DROUGHT PRONE REGIONS AND SURVIVAL STRATEGIES
A STUDY OF SEMI-ARID ANDHRA PRADESH

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Certificate

I hereby declare that this thesis titled *"DROUGHT PRONE REGIONS AND SURVIVAL STRATEGIES : A STUDY OF SEMI-AIUD ANDHRA PRADESH"* for the award of the Degree of *Doctor of Philosophy* entirely my own and has not been submitted for any other degree at this or any other University.

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CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION

Drought is a climatic inconsistency characterised by deficient supply of moisture. Such a deficiency may be due to the inadequate and erratic distributions of rainfall. Drought has different connotations in different situations: absence of soil moisture to a farmer, absence of rains for a meteorologist, and decrease or absence of water in storage reservoirs and irrigation canals for an irrigation engineer (Maunder 1979 : 338).

The most common feature of drought is a continuously imbalanced distribution in the incoming water and water loss. The active working of precipitation, high evaporative transpiration, weathering away of soil moisture due to downward sinking of ground-water table, increased warming up of weather due to wind sweeping, and scorching heat, spell a drought situation. Irrespective of the definitional aspects (meteorological, hydrological or agronomical), drought in India affects almost 79% of the geographical area, causing different degrees of water stress and drought conditions. According to some estimates, it has been stated that out of about 260 million ha. of drought prone area, about 76 million ha. are subjected to mild, 117 million ha. to severe and 20 million ha. to disastrous drought conditions (Maunder 1979 : 338).

The concern of this study is more with agricultural drought than meteorological or hydrological drought. Agriculturally, drought is actually a period of scarcity of water which results in less production of crops. In socioeconomic sense, it is a period of intense economic problems, resulting from loss of agricultural production and shortage of water and pastures for animals, and decline in food cropped area. Drought is a serious problem for the government as well as rural people. It is a period of serious economic disaster resulting in acute shortage of water, lack of fodder for livestock, decline in area under different crops, and unemployment. In other words, it may also be defined as a period in which all the agricultural activities of farmers get disturbed though insufficient

and inconsistent rainfall is a primary cause, drought is also caused by disturbances in the ecosystem of a region. All the ingredients of nature like water, soil, vegetation and land along with the man play a very important role in maintaining the ecological balance of an area. Deforestation, over grazing, inappropriate landuse and abuse of water resources cause deterioration of the surrounding environment, resulting in depletion and degradation of fertility of soil and its erosion.

Drought essentially results from long-continuous dry weather and lack or insufficiency of rain which causes exhaustion of soil moisture, depletion of underground water supplies and reduction and eventual cessation of stream flow (Encyclopedia Britannica). Drought may be accurately described as a condition in which the amount of water available falls short of the quantity of normal requirement of water due primarily to failure or uneven dispersal of rainfall.

Because of the primary place given to rainfall in understanding drought, attempts at quantification of it are to a large extent based on quantity and variations in rainfall. The Meteorological Department has defined drought as a situation occurring in areas with less than 750 mm of rainfall when the annual rainfall is less than 75% of the normal. It has defined as moderate drought when the rainfall deficit is between 25 to 50 percent, and as severe drought when the deficiency is above 50 per cent. Areas where drought has occurred, as defined above in 20 per cent of the years examined, are considered drought prone areas and where it has occurred in more than 40 per cent of years, as chronic drought areas (Irrigation Commission 1972 : 160). According to the Second Irrigation Commission, (Irrigation Commission 1972 : 161), drought is the result of an imbalance between the soil moisture and evapo-transpiration needs of an area over a fairly long period, so as to cause damage to standing crops and a reduction in crop yield. The basic characteristic of drought is a steady rise in temperature in addition to the absence, or severe deficiency of rainfall over a fairly long period. Several factors such as precipitation, temperature, wind velocity, sunshine, soil texture, soil moisture and antecedent rainfall interact to produce this situation.

The problem of drought has several socioeconomic dimensions (Venkat Reddy 1978 : 302). There have been glaring disparities in income and living standards between dry and drought areas on the one hand and the irrigated and assured rainfall areas on the other. These differences are further widening since the Green Revolution, which is confined to the irrigated areas only. Such differences, if allowed to continue, would in the long run lead to marked inequalities in income between social groups and also regional imbalance as can be noticed in Andhra Pradesh. Therefore there is a need to take into account the socioeconomic factors to study the strategies for development. Droughts have been, more or less, a permanent feature of the Indian agrarian scene.

1.2 CONSEQUENCES OF DROUGHT : AN OVERVIEW

The difficulties of conceptualization notwithstanding, visitations of drought culminate in several socioeconomic aberrations. Some of such socioeconomic aberrations include distress sale of cattle, measures for storing food, collection of abnormal famine foods from forests, migration of able bodied persons, sale of valuables, and outstanding loans for food which result in the collapse of purchasing power. The drought in it's wake also generates social disorders like dispersal of dependent (elderly and children) members of the family to better off relatives (Venkateshwarlu 1987 : 287).

CONSEQUENCES OF DROUGHT

Recent research has accumulated comprehensive information on drought related impacts on economic, environmental and social sectors (Wilhite and Easterling 1987 : 208). Thus reduction in employment due to production losses, increased cost of water management, damage to livestock, lack of feed and drinking water, increase in pollution such as water contamination and deterioration in landscape quality may become most serious and hazardous outcomes in drought affected environments. The debilitating social impacts, may include early retirement, inter personal tensions caused by production uncertainty, decline in recreation, decline in health, personal hygiene and water recycling. Drought accentuates the incidences of stomach, eye and lung ailments and water borne diseases such as fluorosis. It is however, not necessary that there is a continuous or consecutive occurrence of all the socioeconomic ill effects.

The principal agro-economic indicators in an acute drought condition (Kalla 1988 : 3) may include deteriorating farm wage structure, increase in the number of child labour, continuous increase in the share of income from non-farm employment and a reduction in consumption. Continuous persistence of droughts may also result in social indicators including deserted villages, disruption of social institutions such as employment and labour markets, and relationships among societal groups, disorganization of social structures, disturbances in agrarian structure and changes in modes of subsistence, production and living.

Droughts are by no means confined to the Indian subcontinent but also are experienced in a wide ranging locations across Latin America, Belize, Brazil, the United States, the sub-Saharan Africa and several other countries. Droughts in the United States resulted a loss in crop production, and problems to industries (Hall 1983 : 155). Some of the educational institutions were closed due to shortage of water supplies. In the Northeast Brazil drought resulted in price rise due to hoarding, fall in crop production and problems to livestock and their production. In the Republic of Sudan (Trilsbach 1989 : 129) drought resulted in indirect effects on social groups. Drought necessitated rural farmers and refugees to move to the urban areas and to work on Irrigation schemes. The government operated irrigation schemes, which had their roots in the earlier colonial policies, helped certain sections of the people thus creating problems to some others.

In Uganda, the British colonial policies and later those of the Ugandan government disrupted the delicate balance between the pastoralists (Karamajong) and their land. The policies needed imposition of taxes on pastoralists, which made them sell livestock for payment of such taxes. Such action resulted in over-grazing and famine. The land use problems emanated due to occupying of some of the lands by the Ugandan government which deprived the local pastoralists of their areas in which they were grazing their cattle. Conflicts with the neighboring farmers for water and land use also resulted. In Turkana (South Africa) drought caused difficulties to pastoralists. The construction of an international highway across their lands, and changes brought by the relief works and development projects resulted in uncertain future.

In Africa drought caused water shortages due to scanty rainfall, depletion of groundwater resources, reservoirs and artesian wells. Absence of tree vegetation accelerates run-off and reduces the proportion that eventually percolates to the underground water reserves. Given the increasing demand for water by men and animals, prolonged drought may reduce water supplies which may preclude them. In Sahelian countries (Niger, Chad, Mali) drought resulted in massive deaths of livestock. Food, fodder and water sources were affected. The other effects were; Inter-household inequality in Nigeria; peasant differentiation in Haiti; disruption of employment market in the Republic of Sudan (for example, on the Rahad Irrigation scheme where surplus labour from the International refugees was paid meager wages, and which also resulted in unemployment to some of the internal labour groups); migration of the affected families, dependence on friends, relatives apart from charities for material help and relief.

The malnourishment of children, women and men in Somalia drew the international attention to carry on relief operations on humanitarian grounds, not considering the problem of drought as the legacies of the Third World countries but as a problem of responsibility for the developing and developed countries as a whole.

The implication of policies in drought affected countries which tried to induce development in the name of relief; the existing competition between human and livestock for the fast depleting land, water, fodder and grazing forests the drought related casualties of men and livestock; the conditions of poverty, poor nutrition, disease and underdevelopment; disorganisation of social units, migration, unemployment; and landuse problems to pastoralists, and grazing problems to shepherds, provide a framework for an appraisal of the drought survival strategies.

1.3. IMPACT ON PRODUCTION

To understand the impact of drought on crop production we can make a brief review of the experiences in the countries of Latin America, the United States and sub-Sahara Africa.

During the past 100 years, four periods of severe droughts have affected the US Great Plains: in the 1890's, 1910's, 1930's and 1950's or roughly every 20 years. Each successive drought brought a marked decline in crop production. The US plains experienced an average of 20-25 percent reduction in wheat yields in relation to preceding wet years during the 1930's (Warrick 1983: 68).

The drought of 1975 in Belize (Central America) (Hall 1983 : 156) affected virtually all facets of peasant and commercial agricultural production. Grain production is estimated to have declined by 50 percent; that is from a forecast production of 25 million kg to a production of around 1.25 million kg. Rice production was reduced directly by the drought but was also affected indirectly by a build-up of armyworm populations which damaged the rice crop. Paddy production was as low as 1.25 million kg, compared with 3.0 million kg in 1974. There was a shortfall of around 2.5 to 2.7 million kg of finished rice. Commercial crops were also affected. Sugarcane losses equalled half of the normal production and the more recently planted sugarcane fields were stunted because of water stress. The 1976 crop production was also down because of the water stress problems of 1975. In the citrus industry the orange crop, which experienced a 25 percent decrease bore the brunt of the effects of drought.

The production of selected crops (Coppans 1983 : 87) for Sahelian countries during the 1971-74 drought show declining trends as major crops such as millet sorghum, groundnuts and cotton showed low production. In Chad the millet production was 639 million tones in 71-72 and it was 430 million tones in 1973-74. In Mali, production for millet sorghum was 715 million tones in 1971-72 and it declined to 530 million tones in 1973-74. Cotton production was 74 million tones in 1971-72 and it declined to 58 million tones during 1973-74. In the famine affected area in Ethiopia, 85 percent of the cultivated land was devoted to food production including food crops and pulses. Sixty eight percent of the peasants faced food deficits and many areas were deficient in wheat, barley, sorghum, maize, and pulses.

1.4. IMPACT ON LIVESTOCK

Pastoral nomads across Africa and other regions are facing challenges to their way of life which has rested on a non-monetized, precapitalist mode of subsistence production (Mc cann 1987 : 258). For example, people of Turkana, confronted by the construction of an international highway across their lands and by the changes which famine relief and development projects are bringing, face an uncertain future. Relationship between farmers and herders were strained (Horowitz 1972-1973, 1975 : 58) as the desiccation of the northern pastures forced a southward retreat of herds before the harvest was complete, with resultant conflicts between the two groups. For maintaining healthy, well nourished oxen, households must have access to pastures and supplementary feed (usually stubble from the past season's harvest). In much of drought prone northeast Ethiopia the first effect of drought is the reduction of available forage. For Lasta and many other areas with high population pressure, pasturage is apportioned by households in the same manner as in arable land. Drought conditions result in several restrictions on production. First, oxen are weakened and tire easily; second, weak animals succumb to parasites and diseases; and finally household labour is required to handfeed animals by **lopping** browse with leaves. Households with cash resources can usually purchase straw or hay from less affected areas or support a herder to feed their animals, but others face pressure to sell or go into debt to obtain food. Many households are unable to support their animals and fall into capital dependency, which means that they have to borrow or rent oxen.

It is during drought years that herders most severely feel the loss of strategic water points and reserve dry-season grazing areas. Pastoral groups like Maasi of Kenya and Tanzania have to concentrate on already depleted low land-range areas. Under these conditions livestock losses are numerous, with upto 50 percent of cattle dying during recent droughts in certain districts in Kenya.

Perhaps the most long term serious effect of drought on the economy of communal lands was the decimation of livestock herds. While it is safe to say that no person in Zimbabwe died as a direct result of starvation, cattle deaths between 1978 and

1983 were estimated at 36 percent of the communal **land herd.** Cattle died at dried up dams and water holes when they got stuck in the mud and were too weak to struggle out. In many areas farmers refused to dip their cattle for fear that, in their weakened conditions, they may get drowned in the dip (Brotton 1987 : 225).

The 1974-76 drought caused millions of Dollars (Belize) in livestock losses during the dry period. Of the commercial livestock, cattle were the hardest hit by the drought as it was estimated that 200 head of cattle died due to lack of adequate feed and water supplies. Further an estimated total of 525 head of cattle were lost, mainly in the Western (Cayo) district. The greatest loss in cattle was that of body weight-gain. A survey of cattle population of 45,000 showed an average weight loss and caused a loss of around $ 3 million to the industry (Hall 1983 : 156).

During the 1983 drought in northeast Brazil, there was a decline in the number of cattle from 22.1 million in 1982 to 20.6 million in 1983. Aggregate data for the northeast have hidden the greater impact on cattle raising in the semi-arid part. Personal interviews with farmers in the state of Ceara indicate a decrease, as much as 80 percent in livestock between 1982 and 1983 (Parry et al 1988 : 288).

Mass deaths of livestock are recorded in Sahalian countries (Niger, Chad, and Mali) in recent as well as previous droughts. Estimates of livestock losses in 1972-73 ranged from 20 percent to 50 percent, the vast majority containing cattle. Total loss of livestock occurred to cattle, sheep and goats. In the hardest hit areas, the loss was put between 1.5 million and 1.8 million representing about 20 percent of the total livestock.

Drought can wipe out the capital and hit the basis of the social organization of the herders. The 1968-73 drought forced many pastoralists to poverty, to give up herding permanently, and to settle in towns. During 1968-73, Sahalian drought killed hundreds of thousands of grazing animals. Most of the Sub-Saharan areas were affected by drought and grain production fell from over 150 kg per person in 1970 to below 100 kg in 1984.

Livestock, the traditional source of cash in drier zones, suffers drastically in a drought area. In Kenya, in 1984 livestock losses were estimated to be between 50 percent and 60 percent. During a drought year, in the absence of food crops, farmers are inclined to sell livestock or exchange their livestock with foodgrains or cash. It is for this reason why the prices of livestock were often lower in the local markets. Herd owners who dispose of their livestock during a drought, may not be left with cash reserves for purchasing livestock as successive droughts cripple the livestock owner who is often unable to rebuild his herds. Drought impact of abnormal mortality was higher during 1973-74, as rangeland and crop residues became scarce. Cattle mortality, sales and unrecorded emergency slaughter were the available indicators of the drought effects. Sheep and goats were lost in large numbers (Parry et al 1988 : 243).

Dry (seasonal) grass and fodder which is free for collection become commercialised as the paucity of pasture and grazing area decreased over a period of time. An overall shortage of feed, migration of people as well as cattle, and the farmers own needs for income following poor harvests create volatile market in fodder. If there is insufficient fodder or off-farm grazing is unavailable, livestock will have to be sold. Livestock mortality will be high unless extensive off-farm resources are available.

Economic impact of drought on cattle owners, as for example in Sahel, has been visualised where cattle herds movement reduced current income flow as milk yields fell and surviving ones were sold out at very low prices in exchange for millet. Loss of livestock involved considerable reduction in assets (capital stock) and income generating capacity. Drought induced other long term effects such as generalised feeding deficiency, increased fracture, reduction in fertility and low survival rates.

Marketing is another area where previous policies have been detrimental to herders and where donors and states can play a constructive role in the future. Most herder groups are in an especially vulnerable position in the market place. Their isolation from urban centres and market infrastructure often means that they pay premium prices for imports (e.g grain) and receive low prices for cattle and livestock product exports (Horowitz 1987: 75).

1.5. IMPACT ON EMPLOYMENT, HEALTH AND LIVELIHOOD

Information collected from 229 households in the agroclimatic zones of a drought-prone area in Kenya indicate that few of the households have permanently employed members of the nuclear family. The permanent employment is the only cash income that is fairly insensitive to drought, at least in the short term. Long drought, over more than one season, may force problems to some of the agro industries to their closure as several firms making grain products (bakeries, millers etc.) were closed temporarily during the 1984 drought (Parry et al 1988 : 243).

There is a large number of rural households do not have permanently employed members and rely on casual labour for their major cash needs. These households arc more vulnerable to drought, as the availability of casual work, particularly agricultural, may change during a drought. These are to be engaged in emergency work programmes for their food and maintenance which are difficult to organise.

Field research conducted in the northeast Brazil during the droughts of 1979-80 (Parry et al 1988 : 291) showed that 24.2 percent of workers affected by the droughts wanted to move for employment. Drought leaves severe impact on wage earners, lease farmers, dwellers and renters. The wage earner finds it difficult to be hired by the farmers for the execution of works, as these are scarce during drought period. Drought is a problem of subsistence to marginal farmers, agricultural labourers, and non agricultural labourers. In fact for wage earners, partners (non-owners), dwellers and renters, a drought can preclude the possibility of working on the owner's land partly because subsistence agriculture becomes too risky and expensive and also because the owner wants his resources to be devoted to allied activities. In 1980, in Brazil the number of unemployed increased. Tenant farmers faced problems of accessibility, small landowners incurred loss of production and income. Income from cash crops and off-farm employment sources of income may be vulnerable to drought as well. It is the household to bear the consequences of drought.

During the 1972 Sahelian drought, the estimated number of drought-related human deaths was close to 1,00,000 persons. It also caused great damage in terms of more permanent social and economic disorganisation and migration to towns or other regions, an increased dependency on foreign aid and food relief. At the peak of the crisis, in April-June, 1974, there were some 2,00,000 people entirely dependent on food distribution in Niger (5 percent of total population). In Mauritania, 2,50,000 (20 percent of total population) moved temporarily and under dismal conditions into towns, completely destitutes. In Mali, another 2,50,000 (5 percent of total population) may have been forced into total dependency on towns (Coppons 1983 : 85).

In Niger, a case study in a Hausa village showed the farmers responded to famine by selling labour for cash, since a return to subsistence farming is not feasible, and that they resorted to increased seasonal migration (ICRISAT 1972 : 90).

Another consequence of drought is disruption of the employment market. Many of the large scale agricultural schemes both irrigated and rainfed have relied on seasonal labourers for agricultural operations. The severity of drought and subsequent famine forced many rural people to seek alternative paid employment. The labour stream on the market disrupted the traditional system by making work opportunities more difficult to obtain by depreciating prices. Similarly employment market was disrupted on the Rahad Irrigation Scheme in the east central Sudan. For at least four years before 1984, hired labour was paid a meager wage of 75 paistras for picking up a guffah of cotton. This was supplemented with a large supply of dura, the staple food, and reasonable accommodation. Labour surplus from internal refugees (mainly from Tendelti and Unm Ruwaba of west-central Sudan) made the employers to reduce wages. The consequence was that those labourers employed in internal labour groups either faced unemployment or found their incomes reduced below the normal expenditure (Trilsbach 1989 : 129). During drought periods there are many waves of migration toward towns in the interior of capital cities of the region and to other regions of Brazil. People start migrating during drought years when it becomes evident that there will be no rain and return when the drought is over, but the perception of the

end of drought is also determined by "normal" weather and farmers expectation of it (Parry et al 1988 : 271). Just as the effects of crisis are not distributed equally among households in Ethiopia, effects differ within the households based on such factors as age, social status and gender. Information on intra-household relations is essential to design rehabilitation projects as well as short term relief efforts to distribute aid at the household level.

Retroactive indebtedness and loss of productivity stimulate short-term as well as permanent migration as proved by the exodus of thousands of high-land population in Ethiopia annually to seek wage labour. More vital for the longterm stability of the rural economy of the drought-prone areas is the impact on those who stay behind. With sufficient rains the normative cycle of growth would allow dependent households gradually to reacquire livestock and retrieve the food supplies and seed programmes. Drought restricts supplies of capital which in turn lends increased manipulative powers to households which control the scarce remainder (Mc Cann 1987 : 245).

Another impact of drought on Sudanese society is the migration of the affected families to the areas where their relatives live. It is common that many families would resort to relatives or friends for financial and material support during the crisis which in turn may give rise to family onuses as shown by the Sudanese households. Inspite of assistances from the international charities, the vast majority of the migrants expect to receive a basic living at the expense of their relatives. This would result in onerous burdens on the host families though they are traditionally inclined to assist their guests. Livelihood would become difficult as food prices soar high.

In Sudan, female dominated refugees become a cheap labour source of urban labour. Most of them worked as house-maids in urban areas for which they were paid low wages, enough to buy some bread and onions, and often they have to feed as many as five children and one or two elderly people. Many find it difficult to improve incomes by extending their working hours, as many would undergo wage cut, since they work on semi-skilled works. This would naturally result in a dearth in money supply and a general slump in commerce and trade (Trilsbach 1989 : 129).

To withstand drought at farm level farmers adopt strategies such as (1) reduction in consumption, (2) postpone social arrangements such as marriages, (3) exodus to better areas with livestock or sell stock, (4) take consumption loans, (5) sell assets like gold, ornaments, as a last resort, and (6) some develop their indigenous systems of foodgrains and fodder storage to tide them over during scanty rainfall years. Farmers also to adopt risk through diversifications of crops and cropping systems (Venkateswarlu 1987 : 285).

The seasonal strategies to cope with drought in a village in Orissa arc either adoption or diversification of primary, secondary and tertiary occupations of all working household members such as collection of common property resources, employment seeking, consumption modification, borrowing or lending, asset creation or sale, migration which are common strategies for coping with seasonality. Cultivators intensify plantation of winter crops and invest in new groundwatcr sources. Shepherds undertake relative feeding and grazing between dry versus lactating animals and migrate elsewhere. Weavers undertake alternative production of rope making. Service castes either participate in relief work or migrate. People in general modify or undergo retrenchment in their cropping patterns, participate in relief works, and borrow. The shepherds either migrate or mortgage their assets (Martha 1991 : 106). Most of the farmers prefer during drought to work under relief operations as they arc indebted to banks and have an inclination to undertake dairy and poultry as a subsidary occupation. Many families migrate to canal irrigated zones. Farmers migrate when there is a complete crop failure and lack of pasture and livestock.

It is a general notion that during drought, scarcity of food supplies causes prices to rise considerably. In the case of colonial West Indies, in the pre-emancipation period, periodic slumps in sugar prices and food production levels were reported in Barbados (Watts 1987 : 49). During the 1983 drought (Wellow Province) there was a slump in crop production and an upsurge in prices of foodgrains (Aduga 1984 : 114).

Another consequence of famine is variation in prices of foodgrains. As was seen during 1984, in most of the areas (eg. Republic of Sudan) grain prices at least trebled, and even further exceeded in some places. This was in spite of plenty of food stocks available in towns. It's price precluded often any opportunity for abject families to purchase and such people had to rely on famine assistance from charitable organisations. The dilemma for many rural people was that while basic food stuffs were increasing in value, salable assets, specifically livestock, were diminishing. These fluctuating prices had many implications for many rural traders in general, because the need for food and basic survival items cut short the amount of money in the trading system and the sale of non-essential items (Trilsbach 1987 : 129).

The farmers were inclined to sell the produce and not to wait for the best moment due to level of capital and storage capacity. After a spate of post-harvest selling, prices begin to rise sharply especially in drought years. During the 1979 drought in (northeastern Brazil) prices of beans and rice, in the state of Ceara, rose to 100 percent above the rate of inflation. Prices of this scale arc typical responses to local rural markets, but are often not reflected in consumer prices in the large cities, largely because of storage by middlemen.

The intensity and frequency of the crisis can best be understood by reviewing the price movements of rice, staple diet of most Kampucheans. Towards the end of June 1972, rice prices began to rise sharply, continuing upwards to such an extent that they quickly exceeded the capacity of all but the wealthy to purchase it. Fear, speculation, anarchy and corruption played their part in maintaining price level that placed the staple beyond the reach of those who needed it most (Ea Merg Try 1984 : 32).

The most immediate countywide effect of the 1982-84 drought in Zimbabwe was the desication of domestic water supplies. It was not uncommon for village women to walk up to 15 km each way (20 km in Filabusi) to seek alternative source. In Schi, women and livestock had to stand all day waiting for over burdened wells to recharge with water. There were reports from Zabagwati of women exchanging blows and

scratches for filling too many containers. Even in the wetter areas, domestic water supplies ran dangerously low in places of population concentration. Water rationing was introduced in urban country and rural schools were forced to shut down during dry season (Brotton 1987 : 225).

Drought is normally characterised by water shortages. There is scanty rainfall and hence minimal recharge of the groundwater reservoirs and artesian wells. Absence of tree vegetation accelerates surface run off. Given the increasing demand for water by men and animals, prolonged droughts severely deplete water resources and may reduce supplies to dangerously low levels in many parts of Africa. Most major metropolitan areas of the United States depend upon surface water sources like lakes, reservoirs, and rivers for their water supply and persistent droughts have seriously threatened the adequacy and quality of these supplies. Persistent drought in 1980 continued through 1988. All outdoor use was disallowed and water use by industry was curtailed, yet no marked economic losses occurred. The impact of the 1988 drought on water resources depended upon several factors, most notably, pre existing conditions. There is a general agreement that in the period 1845-48, approximately 1.00-1.25 million people died from starvation and from associated diseases such as pestilence, dysentery, relapsing fever and cholera in Ireland. In the 18th and 19th centuries, starvation, disease and death had become normal features of the Irish society. An estimated 2,50,000 died from pestilence, 99,000 from dysentery, 30,156 from cholera and 87,000 emigrated between 1845 and 1848 (Regan 1983 : 114).

A causal look at the health levels in the Sahel and incidence of the 1972 drought unravels that it aggravated what was already very precarious situation in the Sahelian countries. What the drought did in countries where the margins for survival were narrow was to push many people beyond the margin, make a quantitative difference in physical or economic conditions, bring a qualitative change in the possibilities of survival, leading to migration, a high incidence of infections and parasitic diseases at high rates of mortality, an extremely low and uneven density of health resources (Escudero 1982 : 87).

The manifestation of the underdevelopment in Ethiopia is the extremely low living conditions of the people. Owing to the great burden of ill health caused by communicable diseases (like malaria, parasites, eye and skin infections, measles, tuberculosis, and small pox) and nutritional deficiency which arc the ills of underdevelopment, morbidity and mortality rates are high. Infant mortality was estimated about 200 per 1000 (for developed economies it is less than 20) and life expectancy is about 36 (for developed economies it is over 60 years). In 1973, 2,00,000 people died from famine (Ayellew 1982 : 93).

During the 1974 drought, the estimated number of drought related human deaths was close to 1,00,000 persons. At the peak of the crisis, in April-June 1974, there were some 2,00,000 people entirely dependent on food distribution in Niger (5 percent of the total population).

Historical records of famine in pre-industrial societies usually paint pictures of death on a massive scale, the low rates of population growth in pre-transitional and early demographic transition societies to testify to the high wastage of life associated with famine. Sorokin (1942) has demonstrated the horrific loss of life caused by historical famines suggesting that the death rate in affected areas sometimes reached 200 to 500 or 800 per every thousand population compared with normal rates of 10 to 30.

Coldwell (1975) has drawn on a wide variety of sources in his examination of mortality associated with the famine of early 1970's. This estimate of excess mortality over the entire Sahel during 1970-74 was no more than a million. It would appear however that elsewhere, especially in South Asia, excess mortality may be more significant. Ainapur (1980) has estimated excess death during 1943 Bengal famine at 2 million and those in Bangladesh in 1974-75 at 1.5 million (Hugo 1984 : 7).

The drought of 1970's in Ethiopia not only placed the rural peasants in poverty but also advanced their indebtedness. Peasants arc under the burden of deadweight debt from year to year and they carried a debt amounting to almost 55 million. About 40 percent of the indebted peasants were land owning peasants, 32 percent were tenants, and

19 percent were partly owners and partly tenants. The most single purpose of these loans was purchasing food which accounted for 48 percent of the total number of loans. In Brazil, the drought forced the landless class to borrow at the time of distress and they have become bonded to money lenders owing to non-payment of loans (Nunes 1986 : 101).

1.6. DROUGHT AND SOCIO-ECONOMIC STRUCTURE

In West Africa, different methods are adopted by different economic strata to withstand a very poor harvest. The rich are able to withstand the shock of a very poor harvest through trade and off-farm income. Wealthy farmers have large holdings in extended patrilineal domestic units, produce more grain and groundnuts and are more likely to cultivate high value crops such as tobacco. They own ploughs and groundnut decarticators and keep cattle. They generally engage in intervillage trade in grain and other commodities. They store grain and lend money. The poor conversely have smaller households, heads of poor families usually engage in menial, often transient occupation that yield low returns. They engage in wage labour and borrow heavily to buy grain in rainy season. The worst-off are those with no credit worthiness; at best they may borrow a little land to farm, or use corn stalks to make bread for sale. It is common for poor men to sell both their farm manure and farms. They dispose of their few resources to meet their reproductive needs in a cycle of impoverishment (Watts 1987 : 197).

The stratification of Hausa communities translates directly into equally significant typological distinction for food availability and security during drought. The poorest farming households (5.1) were deficient subsistence producers often purchasing nearly 100 percent more grain than they sold. Lower income households tended to fall well below estimated minimal requirements; in these low income classes, the gross value of farm production could not cover the purchasing power required to obtain the food necessary for minimum caloric intake.

Simmons (Watts 1987 : 199) made a crude economic distinction during drought between rich and poor; on the basis of cattle ownership. During the critical preharvest months, grain consumption per day was almost 30 percent higher among cattle owners when prices were 90 percent higher than the harvest level.

Available evidence suggests that the distribution of the effects of famine clearly create parallel process of stratification and economic vulnerability already present in rural Ethiopian society. The impact of regional drought and food shortage on individual households has a number of complex but definable factors. In the Hausa village (Kaita) the vast majority of households still owned their means of production, inspite of population densities, land shortage and the changes brought by colonialism. The absence of landless class, nevertheless should not obscure sharp socioeconomic differentiation within the community, the genesis of reproduction which is precisely related to the appearance of wage labour, the use of indebted ones, and the dominant role of merchant's capital under the aegis of the colonial state. In Nigeria there exists interhousehold inequality, specifically during seasonal stress. Labour is sold in urban markets and livestock and land are also sold often at non-reasonable prices. The poor households suffered a decline in household assets comprising of cattle, grain, land and farm related assets. While the well to do groups of households were able to muster the benefits of development and could adjust well with the famine situations utilizing the scarce labour (normal period) which was available plentily. clearly then, in peasant communities where socio-ecoonomic differentiation is so prominent, poor farmers, shackled by their poverty, are largely powerless to effect the sort of changes that might mitigate the debilitating consequences of environmental hazards (Watts, 1963 : 255).

In Brazil, the drought effected the poor more severely which reinforced the already prejudiced differences between rural and urban population as well as the difference between the small producers of the subsistence crops who constitute the entire gamut of rural producers, and the largescale farmers who produce cash crops (cotton,hemp etc)as well as raising cattle (Nunes 1986:101).

