SDP	Excellent	Satisfactory	poor
7	Programmes are planned based on top to bottom approach and are target oriented	Absent	Moderately present	Commonly present
8	Political interference	Absent	Moderately present	Commonly present
9	Improper utilization of budget.	Absent	Moderately present	Commonly present
III	**Procedural problems**			
1	Plans prepared by the officials at taluka level to development of backward region fit to requirement	Excellent	Satisfactory	poor
2	Communication and coordination among different departments in Implementation of SDP	Very well	Some what	Not at all
3	Government officials role in Implementation of SDP	Excellent	Good	Satisfactory
IV	**Funds allocated and release**			
1	Extent of fund allotted for agricultural development under SDP	Adequate	Inadequate	Poor
2	Availability of funds Under SDP	Timely	Irregular	Not at all
3	Funds Management by officials	Excellent	Satisfactory	poor
4	Timely release of funds	Excellent	Satisfactory	poor
V	**End benefits of SDP**			
1	Agricultural development programmes implemented by SDP in the taluk	Excellent	Satisfactory	Poor
2	Area and coverage of the SDP implemented	Excellent	Satisfactory	Poor
3	Number of developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Impact on agricultural productivity	Excellent	Satisfactory	Poor
5	Growth of basic infrastructure in the taluk	Excellent	Satisfactory	Poor
6	Growth in infrastructural facility for agriculture in the taluk	Excellent	Satisfactory	Poor
7	Effective utilization of funds for agricultural development	Excellent	Satisfactory	Poor
8	Utilization of local resource for development	Very well	Some what	Not at all

II. Problems perceived by the policy makers in Special Development Plan

1.
2.
3.

III. Suggestions for the effective execution of the programme

1.
2.
3.

Part-B

Schedule for officials

Name of the official :

Designation :

Number of years of service :

Taluka :

District :

I. Components of variables influencing the agricultural development

Sl. No.	Variables	Opinions		
I	**Awareness**			
1	Awareness of farmers about SDP	Fully Aware	Partial Aware	Not at all
2	Awareness of non-officials about SDP	Fully Aware	Partial Aware	Not at all
3	Farmers' participation in developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Interaction of farmers with the officials about SDP	Very well	Some what	Not at all
5	Interaction of non-officials with the officials about SDP			
II	**Implementation**			
1	Implementation of programmes	Timely	Irregular	Not at all
2	Programmes implemented for agricultural development under SDP	Excellent	Satisfactory	Poor
3	Horticultural development programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Implementation of the Special Development programme (Planning and execution)	Excellent	Irregular	Not at all
5	Co-ordination of activities	Excellent	Satisfactory	poor
6	Supervision and evaluation of SDP	Excellent	Good	Satisfactory
7	Programmes are planned based on top to bottom approach and are target oriented	Absent	Moderately present	Commonly present
8	Political interference	Absent	Moderately present	Commonly present
9	Proper utilization of budget.	Absent	Moderately present	Commonly present
III	**Procedural problems**			
1	Plans prepared by the officials at taluka level to development of backward region fit to requirement	Excellent	Satisfactory	poor
2	Communication and coordination among different departments in Implementation of SDP	Very well	Some what	Not at all
3	Government officials role in Implementation of SDP	Excellent	Good	Satisfactory

Sl. No.	Variables	Opinions		
IV	**Funds allocated and release**			
1	Extent of fund allotted for agricultural development under SDP	Adequate	Inadequate	Poor
2	Availability of funds Under SDP	Timely	Irregular	Not at all
3	Management of funds by officials	Excellent	Satisfactory	poor
4	Timely release of funds	Excellent	Satisfactory	poor
V	**End benefits of SDP**			
1	Agricultural development programmes implemented by SDP in the taluk	Excellent	Satisfactory	Poor
2	Area and coverage of the SDP implemented	Excellent	Satisfactory	Poor
3	Number of developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Impact on agricultural productivity	Excellent	Satisfactory	Poor
5	Growth of basic infrastructure in the taluk	Excellent	Satisfactory	Poor
6	Growth in infrastructural facility for agriculture in the taluk	Excellent	Satisfactory	Poor
7	Effective utilization of funds for agricultural development	Excellent	Satisfactory	Poor
8	Utilization of local resource for development	Very well	Some what	Not at all

II. Problems perceived by the officials in Special Development Plan

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3.