The drought left severe consequences on economy and society of the North Eastern Brazil particularly wage earners, partners, dwellers,and renters. The wage earner is hired by farmers for the execution of a specific task and is paid in money, usually on a daily basis. The partner is a non-owner, he produces on the owner's land, taking all the risks and paying the owner with a percentage of production, upto 50

percent. The renter pays in cash for the rent of the land. The dweller is a permanent worker. He lives either on working a certain number of days for the owner or make a payment cash for goods. The squatters are non-owner producers who does not pay any rent for land used. Wage earners suffered a loss in employment. Tenant farmers loose access to land leading to migration. Small land owners incurred loss of production and income and sold land mainly to the large owners. The medium and large farmers utilised the water in reservoirs, adopted cattle raising, obtained subsidised credit and utilised the abundant man power for farm restoration. For them the problem is basically of production (Parry et al,1988:129).

Large land owners became the main beneficiaries of drought works through political influence and inturn enriched their economic and social status vis-a-vis other social groups. By benefiting the large land owners and higher social strata of the arid hinter lands, the drought hampers the way of rural life and their conditions (Nunes, 1986:101).

Land is the basis of life and the general assumption is that the peasant community in drought areas is very clearly tied to the land, which is the only source of life and subsistence; particularly in the case of Ethiopia. The size of cultivable land that the peasants possess, the availability of grazing land near-by and the availability of drought animal to some extent determine farmer's level of life. Land was considered to be birth-right of every human being. The land reform of 1975 in Ethiopia does not allow peasants to sell land or to exchange it for other property or assets. During the process of marginalization, private ownership of land took its roots and the consequent disruption of traditional system and values. Commercialization lead to the emergence of tenants and hence their gradual eviction, leading to their gradual transformation into agricultural proletarians (Spitz 1986 : 8).

1.7. DROUGHT AND POLITICAL PROBLEMS

Political problems emanating from political turmoil also seemed to have acquired greater vehemence in the face of drought and famine. The British policies and later,

those of Uganda's government not only disrupted the delicate balance between the Karamajong pastoralists in Uganda and their land but infact deflected them from their gradual exodus towards sedentary farming. The constant acquisition of crucial Karamajong lands by the colonial government beginning in the 1920s without a reduction in the number of livestock lead to overgrazing of the remainder. The net implication of colonial and neo-colonial policies on the pre-capitalist Karamajong created the need for cash income to pay taxes which would only be earned by selling cattle to sole buyer governments at a fixed artificially low prices. Cattle were raised on decreasing areas of land which became overstocked and subsequently eroded. Food from hunting and sedentary farming became scare due to colonial and neo-colonial policies with the virtually inevitable consequences of desertification, diseased cattle, increased rampage by neighbouring tribes and finally a catastrophic famine.

The people of Turkana in Africa are confronted by the construction of an international highway across their lands and by the changes which famine relief and development projects are bringing them to face an uncertain future. The non-Turkanas, who are making most of the decisions which shape the new relationship between Turkana and outside world, contemplate that solution of the nomadic flocks primarily lies in the production and to certain much lesser extent fish and perhaps irrigated crops for sale on the national market. This may however undermine what is left of Turkana culture, and places stress on Turkana land which it cannot bear. Relief agencies and government enter into these potentially volatile situations, often with cogent methods without conceiving consequences. It was suggested that they shall look closely at the immediate and background causes of famine before leaping into formidable solutions which may simply complicate the matters in the long term. The development schemes posited on a closer involvement in a market and cash economy, and closer ties to national governments, may be planting future seeds of famine for pastoralists and ecologically sensitive lands which they occupy (Snow 19X7 : 155).

The political and military situation in Kampuchia during 1975 did little to ease the famine crisis. For the bulk of the population, one set of difficulties **and** problems was, one effect replaced by another. As the strategic situation of the Phnom-Penh authority worsened, food crisis in Kampuchia during the 1970's had their origins in the political and military events of the decade. While the fall of Pol-Pot regime, the Vietnamese occupation and decisions of the Heng Samrin administration have resulted in more abundant agricultural production, a substantial decline in international aid since 1981 continues to concern both the Phnom-Penh authorities and those responsible for the aid programmes. Armed hostilities continued to prevent cultivation and or disrupted the harvesting of the nation's rice crops, and risk of famine in Kampuchia remains. Short term military and political victories, for this or that ideology, will only be defeats, if those who survive them, do not have enough to eat. Forecasted subsistence crises and diminishing international aid make the outlook a bleak one for a nation and people already devastated by war and famine (Merg Try Ea 1984 : 48).

1.8. DROUGHT AND INTERVENTION

The Brazilian Government spent the equivalent of US $1777.9 million in emergency programs during the 1975-83 drought period. Some 25 million workers were assisted in 1983, and 88 percent of the total area of northeast Brazil was effected. The emergency porgramme precluded starvation and thousands of deaths, as well as massive migration. The emergency programmes have also contributed to the creation of infrastructure like dams, roads etc. Notwithstanding these positive effects, it was recognized that the programmes were not sufficient to prevent deterioration of nutrition levels and increasing mortality rates. As relief programmes, they did not help to solve the structural problems prerequisite for reducing poverty and increasing resilience in coping with droughts. It is interesting to note that, during the 1979-80 drought, 80.5 percent of the total family budget of workers enlisted in the emergency program was spent either on food (45.6 percent) or to repay personal debts (34.39 percent) (Parry et al 1988 : 294).

There are NGOs such as CARE and OXFAM which function primarily as funding agencies and others which are primarily operational at the local level. Some NGOs are specialised in providing food aid, while others provide medicine. Some NGOs largely focus on relief, while others provide priority for development activities. Some work closely with the state, some receive substantial revenues from the state, and some others work independently of the state (Scott 1987 : 349).

1.9. SCOPE OF THE PRESENT STUDY

In the light of the foregoing review of drought and it's effects in the countries of Africa and Latin America the present study aims at an analysis of the drought, it's effects and survival strategies in the semi-arid Rayalaseema and Telangana of Andhra Pradesh.Two mandals in each of these two regions have been chosen for their common geographical features of being located in a semi-arid area with similarities in landforms, topography, soils, community pattern, economic organization, and with a hierarchy of caste and class groups, with mutual dependence and exchange of goods and services providing favourable conditions (advantages) to a certain category of sections, while at the same time creating problems (disadvantages) of survival and livelihood to the lower sections, particularly in the wake of drought.

1.10. OBJECTIVES OF THE STUDY

The main objectives of the present study are:

i) To study the impact of drought induced changes on agriculture, allied activities and the resource use in a drought prone area,

ii) To study the impact of drought on different groups of people,

iii) To analyse the survival strategies adopted by different groups, particularly the 'poor' and

iv) To identify appropriate policy intervention as well as institutional arrangements to mitigate the impact of drought.

1.11. METHODOLOGY

Drought, being a natural geographical phenomenon, it has to be studied in various situations under varied socio-economic conditions. The basic survival strategics relating to specific geographic locations and, specific agricultural caste groups involved in farming have to be paid closer attention. Attention should be paid to special groups such as shepherds and cattle keepers who bear the drudgeries of ecological crisis such as drought while responding to thc natural variation to a certain cxtcnt and constant self-devastating man-made ecological imbalances which take their shape into 'drought' at the regional resource level.

The farmers, agricultural laburers, rural artisans and the landless labourers suffer differential impact of drought as it's destructive forces arc focussed on the basic survival system consisting of (a) man and society, (b) man and environment, and (c) man and nature.

First, the spell of drought on man and society results in changes in societal conditions. Second, the spell of drought which works on man and environment creates problems to traditional practices such as farming and sheep rearing/cattle keeping Drought necessitates the communities which depend upon such activities to go for unconventional methods of cultivation, irrigation practices, and landuse procedures. The well to do sections of the farming community muster available resources and developmental benefits using social status and economic conditions. In such an environment man himself poses problem to the well being of man and his environs, ponds, water resources, forests, trees, livestock, crops, pastures and the land resources. Man during drought, with a shortsightedness ignores the future needs involving longrun ecological perspective. Some of these arc indiscriminate water use, over utilisation of water, land, forest resources, accumulation of technologies providing preconditions for degradation and desertification of land and forest, and encroachment of the existing resources. Such a problem is to be interrelated with appropriate technology and rational utilisation of the resources.

Third, the spell of **drought** works on man-nature relationship. Man is an ingredient of nature maintaining symbiotic relation./the phasing and sowing of the crops, watering and harvesting of the crops, growing of trees, rearing of cattle and sheep, feeding of animals, collecting of water, fodder, food and fuel wood are all seasonal activities of man for livelihood. Every action of man is in tune with the changes in nature. Drought causes it's impact on man and his crops, livestock and on his surroundings. The action of nature here is rainfall which forms a subsystem of nature. But man instead of identifying the causes which had disturbed the once well balanced man-nature system of relationship which have often been disturbed by man himself by way of encroachment of water, land and forest resources, overcultivation and utilisation of resources, unconventional methods of cultivation, lead to creation and aggravation of droughts. The deviation of man from nature occurs over a period of time at a point of space when man's actions result in changes which are not adjustable with nature. Nature, in the form of second level alternatives of survival, provides certain subsistence systems as contingents to man. However these alternative strategies do not occur on an immediate basis but are achieved after certain risks such as time testing, distance covering migratory strategies for resource collection, specifically in case of different sections of farming and non-farming communities at village level in general and certain shepherd groups in particular.

The design of the study should be capable of accommodating the collection of adequate information not only the households, but also the nature of resouces and institutions. The study focuses two drought prone districts viz Ananthapur and Mahboobnagar of Andhra Pradesh. Four villages from Anantapur district and three from Mahabubnagar are selected for more detailed study. From each village 50 households are selected on the basis of stratified random sampling. The households are stratified into three groups of cultivators, agricultural labourers and others. Besides, care is taken that different caste groups are represented in each stratum.

For the purpose of an indepth study of predominantly non-agricultural groups, two shepherd communities, Gollas and Kuruvas are selected form Mahboobnagar district.

For the study of these groups a combination of household survey and field observation methods were used. The other main sources include secondary sources like literature on drought studies as well as Census, the A.P. Directorate of Economics and Statistics and the Mandal Offices.

The study is divided into six chapters. The second chapter is a survey of drought conditions in India and Andhra Pradesh with a view to provide a wider background to the present study. The third chapter analysis the drought conditions with specific reference to Anantapur and Mahabubnagar districts. The fourth chapter deals with the impact of drought particularly on agriculture and employment in the selected villages. The fifth chapter attempts a study of certain specific groups like shepherd communities in terms of the adjustment strategies adopted by them in the face of drought. The last chapter contains the summary and conclusions of the thesis.

CHAPTER **II**

DROUGHT IN INDIA AND ANDHRA PRADESH

2.1. DROUGHT PRONE AREAS OF INDIA

The Irrigation Commission (Mamoria 1978 : 123) observed that "assuming that districts which receive less than 75 cm of rainfall per annum are liable to drought, there are 77 such districts in the country which account for about 34% of the net area sown. Exclusive of such of these districts as have developed irrigation on adequate scale, there still remain 50 districts accounting for one-fourth of the uncultivated area of the country which could be considered as vulnerable to drought. There are in addition, another 22 districts in Maharastra, Gujarat, Madhya Pradesh, Karnataka, Rajasthan and Uttar Pradesh accounting for 9% of the cultivated area of the country, which get between 75 cm and 85 cm of rain . They should also be considered as vulnerable because of doubtful efficacy in rainfall. If these areas are taken into account, as much as one-third of the cropped area in the country would appear to be susceptible to drought.. The only regions which are not vulnerable are Assam, West Bengal, Orissa, the West Coast and certain parts of central India (Irrigation Commission 1972 : 123).

Drought areas [20% probability of rainfall departures of more than (-) 25 percent from the normal 1 consist of Gujarat, Rajasthan and adjoining parts of Punjab, Haryana, West Uttar Pradesh and West Madhya Pradesh. Also consist of Madhya Maharashtra, interior Karnatak, Rayalaseema, South Telangana and parts of Tamil Nadu. A small portion of northwest Bihar and adjoining east Uttar Pradesh and a small portion of north east Bihar and adjoining portion of West Bengal.

Chronically drought affected areas (40% of rainfall departure of more than (-) 25 percent) consist western parts of Rajasthan and Kutch. It could be seen that most of the areas susceptible to drought clearly fall within the arid and semi-arid zones of the country. They are identified with the intensely arid zone. Severe drought areas record lowest rainfall and the highest variability. Drought may occur outside this zone in areas like Vidarbha (in Maharashtra), Chettisgarh (in Madhya Pradesh) and areas in some of the sub-humid regions in the east (Mamoria 1973 : 123).

2.2. DROUGHT : IN THE PAST AND PRESENT

Historical review of drought envisages that it existed in the form of famine even during the fifteenth century. Famines occurred in northern India, Deccan region, parts of Eastern India and parts of Western India and also in Central India. There have been instances when Indian Muslim rulers provided certain relief measures, adjustments in the treasury and allowed the farmers certain exemptions from paying land and crop taxes during famine. During the seventeenth century, famines occurred in Rajasthan (Rajputana, Oudh) and Punjab states during which the landlords exploited the rural peasantry. Taxes were collected from the poor peasants without caring for the crop failure. The prices of foodgrain increased due to hoarding of the stocks by the urban merchants. However, some of the rulers were kind enough to provide some relief to the famine victims. The Great Bengal famine (1943) left a devastating scenario in the famine history of India when thousands of people died of disease, and large scale starvation, leaving many people destitutes. The development of famine codes during the Bengal famine and earlier during the pre-independence era by the British Government contained systematic procedures of assessment of famine and handling and implementation of famine controlling methods as well as post-relief works. These famine codes have been developed from time to time and have been improved in quality and content. Relief measures such as takkavi loans, fixing of revenues to be paid by the farmers in famine affected areas on the basis of area and crop production affected were extended. Food provision through emergency food camps to the affected population, fodder camps to provide fodder, emergency employment works, food for work programmes, rural construction through infrastructural works and inter-state transportation of essential commodities were some of the relief measures during the British period (Famine Inqury Commission 1985 : 45).

The planning era started during the times when problems at home and abroad existed as the regional stability in terms of defence and food sustainability declined due to partition of the country and wars with China and Pakistan. The consecutive five year plans provided some scope in their content to accommodate drought prone area programmes and desert development programmes. Irrigation schemes, watershed management, dry

farming techniques, modern methods of irrigation, land use practices, soil conservation and afforestation schemes have been intended mainly with a view to provide demonstrations at the field level to contain drought and it's prevention. As a part of five year plans major and medium irrigation schemes have been approved and investments allocated. At the district level minor irrigation works have been identified and implemented. During the nineties 'Technology Missions' were initiated on drinking water, rural literacy, immunization, oil seeds production, and communication services. Of these, drinking water programmes, literacy programmes and the immunization programmes have had greater relevance to the people in drought prone areas (Dutt 1985 : 80).

Reasons beyond analysis, most of the efforts were concentrated in certain areas which have drought tolerant features (locational, resource wise) and favorable ecological conditions. In rural Maharastra, drought has been occurring since the nineteen sixties when crop production, employment and livestock were affected. The government of Maharastra with its experience in handling the employment guarantee schemes and food for work programmes, was able to manage drought works reasonably better.

The content of the Programme in the eighties is simplified so as to allow a large contingent of women labourers to work. The work avenues are offered within reachable distances from the homes of the drought affected families. While a majority of the labourers are employed in public works, the remaining are being employed in other relief works. But the state till today suffers from drinking water and pasture as many villages are identified as problem villages which do not have enough drinking water for men and cattle and pasture for livestock.

In Gujarat, the 'Kutch' area, has been suffering from severe drought. The tribals who cultivate jhum as a practice do not have enough to eat. The cattle perished on a massive scale and animals were sold away, providing a pathetic scenario. The drinking water problem needs no special mention.

The state of Rajasthan traditionally has certain areas which have characteristic features of desert. These areas are drought stricken by virtue of their geographical

location in a semi-arid country shadowed by rainfall scarcities. Cattle, sheep and camel suffer due to water and fodder shortages as farmers suffer due to the absence of **rainfall. Though in** the current year the area received sufficient rainfall which enabled the farmers to grow dry crops even in areas filled with sand dunes. The pastoralists were happy as grasses grew due to rains and water was available to certain extent. But during the last years of successive drought, rural women suffered as they have to carry drinking water from distant areas. Not even grasses grew in such areas in specific rainfall deficient years.

In Orissa the recent Kalahandi drought has been in the news due to its accompanying of starvation deaths. The drought has been occurring thrice in an year. The 'drought' and 'starvation' have been unprecedented in such areas. Some of the surveys provide the realistic picture of survival efforts by the rural people adopting and adjusting to the environmental crises.

Recently a complex of problems connected with rapid rate of desertification in a number of regions, including sub-humid tropics became more acute. These tendencies are clearly traced to a number of reasons, the most important of which are: (i). growth arable lands which is firstly due to ploughing up of marginal and unproductive lands, (ii). decreasing of the pasture areas simultaneous rising of animal population, (iii). general elimination of tree-shrub vegetation for the purposes of fuel, building materials, food and fodder (Sharma 1991 : 293).

The main problem area is the Aravali range in Rajasthan. The Aravali is the main watershed and centre origin of rivers for this territory. On the east where depth of incic and water filtration are limited with downpour regime of precipitation, floods become disastrous. On the west where temporary streams prevail in rainy season they bring great quantity of detrial material and sand. Unconfined groundwater is almost absent on platform part of region but they play an important role for development of irrigation on the old alluvial plains. However, these waters are charecterised by rather deep occurrence and often high mineralisation which grow towards west. Sparse natural vegetation is

represented by xeromorphic deciduous forests on mountain slopes in more humid areas and by torn open woodlands, shrub and deserted savanna, tree-and-shrub semi-desert on other surfaces (Saxena 1977). It is characteristic that modern vegetation as a whole is more Xerophitic than those which must grow under the existing natural conditions even in more dry districts. The fact that many dominant species of flora (Acacia jasquemonti, Zizypus nummularia. Euphrobia nerifolia) belong to genesis which are usually spreading in monsoon forests and savannas of south India is the evidence of it. Really desertic are only Capparis + spp. Xerophitisation of vegetation is connected not only wit natural characteristics of landscape conditions but also with human activity. The everywhere thinning of mozophitc natural vegetation cover during the centers resulted in the replacement of climate forest and savannas by more unpretentious.ess xerophytic species (Sharma 1991 : 297).

During a period of 177 years (1770-1946) with a gap of 16 years, Bihar was hit by almost equal number of scarcities. During that period drought commonly affected the districts of north Bihar most, but in the south Gangetic plain as in the Bihar plateau drought was less frequent. But the calamity is unrelated to the regional distribution of annual rainfall. Since independence, till 1961, the distribution of drought had a different area pattern; drought being more frequent in the south than north of the Ganges. Successive seasons or years of drought cause some economic and social crises like depletion of food resources and rise in their prices, health hazards and chronic diseases to people. Regarding irrigational facilities there is a serious regional imbalance between north and south Bihar. Lopsided planning has been responsible for creating regional imbalances. Chotanagapur, Santhal parganas and other chronic drought prone areas of this state require greater carc and special attention in this respect.

TABLE 2. 1.

DROUGHT IN INDIA: 1876 TO 1990

Year	Geographical Area Affected by **Drought**		Intensity of Drought	**Ranking (on The basis of Column (3)**
(1)	**Million Hectares** (2)	**% to total Area** (3)	(4)	(5)
1876	49	15.8	Moderate	33
1877	203	**64.7**	Calamitous	2
1883	103	**32.8**	Near severe	**11**
1884	70	22.2	Moderate	**25**
1885	48	**15.4**	Moderate	**34**
1891	115	**36.7**	Near severe	9
1896	68	21.7	Moderate	**27**
1899	199	63.4	Calamitous	3
1901	89	28.5	Near severe	19
1902	54	**17.1**	Moderate	**32**
1904	98	31.1		**15**
1905	109	34.7	Near severe	10
1907	85	27.2	Slight	22
1911	97	30.8	Near severe	**16**
1913	70	22.3	Moderate	**26**
1915	63	20.2	Moderate	29
1918	216	68.7	Calamitous	1
1920	122	38.6	Near severe	**7**
1925	80	25.5	Moderate	**23**
1928	67	**21.4**	Moderate	**28**
1936	86	27.6	Moderate	**21**
1941	101	12.3	Near severe	12
1951	104	31.6	Near severe	**13**
1952	81	24.6	Moderate	**24**
1965	135	41.1	Severe	6
1966	101	30.7	Near Severe	**17**
1968	45	13.7	Moderate	**35**
1969	62	18.9	Moderate	**30**
1971	42	12.8	Moderate	**36**
1972	139	42.3	Severe	**5**
1974	92	28.0	Near severe	20
1979	124	37.7	Near severe	8
1982	104	31.6	Near severe	**14**
1985	95	28.9	Near severe	**18**
1986	60	18.3	Moderate	**31**
1987	155	47.2	Severe	**4**

Source : R.B.I. Bullitin, 1991.

Note :

The popular impression that India faces drought once in every three years is bornoutby the Table which shows that 36 out of 115 years suffered from drought.. India had faced three calamitous droughts in 1877, 1899 and 1918 in the pre independence period. However, in the post independence period we experienced three severe droughts in 1965, 1972 and 1987.

Table 2.1 Shows that Drought continued to occur even during the post-independence India resulting in **crop failure almost** every year in some parts **of the** country or other. To cite recent examples, **156 districts** in Bihar, Uttar **Pradesh, West Bengal,** Rajasthan, Madhya Pradesh, Karnataka (Mysore) and Maharastra, were affected by drought in 1965-67; 227 districts in Maharastra, Rajastan, Andhra Pradesh, Gujarat, and West Bengal in 1971-72 and 1972-73; in 1979-80 almost all parts of the country, and 1982,1983,1984-85,1986-87 were also years of drought. India cannot slacken its concern regarding drought situation just because 1988-89, 1989-90 and 1990-91, have been good agricultural years. Even in the good agricultural year 1988-89, droughts have been reported from Bihar, Kalahandi in Orissa and Chhatisgarh in Madhya Pradesh.

During the British period droughts led to famine and mass starvation. The beginning of colonial period is also marked by the on set of severe droughts and famines. During the famine of 1770 one-third of the population of the province perished. The colonial era ended with the great Bengal famine of 1943, in which three million people perished. Between 1770 and 1880 as many as twenty seven scarcities and famines were recorded. During the fifty years starting from 1850 to 1900, twenty million lives were lost in about 20 famines. Amongst the serious droughts and famines were those of 1837-38 (Allahabad area), 1860-65 (Western and Northern provinces), Bengal and **Bihar,** 1868-69 and (Bengal and Orissa), 1873-74 (Bengal, Bihar, Bombay and Madras) and 1876-78 (Bengal, Bihar, U.P, Central provinces, Madras and Bombay). Droughts continued to occur in the present century though the extent of loss of life has been contained because of improved movement of essential supplie to drought effected areas (Dubashi 1992 : 27).

2.3 DROUGHT AND AGRICULTURAL PRODUCTION

The united provinces of Agra and Oudh experienced one of the worst famines in history in 1907-08, caused a decline in **the** out-turn of Kharif crops estimated at thirty one percent of the normal out-turn as against thirty seven percent. The total loss of crops in the autumn of 1907 was an estimated four million tonnes. This meant a loss of food for **48 million** inhabitants of the province (Bhatia 1991:151).

The **occurtnce of droughts has continued into the current times . The drought** related crop failures of 1967 and 1969 had the potential to bring about the worst famine in the sub-continent's history. There was a ninteen percent fall in grain production in 1966-67 from the previous crop season. Grain stocks were used up, leaving few reserves when drought and poor crops recurred in the following year (Hewitt 1983:190). These were the years of import of very huge quantities of foodgrains.

During the early 1970s Maharastra suffered three successive years of drought which culminated in disastrous failure of the monsoon rains of 1972 and the associated calamitous agricultural year of 1972-73 when cereal production fell to under half of 1967-68 level. Even in good agricultural year Maharastra was a cereal deficit state. Percapita cereal production declined to barely 51 kg. per person, only 47 percent of the level of 1967-68 and only 71 percent of what might have been expected even on the basis of the declining trend of the previous four years. Turning to the districts which lie at least partly in the drought prone zone, a more complicated picture emerges. Cereal production percapita across the districts in 1972-73 was barely 45 kg, only 37 percent of the level of 1967-68, and well below the trend. More over all of what were termed the "most acutely affected" districts were located in this zone (Dyson 1992:1325). The state of Maharastra (with an area of 3,08,000 km and a 1971 population of 50.4 million) experienced a three year drought in 1970-73 during which the output of foodgrains (cereals and pulses) were 19 percent below the average of 1968-69 and 1969-70 in the first year; and 53 percent in the third year. These deficits were added to Maharastra's normal need to import 2.6 million tons of foodgrains, about one third of it's consumption requirements (Mc Alpin 1987:394).

The production of foodgrains in 1972-73 was below that of 1968-69 by as much as 54 percent. Reduction in production of foodgrains was to an extent of about 80 percent in Bihar, Solapur and Sangli districts; between 65 and 75 percent in Aurangabad, Nasik, Ahmednagar, Nanded districts; between 55 and 65 percent in Satara, Dhulia Osmanabad, and Akola districts; and the reduction was around 50 percent in Pune Thana, **Parbhan,** Buldhana and Bhandra districts (Brahme, 1983 : 51).

During the 1972 **drought** (1972-73) there was a reduction by about twelve percent in **the total** area sown in Maharastra. A decrease **in the** hectorage to the extent of about 20 percent was noted in the case of pulses and **chillies and thirty** percent in the case of bajra. The corresponding percentages were 15 for wheat and 12 for groundnut. The extent of reduction in the case of crops like Jowar and cotton, was less **than** ten percent while there was no decrease in the area under rice and sugar cane (Brahme 1983 : 51).

«The impact of drought on the village economy can be identified by considering variables such as the area under crops, and the production of various crops which undergo deceleration. Drought prone areas in Rajasthan show the occurance and impact on local crop yields in different years. During the eleven year drought hit period the agricultural productivity in as many as seven years recorded a crop loss of 95 percent (Joshi 1983:45).

The impact of drought on area, production and productivity in Anantapur district revealed that among the respondent sampled households, the acreage of cereals (jowar bajra, korra and arike) declined by 16 percent and production by 31 percent during the drought year in 1982-83 compared to the preceding year. Production of groundnut sharply declined by 27 percent and productivity by 40 percent respectively (Naidu 1985 : 790).

2.4 DROUGHT AND LIVESTOCK

Among the assets, decline will be much in drought animals followed by the livestock as during droughts, animals perish or soldout, in grain prices rise rapidly, while animal prices fall and the herder's purchasing power collapses. The high incidence of selling and mortgaging of land and livestock during famines show the magnitude of distress suffered by the farming community. Singh (1965) noticed that such distress sales were prevalent particularly among the middle class and small group of farmers (Curry 1976 ; 71).

During the 1972-73 drought in Maharastra, the loss of drought animals varied from about 20 percent to 35 percent in different villages. In the face of acute scarcity of water and fodder resources it was difficult to maintain the livestock, particularly the

bovine population in the drought affected villages. Loss of livestock was estimated to be 21.8 lakh which comes to 13 percent livestock of 14 districts in the state. It was estimated that about 6.1 lakh of cattle were lost due to death and 8.2 lakh of cattle were sold. The total loss inflicted on the cultivator on account of the loss of livestock was estimated to be of the magnitude of about Rs.61 crore (Brahme 1983 : 51).

During drought, fodder as well as foodgrain become scarce. Drought may, in certain situation result in increasing deterioration of land and pastoral resources exert pressure on productive lands and the development of a land market characterised by speculation and absence of guarantees in transactions. It may also result in appropriation of animal capital, pastoral land and of watering points by the influential people. Cattle perished due to acute scarcity of fodder and drinking water during the 1979-80 period (Madhya Pradesh). In Maharastra, during the 1992 drought as many as 1,292 villages (of Gadchiroli district) faced unprecedented shortage of food and fodder for cattle (Dhangere 1992 : 1421).

2.5 IMPACT OF DROUGHT ON PRICES AND INDEBTEDNESS

According to the Famine Commission of 1890, in times of very great scarcity, prices of foodgrains rise to three times their ordinary level. "Whereas in ordinary years the prices of foodgrains of the mass of the people may be from 20 to 30 seers a rupee, in times of great scarcity, it will rise to 8 to 10 seers a rupee or even higher. During the 1907 drought in Bundelkhand, prices rose sharply wheat touched the peak of 6 seers a rupee on 15th October 1896" (Bhatia 1991 : 151).

The famine of 1837-38 in Uttar Pradesh covered an area of about 25,000 square miles which was inhabited by a population of about 8 million. Drought was accompanied by scarcities and high prices which rendered the lower classes to great extremities as in the Fatehpur district. The prices of foodgrains rose high causeing much distress amongst the lower classes (Allahabad). Some believed that even the price rise was not of great consequence as the people lacked the ability to purchase food (Sharma 1993 : 341).

An enquiry by Thornburn (Bhatia 1991:52) in **four** selected circles **of the Punjab** revealed not only the existence of a state of widespread indebtedness among **agriculturists** but also a rapid transfer of property from them as a result of that. In 474 villages, in widely distant and differing tracts held by different tribes and colonies, the cultivators in 26 villages were helplessly involved in debt, in another 210 villages they were seriously involved in debt, and only in 138 villages the debt burden was **comparatively** lesser.

The famine of 1858-1900 in Rajasthan (Rajputana) resulted in extreme social backwardness of peasantry who had relied for centuries on the feudal landlords. On account of a backlog of indebted amount the peasants were forced to pass on the land into the hands of non-working classes leaving the tenants and the landless labourers in misery. Increased indebtedness resulted in lack of capital for agricultural works and there was also absence of alternative outlets for employment which forced them to the margins of abject poverty. Indigenous craftsmen, specially the weavers were impoverished as drought restricted their markets (Maloo 1987 : 234).

During the 1979-80 drought in Madhya Pradesh the incidence of poverty was found to be higher (68 percent) and for SCs and STs it was 75 percent. This sort of high level poverty among sampled households was attributed to the low returns from agriculture and also partly to the methods of cultivation (Balakrishna 1982 : 27).

Drought is normally characterised by water shortages. The 1979-80 drought in Madhya Pradesh when 23 districts were declared as drought prone. Drinking water was a major problem in most of the villages. During the 1992 drought in Maharatra as many as 1292 villages (located in Gadchiroli) suffered severe drinking water problem. Many of these villages either do not have any wells or, if they have, the wells have dried up. Rural peasants, tribal households and women were in desperation as they have to meet their needs of drinking water by resorting to various alternatives. In Maharastra (Vidarbha and Marathwada) out of over 42,000 villages as many as 29,157 (nearly 22,000) of the total (29,157) villages declared as affected by water scarcity and faced famine like conditions that were nothing short of catastrophe (Dhangere 1992 : 1421).

Data covering 19 villages from 7 states (Gujarat, Karnataka, Kerala, Rajasthan, Uttar Pradesh and West Bengal) revealed (Benerji 1982 : 105) a substantial group of rural population, comprising small farmers and artisans who manage to get two full meals all the year round, live in almost perpetual fear of being pushed down into the "hunger classes" by a variety of natural calamities and individual catastrophes such as prolonged sickness and death of the breadwinner, old age and crushing social obligations like marriage expenses.

Diseases literally thrive under the conditions that are prevailing in the Indian villages, and a vast majority have to fight these adverse conditions right from the birth. The mother is exposed to serious hazards which cause high mortality and morbidity rates. Their children face acute problems of nutrition and infection in the very early phase of their lives.

During the great Bengal famine of 1943, devastating epidemics of malaria, small pox and cholera were associated with the famine. Famine diarrhea, famine driopsy and anemia also took a very heavy toll of lives (Benerji 1982 : 105).

Short of starvation deaths, every kind of damage occurred to an alarming degree of hunger and sever nutritional deterioration during the 1966-67 drought in Bihar and food crisis based on large scale scarcity during 1970-73 drought in Maharastra have been reported. During 1992 drought (Gadchiroli in Maharastra) consumption of pollutant and undrinkable water has given rise to epidemics of cholera and gastro-enterities in the district (Dhangere 1992:1421).

2.6 DROUGHT AND SOCIO-ECONOMIC STRUCTURE

The operational impact of drought would explain the twin processes of marginalisation and stratification of societal groups as these groups are often disturbed by drought. Historical evidences provide scope for generalisation of famine induced droughts which resulted in hunger and malnutrition. Droughts in the present context create serious problems for men, women, children, livestock and their environment.

Drought's impact can be identified in location specific semi-arid areas where the rainfall is low and the irrigation is of scarce.

The primary concern of the present study is the impact of drought and responses to it in bad years. the socio-economic impact of climatic fluctuations favors the paradigm of human ecology which characterises households as actors in their environment adjusting and adapting to it's changes. By contrast, during a drought episode, households balance their resources and objectives by adjustments, which are short-term coping strategies. Since the farmers decisions would (largely) determine the effectiveness of various measures adapted, it is necessary to examine the farmer's adaptation to rainfall variability. Impact on crops, production and livestock loss also form the basic criterion to determine the effect of drought in a region. Within this socio-economic framework, the present study makes an attempt to study the cropping pattern, asset mobilisation, migration and livestock movement, which are the only alternative strategies during drought.

Drought affects the agricultural sector where farm level activities are disturbed due to lack of rains. Water deficiency causes foodgrain deficiency, which in turn leads to increase in price levels; crop losses results in seasonal unemployment and losses in agro-industries and regional income reduction. Employment opportunities become scarce during drought in the area to causal labourers, daily wage earners, marginal farmers and agricultural labourers suffer following risks in subsistence agriculture. Low agricultural yield results in low income, shift in living standard variation in the economy, fall in regional output and inflation becomes incredible. Poor nutrition due to food shortages to children, malnourishment to agropastoralists and hunger becomes common during scarcity period.

Drinking water shortages due to minimal groundwater recharge and water contamination (in fluoride areas) occur as intensity of drought increases. Rural women, children and tribal people suffer due to the distance they have to walk for water. Cattle also suffer due to water shortage. Scanty rains leading to prolonged depletion of pastures result in either non-availability or limited availability of fodder and water for

cattle. Meager food, water and fodder **supplies result in competition between human and** livestock. This would in turn cause sale of livestock such as cows, bullocks, sheep and goat at low prices which in the long-run decrease farm efficiency. Migration and transhumance to distant areas isolate rural households and cattle from local living. Fall in dairy production also can be seen as the milch animals are either subjected to sale or migration. Drought also causes a decline in livestock products and their quality while following diminishing livestock assets.

Drought simply destroys or disturbs the ecosystem through soil and land degradation process. High population density on limited resource zones, land use problems related specifically to grazing such as conflict between local and neighboring pastoralists for water and pasture, desertification and degradation, fragile lands become common in the event of a prolonged drought. Soil deterioration takes place due to continuous monocrop cultivation without adding much to soil fertility, soil loss by over-cultivation, grazing and indiscriminate wood cutting resulting in an increase in soil erosion and run-off. The other visible effects of human action in drought affected pockets, in addition to soil cover depletion and denudation of tree cover and species in the long run, are low quality of pasture and tree crops, sand dune formations in wind locations. An increase in cost of water use and water management can be observed in certain areas where groundwater would be available only at 200 to 250 feet depth. This necessitates huge investments in digging bore wells and overhead tanks. In these areas, water quality gets affected as fluoridation systems are yet to be made cost effective.

Another measure to reduce the drought effect is to go for soil conservation through deep ploughing, leveling, bunding, deep terracing and furrow method. Conservation of water resources along with soil becomes essential. Millet farming, sheep and goat rearing and watershed and grazing residue management through fodder crops and plantations fetch economic benefits. Further flood protection, waste land reclamation, irrigation systems, agro forestry schemes are needed to mitigate rural drought. Such measures of drought relief are essential features of a short-term coping strategy. During drought it is the agricultural and non-agricultural labourers, landless poor, small and

marginal farmers who become vulnerable to credit as they move to urban areas in search of work to earn income for daily maintenance in the form of foodgrain and wages. Non-availability of employment opportunities within the local area and lack of food makes essential the households either to participate in public works or migrate. Scarce irrigation makes the population to reel under poverty. Also increase pressure on common property resources such as village commons, pasture, grazing and forest.

Following rainfall variability and scarcity farmers are compelled to change the cropping pattern in favor of dry, less valued, crops. Usually changes occur in food crops from paddy and pulses to dry crops such as jowar, bajra, cotton and groundnut. A decline in cash crops results in subsistence farming with a decline in cropped area and on-farm employment. Since there is a lack of insurance against bad weather, possibility for changes in input use is limited during severe drought.

Migration becomes one of the foremost adjustment strategies. Peasants with small and marginal holdings of land migrate to irrigated areas to harvest paddy or to urban areas to work. Persons with enough resources may resort to self-employment. A majority of rural labourers are left in seasonal unemployment and would like to participate in government and public works. Changes tend to occur in food consumption pattern as households either retrench or shift their diet from consuming rice and dal to nourishing food prepared out of jowar or bajra. Past savings are exhausted and borrowing of money and food grains, selling or mortgaging of assets, postponement of dues appear in general.

To tackle drought, farmers follow adjustment strategies such as subsistence production, inter-cropping, crop combination and phasing, better use of water and land resources, shift from staple food crops of favorable years, agricultural diversification, seed and fertilizer combinations. However all these modernization techniques are either availed by resourceful farmers or only limited to irrigated zones.

Government can intervene early to avoid havoc through employment generation works by assuring minimum wages. Stabilization of food grain production and food

availability, farm infrastructure, farm prices and cattle prices can offer much to the poor farmers in times of helplessness than providing subsidies, which are often reaped by the well to do state of the peasant community. Improving food delivery system through proper functioning of public distribution system to areas which are severely hit by the drought will enhance the relief measures.

Infact it is one of the focussed areas of relief operations. Essential commodities are to be supplied at reasonable prices to the low-income rural households. Clean drinking water establishments, fodder provision through setting up of cattle camps, proper credit sanctioning in the form of short-term loans with low interest rates and reasonable subsidies are the other measures. Local level community organizations can help in proper utilization of common property resources. Drought loss management through supplementary earning, sustenance relief and post-drought recovery are essential.

Drought affects different socio-economic strata of the rural society differently. Although drought affects the entire rural economy adversely, it is the small, marginal farmers, agricultural labourers and other poorer sections who suffered most. Analysis of loss in per acre yield of Kharif crops by the size of holdings show that small cultivators often suffer a lot than the medium sized and big cultivators. It is the small cultivators, medium sized cultivators and the big cultivators who incur money loss due to drought. The average monetary loss incurred due to drought increases with increase in the size of holdings. The maximum reduction is in the production of big farmers who suffer when compared with small and medium cultivators. The pasture fields affect the grazing lands in case of small cultivators. The impact on total incomes of the three categories of farmers follows another trend.

The small and medium sized farmers suffer less when compared to big farmers. The unemployment problem show a reverse trend as pervasive in small cultivator's group and none from the categories of medium sized farmers or big cultivators perceive any problem of unemployment or changed its occupation as a result of drought. Dearth of foodgrains show a smooth trend to move up with the size of holdings, probably due to

the reasons of either the bigger **cultivators maintain** a bigger size of **families/joint** families for they estimate shortage after adding foodgrains required for hired labour in their normal household requirements. The impact of drought is detrimental especially for the small and marginal farmers (AERC 1972 : 10).

In the two villages of Mhuabhata and Serripally (Kalahandi) there were two groups namely Kumbars and Kurmis. Kumbars are traditional potters and Kurmis belong to and agricultural caste and most of them depend entirely on agriculture. Due to land concentration in a few hands, and drought for three years, the poor belonging to the aforementioned sections suffered more as they were compelled to migrate to other areas in the absence of livelihood. At the same time the big and rich farmers could get rice and wheat throughout the year. The middle-class showed a favorable tendency towards consumption, access to education and also to the schemes undertaken by the government. The poor conversely, suffered due to crop loss and weakened economic base. The small and marginal farmers, and labourers who depend on agriculture were largely affected by drought. The middle class by virtue of its structurally advanced economic position could provide for an ideological rationale of developmentalist's process as operating in India today (Nayak & Mahajan 1991 : 58). The famine effects are neither random nor even on various peasant sections. Population loss was more among Madigas, Boyas and Chenchus (Kurnool). There was a change in the age and sex composition of families belonging to small peasants of depressed castes.

The great Bengal famine, particularly during 1942 to 1945 caused increased economic differentiation which is of interest. The landlords and professional class were uneffected but there was a net downward shift of households from middle economic status (ryot, small artisan and trader, petty employer, rentier) to poor economic status (ryot - bargadar, bargadar, labourer) while a large number of households belonging to the poor economic status classes (ryot, bargadar, bargadar and labourer) become destitute, and either emigrated from the village altogether or were reduced to beggary. The slow disintegration of the middle group of self employed peasants and artisans, which had been going on for decades was found to have been accelerated. Further there has been acceleration in economic defferentiation within the peasantry, under the impact of war **and famine conditions (Patnaik** 1987 : 11).

The people living in a **village** called Ranawatan-ki-sadri in **Chittorgarh** of Rajasthan provide another example **with land and** labour as primary factors of production of a wealthy system of land tenure and the feudal forces at work in a rural system. The landlord (Jamindar) and his relatives seized the power and resources whereas the people belonging to lower castes suffered due to their caste oriented activities. Rainfed crops suffered due to the absence of canals for getting water from tanks, while thousands of people died in famines. However sheep and goats helped some people in meeting the domestic necessities, and in fact formed a source of subsidary income to the farmers (Chauhan 1967 : 12).

Any solution to the serious situations of drought has to begin with the analysis of its impact on the weaker sections who suffer the most. The basic problems that have led to drought and resulted in the marginalisation of the people have to be dealt with. It is not only tribals but also forest dwellers who suffer more due to deforestation. As far as the small person is concerned the environmental and social problems have to be dealt with (Fernandez 1987 : 421). Environment has to be viewed primarily as people who have a symbiotic relationship with it.

2.7 DROUGHT RELIEF

Drought impact on Karnataka's economy has many facets. During the years of 1972-73,1976-77,1979-80, and 1982-83 drought struck 8,651 villages, spread over hundred taluks. Apart from reduction in foodgrain production it caused a loss in employment especially for the small and marginal farmers and agricultural labourers. The estimated loss in employment worked between 7.5 to 8 crore man days, a major portion of which affected agricultural labourers (Deshpande 1984:136).

Drought in India has been met by offering employment during virtually every scarcity since 1870s. During the the Maharastra drought of 1970-73, fewer than 2,00,000 individuals were given relief for which no work was exchanged (Mc Alpin 1987:402). During the 1896-1897 famine, there were 50,000 persons on state relief. Their number rose to 3.3 million in 1897 of which about 2.5 million were employed on

gratuitous relief works. While during the colonial days, **large works formed the** bulk of relief efforts, after independence, as during the Bihar drought, employment was made available to small and dispersed village works such as (a) construction and innovation of irrigation projects, (b) minor irrigation works, (c) reclamation of wasteland, (d) soil conservation measures, (e) sinking of kutcha wells to relieve water shortage for men and cattle, (f) improvement of water supply, (g) construction and repair of village roads, and (h) repair and improvement of public buildings.

In Maharastra, work was offered to those who needed it. At the peak nearly 5 million people constituting 50 percent of the total working population were employed on relief works. Employment opportunities were made available at a reasonable distance of about 5 km from the homes of the affected people. The scale of daily maintenance for a household was in the order of four kg of grains. Wages were paid in cash to enable labourers to purchase food from fair price shops. The workers employed on the scarcity relief works on sustenence basis were involved in percolation tanks, road works and community wells. The daily average rate of earnings worked out to Rs.1.56 for women.

In Bihar gratuitous relief was organised by a number of voluntary organizations. Indirect relief was in the form of subsidised loans given to cultivators to save crops by resowing short-term crops, construction of a kutcha well to tap the ground water, and installation of electric pumps (Dubashi 1992 : 20).

In Rajasthan during 1994, the region continued under drought spell and there was no cultivation due to lack of rain. The 22,000 villages spread over 24 districts have been declared as drought prone. An amount of required extent has been provided for undertaking relief works to create over 5 lakh mandays of employment through construction works.

When famine threaten the sustenance of a rural community and breaks down its mechanism of "inter-dependence", the population migrates in search of food and work. The survey of 1943 Bengal Famine victims (Mahalanobis 1946) showed a startling increase in the number of destitutes migrating to urban areas as rural poverty increased.

The most **thought provoking narrative is perhaps Das's (1949) study** of destitutes **arriving in** Calcutta during 1943 famine. Through skillful use of descriptive and analytical techniques the vividly sketched the plight of the famine victims. According to his survey, about 45 percent of the destitutes were children aged 0-10 years and about 39 percent were men and women aged 20-60 years. Females accounted for 53 percent of these between the ages of 15 and 60, a ratio of 111 females for every 100 males. In the 15-20 year age group, however, the proportion was far greater: 204 females for every 100 males (the higher ratio of females). Further studies highlighted the extent of famine-enforced migration from rural to urban areas. Singh (1975) found that some 5 percent of households in Palamau district migrated during the 1966 famine in Bihar (Bhatia 1991 : 250).

A glance played by the rural women during the Bengal famine would reveal the famine responses of poor women who were most vulnerable to food crisis, particularly in Bihar and Bengal. Their role changes during famine, to primary decision makers and food procurers and they would doubtless be driven from wage labour to destitution, perhaps to migration to urban areas (Ali 1989 : 113).

There is a suggestion that the generally elevated vital rates in urban Maharastra in 1973 reflects distress migration towards towns. Of women, some of whom gave birth, and of afflicted people in general, some of whom died. Raised mortality is certainly not an inevitable component of famine. Conversely Maharastra poses an instance where there was substantial excess mortality not withstanding comparatively well targeted measures of relief. This brings finally to migration which itself has complex links with famine and mortality. Distress migration during famine can rightly be viewed as both an important survival strategy and a process which may actually increase the risks of death. Moreover, the ambiguity of the relationship between migration and mortality in circumstances of famine pertains not only to those who migrate, but also to those who stay behind (Dyson 1992 :1331).

During the 1979-80, drought prone areas of Madhya Pradesh were facing a drought of unprecedented magnitude. Cattle perished and acute scarcity of fodder and drinking

water existed. In a village called Kudra it was reported that while the tribesmen, mostly farmers left the village in search of works, women and children who were left behind were forced to eat churala, a kind of grass to satisfy hunger (Balakrishna 1982:27).

The recent Kalahandi drought (1986-87,87-88,88-89) has not only weakened the economic base but also created social problems. The drought has caused severe crop loss and the main sufferers are the medium, small and marginal farmers. People of Kalahandi usually migrate during drought to the nearby urban centre, Raipur in Madhya Pradesh, which has become a very common means to escape from economic distress. They get some work as wage labourers in factories or some other private enterprises. It is the agricultural labourers who depend on agriculture who have been largely affected by drought. Except those under the Jajmani system with big farmers, other small and marginal farmers, landless labourers who depend mainly on employment opportunities available in their own village and other neighboring villages (also affected by drought) are now migrating to Raipur district for employment. Recently a total of 239 persons migrated, (Nayak etal 1991 : 58).

Changes in occupation occurred during Maharastra drought (1972) for 45 families who were artisans. This included 32 rope makers, 4 barbars, 3 carpenters and 3 potters, 2 oilman and 2 blacksmith families. Six families of rope makers reported that the principal earners worked in their traditional occupation and others joined relief works.

The cash need at the time of drought inspite of relief works had to be met through of distress sales of cattle, utensils or other household assets or borrowings against gold or mortgage. The agricultural labour families or the small cultivator families reported that they hardly had any assets to fall back upon during drought period. Out of 100 families, 23 families reported sale of assets/cattle/utensils. Gold was mortgaged in three cases and in one case ornaments were mortgaged. One case of sale of land was noted, where an amount of Rs.3000/- was received against sale of one hector of land. In addition, the sale of animals fetched an amount of Rs.100/- to 150/- in case of bullocks and Rs.35/- to 50/- in case of cow (Brahme 1983 : 51).

The drought in Kalahandi affected the socio-economic condition of the people but the situation had never led to child selling as a heard elsewhere. Livestock surprisingly escaped from the clutches of drought. The medium farmers received necessary loans and reacquired help and maintained their livelihood. Landless labour, small and marginal farmer were able to earn livelihood by surviving in Jajimani system, participating in labour intensive programs and other migralional strategies towards industrial cities.

The big farmers could manage to sustain because of their savings and other assets. The medium class farmers, due to government service and necessary loans help from their in laws either in Kalahandi or Raipur district, could also maintain their livelihood out of the rest small and marginal farmers as well as landless people, some manage through the Jajmani system and through the labour intensive programmes, some tried to cope through forest collection and others prefer to migrate to different industrial and project areas (few in Kalahandi and majority in Raipur) for employment. The worst sufferers in the prevailing circumstances are the poor and marginal farmers, landless labourers including scheduled castes and tribes. Consequent upon the drought some of them could manage to meet the food requirement of their families by resorting to various types of occupation such as working wage labour in Government run welfare programmes, as daily labour in the neighboring towns and even in the urban areas of the neighboring states and remaining attached to tradition - bound jajamani system albeit with drastically reduced returns (N.K. Behura and P.K.Das 1991 : 150). Fig 2.1 shows the district under D.P.A.P. programme in India, and respective percentage areas under D.P.A.P. coverage.

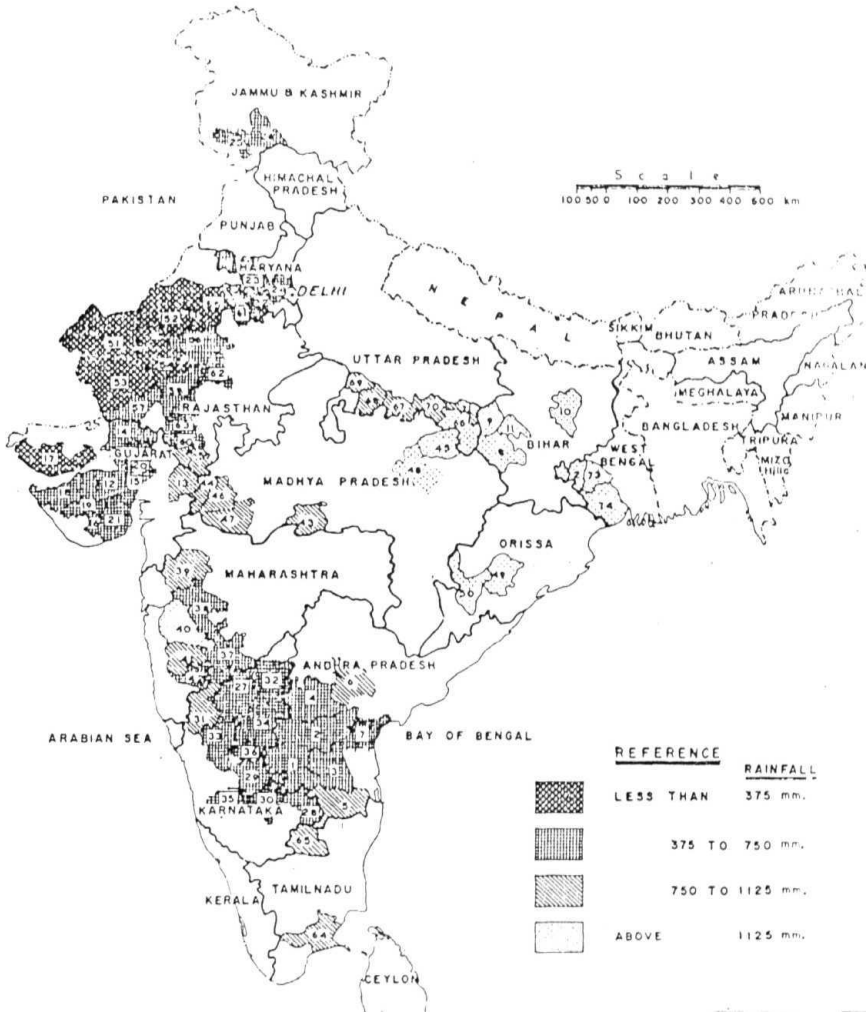


Fig 2.1 Districts Covered under Drought Prone Area Programme (DPAP), Government **of India (Source, Dutt 1985)**

Key to Fig. 2.1: Districts (State Wise) Covered under the Drought Prone Area Programme.

/. *Andhra Pradesh* (7 Districts)

1. Ananthapur (100%)
2. Kurnool (100%)
3. Cuddapah(89.6%)
4. Mahboobnagar (87%)
5. Chittoor (74%)
6. Nalgonda (14%)
7. Prakasham (10.8%)

7. *Bihar* (4 Districts)

8. Palamau(100%)
9. Rohtas (45%)
10. Monghyr (34%)
11. Nawadah(2()%)

7/. *Gujarat* (10 Districts)

12. Surendranagar(87%)
13. Panchamahals (75%)
14. Banaskantha (57%)
15. Ahmedabad (51%)
16. Amreli(41%)
17. Kutch (48%)
18. Jamnagar (25%)
19. Rajkot (21%)
20. Mehsana (11%)
21. Bhavanagar(8%)

IV. *Harvana* (3 Districts)

22. Mohindergarh (100%)
23. Hissar (29%)
24. Rohtak (25%)

V. ***Jammu & Kashmir* (2 Districts)**

25. Doda(100%)
26. Udhampur (26%)

VI. *Karnataka* (10 Districts)

27. Bijapur (62%)
28. Kolar (62%)
29. Chitradurg(61%)
30. Tumkur (43%)
31. Belgaum (42%)
32. Gulbarga (35%)
33. l)harwar(34%)
34. Raichur (26%)
35. Chickmagalur(19%.)
36. Bellary (10%)

VII. *Maharashtra* (6 Districts)

37. Sholapur (86%)
38. Ahmednagar (53%)
39. Nasik (48%)
40. Poona (44%)
41. Satara(43%)
42. Sanghli (38%)

VIII. ***Mahdya Pradesh* (6 Districts)**

43. Betul (100%)
44. Jhabua (100%)
45. Sidhi **(100%)**
46. Dhar (65%)
47. Khargon (25%)
48. Shahadol (25%)

IX. *Orissa* (2 Districts)

49. Boudh Phulbani (88%)
50. Kalahandi (61%)

X. *Rajasthan* (13 Districts)

51. Jaisalmer(100%)
52., Bikaner(100%)
53. Barmer (100%)
54. Jodhpur (100%)
55. Churu (100%)
56. Nagaur(100%)
57. Jalore (100%)
58. Pali (100%)
59. Banswara (100%)
60. l)ungarpur(100%)
61. Jhunjhunun (51%)
62. Ajmer (20%)
63. Udaipur (18%)

XI. *Tamil Nadu* (2 Districts)

64. Ramanthapuram (100%)
65. Dharmapuri (100%)

XII. *Uttar Pradesh* (6 Districts)

66. Mirzapur(100%)
67. Banda(63%)
68. Hamirpur (55%)
69. Jalaun (49%)
70. Allahabad (41%)
71. Varanasi (33%)

XIII. *West Bengal* (3 Districts)

72. Purulia(100%)
73. Bankura(29%)
74. Midanapur(23%)

NOTE : Figures in parentheses denote percentages of area in the district c

2.8 DROUGHT PRONE AREAS OF ANDHRA PRADESH

Andhra Pradesh state is situated in a topical region between 13° N to 20° N and 77° E to 88° E . The state, physiographically is divided into Telangana, Rayalaseema, and Coastal Andhra. Drought has been recurring in different areas of Andhra Pradesh. Eight districts viz Anantapur, Chittoor, Kurnool, Cuddapah, Prakasham, Mahaboobnagar, Rangareddy and Nalgonda are identified as drought prone districts in Andhra Pradesh. In Rayalaseema 33 taluks were identified as drought areas in 1978, out of which 26 taluks were chronically drought areas. Almost all the taluks of Anantapur, nine out of eleven in Kurnool, five out of nine in Cuddapah and two out of eleven in Chittoor are drought prone. Half of the taluks of Rayalaseema region were identified as hard-core (severe drought areas). Again all the taluks of Anantapur, five out of eleven in Kurnool, four out of nine in Cuddapah come under this group. No taluk of Chittoor district was identified as a hard core drought areas, (Venugopal and Geeta, 1978 : 71). During the period 1921 to 1952 there were 12 droughts. Droughts have occurred continuously for three to four years, during different periods for example, from 1921 to 1924; 1933 to 1935; 1941 to 43, and 1950 to 52. During these periods more than one third of the taluks of Rayalaseema faced drought years. These were followed by moderate drought years for the next five or six years.

2.9 AGRICULTURE IN DROUGHT PRONE ANDHRA PRADESH

The recent documentation on the impact of droughts on agricultural production shows the extensive damages caused by the frequent recurrence of droughts. The 1981-82 drought affected jowar, bajra, pulses and groundnut crops (Govt. of A.P., Memorandum on Drought 1981). The farmers were badly hit and their purchasing power reduced. In 1983 the Government of Andhra Pradesh declared that 156 taluks in full and 17 taluks in parts, spread over 20 districts of the state, as drought affected. During this year the kharif and Rabi seasons were not normal and the distress among the people further got aggravated. Unemployement and drinking water problems existed. Equally grave was the position of availability of fodder to the cattle. In 1984-85, considerable areas have been left fallow both under rainfed crops and paddy crops. Under the rainfed crops the area

left as fallow was 6.72 lakh hectares and **the area left as fallow under paddy crop was 6.11 lakh hectares.** Scanty rainfall lead to drought, which affected water levels and caused misery **and** distress not only to small and marginal farmers but also to the large farmers. **The** shortfall in the area under paddy was 4,62,628 hectares out of a normal area of 9 lakh hectares. Extensive damage was caused to the groundnut crop. As against 12,20,000 tonnes of groundnut output in kharif 1983-84, the estimated produciton was 3,51,200 tonnes. Even after consideration of rabi production, the total production in 1984-85 was 8,27,200 tonnes as against the actual production of 16,96,000 tonnes in 1983-84. The year 1984-85 witnessed a steep fall in agricultural produciton, large scale unemployment of agricultural labourers, acute drinking water scarcity and fodder scarcity. During 1984-85 50.5 percent of the area i.e. 39,46,823 acres out of total area 65,60,310 acres has been affected by the drought. Persons belonging to small and marginal farms and agricultural labour suffered due to drought. (Govt. of A.P., Memorandum on drought 1984-85).

The year 1985-86 was also a drought year. The crops and yields were badly affected. Under dry crops about 7 lakh hectare was fallow. A production loss of 3.5 lakh tonnes was estimated which amounted to a loss of Rs. 52.50 crores. The loss of crop in kharif and reduction in yield dur to lack of water was estimated about Rs. 475.00 crores. The total crop loss including production loss due to fallows was in the order of Rs. 860 crores. Out of a total population of 29,56,798 vulnerable to drought, 10,01,518 were affected by drought. Atleast 25% of the labour was affected in the area i.e. 3.49 lakh persons in 10 districts and 6.35 lakhs in 8 districts, thus totalling 10.02 lakhs (Govt. of A.P., Memorandum of Drought 1986).

The state of Andhra Pradesh was reeling under drought for successive third year during 1986-87. In the 12 districts affeted by drought, an extent of 3.57 lakh hectares was left fallow under paddy alone. An area of 4.37 lakh hectares was kept as fallow. The production loss under paddy crop was 7.14 lakh tonnes. Under dry crops approximately **10.00 lakh hectares** was left as fallow. The value of production loss was estimated at Rs. 75.00 crores. The total crop loss on account of crop failures and consequent reduction

in yields both under wet and dry **crops** for **10.38 lakh** hectares came to Rs. 207.60 crores. The total crop loss on account of areas left unsown and the production loss due to failure of crops and consequent reduction in yields both under wet and dry crop together is estimated at Rs. 496.00 crores. An amount of Rs. 48.40 crores was released as gratuitous state relief towards employment generation, water facilities and fodder provision to cattle. Out of a population of 90,51,631 vulnerable to drought 31,27,005 were affected by drought (Govt. of A.P., Memorandum on Drought 1987).

The state has been subjected to a fourth consecutive drought during 1987-88. It was estimated that an area of 10.4 lakh hectors was affected and 42% of the area was left as fallow. It has been estimated that during drought period, the number of affected agricultural labourers, small and marginal farmers in all the 13 affected districts covering 405 mandals was 25.03 lakhs. Due to prevlence of drought conditions there is not only scarcity of water but the purchasing capacity of poorer sections of the society has been reduced, thus adding to the hardship of people living in the drought affected areas. Even during normal conditions 48% of the rural population in the state live below the poverty line and 80% out of them suffer from protein malnutrition, and within that category 60% were children in the age group of 0-6 years. An area of 16-33 lakh hectors was unsown and an area of 10.04 hectors have been damaged after sowing. A total area of 23.83 lakh hectors have been lost due to drought. A total population of 76,61,676 were vulnerable to drought which consisted of small and marginal farmers, and agricultural labourers, out of which 25,03050 persons were affected by the drought. During the 1990-91 drought, a total value loss in production of worth of Rs. 521.48 crores and unemployment existed with a total of 1354.85 lakh mandays lost. During the 1991-92 drought, the total value lost in production was Rs. 396.60 crores. Mandays numbering 1504.05 lakhs were lost due to drought during the same period.

In Andhra Pradesh drought has been occuring at various intervals particularly due to the delays in the arrival of monsoon rains. Due to scanty rains below the normal level a number of districts are getting affected. The ground water table is going below at a faster rate. The area under forest has been fast decreasing as the grazing fields does.

Most of **the** districts are now under the impact of drought and poeple are awaiting the declaration of such areas as drought-prone by the government. The farmers are not even getting enought water for growing a single crop. Tanks are dried and the ayacut areas which were yielding two crops (irrigated) in a year, for a period of two years when once filled with water, now are kept fallow. Many villages are drinking water problem villages. Wells and borewells are getting dried up. Live stock are being disposed in urban markets at minimum prices due to non availability of fodder and water.

2.10 STATE POLICY TOWARDS RELIEF AND MITIGATION OF DROUGHT

The state's efforts to mitigate the effects of drought could be seen through the implementation of Drought Prone Area Programme (DPAP).