III. Suggestions for the effective execution of the programme

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3.

Part-C

Schedule for farmers

I. General Information

1. Name of the farmer :
2. Village :
3. Taluka :
4. District :

II. Specific information

1. Age :
2. Education :
3. Size of the family :
4. Type of family : nuclear/joint
5. Size of land holding :
6. Income of the family :
7. Social participation **:** Member of Panchayath /Co-operative society / Youth club / SHGs / Any other (specify)

III. Components of variables influencing the agricultural development

Sl. No.	Variables	Opinions		
I	**Awareness**			
1	Awareness about SDP	Fully Aware	Partial Aware	Not at all
2	Participation in developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
3	Interaction of farmers with the officials about SDP	Very well	Some what	Not at all
4	Interaction of farmers with the non-officials about SDP	Very well	Some what	Not at all
II	**Implementation**			
1	Implementation of programmes	Timely	Irregular	Not at all
2	Programmes implemented for agricultural development under SDP	Excellent	Satisfactory	Poor
3	Horticultural development programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Implementation of the Special Development programme (Planning and execution)	Excellent	Irregular	Not at all
5	Supervision and evaluation of SDP	Excellent	Good	Satisfactory
6	Transparency in SDP implemented	Very well	Some what	Not at all
III	**Procedural problems**			
1	Plans prepared by the officials at taluka level to development of backward region fit to requirement	Excellent	Satisfactory	poor

2	Government officials role in Implementation of SDP	Excellent	Good	Satisfactory
3	Lack of expected awareness and monitoring of officials	Present	Moderately present	Commonly absent
IV	**End benefits of SDP**			
1	Agricultural development programmes implemented by SDP in the taluk	Excellent	Satisfactory	Poor
2	Area and coverage of the SDP implemented	Excellent	Satisfactory	Poor
3	Number of developmental programmes implemented by SDP	Excellent	Satisfactory	Poor
4	Impact on agricultural productivity	Excellent	Satisfactory	Poor
5	Growth of basic infrastructure in the taluk	Excellent	Satisfactory	Poor
6	Growth in infrastructural facility for agriculture in the taluk	Excellent	Satisfactory	Poor
7	Facilities available under SDP	Excellent	Satisfactory	Poor
8	Utilization of local resource for in development	Very well	Some what	Not at all

IV. Problems faced in Special Development Plan programme by farmers

1.
2.
3.

V. Suggestions for improvement of SDP

1.
2.
3.

REGIONAL DISPARITY IN AGRICULTURAL DEVELOPMENT OF KARNATAKA - AN ECONOMIC ANALYSIS

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ABSTRACT

Regional disparities in agricultural development arise largely due to diverse agro-ecological factors as well as disparate access to technological and infrastructural facilities among various regions. The present study was conducted to compare the regional disparity in agricultural development between south and north regions of Karnataka for the period 2001-02 to 2010-11.

The results revealed that the regions were highly despaired with respect to agricultural development. Disparity in land use dynamics showed that the significant land from desirable ecological sector has shifted to non-agricultural sector in southern region; while, major land shift in northern region was observed from agricultural sector to non-agricultural sector and both were serious matter of concern. Northern region has performed comparatively better in growth rate of production and productivity of cereals and minor millets, horticultural crops, and area and production of pulses. While, southern region performed better in growth rates of area under cereals and minor millets and horticultural crops, and productivity of pulses. However, growth trends of oilseeds were poor in both the regions. Huge disparity in availability of infrastructural facilities for agricultural development was observed in the study period, but, the gap was declined due to infrastructure development, particularly in north region. There was a disparity in allotment of SDP funds between the regions; where north received 68.38 percent of total funds allotted to agriculture and allied sector. Further, Theils entropy analysis also confirmed the disparity in flow of funds between the regions. Comparison of present level of development of selected taluks with HPCFRRI Committee report has revealed that some of the taluks have shown development and some remained in backward category. Agricultural development of agricultural sector was not as good as all sector combined together. Opinion about performance of SDP revealed that the programme performed well but, infrastructure for agriculture, area coverage of programmes, horticultural programmes implemented and utilization of local resources in development were poor.