Droughts have now become an internal part in the survival mode of the people in the country. 19% of the total geographical area and 12% of the total population is under drought prone conditions. Due to low and instability in productivity there exists several imbalances in regional and economic characteristics in these areas. The Government of India initiated longterm drought eradication plan during the 5th five year plan known as drought prone area programme (DPAP). The programmes's strategy is to encourage agriculture and allied activities and with these to achieve balanced regional development. The important aims of the programme are (1) to reduce the impact of drought, (2) to increase the incomes of people, (3) to restore ecological balance. The programmes implemented so far have been (1) irrigation sources development (2) soil and moisture conservation (3) adopt suitable cropping patterns based on type of the regions, development of pasturelands, (4) livestock development and (5) development of small and marginal farmers and agricultural labourers. The central Government have created special department in the concerning rural development ministry for the implementation of the DPAP. At the district level, it is the collector who acts as the chairman of DPAP. Different schemes are implemented by the staff of the concerning blocks in which the programme is in operation. DPAP is implemented in 74 districts and in 13 states all over India and 7 districts in the state of Andhra Pradesh.

The DPAP in originally an integrated programme implemented along with DDP (Desert Development Programme) and IWDP (Integrated Waste Land Development Programme), the component additionally included in the DPAP are land development, provision of irrigation through watershed schemes and provision of natural sources such as water. Food and fodder crops along with firewood crops are grown under this programme. The broader objectives of the programme are soil and moisture conservation, forestry. Agro-forestry, pasture development, and horticultural schemes. Due to the creation of these sources the groundwater sources will be increased so as to solve the problems of drinking water and irrigation. In addition fodder , fuel and firewood, wood for construction, raw materials required for rural industries, raw materials required for rope and leave plate making are available. Such a situation will create and increase employment prospects for the rural poor. At present the programme has been extended to 96 districts, which cover 627 Blocks in 13 states spread throughout the country with a programme coverage in 5.36 sq.km of area. The programme required and allocated an additional funds of 50 percent in the year 1993-94 and it has been 10.70 percent during 1994-95 years. An amount of Rs.178.91 crores was given during the last three years to the concerning states. Another related programme is DDP which is implemented in 21 districts covering 31 Blocks with an area and programme coverage in 3.62 lakh hectors 50 percent of addition funds in 1993-94 and 13.13 percent of additional funds, in 94-95 are given for this total centrally sponsored programme. An amount of Rs. 173.25 crores have been allotted during the last 3 years, to 5 states for this scheme. People in drought prone areas are concerned with their inherent survival strategies in order to cope with drought. Droughts have now become integral part of Indian rural economy leaving recurring effects on farming and non-forming communities. Drought is an environmental crisis which lessens small cultivators ability to support his members, as a consequence, he move towards areas suitable for migration in order to gain livelihood. Women, children, the disabled as well as crops and livestock are the main sufferers in the event of drought.

As noted earlier drought conditions in Andhra Pradesh prevailed in the years of 1981, 1982, 1983,1984,1985,1986,1987,1988,1989,1990,1991,1992,1993,1994,1995. In the year 1981, 14 districrs were declared as drought- prone. Forty two thousand tonnes

of foodgrains have been released by the government of India under NREP. Rs.10 crores have been released for employment generation works. Rs 550.00 lakhs have been spent on major and medium irrigation schemes and Rs.680.00 lakhs have been spent on minor irrigation works. An amount of Rs.300.00 lakhs was spent on rural roads and Rs. 230.00 lakhs was placed at the disposal of the district collectors for the rural works of scattered nature.

The physical achieverments during 1979-80 drought shows sanction of grant of Rs. 909.00 lakhs where as the amount sanctioned was 21,262 lakhs. 13,680 works have been completed, 1177 problem villages were also covered out of the totla villages 6920. 25,801.0 (M.Ts) of dry fodder has been supplied along with 3 1,869 fodder minikits. 4.95 lakhs of subabul plants were provided to farmers. The quantity of concentrated food supplied during drought was 1022.00 (M.Ts). An area of 21,346 acres was taken under fodder cultivation in farmers field.

In view of continuity of severe drought, supply of fodder has been arranged at 50% cost of fodder, transport being free. Four fodder banks have been established to tackle drought. Four cattle camps have been established in the state to tackle drought. Drought resistant fodder trees of K-8 M.P. Chary, 5.5.6, 59.3, jowar, sunhemp, kubabul, jatropha and agave types were launched. The government of India sanctioned as assitance of R.s 68.77 crores including a loan assistance of Rs. 9.26 crores. The state government has released this amount of undertaking drought relief operations including provision of drinking water, fodder for cattle, maintenance of health as follows. An amount of Rs. 3,000.00 lakhs for employment generation works, 1,710,00 lakhs for rural water supply, Rs. 140.00 lakhs for fodder programme and Rs. 50,00 lakhs for public health. An amount of Rs. 166.00 lakhs have been provided under gratuitous relief. The entire amount has almost been spend by the end of 1983.

The state government declared 19 out of 23 districts as drought affected, in the year 1984. A total plan outlay of Rs. 54166.56 lakhs has been allocated for irrigation, roads, water supply and NREP works. Gratuitous relief was Rs. 3,00,000.

The state government declared 437 mandals in 19 districts as drought prone in the year 1985, initially, and added 247 mandals later to notify almost all the mandals in these district as drought prone. A total population of 1,32,71,323 are small, marginal farmers and agricultural labourers who are vulnerable to drought. The total affected population from this group by the drought was 34,61,934. A total amount of Rs. 74,331,50 lakhs was earmarked for irrigation, to roads and water supply, community development (NREP & RLEGP), soil and moisture conservation and DPAP works. Out of 24,986.45 lakhs of labour population, 12,493.23 lakh persons were affected by drought.

The state government declared 14 districts out of 23 distrcts as drought prone during 1986-87. The sector-wise projectons under drought relief programme required an amount of Rs. 326.3 crores for various drought proofing measures. The works included irrigation, road works, water supply, community development, watershed, soil conservation, sericulture, forestry, horticulture, fodder and gratuitous relief.

The state government declared 14 districts as drought prone in 1987-88. The Government released an amount of Rs. 63.64 crores and Rs. 33.66 crores (inluding spill over amounts) during 1987-88 as against the central ceilings of Rs. 48.38 crores for both years. The state government incurred an expenditure of Rs. 35.62 crores by 31st March, 1987 and Rs. 27.09 crores during 1987-88 upto June, 1987 upto 30th June, 1987 on drought relief works. Of the total expenditure of Rs. 62.71 crores spend on drought relief works during 1986-87 and 1987-88 as much as Rs. 9.45 crores have been spent on drinking water. This was due to intense water scarcity. The state faced severe drought as in many districts drought conditions prevailed even upto 4 successive years, adding to the suffering of rural population and depressing the rural economy.

In 1992-93, the state government declared 7 districts out of the total 23 districts as drought prone and a total of 176 mandals were affected by drought. The sector-wise allocation for major irrigation was Rs. 710.00 lakhs, 110.00 lakhs for medium irrigation works and 1976.00 lakhs for minor irrigation works. The minor irrigation works under

Panchayat Raj department consisted of Rs. 11905.00 lakhs. An amount of Rs. 2515.26 lakhs were proposed for horticulture programmes, 1,93.00 lakhs have been proposed for sericulture programme. The creation of employment upto 8,67,000 days was proposed.

A total outlay of Rs. 645.44 crores was proposed to works under irrigation (138.81), agriculture (40.66 crores), horticulture (83-90 crores), wasteland development (4.50 crores), sericulture (1.93 crores), handlooms (0.83 crores), rural roads (193.00 crores), fodder (5.60 crores), drinking water (127.43 crores) labour migration (46.24 crores) and gratuitous relief (2.54 crores) thus totalling Rs. 645.44 crores.

During the 1993 year an amount of Rs. 795.44 lakhs have been spent on agriculture, irrigation, forestry, livestock development and sericulture. Apart from these programmes, soil and moisture conservation programme, land and soil fertility, irrigation potential, forestry and fodder development programmes have been undertaken.

During the year 1993-94 the state government of Andhra Pradesh has allocated an amount of Rs. 18.04 crores under the DPAP programme. This programme is undertaken in 8 drought prone districts namely Anantapur, Chittoor, Cuddapah, Kurnool, Prakasam, Mahaboobnagar, Rangareddy and Nalgonda districts. Sixtynine blocks in these districts have 75 micro watersheds. The concerning DRDAs (District Rural Development Agency) doubled the allocation of 1992-93 budget in the year 1993-94. People's participation has been sought while planning and implementing the watershed and percolation tanks and small reservoirs. This would not only safe-guard the interests of the farmers but also protect their properties. More care is taken by the concerning officials to identify and implement micro-watersheds and the related method. The integrated watershed programme was started in the year 1985. Hereafter they are called micro-watershed. Each micro watershed consist an area of 5,000 to 7,000 hectors. 75 percent of the D.P.A.P. funds are provided for land and soil conservation. Drought mitigation works such as irrigation, forestry and fodder. Livestock development, fisheries, sericulture and horticulture received 15 percent of the DPAP funds for their development.

2.11 SURVIVAL THROUGH THE JAJMANI SYSTEM

The origins of the word 'Jajmani' are to be found in the Sanskrit word 'yajman' meaning the one who employs a Brahmin priest to offer a sacrifice. The Jajmans of a Brahman priest are his parishioners - similarly, Chamars, Doms, Dafalis, Bhats, Nais, Bhangis, Barhais, and Lohcrs all have their jajmani, or clientele, from when they receive fixed dues in return for regular service. These Jajmanis are Valuable sources of income, both heritable and transferable: they are strictly demarcated, and the crime of poaching on a fellow casteman'sjajmani is bitterly resented. A Dom, it is said, would not hesitate to hand over to the police such a poacher. The Jajmani system is a system of hereditary obligations of payment and of occupational and ceremonial duties between two or more specific families of different castes in the some locality. These service relationships were inheritable, saleable transferable by the individual artisan or servant who possessed then. In other words, the irreducible essence of the jajmani relationship is the exclusive property right possessed by a member of an artision or servant caste to serve a specific patron family. When the Sahukar accepts a cultivator as his client (asami), it becomes his duty to give advances in money for any purpose whatever, and also in any kind in which he deals. The client, on the other hand, undertakes to borrow from no one else and to repay the sahukar debts out of his produce before he settles the dues of any other person. Jajman is a person (Mayer 1993 : 355) who employs and fees Brahmans for the performance of any solemn or religions ceremony; as it is not usual for relation between the employer and those employed to become hereditary, the latter come to regard the farmers as their pupils or clients, and claim as their right and due the fees that are to be paid on such occasions, although they should not perform the ceremonies; from religions, the term passed to very miscellaneous relations, and barbers, washermen, and sweepers claim, in some parts of Hindustan, a prescriptive or heriditery right to be employed and paid by strain individuals, whom they therefore style their jajman. Jajman is a person from whom Brahmans, or menials, such as barbers, washermen, and sweepers, have an heriditery right to claim pertain perquisites, on occasion of any ceremonies or services which they are called upon to perform (Elliot 1976).

Sharma (1984) in his recent study of the jat - dominated western U.P village of Uattary Ghatayan, indicates that only vestigial jajmani relationships remain. Almost all castes, from Brahmins to Chamars (scavengers) and Bhangis (sweepers) have experienced significant out-migration and change of occupation. The oilpressers have largely grown into transportations and agricultural labour, the work which was formerly done by the Chamars. The latter now prefer to work for daily wages. The jogis, once beggars, now raise buffaloes and sell milk. The potters still make clay pots, but have discontinued the jajmani system and sell the pots (for) cash mainly at the time of marriage (Sharma 1984). Only the carpenters retain jajmani relations, and money of then have also left for outside work.

The Balutadari system in Maharastra, Mirasi system in South India, are contemporary to the jajmani system found in northern India. Jajmani system helped the rural artisans as well as the local landlords to survive through the difficult phases of drought. The jajmani system proved a kind of inherent survival strategy to the artisans particularly to the washermen and carpenters, during the drought. When the drought aggravated in rural villages, (for example survey villages in Telangana and Rayalaseema in the present study) consisting of small and marginal farmers and agricultural labourers migrated to other areas to work. But those (particularly washermen, carpenters) working under jajmani system with big farmers and landlords could survive the drought without migration, through serving them with works such as washing cloths and making agricultural tools and implements such as ploughs and bullock carts. Inspite of crop failures the lend owners paid essentials to these artisans while adjusting the some with other non-farm incomes. Thus the jajmani system is still prevalent in a number of villages in south India which not only represents the traditional bondage between the landowners and the servants but also reveals the underlying drought survival strategy in rural India.

CHAPTER III

DROUGHT CONDITION IN ANANTAPUR AND MAHABUBNAGAR DISTRICTS

3.1 AGRICULTURE IN DROUGHT PRONE ANANTAPUR DISTRICT

Anantapur is one of the four districts of Rayalaseema region of Andhra Pradesh, the other three being Kurnool, Cuddapah and Chittoor. This region is a typical dry tract of the State situated in an unfavourable natural zone and forms a substantial part of the drought prone region of the State.

The soils of the district arc predominantly red and black. Fertile black cotton soil predominates the Northern division, consisting of Gooty, Uravakonda and Tadipatri mandals. The Central division which comprises of Anantapur, Dharmavaram, Kalyandurg and Rayadurg mandals, presents a picture of poor and inhospitable stony red soils with slight admixture of black in parts. The Southern division comprising Madakasira, Penukonda, Hindupur and Kadiri contains chiefly red soil which is slightly better than the Central division.

The red soils which range from brown to red in color and arc low in humus nitrogen and phosphoric acid, and are found congenial for rice cultivation. The light textured soils between are found to be particularly favourable Kharif crop cultivation, while the clay loams with their high degree of moisture retention are found congenial for Rabi crops.

RAINFALL AND IRRIGATION IN ANANTAPUR

The average rainfall in the district is 544 mm. The district received deficient rainfall for three years during the period form 1955-56 to 64-65. /There were five deficient rainfall years during 1965-66 to 1974-75 and during the period 1975-76 to 1984-85, there were 5 deficient rainfall years. During 1955-56, area irrigated under tanks was 43 percent of the total area irrigated. During the same period area under well

irrigation was 31 percent of the total area irrigated. During 1965-66 area irrigated under tanks and wells was 26 percent and 53 percent respectively. During 1975-76, area under tank irrigation was 32 percent and area under well irrigation was 37 percent of the total area irrigated. During the period of 1987-88, the area under tank irrigation declined to 10 percent and area under wells increased to 55 percent. During 1987-88 area irrigated under canals was 32 percent of the total area irrigated. The area under different irrigation sources and their respective percentages is given in the Tables 3 and 3 (a).

TABLE 3
NET AREA IRRIGATED UNDER DIFFERENT SOURCES OF ANANTAPUR DISTRICT
(Area in Hectares)

YEAR (1)	TANKS (2)	CANALS (3)	WELLS (4)	TUBE WELLS (5)	OTHER SOURCES (6)	TOTAL (7)	GROSS (8)
1955-56	36509	18342	26079		3440	84370	123549
1956-57	43984	19646	32348		2967	98945	128328
1957-58	33451	16971	33072		5	83499	106069
1958-59	34556	18730	31515		1584	86385	420752
1959-60	38980	19420	25204		474	84075	112252
1960-61	36745	17717	26452		1701	82614	108078
1961-62	32060	21049	415690		5832	100510	118402
1962-63	50825	18276	45389		4182	118672	146680
1963-64	43743	31175	26377		4833	106128	132460
1964-65	48418	27950	38281		41 12	• 118761	150693
1965-66	27706	18117	55676		4004	105530	115675
1966-67	-	-	-	-		-	
1967-68	35232	17794	35080		3013	91119	115447
1968-69	26224	32794	42955		2922	104895	115062
1969-70	33646	37296	41927	137	6448	119454	132424
1970-71	31727	42167	49607		2300	125801	141593
1971-72	33971	33037	45219		4537	116764	137221
1972-73	48232	40394	62863		7161	158650	172416
1973-74	42423	35099	52545		10228	140295	189991
1974-75	40362	33269	62467	5	9753	145856	194228
1975-76	45433	29816	51519	3	13789	140560	182663
1976-77	14120	20769	62621	-	9687	107197	139243
1977-78	26474	31794	67223	-	9201	134692	167396
1978-79	17024	32336	60680	34	5711	115785	154208
1979-80	9662	79933	13754		3909	107258	142324
1980-81	9065	84468	14703	-	3283	111519	147091
1981-82	36586	39791	56238	273	8930	141818	182243
1982-83	20699	40074	65452	288	6309	132822	162238
1983-84	20542	37081	69118	732	7275	134748	165210
1984-85	9513	37571	61072	2709	2220	113085	130053
1985-86	3138	37375	58100	2859	1682	103154	116867
1986-87	8751	40472	59062	3277	1048	112610	123048
1987-88	13300	14065	75627	1739	2364	136091	142427

SOURCE : Data collected from the ***various*** *issues of* ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

TABLE 3 (A)

NET AREA IRRIGATED UNDER DIFFERENT SOURSES OF ANANTAPUR DISTRICT

(Area in Percentage)

YEAR (1)	TANKS (2)	CANALS (3)	WELLS (4)	TUBE WELLS (5)	OTHER SOURCES (6)	TOTAL (7)
1955-56	43.00	22.00	31.00		4.00	100.00
1956-57	44.00	20.00	33.00	-	3	100.00
1957-58	40.00	20.00	40.00	-	-	100.00
1958-59	40.00	22.00	36.00	-	2.00	100.00
1959-60	46.00	23.00	30.00	-	1.00	100.00
1960-61	45.00	21.00	32.00	-	2.00	100.00
1961-62	32.00	21.00	41.00	-	6.00	100.00
1962-63	43.00	15.00	38.00	-	4.00	100.00
1963-64	41.00	29.00	25.00	-	5.00	100.00
1964-65	41.00	24.00	32.00	-	3.00	100.00
1965-66	26.00	17.00	53.00	-	4.00	100.00
1966-67	-	-	-		-	
1967-68	39.00	20.00	38.00	-	3.00	100.00
1968-69	25.00	31.00	41.00	-	5.00	100.00
1969-70	28.00	31.00	35.00	_	6.00	100.00
1970-71	25.00	34.00	39.00	-	2.00	100.00
1971-72	29.00	28.00	39.00	-	4.00	100.00
1972-73	30.00	25.00	40.00	-	5.00	100.00
1973-74	30.00	25.00	38.00	-	7.00	100.00
1974-75	28.00	23.00	43.00	-	6.00	100.00
1975-76	32.00	21.00	37.00	-	10.00	100.00
1976-77	13.00	19.00	58.00		10.00	100.00
1977-78	20.00	23.00	50.00	-	7.00	100.00
1978-79	15.00	28.00	52.00		5.00	100.00
1979-80	9.00	75.00	13.00	-	3.00	100.00
1980-81	8.00	76.00	13.00	-	3.00	100.00
1981-82	26.00	26.00	40.00	-	6.00	100.00
1982-83	16.00	30.00	49.00	-	5.00	100.00
1983-84	15.00	28.00	51.00	-	6.00	100.00
1984-85	9.00	33.00	54.00	2.00	2.00	100.00
1985-86	3.00	36.00	56.00	3.00	2.00	100.00
1986-87	8.00	36.00	52.00	3.00	1.00	100.00
1987-88	10.00	32.00	55.00	1.00	2.00	100.00

SOURCE : Calculated on the basis of data from the various issues of **Season and Crop Report,** *Directorate of Ecommiics and Statistics, Government of Andhra Pradesh Hyderabad.*

(Note : Figures indicate percentage area to the total area irrigated.)

CHANGES IN THE CROPPING PATTERN

The following analysis of changes in the cropping pattern, area, production and productivity of crops and their sensitivity to changes in rainfall is based on the data from the Season and Crops Reports published annually by the Directorate of Economic and Statistics of the Government of Andhra Pradesh.

We now look at the changes in the cropping pattern for the period 1955-56 to 1990-91. Table 3.1 presents the percentage share of rice, jowar, bajra, groundnut, cotton and castor to the total cropped area for the district.

The share of the area under rice crop showed a tendency to increase but marginally upto 1975-76 but there was a decline in the 1980's. The percentage share of dry crops like castor, cotton, bajra and jawar have been declining consistently during the three and a half decades, and the area under these crops whichwas about 30 per cent at one point of time has been, over the years, reduced about 10 per cent. The area under groundnut crop in the region has been on the increase considerably, from 21.38% in 1955-56 to 60.61% in 1989-90. In short, the trends in cropping pattern shows a major shift from dry crops like cotton, bajra and jawar towards commercial non-food crop like groundnut, especially during the 1970's and 1980's.

One of the main reasons for the steep rise in the area under groundnut in this region could be because of the suitability of red soils and more economic returns from groundnut. The entire agricultural production seems to be moving towards mono-crop economy and that crop is basically rain-fed with all its vagaries of instability. This large dependence on rain-fed groundnut crop makes the whole region all the more vulnerable in case of failure of monsoons.

Table 3.1
SHARE OF MAJOR PRINCIPAL CROPS TO TOTAL CROPPED AREA IN ANANTAPUR DISTRICT

YEAR	CASTOR	COTTON	BAJRA	JOWAR	G.NUT	RICE
1955-56	1.13	6.92	8.29	13.15	21.38	
1965-66	0.96	3.92	6.76	13.69	27.90	3.47
1975-76	0.53	1.20	6.52	12.08	32.85	11.35
1989-90	0.76	0.03	2.93	7.94	60.61	**5.03**

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad.*

SENSITIVITY TO RAINFALL

The response of total cropped area to rainfall has been computed for the district to find out the sensitivity of the area in both these regions to rainfall. To compute the elasticities of acreage response to rainfall, a simple log-linear regression equation has been used, and they have been computed with a lag of one period and without a lag for the period 1955-56 to 1989-90. A look at the results show that the elasticity of acreage response to rainfall for the district is about 0.25. When a lag of one period is taken into, consideration the elasticity is about 0.06. The lower elasticity for the lag in comparison to the non-lag period in Anantapur district shows the extent of instability to be higher at low rainfall levels and it decreases as the level of rainfall rises. From this we can infer that the acreage response to rainfall in Anantapur district is higher when we take into consideration the acreage and rainfall in any given year and this high sensitivity also shows the extent of dependence on rainfall in the area.

Apart from looking into the acreage response to rainfall, we have also looked into the sensitivity of output to rainfall variations and the sensitivity of productivity to rainfall variations for the major principal crops for Anantapur district. Table 3.2 and 3.3 give the elasticities or percent deviations in production and productivity from its trend

due to 1 percent deviation in rainfall. The sensitivity or elasticity of output and productivity with respect to variations in rainfall has been observed to be a meaningful indicator for studying the impact of instability. The higher the sensitivity, the greater would be the fluctuations in output. Since moisture from rainfall is an important input, the sensitivity would be very high in low rainfall levels and it would decrease as the level of rainfall increases. To have a very clear idea as to what is happening to the output and productivity in Anantapur district, we have divided the study period into four sub-periods, 1954-61, 1962-67, 1968-76 and 1977-89. This would also help us in understanding and obtaining a level of rainfall which can be considered desirable or critical for production in the area. A look at the elasticities in Table 3.2 shows that the crop output has become more sensitive to rainfall during the second period of 1962-67 for most of the crops in Anantapur district. For all the other crops, except for chillies and greengram, the percent deviation in output due to rainfall is higher than what was experienced during the 1954-61 period. Pulses and most of the commercial crops have become more sensitive to rainfall during the second period. The higher sensitiveness of most of these crops during the second period could be because of the low rainfall levels in the area and depletion of groundwater sources during the period. If we look at the third period 1968-76, we find that for some of the crops the sensitivity of output to rainfall is comparatively lower compared to the second period, especially for crops like, groundnut, bajra, jowar, castor and maize when it has been very high for these crops during the earlier period, for all other crops the sensitivity of output to rainfall is comparatively quite high. If we look at the fourth period 1977-89, we find that except for groundnut, joawar and sesamum, for all the other crops the sensitivity of output to rainfall is very high. A look at the sensitivity of output to rainfall for the four sub-periods shows the higher sensitivity of output to rainfall during the second and the fourth periods for most of the crops, which would mean that the level of rainfall during the second period especially has been very low compared to what is required. In regard to the fourth period the sensitivity could be high not only because of low rainfall in the area, but also due to depletion of groundwater sources over the years in the area. What is more interesting is the sensitivity of output to rainfall for the groundnut crop which has declined during the third and the fourth sub-periods, though the sensitivity of output

to rainfall is comparatively high for this crop compared to other food crops. Another point to be noted is how the area under groundnut crop has been increasing during the subsequent periods as shown in Table 3.1 and the decline in the area of most of the other principal crops. This only shows that how over the years though the sensitivity of output to rainfall of groundnut crop has been high compared to other crops, but it has been comparatively less resistant to rainfall over the subsequent periods, in comparison to other crops which have been more resistant during the same periods.

TABLE 3.2

SENSITIVITY OF OUTPUT TO RAINFALL IN ANANTAPUR DISTRICT

CROP	1954-61	1962-67	1968-76	1977-89
GROUNDNUT	**-0.57**	2.00	1.40	0.84
BAJRA	**-1.39**	2.18	0.63	1.41
RICE		-1.08	0.10	0.27
JOWAR	-0.48	1.08	0.76	0.13
RAGI	0.23	0.29	0.36	0.41
SESAMUM	0.17	1.10	1.35	1.26
CASTOR	0.67	-0.18	0.28	1.41
TOBACCO	-0.27	1.57	0.96	1.03
COTTON	-0.23	1.30	0.50	0.64
MAIZE	-3.73	**-0.09**	0.51	1.26
BANGALGRAM	-0.23	3.37	0.80	**-3.27**
REDGRAM	0.43	-0.08	-0.68	0.20
SUGARCANE	0.47	0.05	0.07	3.39
CHILLIES	1.81	0.58	0.44	0.36
GREENGRAM	0.84	-0.16	1.06	**-0.50**
HORSEGRAM	1.11	2.12	1.61	2.09

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

A more clear view can be had, if we look at the sensitivity of productivity to rainfall, apart from looking at the sensitivity of output to rainfall. A look at Table 3.3 shows the sensitivity of productivity to rainfall to be high during the second period of 1962-67 for most of the crops. The sensitivity of productivity to rainfall during the third period is lower than that of the second period for all other crops, other than pulses. The fourth period shows a higher sensitivity of productivity to rainfall for bajra, castor, cotton and pulses. If we look at the behavioral pattern of both the sensitivity of output to rainfall and the sensitivity of productivity to rainfall, we find the sensitivities to be very high during the second and the fourth sub-periods for most of the crops. This apart, the sensitivity of productivity to rainfall for castor, cotton and pulses has been quite high during the subsequent periods, and that of groundnut has been low only during the third and the fourth sub-periods though there is not much difference.

It would be more interesting to look at the response of area, production and productivity to rainfall for the three and a half decades, 1955-56 to 1989-90, for about 16 crops, as shown in Table 3.4 for Anantapur district. The elasticities have been computed using a simple log-linear regression equation. The sensitivity of area with respect to rainfall seems to be comparatively low compared to production and productivity for almost all the crops. And/the productivity of groundnut and cotton seem to be more sensitive to rainfall than other crops because of their high elasticities for the entire period 1955-56 to 1989-90.

TABLE 3.3

SENSITIVITY OF PRODUCTIVITY TO RAINFALL IN ANANTAPUR DISTRICT

CROP	1954-16	1962-67	1968-76	1977-89
GROUNDNUT	-0.56	2.38	0.95	0.91
BAJRA	**-1.30**	1.51	0.35	0.70
RICE		-0.15	-0.17	0.02
JOWAR	0.09	0.69	0.84	-0.34
RAGI	0.87	0.20	0.21	-0.14
SESAMUM	-0.34	-0.38	1.18	-0.87
CASTOR	0.40	0.84	0.11	1.25
TOBACCO	0.26	-0.61	0.08	-0.12
COTTON	-0.38	1.05	0.67	2.49
MAIZE	0.82	0.16	0.70	0.45
BANGALGRAM	0.15	0.05	0.74	-2.15
REDGRAM	0.38	3.13	-1.05	0.10
SUGARCANE	0.35	0.09	-0.04	1.23
CHILLIES	1.09	-0.08	0.55	0.01
GREENGRAM	0.37	0.10	0.80	-1.18
HORSEGRAM	-0.24	0.36	1.68	1.93

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

TABLE 3.4

SENSITIVITY OF AREA, PRODUCTION AND PRODUCTIVITY TO RAINFALL IN ANANTAPUR DISTRICT

(1955-56 to 989-90)

	Area	Production	Yield
GROUNDNUT	-0.12	1.07	1.20
BAJRA	-0.09	1.19	0.49
RICE	-0.09	-0.11	0.12
JOWAR	0.36	0.49	0.12
RAGI	0.39	0.39	-0.01
SESAMUM	1.81	1.81	0.03
CASTOR	0.37	1.12	0.75
TOBACCO	1.27	1.61	-0.11
COTTON	-0.28	0.93	1.22
MAIZE	-0.35	-0.11	0.24
BANGALGRAM	-2.04	-0.75	-0.48
REDGRAM	**0.27**	0.93	0.67
SUGARCANE	**1.04**	1.74	0.70
CHILLIES	**0.37**	0.80	0.43
GREENGRAM	**0.58**	0.13	-0.43
HORSEGRAM	**0.37**	1.57	1.20

SOURCE : Calculated on the basis of data from the various issues of Season & Crop Report, Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderalxid

INSTABILITY IN CROP OUTPUT

While crop sensitivity was examined in terms of rainfall variations, and attempt is made here to show the sheer instability in crop output and crop productivity, as shown in Table 3.5 To measure the instability in crop output and crop productivity, we have first computed annual percentage changes in output and productivity, and then estimated the standard deviation in such annual changes. The standard deviations are computed for the four sub-periods 1955-56 to 1961-62, 1962-63 to 1967-68, 1968-69 to 1976-77 and 1977-78 to 1989-90, and also for the entire period 1955-56 to 1989-90 for about 16 crops for the district. A look at Table 3.5 shows that there is greater instability for all the crops except ragi, maize, bengalgram, sugarcane and chillies during the second sub-period compared to the first sub-period. The amplitude of fluctuations for all the other crops is significantly high in the second period of 1962-63 to 1967-68. During the third, period except for sesamum and bengalgram whose variability is very high, for all other crops the variability is comparatively lower than the earlier period. The fourth period from 1977-78 to 1989-90 shows a very high variability for all the crops in the district. The variability seems to be very high for the second and the fourth sub-periods compared to the other periods. The extent of variability in the district for rice, jowar and ragi are considerably low during all the periods, in comparison to all the other crops which are grown in the region. This high variability of these other crops could be because of these are grown largely under unirrigated and uncertain rainfall conditions.

TABLE 3.5

INSTABILITY OF CROP OUTPUT IN ANANTAPUR DISTRICT (STANDARD DEVIATION IN ANNUAL OUTPUT GROWTH RATE)

CROP	1954-61	1962-67	1968-76	1977-89
GROUNDNUT	21.97	85.51	32.59	78.87
BAJRA	69.38	209.75	49.89	96.89
RICE		44.10	29.28	41.73
JOWAR	37.45	69.92	28.71	42.13
RAGI	37.57	15.78	18.04	21.51
SESAMUM	29.92	85.38	199.93	108.12
CASTOR	14.87	59.01	43.01	132.67
TOBACCO	36.37	76.11	72.14	124.22
COTTON	18.55	64.44	60.36	192.61
MAIZE	229.63	158.90	57.92	155.07
BANGALGRAM	35.83	24.70	38.87	66.01
REDGRAM	21.43	245.70	71.57	120.27
SUGARCANE	**57.27**	39.81	36.75	180.96
CHILLIES	23.97	14.77	44.64	49.33
GREENGRAM	41.60	39.54	73.23	621.69
HORSEGRAM	30.21	20.09	77.42	204.63

SOURCE : Calculated on the basis of data from the various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad.

If we look at Table 3.6, where the instability of crop yield has been shown, we find that the variability of the yield for all the crops except ragi, maize, horsegram, sugarcane and chillies seems to be very high during the second period compared to the earlier one. A look at the Table also shows the high variance in groundnut yield during the second period compared to other periods. The instability in groundnut yield has been very high during 1962-67 period which is the same as was observed even in its output instability. There seems to be a considerable decline in the variances during the third period of 1968-77 for almost all the crops except for sesamum, bengalgram and cotton. The variance of even the groundnut yield during this period shows a considerable decline. The fourth period shows a considerable increase in the variances for most of the crops when compared to the earlier one, but the instability in the crop yield for all the crops is lesser when compared to the second period of 1962-63 to 1967-68.

A look at the instability Tables of both output and productivity show the extent of instability to be very high during the second sub-period of 1962-63 to 1967-68 for almost all the crops. The third and the fourth sub-periods also show instability but they are considerably less compared to that of the second sub-periods./As most of the crops which are grown in this area arc dry crops, the instability cannot be because of the seed fertiliser technology for they hardly have much influence on dry crops, and the only reason for such high variances in the dry crops can be identified to be that of rainfall which has been unstable, as shown in Graph 3.1. We find the fluctuations to be very high during the second sub-period compared to the other periods, though the rainfall has been oscillating consistently during the three and a half decades.

TABLE 3.6

INSTABILITY OF CROP OUTPUT
(STANDARD DEVIATION IN ANNUAL OUTPUT GROWTH RATES)
IN ANANTAPUR DISTRICT

CROP	1954-61	1962-67	1968-76	1977-89
GROUNDNUT	19.20	130.05	27.54	69.21
BAJRA	65.74	104.97	31.53	98.97
RICE		9.60	14.12	16.83
JOWAR	44.66	43.86	21.29	29.51
RAGI	22.95	18.26	15.23	21.24
SESAMUM	16.26	73.34	114.95	275.46
CASTOR	7.87	35.71	34.59	158.42
TOBACCO	28.92	63.74	23.98	38.38
COTTON	6.48	43.49	68.24	165.95
MAIZE	35.14	33.78	23.52	39.16
BANGALGRAM	4.26	10.97	53.57	50.61
REDGRAM	17.64	180.46	68.09	74.16
SUGARCANE	58.44	23.41	48.40	194.29
CHILLIES	16.14	13.30	53.56	42.05
GREENGRAM	5.90	23.03	62.51	663.75
HORSEGRAM	22.16	17.31	48.53	241.07

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh. Hyderabad*

TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY

The trends in area, production and productivity for Anantapur district for about 16 crops are shown in Tables 3.7, 3.8 and 3.9. To look at the trends we have computed compound growth rates for the entire period of three and a half decades of 1955-56 to 1989-90, and for the four sub-periods, 1955-56 to 1961-62, 1962-63 to 1967-68, 1968-69 to 1976-77 and 1977-78 to 1989-90.

The growth rates calculated in Table 3.7 show that during the first period from 1954-61, there has been negative growth rate for most of the dry crops like, groundnut, castor, tobacco, cotton, sugarcane and chillies. For the remaining other crops there has been a substantial increase in the area under these crops. The second sub-period from 1962-67 shows negative growth in the area under all the crops except bajra and sugarcane. This negative growth in the area under most of the crops during the second sub-period could be attributed to the high fluctuations in rainfall during this period. In the third sub-period, we observe again a negative decline in the area under most of the crops, except for groundnut, ragi and rice. This substantial increase in the area especially under groundnut crop could be because of the shift in the cropping pattern as we have observed in Table 3.1, where we find that there has been a decline in the share of area under major principal crops grown in this area. Another aspect to be observed is the growth in the area under cotton during the second and the third sub-periods, as the decline in the area under this crop has been considerably more compared to other crops. During the fourth sub-period, we observe a further increase in the area under groundnut crop which is about 2.92%. However, there has been a further decline in the area under most of the other crops, except for a few pulses like, bengalgram and redgram. If we look at the growth in the area under different crops during the last three and a half decades we find that except for groundnut and maize, the growth rate in the area of all the other crops has been negative. The area under groundnut crop has been subjected to a consistent increase especially during the third and the fourth sub-periods. And in the case of most of the other crops, there has been a considerable decline in the area.

Table 3.8, shows the growth rates of production for 16 crops where we find that during the first sub-period there has been a considerable increase in the production of most of the dry crops like, bajra, jowar, ragi, maize and Pulses. For the other crops there has been a negative growth in production. During the second sub-period, we observe an increase in the production of bajra, rice, sesamum, castor and sugarcane, whereas for all the other crops including groundnut and pusles the rate of growth of production has been negative. During the third sub-period groundnut, rice, jowar, ragi, bangalgram and greengram there has been a negative growth rate in production. The fourth sub-period shows a negative growth rate for almost all the crops except groundnut, rice and redgram. If we look at the rate of growth of production for the last three and a half decades for the 16 different crops, we find that except for groundnut, rice and greengram, there has been a negative growth in the production of all the other crops. Given the fact that the area under redgram, greengram and even rice occupy a very small proportion of cultivated area, Anantapur is emerging predominantly as a groundnut economy.

The growth rates of productivity of the 16 crops are presented in Table 3.9. During the first sub-period there has been an increase in the productivity of bajra, ragi, cotton, redgram and sugarcane, whereas there is a negative growth in the productivity of all the other crops. During the second sub-period the growth rate in productivity of many of the crops like bajra, rice, sesamum, castor, tobacco, maize and sugarcane show an increase, unlike that of area and production growth rates for the same period. The third sub-period shows an increase in the productivity growth rates for jowar, ragi, tobacco, cotton maize and a few pulses, whereas for the rest of the crops there is a negative growth rate. During the fourth sub-period, for most of the crops there has been an increase in the growth rate of productivity except for castor, tobacco, maize, bengalgram, sugarcane and chillies. If we look at the rate of growth of productivity for the last three and a half decades, we find that except for groundnut, sesamum, tobacco, sugarcane, chillies and a few pulses, for all the other crops there has been an increase. Tables from 3.10 to 3.15 shows the area, production and yield of major crops and their respective index values, during 1954-1990 in Anantapur district.

TABLE 3.7

TRENDS IN GROWTH RATES IN AREA
(ANANTAPUR DISTRICT)

	55-56 To 61-62	62-63 To 67-68	68-69 To 76-77	77-78 To 89-90	55-56 To 89-90
GROUNDNUT	-1.63	-0.10	1.67	2.92	1.31
BAJRA	0.11	0.49	-0.56	-5.88	-1.88
RICE		-0.15	2.91	-0.50	-0.18
JOWAR	3.10	-0.77	-2.56	-3.42	-1.28
RAGI	1.89	-1.60	1.99	-4.10	-1.28
SESAMUM	1.32	-3.16	-4.52	-10.83	-3.70
CASTOR	-1.43	-2.11	-0.32	0.11	-1.19
TOBACCO	-2.90	-8.30	-5.30	-1.26	-4.03
COTTON	-2.76	-8.27	-6.27	-7.79	-3.35
MAIZE	22.90	-4.06	-4.32	-2.74	2.75
BANGALGRAM	1.69	-1.77	-1.50	4.13	-0.75
REDGRAM	2.10	-2.73	-0.83	1.40	-0.22
SUGARCANE	-0.30	2.91	-0.18	-8.70	-1.09
CHILLIES	-0.94	-1.858	-0.38	-0.10	-0.91
GREENGRAM	2.12	-0.67	-1.75	-4.35	**-1.24**
HORSEGRAM	-0.89	-2.42	-1.68	-6.40	**-1.71**

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra* ***Pradesh, Hyderabad.***

TABLE 3.8

TRENDS IN GROWTH RATES IN PRODUCTION
(ANANTAPUR DISTRICT)

	55-56 To 61-62	62-63 To 67-68	68-69 To 76-77	77-78 To 89-90	55-56 To 89-90
GROUNDNUT	-4.81	-3.61	0.59	3.40	**1.21**
BAJRA	3.27	2.42	-1.31	-6.55	**-1.51**
RICE		0.74	2.65	0.16	0.39
JOWAR	2.20	-0.95	0.16	-1.32	**-0.14**
RAGI	1.92	-2.55	2.93	-3.45	-0.34
SESAMUM	-1.62	3.80	-23.18	-7.02	-5.21
CASTOR	-1.86	1.20	-6.77	-0.42	-1.13
TOBACCO	-4.22	-6.58	-4.25	-15.92	-4.23
COTTON	-1.69	-13.17	-1.70	-2.28	**-1.04**
MAIZE	22.44	-2.41	-2.40	-2.87	4.36
BANGALGRAM	1.37	-6.05	1.64	-1.53	-1.38
REDGRAM	5.28	-4.96	-10.13	2.06	-1.54
SUGAR CANE	0.48	4.43	-0.99	-18.00	-2.49
CHILLIES	-4.44	-6.51	-2.08	-2.54	-2.23
GREENGRAM	1.54	-8.25	-10.73	0.95	**1.31**
HORSEGRAM	-1.25	-9.13	-0.85	-6.36	-1.89

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop*** *ReportyDirectorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad*

TABLE 3.9

TRENDS IN GROWTH RATES IN YIELD

(ANANTAPUR DISTRICT)

	55-56 To 61-62	**62-63 To 67-68**	**68-69** To **76-77**	**77-78 To 89-90**	**55-56 To 89-90**
GROUNDNUT	-3.18	-3.61	-1.08	0.48	-0.10
BAJRA	3.16	1.93	-0.75	0.09	0.36
RICE		0.89	-0.26	0.67	0.57
JOWAR	-0.90	-0.16	2.72	2.10	10.14
RAGI	0.02	-0.94	0.94	0.60	0.94
SESAMUM	-2.93	6.96	-18.65	3.82	-1.51
CASTOR	-0.43	3.31	-6.45	-0.52	0.06
TOBACCO	-1.33	1.72	1.05	-3.27	-0.21
COTTON	1.07	-4.90	4.65	5.50	2.31
MAIZE	-0.44	1.64	1.92	-1.34	1.62
BANGALGRAM	-0.31	-4.28	3.13	-5.66	-0.64
REDGRAM	3.19	-2.23	-9.30	0.66	-1.31
SUGARCANE	0.79	1.52	-0.81	-9.39	-1.40
CHILLIES	-3.50	-4.66	-1.70	-2.47	-1.32
GREENGRAM	-0.57	-7.57	12.48	5.30	2.55
HORSEGRAM	-0.36	-6.71	13.13	0.40	0.10

SOURCE : Calculated on the basis of data from the various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderalmd

If we look at the rate of growth of area, production and productivity of **the 16 different** crops in the district, we find that there has been an increase in the area of only groundnut and maize, whereas there has been a decline in the area under all other crops. The production growth rates show an increase for groundnut, rice, maize and greengram only, while there has been a rise in the growth rates of productivity for most of the crops except for groundnut, few pulses **and** certain other dry crops. What is interesting in this context is that in the case of groundnut crop though the area and production have increased, there docs not seem to be an increase in its productivity, as it has been on a decline. Whereas in thc case of most of the other crops though there has been a dcclinc in the area and production there seems to be an increase in their productivity levels.

Thc trends in rainfall are thc deviations of the actual rainfall from thc normal rainfall for the district. The normal rainfall in the district is 544mm. The trends in rainfall and the growth rates in area, production and yield of some of the crops are shown in Graph 3.2, Graph 3.3 and Graph 3.4 and Graph 3.5.

Wc find that the behavior of growth rates in area and production are to quite an extent moving in the same manner as the trends in rainfall, though for a few years the movement is in opposite directions, and in case of few other years, we find that after a steep fall in rainfall below the normal rainfall, it takes two consecutive years of good rain for an increase in the area and production. In case of productivity growth rate we find this kind of a phenomenon all the more evident. The picture would be all the more clear, if we look at Graph 3.5 where we havc plotted the growth rate in groundnut yield and the rainfall deviations. During the 1960s, 1970s and 1980s, we find that after a steep fall in the rainfall during any one particular year, it takes about almost two years of good rainfall i.e., about 100mm above the normal for an increase in the productivity. And, a failure in rains brings down the productivity level. The emphasis on rainfall in this context is basically because of the kind of crop which is being grown in this region. As it is groundnut which occupies more than 50% of the area in this region and it being a rain-fed crop, it was thought that rainfall could be the most important determining factor, as the seed fertiliser technology would not be applicable. As rainfall is the most important determining factor, it would be essential to know, as to what could be the critical level of rainfall for the **productivity** level to be positive. From the Graphs, we find that the productivity level seems to be high and can remain positive, if the rainfall is around 100 mm above the normal level of rainfall of 544mm, say for about three to four years, so that even if the rainfall falls below the normal level, the productivity level could still be positive.

TABLE 3.10
AREA UNDER CROPS IN ANANTAPUR DISTRICT
(Area in Hectares)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7	NET SOWN AREA
1954-55	231714	87860		122093	78845	90720	
1955-56	228854	88786		144601	74132	117528	1028345
1956-57	262618	85103		138882	66517	124711	1019681
1957-58	261263	74497		157867	69664	111807	994348
1958-59	239999	88963		178418	52179	86614	1018224
1959-60	214324	90005		171066	61493	103783	1005940
1960-61	207951	85957	56108	219186	58880	13854	1011415
1961-62	174585	88272	56108	191892	46729	114918	980148
1962-63	201985	80693	45892	173418	78365	115564	1046761
1963-64	207720	78389	74910	153355	80549	111746	999928
1964-65	223044	74907	67595	125170	69283	96961	938990
1965-66	244175	59118	91338	119851	34743	81237	862709
1966-67	167861	106038	56601	160598	41569	9477	942757
1967-68	225275	76307	62737	151401	35284	90200	910920
1968-69	205609	66053	46477	164107	31535	93174	852757
1969-70	236148	53086	47324	138047	33598	80598	845946
1970-71	275480	70539	64170	149045	31031	103135	981104
1971-72	264851	57401	71563	131095	30869	93604	898056
1972-73	225026	50833	64463	198622	18954	119593	924604
1973-74	277707	64059	87586	146629	26676	98182	959717
1974-75	300275	58325	102702	1449933	20799	101987	941866
1975-76	324406	64419	98355	119323	11835	85048	944232
1976-77	273111	50329	112066	73420	9753	53614	735373
1977-78	294306	63785	64509	118923	28000	75538	921520
1978-79	338048	55806	75986	116862	25992	78701	907074
1979-80	364889	41577	60750	115975	21828	74441	877473
1980-81	334512	45378	65410	96316	18352	72190	836048
1981-82	391173	57016	52593	95340	20515	68117	948971
1982-83	397106	47329	79494	104778	14083	78940	885054
1983-84	451232	43635	58505	90922	90936	71942	923579
1984-85	473361	32766	60952	67734	17224	60972	851249
1985-86	486529	27182	44039	6322	17834	53431	796236
1986-87	441720	18777	31478	83233	3814	52338	767675
1987-88	545322	26326	41230	71405	256	50497	893273
1988-89	715000	15000	45279	49000	8000	52000	1022000
1989-90	730000	9000	83000	42000	14000	44000	1014000
1990-91	492000	6000	58000	26000	15000	50000	976000

SOURCE : Data collectedfrom the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

TABLE 3.11
INDEX VALUES OF AREA UNDER MAJOR CROPS IN ANANTAPUR DISTRICT
(Area in Hectares)

YEAR	GROUNDNUT	BAJRA	RICE	JOWAR	COTTON	PULSES	NET SOWN AREA
1954-55	100.00	100.00		100.00	100.00	100.00	
1955-56	98.76	101.05		118.43	94.02	129.55	100.00
1956-57	112.90	96.86		113.75	84.36	137.46	99.15
1957-58	112.75	84.79		129.30	88.35	123.24	96.69
1958-59	103.57	101.25		146.13	66.17	95.47	99.01
1959-60	92.47	102.04		140.11	77.99	114.39	97.82
1960-61	89.74	97.83	100.00	179.52	74.60	114.47	98.35
1961-62	75.34	100.46	100.00	157.16	59.26	126.67	95.13
1962-63	87.16	91.84	81.79	142.03	99.39	127.38	101.79
1963-64	89.64	89.22	133.51	127.24	102.16	123.17	79.23
1964-65	96.25	85.25	120.47	102.52	87.87	106.87	91.31
1965-66	105.37	67.28	162.78	98.16	44.06	89.54	83.89
1966-67	72.44	120.68	100.87	131.53	52.72	104.47	91.67
1967-68	97.22	86.85	111.08	124.00	44.75	99.42	88.58
1968-69	88.73	75.17	82.83	134.41	39.99	102.70	82.92
1969-70	101.91	60.42	84.34	113.06	42.16	88.84	82.26
1970-71	118.88	80.28	114.36	122.07	39.35	113.68	95.40
1971-72	114.13	65.33	127.54	107.37	39.15	103.17	87.33
1972-73	97.11	57.85	1 14.89	162.68	24.03	131.82	89.91
1973-74	119.8	72.91	156.10	120.09	33.83	108.22	93.32
1974-75	129.56	66.38	183.04	122.80	26.87	112.41	91.59
1975-76	140.00	73.23	175.29	97.73	15.01	93.74	91.82
1976-77	117.86	57.28	199.73	60.13	12.36	59.09	71.51
1977-78	127.01	72.599	114.97	97.40	35.51	83.26	89.61
1978-79	145.89	63.51	135.42	95.71	32.96	86.75	88.20
1979-80	157.47	47.32	108.27	94.98	27.68	82.05	85.32
1980-81	144.63	52.05	116.57	78.88	23.27	79.57	81.30
1981-82	168.81	64.08	93.73	78.08	26.01	75.08	92.28
1982-83	171.37	53.86	141.68	58.81	17.86	87.01	86.06
1983-84	194.73	49.66	104.27	74.46	25.28	79.30	89.81
1984-85	204.28	37.29	108.63	55.47	21.84	67.20	82.77
1985-86	209.96	30.93	78.48	49.40	22.61	58.89	77.42
1986-87	196.06	21.37	56.10	68.17	4.83	57.69	74.56
1987-88	235.34	29.96	73.48	58.48	0.32	55.66	86.86
1988-89	308.05	17.07	80.69	40.13	10.14	57.31	99.38
1989-90	315.04	10.24	147.92	34.40	17.75	84.50	98.60
1990-91	212.03	6.82	151.49	21.29	19.02	55.11	94.90

SOURCE : Calculated on the basis of data from the various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad

TABLE 3.12

PRODUCTION OF MAJOR CROPS IN ANANTAPUR DISTRICT

(Production in Tonnes)

YEAR	GROUNDNUT	BAJRA	RICE	JOWAR	COTTON	PULSES
1954-55	218167	13361		589220	26710	17383
1955-56	244198	35460		45072	24952	24759
1956-57	272597	31558		85531	22344	25441
1957-58	262383	37283		92711	26874	22599
1958-59	241028	27405		80989	20082	21355
1959-60	228693	50792		102336	25337	21802
1960-61	182737	41880	80916	76368	22917	22138
1961-62	77585	21956	61786	70097	17553	28864
1962-63	157468	35267	117679	79617	23855	23205
1963-64	150873	32249	103119	69132	23924	26435
1964-65	167000	31569	134421	31146	23083	24684
1965-66	37768	13583	58286	29721	4759	10628
1966-67	110443	86762	108870	78419	10354	14111
1967-68	142875	34033	73217	64084	6469	15275
1968-69	151584	30517	61782	60065	5781	14517
1969-70	132310	15660	100241	47381	8773	8265
1970-71	145903	34705	112289	49391	6034	21462
1971-72	201667	36450	118973	54505	8746	12126
1972-73	151121	260277	155018	71895	4633	22200
1973-74	236697	32863	165312	62958	7262	18281
1974-75	251620	26654	176320	91639	16754	24104
1975-76	234803	30663	161801	74816	3945	17592
1976-77	88363	13739	79170	31938	3684	3711
1977-78	274629	40376	141443	70908	16023	16227
1978-79	267494	26117	111952	85310	8955	15434
1979-80	271821	23657	107898	63993	26922	14403
1980-81	134813	18203	97839	44277	3454	8004
1981-82	364111	400082	151205	78129	25101	14563
1982-83	236041	12211	11442	114442	89776	24521
1983-84	500541	40624	111314	70820	283	28731
1984-85	280304	15990	84143	76211	27356	7666
1985-86	321155	13714	69954	69893	23443	6847
1986-87	386930	8995	73023	61573	2164	7546
1987-88	558104	16032	87938	57873	3704	10671
1988-89	691000	4000	189000	48000	7000	10000
1989-90	497000	5000	185000	44000	19000	14000

SOURCE : Data collected from the various issues ofSeason and Crop Report,Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.

TABLE 3.13

INDEX VALUES OF PRODUCTION OF MAJOR CROPS IN ANANTAPUR DISTRICT

(Production in Tonnes)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	100	100		100	100	100
1955-56	111.93	265.39		76.83	93.41	142.43
1956-57	124.94	236.19		145.16	83.65	146.35
1957-58	120.26	270.04		157.35	100.61	130.00
1958-59	110.47	504.49		137.45	75.18	122.84
1959-60	104.82	380.15		173.68	64.85	125.42
1960-61	83.76	313.44	100	129.61	85.79	126.35
1961-62	335.06	164.32	76.35	118.96	65.71	166.04
1962-63	72.17	263.95	145.43	135.12	89.31	133.49
1963-64	69.15	241.36	127.43	117.33	89.56	152.07
1964-65	76.54	236.27	166.12	52.86	86.42	142.00
1965-66	17.31	101.66	105.40	50.44	17.81	61.14
1966-67	50.62	649.36	134.29	133.09	38.76	81.07
1967-68	65.48	254.71	90.48	108.76	42.21	87.87
1968-69	69.48	228,40	76.35	101.94	21.64	83.51
1969-70	60.87	117.20	123.88	80.41	32.84	47.54
1970-71	66.87	257.74	151.13	83.82	22.59	123.46
1971-72	92.43	272.80	147.03	92.50	32.74	69.75
1972-73	69.26	195.17	191.57	122.02	17.34	127.71
1973-74	108.49	245.96	204.30	136.85	27.18	105.71
1974-75	115.33	199.49	217.90	155.53	67.72	138.66
1975-76	107.62	229.49	199.96	126.97	14.76	101.20
1976-77	40.50	102.82	97.08	54.20	13.79	21.34
1977-78	125.88	302.19	178.40	120.34	59.98	93.34
1978-79	122.60	195.47	138.35	144.78	33.52	88.76
1979-80	124.59	177.06	133.34	108.60	100.79	82.85
1980-81	61.79	136.23	120.91	75.14	12.93	46.04
1981-82	166.89	299.99	186.86	132.60	93.97	83.77
1982-83	108.19	91.39	141.43	152.36	91.80	98.12
1983-84	229.43	304.04	137.56	120.19	107.56	93.84
1984-85	128.48	119.62	103.98	129.34	102.41	44.10
1985-86	147.20	102.94	86.45	118.62	87.86	39.38
1986-87	**177.35**	**67.32**	90.24	104.50	8.10	43.41
1987-88	255.81	119.99	108.67	98.22	13.86	61.38
1988-89	316.72	29.93	233.57	81.46	26.20	37.52
1989-90	227.80	37.42	28.63	74.67	71.13	80.53

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra* ***Pradesh, Hyderabad.***

TABLE 3.14
YIELD OF MAJOR CROPS
IN ANANTAPUR DISTRICT

(Yield per acre)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	941.54	152.07		482.58	338.77	191.61
1955-56	1067.05	399.39		311.70	336.59	210.66
1956-57	1041.97	370.82		615.85	335.91	204.00
1957-58	1004.29	500.46		587.27	385.77	202.13
1958-59	1004.29	757.67		453.93	412.03	210.07
1959-60	1367.04	564.32		598.23	412.03	210.07
1960-61	878.75	487.22	1442.15	348.42	389.22	213.16
1961-62	444.40	248.73	1346.29	365.29	375.63	251.17
1962-63	779.60	437.05	1570.10	459.10	304.41	200.80
1963-64	726.33	411.40	1525.54	444.99	297.10	236.56
1964-65	748.73	421.44	1471.69	248.83	333.17	254.58
1965-66	154.68	229.76	1506.79	247.98	436.98	130.83
1966-67	657.94	818.22	1732.16	488.29	249.08	148.89
1967-68	634.22	446.00	1575.34	423.27	183.27	183.34
1968-69	737.24	462.01	1305.51	366.01	18334	169.89
1969-70	560.28	294.99	1562.12	343.22	261.12	102.55
1970-71	529.63	492.00	1569.09	331.38	194.45	208.10
1971-72	761.44	635.01	1845.60	415.77	283.33	129.55
1972-73	671.57	512.99	1769.89	361.97	244.43	185.63
1973-74	852.33	513.01	1609.63	429.37	272.23	186.20
1974-75	837.97	456.99	1792.69	611.20	805.52	236.34
1975-76	723.79	475.99	1443.80	627.00	333.33	206.85
1976-77	323.54	272.98	1227.27	435.00	377.73	69.22
1977-78	933.14	633.00	1861.44	596.25	572.25	214.82
1978-79	791.29	468.00	1842.83	730.01	344.53	196.06
1979-80	744.94	568.99	1649.56	551.78	1233.27	193.48
1980-81	403.01	397.98	1860.30	4459.71	188.21	110.87
1981-82	930.82	703.00	1902.09	819.48	1223.54	213.79
1982-83	594.40	258.00	1956.11	856.82	1741.18	216.08
1983-84	1109.28	931.00	1826.26	778.91	1441.16	226.75
1984-85	592.16	488.01	1910.65	1126.15	1588.25	125.73
1985-86	660.09	506.00	2222.35	1158.67	1314.51	128.15
1986-87	875.96	479.04	1771.11	739.77	567.38	144.18
1987-88	1023.44	608.98	1942.14	810.49	1468.75	211.32
1988-89	966.43	266.67	2277.11	979.59	875.00	192.31
1989-90	680.82	555.56	2176.47	1047.62	1357.14	618.18
1990-91		333.333	2260.87	1115.38	1000.00	240.00

SOURCE : Data collected from the various issues of Season and Crop ***Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

TABLE 3.15

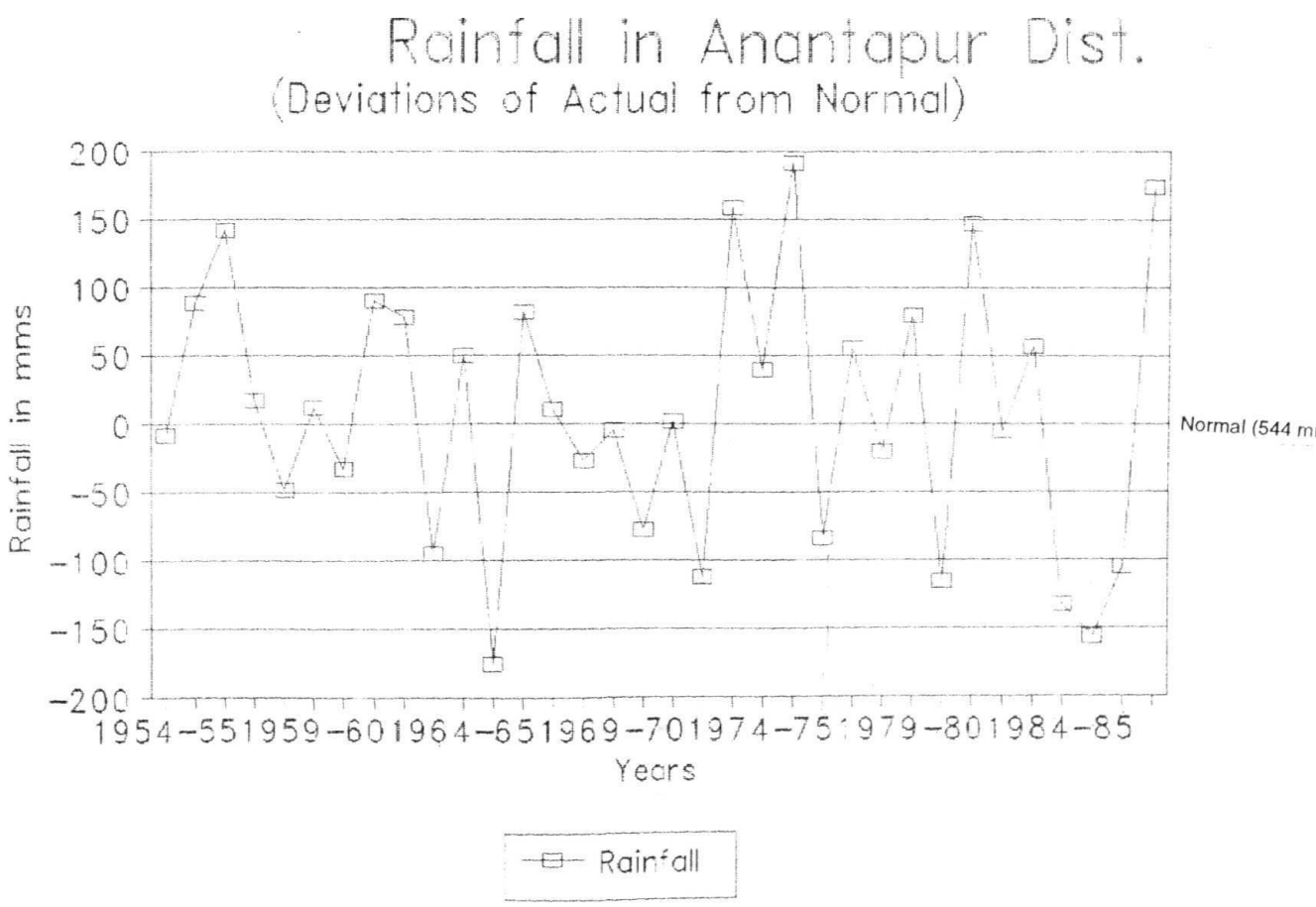
INDEX VALUES OF YIELD OF MAJOR CROPS

IN ANANTAPUR DISTRICT

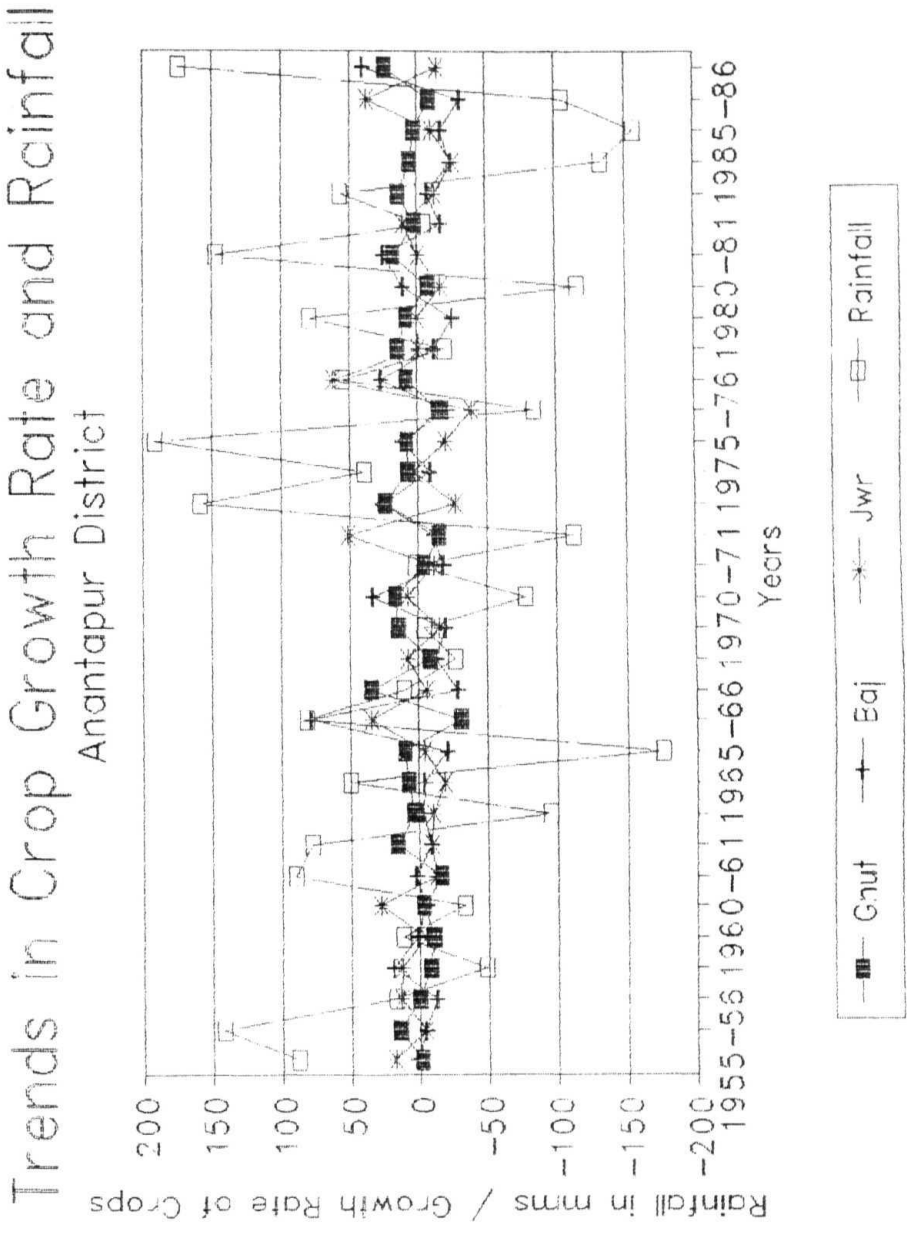
(Yield per acre)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	100.00	100.00		100.00	100.00	100.00
1955-56	113.33	262.63		64.59	99.35	109.94
1956-57	110.66	242.65		127.61	99.15	106.46
1957-58	106.66	329.09		121.69	113.82	105.49
1958-59	106.66	478.23		89.91	113.60	128.67
1959-60	113.32	371.09		123.96	121.62	109.63
1960-61	93.33	320.39	100.00	72.19	114.89	111.24
1961-62	47.19	163.56	93.35	75.69	110.88	131.08
1962-63	82.80	287.40	108.93	95.16	89.85	104.79
1963-64	77.14	270.53	105.78	92.21	87.67	123.45
1964-65	79.52		102.04	54.56	98.34	132.86
1965-66	16.42	151.08	104.48	51.38	40.43	68.27
1966-67	69.87	538.05	120.01	101.18	73.52	68.27
1967-68	67.35	293.28	109.23	87.70	54.11	88.38
1968-69	78,30	303.81	80.52	75.84	54.11	88.38
1969-70	59.50	193.98	108.31	71.12	77.07	53.52
1970-71	56.25	323.05	108.80	68.66	57.39	108.60
1971-72	80.87	417.57	127.97	86.15	83.63	67.61
1972-73	71.32	337.33	122.72	75.00	72.15	96.87
1973-74	90.52	337.35	111.61	88.97	80.35	123.34
1974-75			124.30	126.65	237.77	123.34
1975-76	76.87	313.00	100.1	129.92	98.39	107.95
1976-77	34.36	179.50	85.10	90.14	111.50	36.12
1977-78	99.10	416.25	129.07	123.55	168.91	112.11
1978-79	84.04	307.75	127.78	151.27	101.70	102.32
1979-80	79.12	374.16	114.38	114.33	364.07	100.97
1980-81	42.80	261.70	128.99	95.26	**55.55**	57.86
1981-82	78.86	462,28	131.89	169.81	361.24	111.57
1982-83	63.13	169.65	135.06	177.54	516.03	112.77
1983-84	117.83	612,21	126.63	161.40	425.40	**118.33**
1984-85	62.89	320.91		233.15	468.88	65.61
1985-86	70.10	332.74	154.09	240.09	388.02	66.81
1986-87	93.03	315.01	122.81	153.29	167.48	75.24
1987-88	108.69	400.46	134.66	167.94	433.55	**100.28**
1988-89	102.64	175.36	157.89	202.99	258.28	100.36
1989-90	72.30	365.33	150.91	217.08	400.60	166.05
1990-91		219.19	156.77	231.12	295.18	125.25

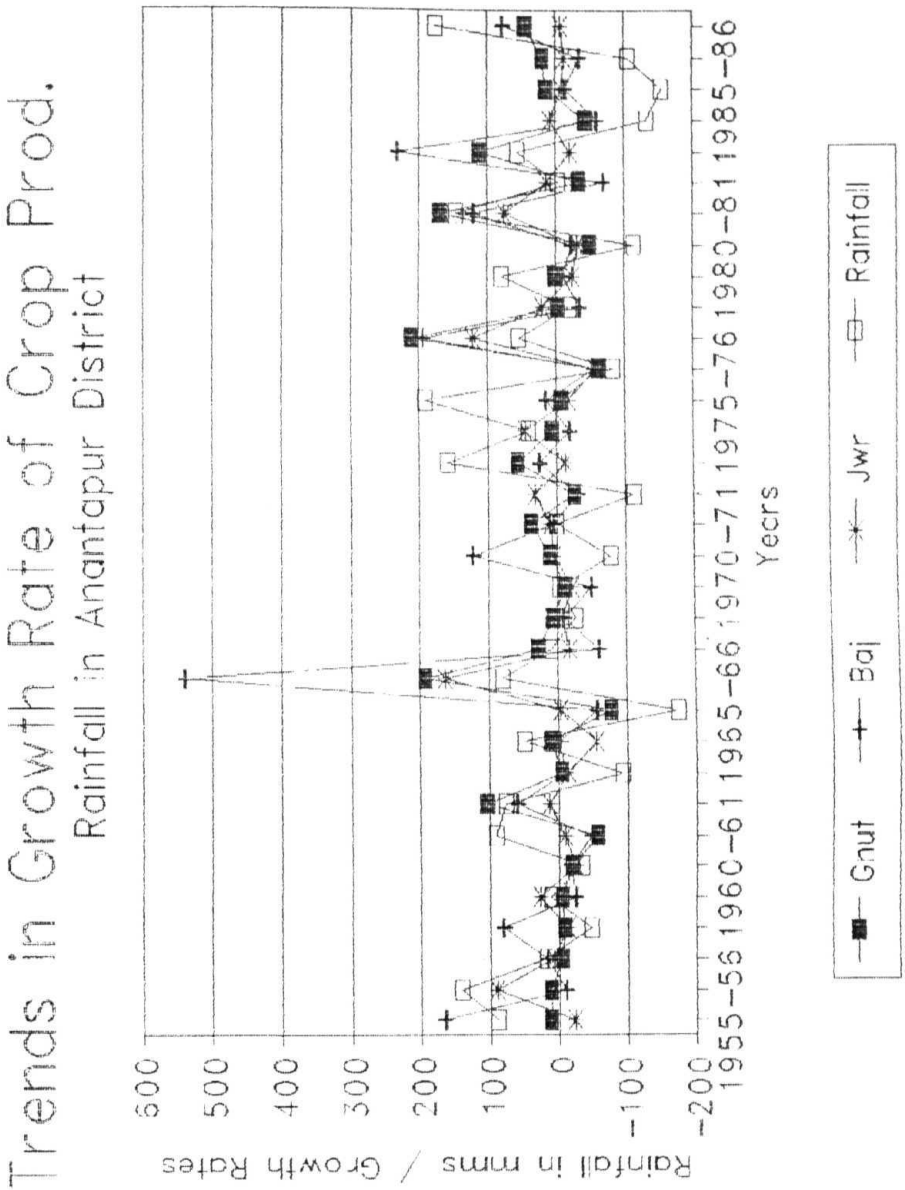
SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop*** *ReportjDirectorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad.*



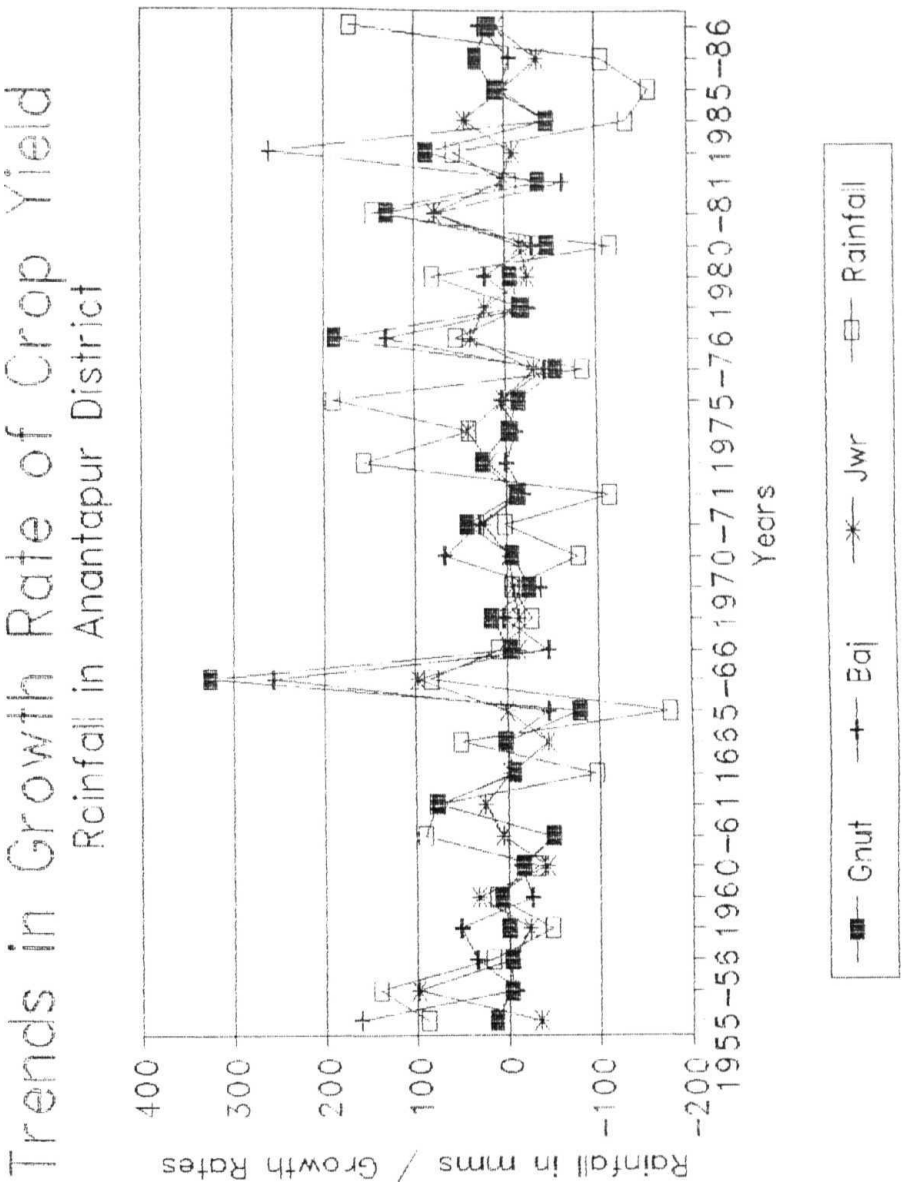
Graph 3.1 Rainfall in Anantapur District Deviations of Actual from Normal



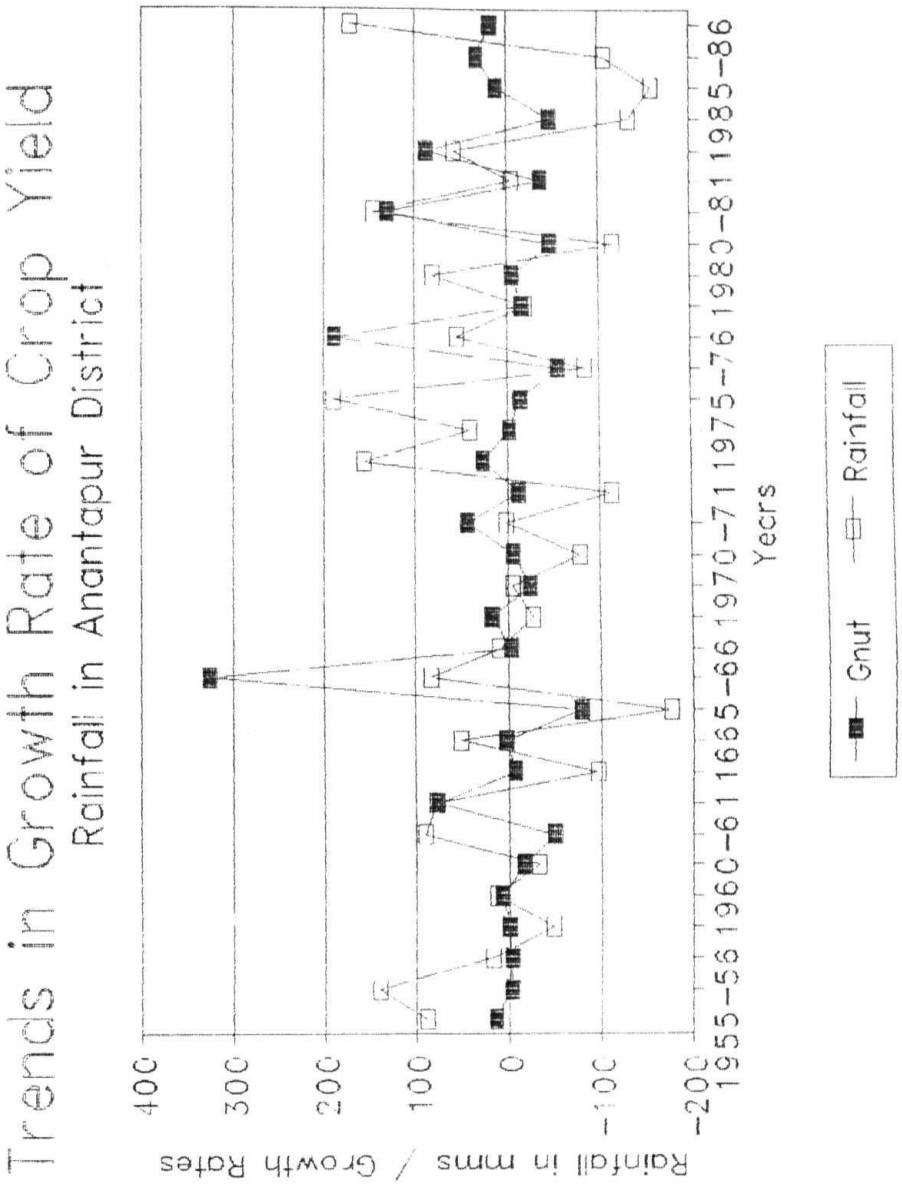
Graph 3.2 Trends in Crop Growth Rate and Rainfall Anantapur District



Graph 3.3 Trends in Growth Rate of Crop Production (Rainfall in Anantapur District)



Graph 3.4 Trends in Growth **Rate** of Crop **Yield (Rainfall in Anantapur District)**



Graph 3.5 Trends in Growth of Crop Yield (Rainfall in Anantapur District)

3.2 DROUGHT CONDITION IN MAHABUBNAGAR DISTRICT

Mahabubnagar district which is locally called as 'Palamur', occupies fourth largest place in the state with an area of 18,369 sqkm. The district lies on 160 and 170 North longitude and in between 770 and 790 East latitude and is bounded in the north by Hyderabad, Nalgonda, Guntur; in the East, by Krishna and Thungabhadra rivers in the South and Raichur and Gulbarga in the West. The district is drained by the River Krishna, and River Pedda Vagu which flow across Makthal and Wanaparthy on the southern boundaries. The river Thungabhadra enters into the Telangana region near Alampur and runs through the southern boundary which incidentally separates the district boundaries form that of Ralayaseema area.

From a geographical perspective, as well as boundary terms the district possess distinctive characteristics. The river krishna flows through Gadwal and Alampur which are areas of cultural prominence. The taluks have larger command areas of irrigation and comes under the river Krishna catchment areas.

The two regions are contributing for the economic development of the district. The district is about to complete a decade of drought, with meager changes in its social, economic conditions for the last four decades. Illiteracy, unemployment, regional imbalances hindering the process of socio-economic development of the district. The small and marginal farmers, agricultural laborers, shepherds as well as cattle keepers are suffering losses and arc being exposed to several hardships in their life during the past decade.

The district which was once a granary now became the land of breached soils with lack of irrigation.

The population of the district according to the 1991 census is 24,42,376. Approximately five lakh people have migrated due to drought in search of survival. Most of the migrants are small and marginal farmers and labourers.

The cattle wealth was 20,00,000 in the year of 1960, which has been decreased to 5,34,000 in 1995. The district has recorded decadal growth rate of population (1981-1991) of 27.8.

DECREASING RAINFALL IN THE DISTRICT

For the past ten years the district received limited rainfall below that of normal level. Indiscriminate grounding of borewells, open wells resulted in depletion of groundwater resources. Forest cover is depleting at a faster rate as ecological balance is damaged resulting in no rainfall at all. Mahabubnagar District which was once a forest zone is now a deserted area filled with boulders.

In the name of developmental programmes the government has sanctioned borewells to the farmers under different irrigation schemes while ignoring the scientific methods. This has certainly resulted in over-ultilisation of water resources resulting in a decrease in water recharge and level day by day. The measures for increase or preservation of water resources taken are negre. The investments made on construction of check dams and percolation tanks are in vain as there is no improvement in the ground water content. There is a clause that there should be only one bore well in an area within a range of 160 metres. This means that irrigation purpose. However such a rule is not even followed by authorities, leaving aside private parties. Earlier, water was available within a depth of 100 feet. At present, within a period of not more than one decade (1983-84 to 1993-94), water occurs only at 250 to 300 feet of depth. Such a risk aversion borewell ayacut areas resulted in troubled agriculture.

Each borewell costs at present Rs.35,000, which in case of failure results in wastage of resources. In the district there are atleast 1,00,000 borewells out of which 40 percent of the borewells are dried up, according to an official estimate. The earlier open wells have already dried up years before. Additional borewells established unconventionally by the rich fanners resulted in shrinking of previous old wells. Farmers are also ignoring the suggestion of establishment of 1 borewell in and around of area of 160 metres. New technology which helped the farmers dig borewells in quick time and with limited resources resulted in more borewells in limited area within a limited span of time.

The district received a rainfall much less than that of 754.2 mm which is the normal rainfall. There is also a shift in the arrival and timing of rains. Rains in the district usually arrive in the first week of the month of June.

The following table gives **the figures of decrease** in **rainfall and** increase in the **number of borewells** in terms of current connections.

Table 3.16

Decade Rainfall in relation to current connections to borewells.

Year 1	Rainfall in mm 2	No. of current connections 3
1984-85	536.4	-
1985-86	531.9	-
1986-87	460.2	-
1987-88	696.5	-
1988-89	956.0	3,211
1989-90	867.8	5,267
1990-91	782.7	6,517
1991-92	535.4	9,345
1992-93	624.7	8,900
1993-94 (upto Aug.)	075.8	8,400

Source : Eenadu, September, 1994.

The information provided in the table indicates that the annual rainfall is lower than the normal in as many as 7 years and above normal rainfall in only 3 years.

The lack of rainfall resulted in reduced groundwater level. This has resulted in scarcity in drinking water supplies. Water is not available for irrigation as well as drinking purpose. Water is not available from hand pumps which are not working in many villages as the farmers in near by locations are going to 200 feet of depth to catch the water for agricultural necessities. This has resulted in scarcity in drinking water in a number of villages. Forests are depleting due to decrease in ground water level. Many forest locations have already turned into dry areas depicting desert characteristics.

For example at present, in the entire district only Achampet region possess forest cover which is thickly scrubbed. The lack of rain results in warm atmosphere causing decrease in the growth of plants and species.

Since 1984, the district received **normal rainfall in** only **4** years **till** date. Such rainfall occurred due to cyclonic storms in the months of October and November. In the remaining years the district received below the normal rainfall.

Table:3.17

Decade **Rainfall in relation to groundwater content**

Year 1	Rainfall in mm 2	Groundwater (feet) 3
1984	535.9	47.23
1985	541.9	29.52
1986	460.2	36.90
1987	709.4	36.67
1988	818.6	34.66
1989	745.0	33.29
1990	686.6	33.46
1991	776.1	33.55
1992	548.5	34.38
1993	612.0	39.49
1994 (upto Aug. 31st)	229.0	41.85

Source : Eenadu, September, 1994.

SCARCITY OF FODDER IN THE DISTRICT

(Though the government has identified the entire district as drought-prone area, the drought works are yet to be implemented on a preferential basis till to date resulting in a pathetic conditions of farmers and cattle. The fodder supply is on a slow phase. Farmers aiming at growing irrigation crops, specifically commercial crops have to face hopeless situation due to absence of rainfall. Drought conditions exists chiefly in the Nagarkurnool division. Fodder is becoming scarce even in Nallamala forest zone. A few farmers who have borewells are making best use of limited water available for raising fodder in agricultural lands to save the cattle. Minor irrigation schemes such as small ponds and irrigation tanks are dried up.

The condition of farmers who have wet land is much more worst. Foodgrains as well as fodder crops are grown in normal conditions but at **present** scarce situation the area under paddy and pasture is very less

Farmers without any water facility are carrying their cattle to weekly markets for sale. The contractors are purchasing such cattle and diverting these cattle into the slaughter places instead of utilising the cattle in agriculture. Distress sale of cattle is found more in the region as more animals are being sold away due to drought.

Farmers in Balmur, Lingala, Amrabad, Uppununtala, Achampet, Rayerla mandals arc protecting the remaining cattle by growing fodder with available water sources. Farmers without water sources are awaiting supply of fodder by the government. The condition of the farmers who are wholly based on livestock subsistence is much more pitiful. Milk production is low due to fodder scarcity. As the rains are absent for thc last four years the hopes of farmers to feed the cattle and sell milk to earn livelihood is being faded away.

WATER PROBLEM IN THE DISTRICT

In the district there are atleast 1,104 villages including 4 municipalities which are problem areas lacking drinking water facilities.

The problem is more acute in the district headquarters. There is no specific water-supply scheme in the district. The people depend on borewells, open wells for water. The groundwater is contaminated specifically in the villages (part per million) (1.5 p.p.m) and urban region (8.8 p.p.m) as the fluoride content is excess than the minimum accepted (0.5 to 1 p.p.m). Scientists have already cautioned five years ago about the fluoride threat. The report emphasised that there is excess fluoride content in the areas of Shadnagar, Kottur, Jedcherla, Narayanpet, Makthal, Kodangal and Kosgi. There are 300 villages which have the danger of fluorisis diseases. The disease spreads mainly through drinking water. The disease causes inaccurate growth of bone, twisting of leg bone and pain in the bone itself.

Further the disease causes pain in the stomach, indigestion, mouth flue and neurological disorders. The fluorosis also causes pain in the muscle and allergy.

Another problem in the district is **migration. Due** to consecutive **drought** for the last 10 years the people are **suffering** losses to Kharif and **Rabi** crops. Lack of crops, water resulted in migration. Out of the total population of 217,42,376 as many as 5,34,000 people have migrated during 1993-94 (*Eenadu, October, 1994*). There have been atleast 10 hunger deaths as per the information, improper implementation of anti-migration programmes resulted in lack of work and the people decided to migrate. There is a drinking water problem in the district, out of the total 1542 villages, 1200 villages are problem villages *{Eenadu, November, 1994*). The district has prospects and scope for industrial development in services sector, limestone industry, beedi making industry, mat weaving, dairy sheep rearing, cattle keeping and social farm forestry with horticultural importance. There is also a scope for developing Alampur and Gadwal as tourism centres. However all the schemes need allocation of the resources.

There is a need to make appropriate use of 240 T.M.C of Krishna river waters accorded and earmarked for the district, as per the award of Bachawat Tribunal. This would enable the district machinery to develop commercial crops, green forests and fruit crops.

The Koilsagar project near Makthal which is a medium scale project, lift irrigation schemes such as Molachintala near Kalwakurti are very much essential towards achieving the economic development of the region. All these schemes need major financial allocation specifically allotted for the developing of irrigation in the district.

The Kalwakurthy, Nettampadu lift irrigation schemes and 9 other small lift irrigation schemes are pending in implementation. Bhima project suffers delays in Central permission due to information gaps between the state and Central Governments. The Jurala project is at snail's progress. Out of the total cultivable land of 22.13 lakh acres, only 3.77 lakh acres of land is irrigated through different schemes. The actual ayacut area under Rajoli Banda diversion scheme is 87,500 acres though it never exceeds 40,000 acres. There is lack of water in Koilsagar, Sarala Sagar, Uka Cheruvu which are

minor **Irrigation schemes, thus leaving the lands fallow.** There are 5,944 small tanks in the district. There is no water in these **tanks. Atleast 800 tanks** have completely dried up. Out of 64 mandals in the district the government declared 36 **mandals in** 1992-93 and 62 mandals in 1993-94 as drought prone (*Eenadu. October 1994).*

In the district there are several irrigation projects pending in implementation. These projects within their limitations can directly contribute to the drought-proofing measures of the government along with the developmental programmes. Further there can be a number of benefits from implementing such projects at the local level. The irrigation provided under such projects can be utilised by the drought affected farmers in growing commercial crops, fruits and vegetables, dry crops and sheep and livestock rearing.

Secondly there is a need to develop railways in the region. There is a limited track length in the area which runs through the district. The construction of rail-track should link all the major market centres, for this will help the rural farmers, grain and vegetable vendors exchange their products at reasonable rates than prevailing transport charges. This would avoid the delays in transportation of the marketable goods specifically milk and vegetables which are perishable goods.

Thirdly, there is **a need** to implement on a war footing to undertake antimigratory program as many people due to drought and survival problems are migrating for work to other areas. Creating of employment opportunities, implementing of anti poverty programmes is the only solution to stop migration. This should cover provision of fodder and water arrangement to farmers as well cattle during drought stress.

(Fourthly, there is a need to appraise the existing resources in the district. A resource inventory of the district should help identify resources and their development and utilisation.

Fifthly there is a need to undertake provisions under the Krishna river water resources awarded under Bachawat Tribunal to provide water to the most distant and dry pockets of the region.

Sixthly there is a need to develop forest policy in favor of people as well as government. Firewood needs, grazing needs are essential while identifying the areas of drought-proofing policies. Finally there is a need to identify the mineral deposits such as calcium, uranium and gold resources to setup establishment of various related industries.

The special irrigation schemes are alternatives to general plans and developmental schemes which need resources from some kind of external agencies such as the World Bank. The district needs an administrative machinery towards collection of funds for implementing the proposed special scheme of irrigation sources development. Such grounding of a scheme needs a socio-economic survey within the existing institutional framework, focussing on affected groups to identify their conditions and needs. The geographical survey should indicate the quality and quantity of water in drying lakes and reservoirs, tanks, wells and borewells, small ponds and fodder pockets for concentrating the developmental activities.

The general sectoral schemes such as IRDP, NREP, TRYSEM and Jawahar Rojgar Yojana have limitations in their reaching of target groups specifically in drought districts as these schemes do not address the overall development of the affected groups. Drought districts have distinct problems which needs varied developmental programmes and strategies to be implemented.

Hence any developmental activity in a drought-region should be distinct from that of a programme of general cadre. Such a programme for development of drought prone areas should be addressed and targeted to the most accurate groups after identifying the groups.

There is a need for reorganising **institutional infrastructure in favour** of **the** poor and weaker sections without disturbing **the well** being of other sections. The existing institutional structure and reform leaves certain areas which hinder the process of development. The land, rural credit, access to water are minimum essentials to the small and marginal farmers, agricultural laborers and shepherds particularly Kuruvas and Gollas Sectoral as well as spatial approach is needed for achieving equitable resource distribution of growth and development. Proper identification of the target group is essential and this is possible only in a bottom-up approach.

3.3 AGRICULTURE IN DROUGHT PRONE MAHABUBNAGAR DISTRICT

Mahabubnagar district of Telengana region is one of the most drought prone districts. It is one of the largest districts in the Telengana region of the state. The district is slightly elevated in the north and west to the south cast. In Mahbubnagar district the area irrigated under tank and well irrigation was 72 percent during 1955-56, of the total area irrigated during 1965-66, the area under tank irrigation was 61 percent and the area under well irrigation was 25 percent. In the year 1975-76, the area irrigated under tanks was 50 percent and the area irrigated under wells was 27 percent. During 1988-89, the area irrigated under tanks decreased to 15 percent and the area under wells increased to 61 percent of the total area irrigated in the district. The area under different irrigation sources and their respective percentages is given in the Tables 3.18 and 3.19.

Table 3.18

NET AREA IRRIGATED UNDER DIFFERENT SOURSES OF MAHBUBNAGAR DISTRICT

(Area in Hectares)

YEAR (1)	TANKS (2)	CANALS (3)	WELLS (4)	TUBE WELLS (5)	OTHER SOURCES (6)	TOTAL (7)	GROSS (8)
1955-56	66786	5888	16597		2998	92269	101648
1956-57	72698	6887	17884		3680	101149	118281
1957-58	60553	7053	16927		3663	88196	99522
1958-59	56740	6477	15684		13421	92322	104061
1959-60	6443	7559	23015		12413	107430	121597
1960-61	50928	8222	20900		4207	84257	91245
1961-62	81386	10413	24568		8047	124414	135350
1962-63	71565	10430	219003		7676	111574	126843
1963-64	71514	9490	20997		7270	109271	126912
1964-65	72366	11409	22312		8655	114742	133307
1965-66	63277	10780	25876		3604	103537	118016
1966-67							
1967-68	64096	17585	24212		2917	108810	132092
1968-69	40360	13710	18525		649	73244	105411
1969-70	40923	22776	25250		2917	91866	112121
1970-71	57595	22433	25730		2995	108753	136656
1971-72	30733	23490	27215		3213	81618	98339
1972-73	15131	17339	35330		1948	69748	85177
1973-74	48967	24516	28994		3359	105836	133589
1974-75	49895	23954	35648		6358	115855	144916
1975-76	60503	22564	32953		5605	121625	158766
1976-77	67553	12959	35698		5702	121912	151251
1977-78	51682	14131	41696		4423	111932	152784
1978-79	71714	18851	43982	103	5643	140293	184096
1979-80	62605	23730	44455	130	4332	135252	184602
1980-81	47247	24098	50942	92	4156	126527	159503
1981-82	57307	24949	55236	138	5000	142630	187272
1982-83	31286	17426	59514	97	4612	112935	151689
1983-84	61718	23627	55794	53	5862	147084	195517
1984-85	27107	12175	40721	640	278	80921	130952
1985-86	9564	23583	44820	557	326	78850	104393
1986-87	844	15903	42377	570	144	59838	75409
1987-88	15603	22721	62971	852	1321	103468	12116

SOURCE : Data collected from the various issues of ***Season and Crop Reporty Directorate*** *of Economics and Statistics, Government of Andhra Pradesh, Hyderabad*

Table 3.19

NET AREA IRRIGATED UNDER DIFFERENT SOURSES

OF MAHBUBNAGAR DISTRICT

(Area in Percentage)

YEAR (1)	TANKS (2)	CANALS (3)	WELLS (4)	TUBE WELLS (5)	OTHER SOURCES (6)	TOTAL (7)
1955-56	72.00	7.00	18.00		3.00	100.00
1956-57	72.00	7.00	18.00	-	3.00	100.00
1957-58	68.00	8.00	20.00		4.00	100.00
1958-59	61.00	7.00	17.00		15.00	100.00
1959-60	60.00	7.00	21.00		12.00	100.00
1960-61	60.00	10.00	25.00		5.00	100.00
1961-62	65.00	8.00	20.00	-	7.00	100.00
1962-63	64.00	9.00	20.00	-	7.00	100.00
1963-64	65.00	9.00	19.00	-	7.00	100.00
1964-65	63.00	10.00	19.00	-	8.00	100.00
1965-66	61.00	10.00	25.00	-	4	100.00
1966-67	-	-	-	-	-	-
1967-68	59.00	16.00	22.00	-	3.00	100.00
1968-69	55.00	19.00	25.00	-	1.00	100.00
1969-70	45.00	25.00	27.00	-	3.00	100.00
1970-71	52.00	21.00	24.00	-	3.00	100.00
1971-72	38.00	25.00	33.00	-	4.00	100.00
1972-73	22.00	25.00	50.00	-	3.00	100.00
1973-74	46.00	24.00	27.00	-	3.00	100.00
1974-75	43.00	21.00	31.00	-	5.00	100.00
1975-76	50.00	18.00	27.00	-	5.00	100.00
1976-77	55.00	11.00	29.00	-	5.00	100.00
1977-78	46.00	13.00	37.00	-	4.00	100.00
1978-79	51.00	14.00	31.00		4.00	100.00
1979-80	46.00	18.00	33.00	-	3.00	100.00
1980-81	37.00	20.00	40.00	-	3.00	100.00
1981-82	40.00	18.00	39.00	-	3.00	100.00
1982-83	28.00	15.00	53.00	-	4.00	100.00
1983-84	42.00	16.00	38.00	-	4.00	100.00
1984-85	34.00	15.00	50.00	1.00	-	100.00
1985-86	12.00	30.00	57.00	1.00	-	100.00
1986-87	1.00	27.00	71.00	1.00	-	100.00
1987-88	15.00	22.00	61.00	1.00	1.00	100.00

SOURCE : Calculated on the basis of data from tfw various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of Andlira Pradesk Hyderalxid

(Note : Figures indicate percentate area to the total area irrigated.)

The important crops grown in this district are jowar (32%), groundnut (19%) and pulses, other crops (15%) of the net sown area.

The major soil group is red earth, comprising loamy sands, sandy loams and sandy clay loams. Black soils, mostly of clayey loams and deep clays, also occur as narrow strips alongside the banks of the Krishna and Tungabhadra. The loamy sands, although occuring all over the district, are predominantly found in strongly sloping terrains in Kalwakurthy, Nagarkurnool and Achampet mandals. They are brown to red and poor in quality.

The sandy loams occur on sloping terrains with good surface drainage. These soils in general are non-saline and non-alkaline. The application of nitrogenous fertilisers in smaller doses at frequent intervals has been recommended for good cropping of paddy, hybrid maize, jowar, bajra and groundnut.

CHANGES IN THE CROPPING PATTERN

We now look at the changes in the cropping pattern in the drought prone district of Mahabubnagar, far the period 1955-56 to 1990-91. Table 3.20 presents the percentage share of rice, jowar, bajra, groundnut, castor, pulses & other crops to the total cropped area for the district. A look at the table shows that the area under groundnut has been on a marginal decline during the period. Jowar seems to be the major dry crop in the district, and its share has been increasing from 28.36% in 1955 to 36.84% in 1989-90. And, the share of cotton, bajra and castor, pulses and other crops has more or less been stagnant. There seems in the district during the last theree and a half decades. In the Mahbubnagar district jowar seems to be the predominant crop from the fifties and the area under this crop has been on an increase which is about more than one third of the total cropped area.

A look at the share of different crops in the total cropped area shows that this region, is not so easily susceptible to the vagaries of mansoon because of its dependence on dry crops such as jowar, bajra and castor. The share of area under all these crops to

the total cropped area has been on a marginal increase from 1955-56 to 1989-90. In comparison, groundnut does not seem to be the predominant crop of this region, as we find in Anantapur district. The area under groundnut crop is on a marginal decline in this region. If we observe the share of the area under groundnut crop which was about 19.91% in 1955-56 it declined to about half i.e., 9.33% during 1975 and increased marginal during the 1980's reaching about 14.67% in 1989-90. Because of larger dependence on dry crops, other than rain-fed crop like groundnut, this region is less susceptible to the vagaries of monsoons. This would become all the more clear if we look at the acreage response in rainfall in the district.

Table 3.20

SHARE OF MAJOR PRINCIPAL CROPS TO TOTAL CROPPED AREA IN MAHBUBNAGAR DISTRICT

YEAR	JOWAR		GROUNDNUT		CASTOR		BAJRA		RICE		PULSES		OTHER CROPS	
	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%	AREA	%
1955-56	286016	28.06	190757	19.00	222703	22.30	50238	5.03	105862	10.00	10266014.00		22962	2.02
1965-66	293532	32.00	117448	13.00	59218	6.00	38180	4CX)	138872	12.00	9830310.98		31095	3.00
1975-76	335554	34.00	92662	9.00	61673	6.00	63682	6.00	144354	15.00	12686113.00		4033	5.00
1989-90	293000	32.00	174000	19.00	106811	11.00	59000	6.00	150000	16.00	9100010.00		28840	3.00

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop*** *ReportyDirectorate of Economics and Statistics, Government of Andhra* ***Pradesh,*** *Hyderabad*

RESPONSES TO RAINFALL

The response of total cropped area to rainfall been computed for the district, to find out the sensitivity of area in the region to rainfall. To compute the elasticities of acreage response to rainfall we have used simply log-linear regression equation, and they have been computed with a lag of one year period and without a lag for the period 1955-56 to 1989-90. A look at the results for Mahbubnagar district is bout 0.10. When a lag of one period is taken into consideration the elasticity is about 0.03 which is comparatively quite low. The lower elasticity for both lag as well as non-lag periods in Mahbubnagar district compared in Anantapur district shown the extent of instability to be lower in this region compared to Anantapur. This is because the sensitivity or elasticity of acreage response to rainfall is found to be higher at lower rainfall levels and it is decreases as the level of rainfall rises. From this we can infer that the acrage response to rainfall is comparitively lower in the district.

It would be more interesting if we look at the line response of area, production and productivity to rainfall for the three and a half decades, 1955-56 to 1989-90, for about 16 crops as shown in Table 3.21 for the district. The elasticities have been computed for the entire study period usinf a simple log-linear regression equation. The sensitivity of area with respect to rainfall seems to be low for some of the crops like bajra, ragi and bangalgram, when compared to production and productivity sensitivities. Whereas, for most of the other crops production and yield sensitivities are comparativiely low. The productivity of groundnut seems to be more sensitive to rainfall compared to other crops. The productivity of jowar and castor seem to be the least sensitive to rainfall compared to other crops.

INSTABILITY IN CROP OUTPUT

We now examine the instability in crop output and crop productivity, as given in table 3.22 and 3.23. To measure the instability in crop output and productivity, we have first compared annual percentage changes in output and productivity, and then estimated the standard deviation in such annual changes. The standard deviations are

computed for the four sub-periods, 1955-56 to 1961-62, 1962-63 to 1967-68, 1968-69 to 1976-77 and 1977-78 to 1989-90 and also for the district. A look at Table 3.22 shows that there is greater instability for some of the crops like, maize, tobacco, cotton and sugarcane while for the other crops the instability is comparitively low. During the second sub-period, we observe that the instability is compartively high for most of the crops from the first sub-period shows the variance of most of the crops to be higher in comparision to the first and the second sub-period for most of the crops, except for some dry crops like, jowar, bajra, sesamum, sugarcane and chillies. The variance is very high for all the crops during the fourth sub-period. The variance is especially very high during this period for crops like, sugarcane, redgram, maize, cotton, castor, tobacco, sesamum and bajra. And, during the same periods for the 16 crops, we find that the instabilities have been very high during the first and the fourth sub-period for almost all the crops compared to the first and the second sub-periods.Another observation that can be made by looking at the table is in regard to the low instabilities for crops like groundnut, bajra and bengalgram during all the four sub-periods compared to all other crops in this region.

If we look at the Table 3.23 where the instability in crop yield has been shown we find that the variability in the yield for almost all thecrops is very high except fro jowar, ragi, redgram, sugarcane and horsegram during the second sub-period compared to the first sub-period. During the third sub-period we observe that the varjance is very high for most of the crops except for bajra, rice, sesamum, tobacco and maize. In this period we also observe that the vairance of cotton is very high and instable compared to all other crops. The fourth period observes an increase in the variance for all the crops except for groundnut, jowar and ragi. The variance for all the crops except for groundnut, jowar and ragi. The variance is very high during this period for crops like castor, tobacco, cotton, cugarcane, chillies and redgram. Similar to the oberrvation in the crop out instability, even in crop yield instability, we find the variance to be very high during the third and the fourth sub-periods, compared to the first and the second sub-periods. Another interesting aspect which is observed is that the variances in crop yield fo groundnut, jowar and ragi is comparatively lower during all the sub-periods, in comparison to other crops.

TABLE 3.2 1

SENSITIVITY OF AREA PRODUCTION AND PRODUCTIVITY

TO RAINFALL IN MAHABUBNAGAR DISTRICT

(1955-56 to 1989-90)

CROP	Area	Production	Yield
GROUNDNUT	-0.48	0.12	0.61
BAJRA	0.05	0.32	0.27
RICE	0.50	0.03	-0.03
JOWAR	-0.03	0.04	0.07
RAGI	0.36	0.50	0.14
SESAMUM	0.21	0.14	-0.07
CASTOR	0.02	0.04	0.02
TOBACCO	-0.16	-0.16	-0.01
COTTON	-0.48	-0.15	**0.33**
MAIZE	0.15	-0.11	0.26
BANGALGRAM	0.17	0.22	-0.09
REDGRAM	-0.34	-0.18	0.17
SUGARCANE	0.89	0.65	**-0.24**
CHILLIES	0.26	0.12	-0.14
GREENGRAM	-0.01	-0.26	-0.26
HORSEGRAM	0.53	0.54	0.01

SOURCF : Calculated on the basis of data from the various issues of Season and Crop ReportyDirectorate of Economics and Statistics, Government of Andhra Pradesh HyderdxuL

TABLE 3.22

INSTABILITY IN CROP PRODUCTION
(STANDARD DEVIATION IN ANNUAL OUTPUT GROWTH RATES)
(Mahbubnagar District)

CROP	1954-16	1962-67	1968-76	1977-89
GROUNDNUT	28.89	38.78	40.47	38.93
BAJRA	52.96	61.15	55.83	95.78
RICE		22.54	42.51	63.03
JOWAR	52.55	40.25	36.01	41.13
RAGI	48.52	15.04	75.14	30.66
SESAMUM	27.69	163.49	46.42	180.92
CASTOR	30.14	39.98	60.70	353.39
TOBACCO	199.37	42.99	117.87	464.91
COTTON	79.38	84.96	186.110	100.36
MAIZE	310.59	213.14	841.53	280.08
BANGALGRAM	29.81	25.39	30.22	35.59
REDGRAM	25.63	21.50	69.68	102.85
SUGARCANE	62.10	54.97	41.52	300.94
CHILLIES	13.43	74.97	41.05	91.14
GREENGRAM	17.06	22.86	46.83	73.69
HORSEGRAM	17.82	24.27	44.53	55.22

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop*** *ReportyDirectorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad*

TABLE 3.23

INSTABILITY IN CROP PRODUCTION

(STANDARD DEVIATION IN ANNUAL YIELD GROWTH RATES)

(Mahbubnagar District)

CROP	1954-16	1962-67	1968-76	1977-89
GROUNDNUT	16.84	47.61	62.31	28.45
BAJRA	53.93	74.92	52.24	73.29
RICE		18.23	14.85	25.85
JOWAR	46.51	36.53	37.12	29.70
RAGI	39.23	19.39	39.89	21.47
SESAMUM	16.03	151.56	28.12	**71.00**
CASTOR	23.11	38.48	41.23	258.68
TOBACCO	25.82	36.85	20.98	322.09
COTTON	40.02	72.07	280.79	105.84
MAIZE	35.13	37.67	24.28	38.97
BANGALGRAM	13.67	18.08	25.47	37.76
REDGRAM	19.97	15.19	64.14	80.14
SUGARCANE	67.19	**5.75**	31.99	144.27
CHILLIES	29.07	32.64	34.74	80.10
GREENGRAM	13.39	19.00	36.77	45.86
HORSEGRAM	41.10	9.10	28.57	58.61

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of* ***Andhra Pradesh,*** *Hyderalxid*

TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY

The trends in area, production and productivity for both the districts for about 16 crops are shown in Tables 3.24, 3.25 and 3.26. To look at the trands we have compted compound growth rates for the entire three and a half decade 1955-56 to 1989-90, and for the four sub-periods, 1955-56 to 1961-62, 1962-63 to 1967-68, 1968-69 to 1976-77 and 1977-78 to 1989-90.

The growth rates calculated in Table 3.24 shows that during the first sub-period there has been an increase in the area under few crops like jowar, ragi, tobacco, cotton, maize and a few pulses. In cases of all other crops there is a decline in the area, and the most being under groundnut crop where it has declined by about 11.30%. During the second sub-period there is a further decline in most of the crops except under groundnut, bajra, jowar ragi, redgram and chillies. The third sub-period shows a decline in the area for a few crops like groundnut, jowar, ragi, sesamum, cotton chillies and pulses, in case of other crops there has been an increase in the area. There is a decline in the area under most of the crops during the fourth sub-period, except for groundnut, castor, cotton, maize and redgram. If we look at the growth rate of area for the last three and a half decades, we find that there has been an increase in the area under groundnut, jowar, tobacco, cotton, maize, redgram, sugarcane and greengram. In case of all other crops there has been a decline in the area. Though Jowar accupies one-third of the total cropped area in the districts, the area under this crop has increased only slightly in the last three and a half decades.

Table 3.25 shows the growth rates of production for 16 crops, where we find that during the first sub-period there has been an increase in production for most of the crops, except for groundnut, sesamum, castor, chillies and a few pulses. The second sub-period also observes an increase in the production of most of the crops except for bajra, jowar, ragi, sesamum, maize, sugarcane, sreengram and horsegram. During thethird sub-period we find that there is a decline in the production of most of the crops like groundnut, bajra, jowar, sesamum, castor, chillies and pulses. The fourth sub-period observe a

further decline in the production of most of the crops except **for castor,** cotton, maize, redgram, chillies and greengrams. If we look at the growth rates in **production** during the four sub-periods, wefind that the decline in the production during **the** first two sub-periods is comparatively lower than that of the last two sub-periods. Though when we look at the production growth rate during the last three and a **half** decades, we do find that there has been an increase in the production in almost all crops at an average of about 1%. We do find a decline in the production in Bajra, sesamum, bengalgram and horsegram.

The productivity growth rates for the 16 crops are presented in Table 3.26. Unlike the area production growth rates, the productivity growth rates shows a different picture. Looking at the Table, we find that there has been an increase in the productivity for most of the crops during all the four sub-periods, and when we take into consideration the last three had a half decades also we find that there has been an increase in the productivity. During the first sub-period, we find that except for sesamum, castor, tobacco, bengalgram and greengram, there has been an increase in the productivity for all other crops. The second sub-period shows a decline in the productivity for groundnut, bajra, jowar, ragi, sesamum, sugarcane and horsegram. During the third sub-period there is a decline in the productivity of bajra, jowar, sesamum, castor, redgram, sugarcane and horsegram. And, during the fourth sub-period we observe a decline in the productivity of only groundnut, bajra, jowar, sesamum and tobacco.

What is interesting to note looking at the trends in area, production and productivity is that despite an increase in the area under jowar, though it is marginal its production and productivity has actually not risen. Out of the four sub-periods, there has been a decline in the production and productivity in almost three sub-periods. Similarly even in the case of groundnut crop in this region we do find much increase in its prodction as well as yield, though there has not been much increase in the area under this crop. The crops in this region whose production and productivity has been on an increase during most of the sub-periods have been Cotton and Maize, though the area under these crops have not increased.

The major reason **that can be cited in this region in** regard to preference for crops like jowar, bajra or ragi, instead of crops like cotton or maize could be the sustainability of these crops, as the major reason for the decline or increase in their production and productivity is rainfall and no other factor like seed and fertiliser techonology, we find that these crops can sustain even with less rainfall. This apart as we have observed before, we find that crops like cotton and maize are very highly variable and very instable in comparision to these crops.

Table 3.27 shows the area under major crops in Mahabubnagar district during 1954-1990. Table 3.28 shows the index values of area under major crops. Table 3.29 shows production figures for major crops in the district. Table 3.30 shows index values of production of major crops. Table 3.31 shows yield of major crops in Mahabubnagar district. Table 3.32 shows the index values of yield of major crops during 1954-1990 in Mahabubnagar district.

TABLE 3.24

TRENDS IN GROWTH RATES IN AREA

(Mahabubnagar District)

CROP	55-56 To 61-62	62-63 To 67-68	68-69 To 76-77	**77-78 To 89-90**	**55-56** To **89-90**
GROUNDNUT	-11.30	6.28	-3.20	0.92	0.60
BAJRA	-0.25	2.97	0.19	-0.86	-0.11
RICE		-0.27	2.45	-1.92	-0.15
JOWAR	1.03	0.35	-0.37	-0.65	0.07
RAGI	1.75	1.47	-0.03	-1.53	-0.11
SESAMUM	-2.31	-6.32	-10.02	-5.81	-1.72
CASTOR	-1.19	-1.02	0.82	2.57	0.27
TOBACCO	2.65	-1.71	2.47	-1.09	1.94
COTTON	7.36	-0.55	-9.31	0.24	0.35
MAIZE	4.08	-7.25	4.22	9.62	2.38
BANGALGRAM	-3.62	-0.64	-1.44	-1.75	-1.35
REDGRAM	-0.23	2.06	0.86	0.53	10.53
SUGARCANE	-3.92	-0.25	4.32	-5.44	0.80
CHILLIES	-8.80	4.60	-2.81	-1.34	-0.78
GREENGRAM	1.28	-2.84	-0.10	-0.17	1.04
HORSEGRAM	0.28	-3.22	0.25	-3.79	-0.96
TOT. CROPPED AREA	**5697435**	**561797**	**9114976**	**12002485**	**23432874**

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderaixu L*

TABLE 3.25

TRENDS IN GROWTH RATES IN PRODUCTION

(Mahabubnagar District)

CROP	55-56 To 61-62	62-63 To 67-68	68-69 To 76-77	77-78 To 89-90	55-56 To 89-90
GROUNDNUT	-10.24	1.77	-1.91	-0.08	0.62
BAJRA	1.93	-0.57	-2.35	-1.24	-0.16
RICE		0.73	3.87	-1.57	0.83
JOWAR	2.63	-1.10	**-1.41**	**-1.11**	0.52
RAGI	7.71	-2.45	1.91	-1.05	0.58
SESAMUM	-4.21	-12.76	-13.86	-0.59	-2.13
CASTOR	-3.40	3.41	-3.85	3.36	0.11
TOBACCO	1.26	**2.78**	**2.77**	-1.75	2.85
COTTON	8.74	1.13	0.66	1.06	3.20
MAIZE	4.92	-4.78	5.21	10.17	3.83
BANGALGRAM	-5.13	0.12	**-0.32**	-1.69	-0.70
REDGRAM	1.83	2.87	-7.49	1.01	0.20
SUGARCANE	3.96	-2.14	3.08	-3,91	0.26
CHILLIES	-7.56	8.53	-1.67	0.34	**1.45**
GREENGRAM	-0.60	-2.26	-5.36	1.44	3.19
HORSEGRAM	1.93	-3.42	-0.01	-2.33	-0.58

SOURCE : Calculated on the basis of data from the various issues of Season and Crop Report, Directorate of Economics and Statistics, Government of AndJmi Pradesk Hyderabad.

TABLE 3.26

TRENDS IN GROWTH RATES IN YIELD

(Mahabubnagar District)

CROP	55-56 To 61-62	62-63 To 67-68	68-69 To 76-77	77-78 To 89-90	55-56 To 89-90
GROUNDNUT	1.05	-4.51	1.29	-0.99	0.03
BAJRA	2.19	-3.55	-2.54	-0.49	-0.05
RICE		0.99	1.42	0.34	0.98
JOWAR	1.61	-1.44	-1.04	-0.47	0.45
RAGI	5.95	-3.91	1.94	0.50	0.70
SESAMUM	-1.90	-6.44	-3.83	-0.01	-0.41
CASTOR	-2.20	4.43	-4.13	0.80	-0.15
TOBACCO	-1.39	4.50	0.30	-0.66	0.91
COTTON	1.38	1.68	9.97	0.83	2.86
MAIZE	0.84	2.48	0.98	0.55	1.46
BANGALGRAM	-1.51	0.76	1.12	0.06	0.65
REDGRAM	2.06	0.81	-8.34	0.48	**-1.11**
SUGARCANE	7.88	-1.89	-1.24	1.53	-0.53
CHILLIES	1.24	3.93	1.15	1.68	2.23
GREENGRAM	-1.88	0.58	5.46	1.61	2.15
HORSEGRAM	1.66	-0.21	-0.26	1.46	0.38

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh Hyderabad*

TABLE 3.27
AREA UNDER MAJOR CROPS OF MAHABUBNAGAR DISTRICT
(Area in Hec.)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7	NET SOWN AREA 8
1954-55	175155	47753		252251	2267	108572	733264
1955-56	190757	50238		286016	2108	102660	998384
1956-57	185519	46944		27552	5421	106585	990896
1957-58	166320	47920		276209	3445	108105	950613
1958-59	69486	55316		302568	3962	72713	9001197
1959-60	51406	42277		286888	5146	113972	866435
1960-61	43707	52310	97749	323253	6331	106284	920156
1961-62	43442	44317	143871	2971012	8036	109856	925489
1962-63	64541	36946	131587	276298	9359	120246	901998
1963-64	78939	39867	138598	315264	12817	114048	945938
1964-65	89219	42995	139972	266225	10431	108667	898363
1965-66	117448	38180	114806	293532	8797	98303	894874
1966-67	134964	49149	107243	297930	9189	81960	898557
1967-68	121798	53921	118676	296406	10828	103372	947541
1968-69	118315	57732	92274	320749	10631	103792	954758
1969-70	127659	54908	99268	328049	10127	112529	993908
1970-71	158869	57390	117565	347861	8875	117303	1053713
1971-72	205619	57604	79444	359907	10480	98780	1026742
1972-73	191025	57259	67003	351893	5186	79030	936868
1973-74	98102	59789	106305	401385	10999	876367	981189
1974-75	160990	63474	121276	336952	7387	44847	1004826
1975-76	92662	63682	144354	335554	1663	126861	960982
1976-77	72865	51956	148633	273961	1792	108057	903704
1977-78	90391	64633	135226	320818	6649	449499	932379
1978-79	118342	52937	164893	335410	9674	114094	983086
1979-80	143562	48702	160407	317272	8462	110048	921623
1980-81	151028	47612	136115	316495	4657	113551	919707
1981-82	168047	4302	158269	338193	7018	110415	958756
1982-83	176965	45186	118485	315231	4751	102271	931291
1983-84	177595	42485	156627	324212	4756	97984	957030
1984-85	171592	31791	93238	255014	7500	88482	761263
1985-86	152297	32848	63557	286892	11473	86175	773052
1986-87	105049	29947	44819	256624	7258	73623	649850
1987-88	125759	31782	78717	316920	2833	61618	838071
1988-89	168000	64000	152000	275000	8000	88000	895000
1989-90	174000	59000	150000	293000	12000	91000	893000
1990-91	194000	47000	133000	285000	15000	91000	884000

SOURCE : Calculated on the basis of data from the various issues of **Season and Crop Report,** *Directorate of Ecotwmics and Statistics, Government of Andhra Pradesh Hyderalxu L*

TABLE 3.28

INDEX; VALUES OF AREA UNDER MAJOR CROPS OF MAHABUBNAGAR DISTRICT

YEAR	GROUNDNUT	BAJRA	RICE	JOWAR	COTTON	PULSES	NET SOWN AREA
1	2	3	4	5		7	8
1954-55	100.00	100.00		100.00	100.00	100.00	100.00
1955-56	108.90	105.20		1 13.38	92.98	94.55	136.15
1956-57	105.91	98.30		109.23	237.12	98.16	135.13
1957-58	94.95	100.34		108.07	169.60	99.56	129.64
1958-59	39.67	115.08		119.94	174.76	66.97	122.90
1959-60	29.34	88.53		1 12.39	226.73	104.97	118.16
1960-61	24.95	109.54	100.00	128.14	179.26	97.89	125.48
1961-62	24.80	92.80	147.18	117.78	354.47	101.18	126.20
1962-63	37.41	77.36	134.61	109.53	412.83	110.75	123.01
1963-64	45.06	83.48	141.78	124.98	565.37	105.04	129.00
1964-65	50.93	90.03	142.06	105.53	460.12	100.08	122.51
1965-66	67.05	79.95	117.44	116.36	388.04	90.54	122.00
1966-67	77.05	120.92	109.71	118.10	405.33	75.48	122.54
1967-68	69.53	112.91	121.40	117.50	477.60	95.12	129.22
1968-69	67.54	120.89	94.39	127.15	468,94	95.59	130.20
1969-70	72.88	1 14.97	101.55	130.04	446.71	103.64	135.54
1970-71	90.70	120.18	120.27	137.90	391.48	108.04	143.70
1971-72	115.67	120.62	81.27	142.67	462.28	90.98	140.20
1972-73	109.06	119.90	68.54	139.50	228.76	72.79	127.76
1973-74	56.00	125.20	108.75	159.12	485.17	80.46	133.81
1974-75	61.08	139.92	124.06	133.57	325.89	109.09	137.00
1975-76	25.90	133 35	147.67	133.02	73.22	116.84	131.05
1976-77	47.60	108.80	152.05	108.60	79.04	99.52	123.24
1977-78	51.60	135.34	138.34	127.18	93.29	110.06	127.15
1978-79	67.56	110.58	168.69	132.96	426.73	105.08	134.00
1979-80	81.96	101.98	164.10	125.77	373.20	101.35	125.68
1980-81	86.22	99.70	137.24	125.46	205.42	104.38	125.42
1981-82	95.94	90.67	161.91	134.07	309.57	101.69	130.75
1982-83	101.03	94.62	121.21	124.96	209.57	94.19	127.00
1983-84	101.39	88.96	160.22	128.52	209.79	90.24	130.51
1984-85	97.96	66.57	95.38	101.09	330.83	81.49	103.81
1985-86	86.94	68.78	65.02	113.73	506.08	79.39	105.42
1986-87	59.97	67.71	54.85	101.73	320.15	67.81	88.06
1987-88	71.79	66.55	80.52	125.63	124.96	56.75	114.29
1988-89	95.91	134.02	155.50	109.01	352.88	81.05	122.05
1989-90	99.34	123.55	153.14	116.15	529.23	83.81	121.78
1990-91	110.75	98.72	136.06	112.98	661.66	83.81	120.55

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of* ***Economics*** *and Statistics, Government of Andhra Pradesh* ***Hyderabad.***

TABLE 3.29

PRODUCTION OF MAJOR CROPS IN MAHABUBNAGAR DISTRICT

(Production in Tonnes)

YEAR 1	GROUNDNUT 2	RAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES . 7
1954-55	1073376	11400		110709	503	20807
1955-56	103210	175347		106634	385	18186
1956-57	116673	9530		62741	1156	20583
1957-58	97705	21397		72395	508	17717
1958-59	37299	15931		168207	1027	19486
1959-60	29739	17852		135917	1323	23419
1960-61	25472	16457	103060	115355	1393	22789
1961-62	35480	16226	172617	137848	1916	24149
1962-63	47663	21672	107102	140012	2262	24809
1963-64	41231	17872	126295	152296	3249	26700
1964-65	61000	8095	1623249	88625	3541	26234
1965-66	61740	18786	130560	135418	4875	24789
1966-67	37818	13716	127106	89226	1372	20210
1967-68	66567	19573	138852	148577	4271	23947
1968-69	50771	12816	100691	104124	1654	22494
1969-70	93410	18065	103438	180130	2082	27475
1970-71	100241	26572	122324	178008	1775	24485
1971-72	83068	17626	92135	115186	2853	21246
1972-73	5842	6699	74641	95523	461	8973
1973-74	74912	12436	165405	131101	733	16748
1974-75	98025	23105	161743	171377	4842	25764
1975-76	71486	14647	184611	111342	1291	22909
1976-77	33329	7794	180580	90465	2528	19548
1977-78	58960	32511	193228	184093	10528	27375
1978-79	94380	17575	283049	206187	12951	23478
1979-80	89060	10374	290942	168464	4983	22414
1980-81	103417	20997	222470	169544	4310	16085
1981-82	130009	15113	287512	188011	3426	25264
1982-83	115872	15137	173708	168758	5058	29739
1983-84	112411	16144	246531	151646	8533	25034
1984-85	76588	6549	222826	101602	10059	15694
1985-86	74579	9431	80450	149769	9770	19623
1986-87	43792	11320	53536	130996	9751	25191
1987-88	75720	12522	141333	184445	16648	15930
1988-89	81000	24000	323000	106000	4000	16000
1989-90	140000	17000	279000	185000	11000	21000

SOURCE : Calculated on the basis of data from the various issues of **Season and Crop Report,** *Directorate of Economics and Statistics, Government of* **Andhra** *Pradesk HyderalxuL*

TABLE 3.30

INDEX VALUES OF PRODUCTION OF MAJOR CROPS IN MAHABUBNAGAR DISTRICT

(Production in Tonnes)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	**100.00**	100.00		100.00	100.00	100.00
1955-56	96.12	152.92		96.31	76.54	87.40
1956-57	108.65	83.59		56.67	229.82	98.92
1957-58	90.99	187.67		56.39	100.99	58.14
1958-59	34.73	139.74		151.93	204.17	93.17
1959-60	27.69	156.59		122.76	263.02	112.55
1960-61	23.72	144.35	100.00	104.19	276.93	109.52
1961-62	33.04	142.33	167.49	124.51	380.91	116.06
1962-63	44.38	190.10	103.92	126.46	449.70	119.23
1963-64	38.39	156.77	122.54	137.56	645.92	128.32
1964-65	56.80	71.00	157.52	80.05	703.97	126.08
1965-66	57.49	164.78	126.68	122.31	969.18	113.13
1966-67	35.22	120.13	• 123.33	80.59	272.76	97.13
1967-68	61.99	171.69	134.72	134.20	849.10	115.09
1968-69	47.28	112.42	97.70	94.05	328.82	108.10
1969-70	86.99	158.46	100.36	162.70	413.91	132.04
1970-71	93.35	23.08	118.69	160.78	352.88	117.67
1971-72	77.36	154.61	89.39	104.04	567.19	102.10
1972-73	52.00	58.76	72.42	86.28	91.65	43.12
1973-74	69.76	109.08	160.49	118.41	145.72	80.49
1974-75	91.29	202.67	156.94	154.79	96.26	123.82
1975-76	66.57	128.48	179.12	100.57	256.66	110.10
1976-77	31.03	68.36	181.04	81.71	502.58	93.94
1977-78	54.91	285.18	187.49	166.28	2093.04	1315.96
1978-79	87.89	154.16	274.64	186.24	2574.75	112.83
1979-80	82.94	91.00	282.30	152.16	990.65	107.72
1980-81	96.31	184.18	215.86	153.14	855.06	**77.30**
1981-82	121.07	132.57	278.97	169.82	681.11	121.42
1982-83	107.91	132.78	168.55	152.43	100.56	142.92
1983-84	104.68	141.65	239.21	136.97	1696.42	120.13
1984-85	72.32	57.44	216.20	91.77	1999.80	75.42
1985-86	69.45	82.72	78.06	135.28	1942.34	94.30
1986-87	40.78	99.29	59.94	118.32	1938.56	124.56
1987-88	70.51	109.84	137.13	166.60	3309.74	76.56
1988-89	75.43	210.52	313.40	95.74	795.22	76.89
1989-90	130.38	149.12	270.71	167.10	2186.87	100.92

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderaixid*

TABLE 3.31

YIELD OF MAJOR CROPS
IN MAHABUBNAGAR DISTRICT
(Yield Per Acre)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	613.03	238.73		438.88	221.88	191.64
1955-56	541.05	349.28		372.83	182.64	177.15
1956-57	628.90	203.01		227.69	213.24	193.11
1957-58	587.45	446.52		265.56	132.12	163.89
1958-59	536.78	288.00		555.93	259.21	267.99
1959-60	578.51	422.26		473.76	257.39	205.48
1960-61	582.79	314.61	1054.33	356.86	220.03	214.42
1961-62	816.72	366.13	1199.80	463.98	238.43	219.82
1962-63	738.49	586.60	813.93	506.74	241.69	206.32
1963-64	522.31	448.29	911.23	483.07	253.49	124.11
1964-65	683.72	188.28	1169.05	332.90	339.47	241.42
1965-66	525.68	492.04	1137.22	461.34	554.17	252.17
1966-67	280.21	297.07	1185.21	299.49	149.31	246.58
1967-68	546.54	362.99	1170.01	501.26	394.44	231.66
1968-69	429.12	221.99	1091.22	324.63	155.58	216.72
1969-70	731.71	329.00	1042.01	549.09	205.59	244.16
1970-71	630.97	463.01	1040.48	511.72	200.00	208.73
1971-72	409.97	305.99	1159.75	320.04	272.23	215.00
1972-73	292.33	116.99	1113.99	271.45	88.89	113.54
1973-74	763.61	208.00	1555.95	326.62	66.64	191.70
1974-75	916.21	364.01	1333.68	508.61	655.48	217.52
1975-76	771.47	230.00	1278.88	331.82	777.71	180.58
1976-77	457.41	150.01	1255.31	330.21	1410.71	18.90
1977-78	652.28	503.01	1428.93	573.82	1583.40	229.08
1978-79	797.52	332.00	1716.56	614.73	1338.74	205.78
1979-80	620.36	213.01	1813.77	530.98	588.87	203.67
1980-81	684.75	441.00	1634.43	535.69	923.56	141.65
1981-82	773.65	349.01	1816.60	555.93	488.17	228.81
1982-83	654.77	334.99	1466.08	535.35	1064.62	290.79
1983-84	632.69	379.99	1574.00	467.74	1794.15	255.49
1984-85	446.34	206.00	2389.86	398.42	1341.20	177.37
1985-86	489.69	287.11	1265.79	522.04	851.56	227.71
1986-87	416.87	378.00	1194.49	510.46	1343.48	352.05
1987-88	602.10	394.00	1795.46	581.99	5876.46	258.53
1988-89	482.14	375.00	2125.00	385.45	500.00	181.82
1989-90	804.60	288.14	1860.00	631.40	916.67	230.77
1990-91		319.15	1962.41	719.30	1133.33	274.73

SOURCE: *Calculated on the basis of data from the various issues of* ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

TABLE 3.32

INDEX VALUES OF YIELD OF MARJOR CROPS IN MAHABUBNAGAR DISTRICT

(Yield Per Acre)

YEAR 1	GROUNDNUT 2	BAJRA 3	RICE 4	JOWAR 5	COTTON 6	PULSES 7
1954-55	100.00	100.00		100.00	100.00	100.00
1955-56	88.25	146.30		84.95	82.31	92.43
1956-57	102.58	85.03		51.87	96.10	100.76
1957-58	95.82	187.03		60.50	59.54	85.51
1958-59	**87.45**	120.63		126.67	116.82	139.54
1959-60	94.36	176.87		107.94	116.00	107.22
1960-61	95.06	131.98	100.00	81.31	99.16	111.88
1961-62	133.22	153.36	113.74	105.71	107.45	114.70
1962-63	120.46	245.71	77.19	115.46	108.92	107.60
1963-64	85.20	187.78	86.42	110.06	114.24	122.16
1964-65	111.53	78.86	110.88	75.85	152.99	125.97
1965-66	85.75	206.10	107.86	105.11	249.76	131.58
1966-67	45.70	116.89	112.41	68.23	67.29	128.66
1967-68	89.15	152.05	110.97	114.21	177.77	120.88
1968-69	69.99	92.98	103.49	73.96	70.11	113.08
1969-70	119.35	137.81	98.83	125.11	92.65	127.69
1970-71	102.92	193.94	98.88	116.56	90.13	108.91
1971-72	66.87	128.17	109.99	72.92	122.69	112.23
1972-73	47.68	49.00	105.65	61.85	40.06	39.24
1973-74	124.56	27.12	145.57	74.42	30.03	100.03
1974-75	149.45	152.47	126.49	115.88	295.42	113.50
1975-76	125.84	96.34	121.29	75.60	350.50	94.72
1976-77	74.61	62.83	119.06	75.23	635.79	94.39
1977-78	106.40	21.70	135.52	130.74	713.62	119.53
1978-79	130.09	139.06	167.07	140.06	603.362	107.37
1-979-80	101.19	89.22	172.03	120.98	265.40	106.27
1980-81	111.6	**184.72**	155.02	**122.05**	416.24	73.91
1981-82	126.20	146.19	172.29	126.67	220.01	119.39
1982-83	106.80	140.32	139.05	121.98	479.81	151.73
1983-84	103.25	159.17	149.28	106.57	808.61	133.31
1984-85	72.80	86.28	226.67	90.78	604.47	95.55
1985-86	79.86	120.26	120.05	118.96	383.79	118.82
1986-87	68.00	158.33	113.29	116.30	605.49	183.70
1987-88	98.21	165.04	170.29	132.60	2648.48	**134.70**
1988-89	78.64	157.08	201.54	87.82	225.34	94.87
1989-90	131.24	120.69	176.41	143.86	413.13	120.41
1990-91		133.68	186.12	163.89	60.09	143.35

SOURCE : Calculated on the basis of data from the various issues of ***Season and Crop Report,*** *Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.*

CHAPTER IV

IMPACT OF DROUGHT : VILLAGE STUDIES

4.1 INTRODUCTION

As it is clear by now, drought is a short-term phenomenon but its impact is felt over the long run. A mild drought followed by a good season may not leave its mark. But if it is severe, it can take a heavy toll of the human, animal and natural resources of the area coming under its direct impact. Drought is not the end, but it is the beginning of the slow but sure process by which it permeates through the economy and makes its impact on the ordinary lives of the mass of people. There is a 'sequential pattern' in which impact of the drought manifests itself.

As has been mentioned earlier, the impact of drought on agricultural production shows the extensive damages caused by the frequent recurrences of drought as observed in Andhra Pradesh, which results in decline in crop acreage, set back to agricultural production, fall in employment in the agricultural sector due to slowing down of agricultural activity, fall in purchasing power of those engaged in agriculture, scarcity in drinking water, fall in water table, scarcity of foodgrains, rise in the price of foodgrains and commodities, scarcity of fodder, distress sale of cattle, loss of cattle life, low intake of food, distress sale and mortgage of land, jewellery and personal property and migration of people in search of employment.

Droughts also affect the economic and social life of the people, and the severity of the impact depends on the intensity of the drought. The impact of drought is not the same on all the sections of the society. It is, greater on the more vulnerable sections, i.e., those with hand to mouth existence and with very little margin and staying power. They include the landless and the marginal farmers and the artisans like the weavers whose livelihood depends on local demand for goods and services. They are the ones whose stocks, if any, which get quickly exhausted, are compelled to sell or mortgage their meagre belongings to the well-to-do. A succession of bad harvests can plunge

small and marginal farmers in a vicious circle of poverty dragging them down from the landowner status to landless.

On the other hand, the well-to-do will not only survive but could emerge even stronger. Taking advantage of scarcity and high prices of food grown they could make a fortune out of their surplus stocks. They not only lend money against land mortgaged or other belongings of the small/marginal farmer and landless labourers, but take advantage of their weakened economic position and inability to repay the loan, could foreclose the mortgage. Thus, the aftermath of a drought not only leaves this section in a vulnerable position, but with this greater measure of inequality, makes them all the more potential for exploitation.

As it is very difficult to make any conclusive statement of the extent of the impact of drought on these households at a macro level, there is a need to undertake micro level studies at the village level to assess the impact of drought on area, employment, wages, income, credit and distress sales of the households. In this regard, an attempt is made to study the socio-economic conditions that prevail in some of the villages in two of the drought prone districts viz. Anantapur and Mahbubnagar of Andhra Pradesh. Four villages from Anantapur and three villages from Mahbubnagar are chosen to make a micro-level assessment of drought and to examin the survival strategies adopted by the households to cope up with the drought conditions.

4.2 VILLAGE PROFILES

The four villages of Anantapur and three villages of Mahbubnagar were selected on the basis of low irrigation facilities, high agricultural labour, and dependence on dry crop cultivation. Most of these villages had been experiencing severe drought during the late 1970's and 1980's, and there was massive migration of households in these villages to canal areas and towns for employment opportunities. From 1988 onwards, there had been short spells of drought in these areas. These villages were reported to be severely hit by drought, on the basis of rainfall. After short listing the villages on the basis of

land use, production and availability of alternative sources of irrigation into clusters, the seven villages were chosen on random sampling. We now briefly present the profiles of the villages selected for the study.

East Kodipalle (1) : East Kodipalle is located in Kalyandurg mandal of Anantapur district, and is in the interior connected by road with the Mandal headquarter and other small towns. It is a revenue panchayat village, having a primary school and does not have a well developed infrastructure. The villagers are basicaly dependent upon agriculture for their livelihood and only about 12% of its population is dependent upon non-agrarian activities for their existence. Rainfall apart, other sources of irrigation available to the villagers are two percolation tanks which have dried up completely now due to shortage of rainfall. There is a small tank which irrigates about 25 acres of land in the village, which has now more or less dried up. There are a number of borewells which have been put in this area and the water is available only below 200ft. The main crop they grow in the village is groundnut, korra, blackgram and castor. And, when they are affected by drought, there is hardly any crop grown in the village. The village has two formal sources of supplying credit, a rural bank and a co-operative society, apart from the informal sources of credit available in the village. The livestock in the village is about 320 bullocks, 150 cows and buffaloes and 600 sheep and goats.

Pillalapalle (2) : Pillalapalle village is located in Brahmasamudram mandal of Anantapur district and is the main revenue village. The village has a high school, post office and even health services, including veterinary dispensary. There is electricity in the village. For irrigation purposes, there is only one percolation tank in the village which is most of the time dried up due to water shortage. Most of the wells in the village have dried up and recently they have put borewells for agricultural as well as domestic purposes. The depth of most of the borewells in the village is beyond 250ft. The major crop grown in the village is groundnut. There is no common property land for grazing in the village. There is one temple in the village and about 60 acres of land is endowed under it which is leased out for cultivation. Apart from the informal credit sources, the villagers depend upon Syndicate bank and Co-operative society which are about 12kms

away from the village for their credit purposes. The livestock in the village consists of 260 bullocks, 300 cows and buffaloes and 800 sheep and goat population.

Chintarlapalle (3) : Chintarlapalle is situated in Shettur mandal of Anantapur district. There is a voluntary organisation viz. RDT (Rayalseema Development Trust) working in the village. The village has a primary school, post office and a veterinary service. The village has a tank with an ayacut of 20 acres, and it is most of the time dry. Most of the wells in this village are also dry and most of the cultivation in the village is carried on with the help of borewells whose depth is about 250 to 300 ft. The major crops grown in the village are groundnut, bajra and castor. There is no grazing land in the village and there is about 40 acres of forest land. The formal credit sources available for the village are Andhra Bank and a Co-operative society which is about 10 kms away from the village, apart from the non-informal credit sources available to the farmers. The livestock in the village consists of 150 bullocks, 180 cows and buffaloes and 550 sheep and goats.

Adavigollapalle (4) : This village forms a part of Shettur mandal in Anantapur district. The village is basically surrounded by forest land of about 2000 acres. There is no grazing land in the village. There are three check dams constructed by the government. Groundnut is the major crop grown in the village. Borewells are the only source of irrigation in the village. The villagers apart from the non-formal credit sources depend upon co-operative sociey in the mandal headquarters for its finance. The livestock in the village comprises of 40 pairs of bullocks, 50 cows, 15 buffaloes and 600 sheep and goats.

Marchala (5) : Marchala is located in Kalwakurty mandal of Mahbubnagar district and is about 3 kms away from the main road which links it with the important towns in the area. Near the village there is a cotton mill which provides permanent employment to about 50 people from the village. There is a high school, post office, and a primary health centre in the village. The village is basically a revenue village and there is a overhead tank in the village for drinking water. The major crop grown in the village

is groundnut and apart from it vegetables are also grown in the village. The villagers depend upon wells and borewells for cultivation purpose, most of which have dried up due to water shortage. The livestock in the village is 400 bullocks, 350 cows and buffaloes and 700 sheep and goats. For the credit facilities, the villagers apart from the informal sources depend upon Indian Bank, and Land Mortgage Bank which are located in the mandal headquarters.

Raikal (6) : Raikal village is located in Shadnagar mandal of Mahbubnagar district which is about 60 kms away from the Hyderabad city. The village has a high school, post office and a veterinary service. The village has a big tank which irrigates about 114 acres of land, but at present it is almost dry. There arc three small tanks, all of them are dry. There is no grazing land in the village. The important crops grown in the village are jowar, groundnut, vegetables and paddy. And they are more or less dependent on borewells for cultivation which are at a depth of 250 to 300 ft. The village has three temples with 16 acres of land which is leased out. The livestock in the village consists of 350 bullocks, 240 cows and buffaloes and 850 sheep and goats. The formal credit sources for the village are a Co-operative Society which is situated in the mandal headquarter, apart from the informal sources available to them. Jawahar Rozgar Yojana has been undertaken in this village, under which drainage and other construction works have been carried out.

Patherchad (7) : Patherchad village is located in Narva mandal of Atmakur taluk of Mahbubnagar district. The sources of irrigation are wells, in-well bores and borewells. In the village there is a tank with 80 acres of ayacut and another three small tanks. However, during the past 8 years, there has been no water in these tanks. There is no forest land in the village. The village has 300 acres of land under common property for grazing cattle. The total livestock population is 900 and 8,300 sheep and goats. For formal cridit, the farmers availing loans at SBI Makthal Branch and through cooperative society at Narva. Credit is also available for the farmers at regional rural bank. The important crops grown in the village are paddy, jowar, groundnut, bajra, redgram, cowgram and greengram. The agricultural wages during Kharif season range from Rs. 20

to Rs. 15 per male **and** female and during Rabi season the wages vary at Rs 20 per male **and** Rs. 10 per female per day.

4.3 SAMPLE SELECTION

The sample households in the village were selected through a stratified sampling on a caste and class basis about 20% of the households were selected randomly. The four villages of Anantapur are East Kodipalle, Pillalapalle, Chintarlapalle and Adavigollapalle; and the three villages of Mahbubnagar are Marchala, Raikal and Patherchad where the socio-economic survey was conducted. The details of the households belonging to different caste and occupation categories are given in Tables 4.1 and 4.2, where households for the entire village as well as the sample households are presented. The sample households were taken from different categories of cultivators, agricultural labourers and others. The 'others' category includes basically the rural artisan class and traders, teachers, village servicemen, tea shop owners, etc. Since the impact of drought felt on all these groups had to be considered, a sample of 20% of these categories were undertaken for the study. The situation in the drought year (1990-91) was compared with the normal year (1991-92). The major emphasis of the study had been to look at the impact of drought on the area and productivity of crops grown on one hand, and that of employment on the other, apart from looking at several other issues like distress sale of cattle, water scarcity, fodder scarcity, etc. Figures 4.1 and 4.2 show the location of study villages in Anantapur and Mahabubnagar districts.

Figure 4.1 Location of Study Villages (Anantapur District)

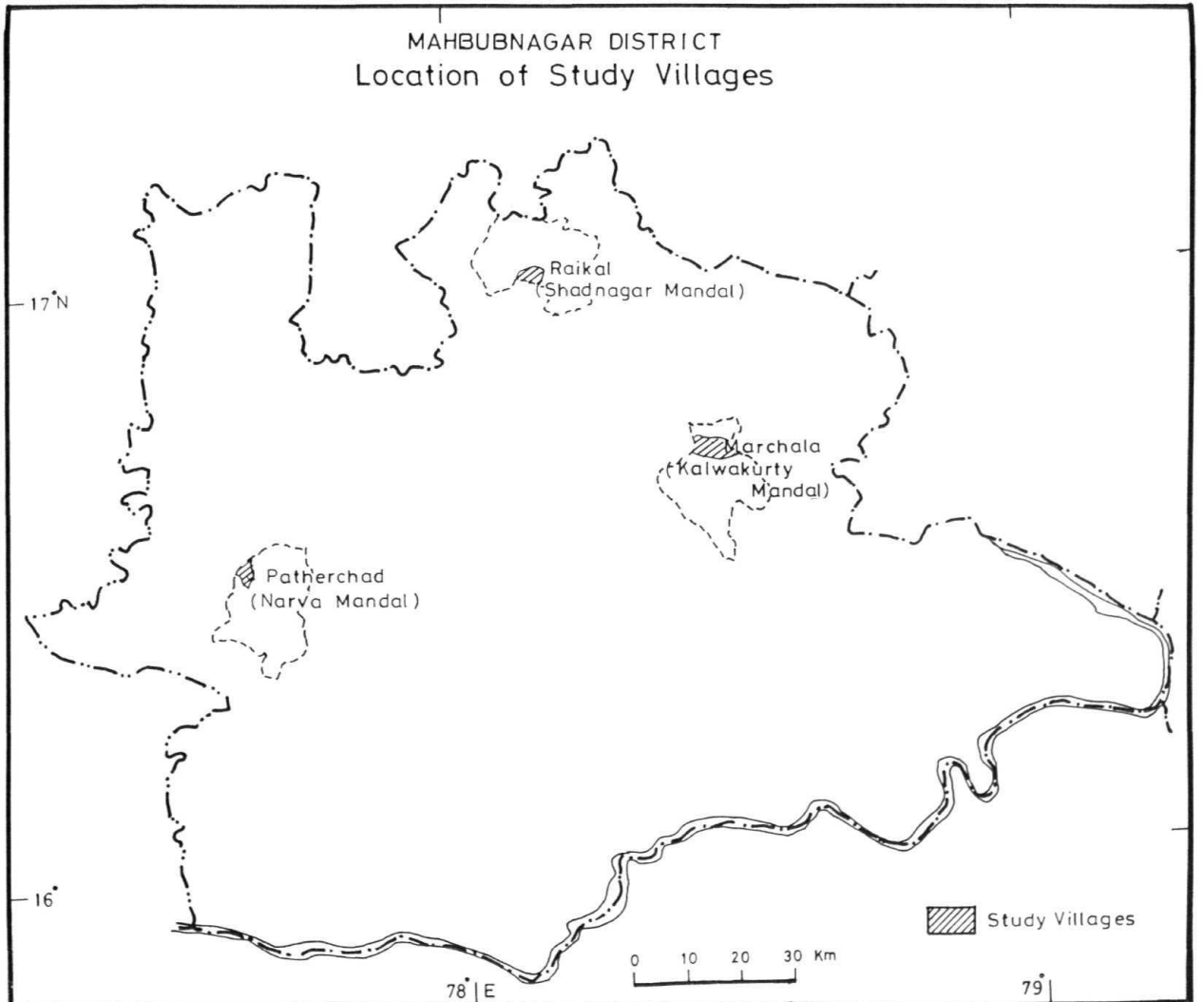


Figure 4.2 Location of Study Villages (Mahbubnagar District)

TABLE 4.1

SAMPLE VILLAGES AND SAMPLE HOUSEHOLDS IN ANANTAPUR DISTRICT

(East Kodipalle, Chintarlapalle, Adavigollapalle, Pillalapalle)

Type of Households	Households Total	Sample Households
1. Cultivators		
0-1	**1**	1
1-2	**5**	2
2-4	**30**	8
4-10	**73**	11
> 10	**60**	9
TOTAL	**169**	**31**
2. Agrucultural Labourers		
Landless	106	31
0-1	**38**	9
1-2	**78**	16
2-4	177	68
4-10	**9**	2
TOTAL	**408**	**96**
3. Others*	199	38
4. TOTAL :	**776**	**165**

** Others include artisans like Blacksmith, Carpenter, Vaddera, Washermen, Businessmen, Yerukala.*

Source: Field Survey

TABLE 4.2

SAMPLE VILLAGES AND SAMPLE HOUSEHOLDS IN MAHABUBNAGAR DISTRICT

(Raikal, Marchala, Patherchad)

Type of Household	Households Total	Sample Households
1. Cultivators		
0-1	**6**	**1**
1-2	**11**	**2**
2-4	**54**	10
4-10	66	**14**
> 10	23	**5**
TOTAL	**160**	**32**
2. Agrucultural Labourers		
Landless	**117**	**25**
0-1	190	**36**
1-2	90	**21**
2-4	**68**	**13**
4-10	1	-
TOTAL	**486**	**99**
3. Others*	319	**69**
4. TOTAL :	**965**	**200**

** Others include artisans like Vadderas, Blacksmith, Carpenter, Barber, Blanket makers etc.*

Source: Field Survey

TABLE 4.3

CROPPING PATTERN IN THE FOUR VILLAGES IN ANANTAPUR DISTRICT

(Normal and Drought Years)

(Area In Acres)

CROPS	NORMAL YEAR		DROUGHT YEAR		% DECLINE	
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
Paddy	164.00	94.00	53.00	5.00	67.70	94.70
Groundnut	857.00	8.50	20.00	1.50	97.60	82.40
Redgram	18.50	0.00	0.00	0.00	100.00	0.00
Jowar	167.25	36.00	14.50	0.00	91.30	91.30
Mulberry	5.50	5.50	0.00	0.00	100.00	100.00
Ragi	5.00	28.00	0.00	7.50	100.00	73.20
TOTAL	**1217.25**	**172.00**	87.50	**14.00**	**92.81**	**91.87**

Source: Field Survey

TABLE 4.4

CROPPING PATTERN IN THE THREE VILLAGES IN MAHBUBNAGAR DISTRICT

(Normal and **Drought Years)**

(Area In Acres)

CROPS	NORMAL YEAR		DROUGHT YEAR		% DECLINE	
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
Paddy	208.25	148.25	77.50	6.00	63.00	96.00
Groundnut	275.80	5.00	20.00	0.00	93.00	0.00
Redgram	33.00	0.00	3.00	0.00	91.00	0.00
Jowar	183.25	49.50	17.25	0.00	73.00	100.00
Bajra	42.00	0.00	0.00	0.00	100.00	0.00
Mulberry	6.00	6.00	0.00	0.00	100.00	0.00
Ragi	7.00	17.00	1.00	6.00	86.00	65.00
Sunflower	11.00	0.00	0.00	0.00	100.00	0.00
Fruits & Veg.	14.00	29.75	13.00	19.75	7.00	34.00
Chillies	7.52	0.00	5.75	0.00	23.00	0.00
TOTAL	787.55	255.50	**137.50**	**31.75**	**82.50**	**87.00**

Source: Field Survey

4.4 IMPACT OF DROUGHT ON AREA

For the analysis of impact both on area and employment, Kharif season is taken into consideration. The entire drought belt is essentially single agricultural season zone depending on South-West monsoon. Changes in this season alone are indicative of changes due to drought. Rabi seasons operations are associated with availability of irrigation. The land use data of the selected villages reveals that substantial area remained unsown during the drought year Table 4.3 and 4.4. In the four villages of Anantapur district, during the drought year only about 7.19% of the normal year area is cultivated. While in the three villages of Mahbubnagar district about 17.46% of the normal year area is cultivated during the kharif season.

If we look at the output of some of the major crops like groundnut, bajra, rice, jowar. cotton and pulses in Anantapur district, we find that there is a decline in the production during 1990-91 as compared to the earlier years 1988-89 and 1989-90. There has been a massive decline in the production of the dry crops like bajra, jowar, cotton and Pulses.

4.5 IMPACT OF DROUGHT ON EMPLOYMENT

Apart from the loss of crop which could be entirely attributed to the variability of area, the impact of drought is also vividly manifested in the market for labour. During the drought period there is a rise in the unemployment. The drop in employment is most marked for those who work on their own farm and work as hired labourers participating in the daily-rated labour market in the village. During the drought period, days worked as family labour or as hired labour on others' farm were halved. The rise in unemployment seems to have disproportionately fallen on casual workers who usually relied on earnings from daily-rated or piece-rate contract of agricultural work. If we examine the employment situation in the villages undertaken for the study, we do find a similar trend prevailing. Not only do the number of working days available to these labourers decline steeply during the drought period, but also the wages get reduced. In the villages of Anantapur and Mahbubnagar, which have been undertaken for study, it was found that

during the drought period male wages generaly decreased from Rs.20-25 to Rs. 15-18 and in the case of female wages it decline from Rs. 15-20 to Rs.8-15. In the case of labourers who migrated, the wage rate reduction was not as drastic as that in the village, and it varied from Rs. 18-25 for males and Rs. 12-15 for the females.

We now present a detailed picture of the employment situation of the sample households which has been taken into consideration in each village. The basic idea behind it being to find out the number of working days available to a labourer during the drought situation in comparison to the normal times. And also to look into the activilies that they were involved during the drought period, and whether they migrated to other areas for employment opportunities and how long did they migrate during the drought period. We can have an indepth analysis in regard to these aspects by looking into the details of each village in both the districts.

ANANTAPUR DISTRICT

We first look into the four villages of East Kodipalle, Chintarlapalle, Adavigollapalle and Pillalapalle in Anantapur district . The major crops which are grown in these areas are groundnut, ragi and paddy, though other crops like jowar, redgram and mulberry are also grown but in smaller proportions. During the drought period only about 10% of the land is cultivated by the large farmers who have irrigation facilities in these four villages taken together. To look into the employment situation in the village we have taken into consideration all the class categories of farmers and agricultural labourers.

The employment situation in the East Kodipalle village during the normal year and the drought year would be more clearly understood, if we look at Table 4.5. During the drought year about 87.5% of the male and almost all the female cultivators do find work for about 60 days on an average, which is about less than half the employment available to them during the normal period. While, in the case of agricultural labourers, only about 76.3% of the male and 70% of the female labourers find work for themselves, for about 98 and 77 days, which is just about more than half the working days available to them, as compared to the normal year. Most of the cultivators and agricultural

TABLE 4.5

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(East Kodipalle)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	08	5	150	120
b) Agricultural Labourers	38	33	145	142
2. DROUGHT YEAR				
a) Cultivators	7 (2*+5**)	5 (1*+4**)	60 (60*–6<r)	60 (60*--60**)
b) Agricultural Labourers	29 (12*+17**)	23 (10*+13**)	98 (110*--90**)	77 (60*--60**)

Source Field Survey

Note : * Indicates non-migrant household
** Indicates migrant household

labourers in the **village** also migrate to other areas for employment. **During** the drought period about 75% of the male and female cultivators, and 60% of **the male** and female agricultural labourers migrate to Bellary, Kanekal, Devangiri and Pulikela for about 60 and 90 days on an average

If we look at the employment situation in Chintarlapalle village as presented in Table 4.6, we find that during drougt year about 72% of the male and 47% of the female cultivators find work for themsevles and none of them migrate, and they are able to find employment for about 120 days on an average which is substantialy lower than the number of days they are able to find during normal year. In the case of male and female agricultural labourers, about 95% of the male and 92% of the female agricultural labourers do find work during the drought year for about 75 days on an average, which is about less than half the days that they are employed during the normal year and about 16% of these labourers migrate to other areas like, Devangiri, Mallapuram and Bommenhalli where they are involved in various agricultural activities.

The employment situation in Adavigollapalle village is shown in Table 4.7 where during the drought year about 3 out of the 4 male, and 4 out of 5 female cultivators find work for themselves for about 100 and 80 days in the village itself, and none of them migrate. The number of days that they find employmet is comparatively less than that of the normal year. In the case of male agricultural labourers about 70% of the male and most of the female agricultural labourers found employment for about 90 days on an

TABLE 4.6

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(Chintarlapalle)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	14	17	150	120
b) Agricultural Labourers	40	40	150	146
2. DROUGHT YEAR				
a) Cultivators	10*	8*	120*	120*
b) Agricultural Labourers	38 (32*+6**)	37 (31*+6**)	73 (75*--60**)	73 (75*--60**)

Source Field Survey

Note : * Indicates non-migrant household
** Indicates migrant household

TABLE **4.7**

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(Adavigollapalle)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	**4**	**5**	**150**	**90**
b) Agricultural Labourers	**17**	**11**	**141**	**139**
2. DROUGHT YEAR				
a) Cultivators	**3***	4•	**100***	**80***
b) Agricultural Labourers	**12** (8•+4••)	**11** (7•+4••)	100 (90•--120••)	**82** (60•--120••)

Source Field Survey

Note : • Indicates non-migrant household
•• Indicates migrant household

average, which is just about two-thirds of the number of days they get employed during the normal year. About 33% of these male and female agricultural labourers migrate to Bommenhalli and Perur and are involved in agricultural activities for about 90 days on an average.

Table 4.8 shows that in Pillalapalle village, during the drought year about 50% of the males and 52% of the female cultivators find employment for themselves in the village for about 120 days, which is comparatively less than the number of days they get employed during the normal year, and none of them migrate during the drought period. In the case of agricultural labourers, about 89.5%' of the males and 87% of the females find employment for themselves during the drought year for about 80 days on an average, which is just about more than half the number of days they get employed during the normal year. About 70% of these male and female agricultural labourers migrate to Bellary, Kanekal, Uravakonda, Hauspet, Anantapur, Bommenhalli and Tadipatri where they are involved in agricultural activities for about 80 days on an average.

After having a look at the employment situation in the four villages, we find that about 75% of the males and females on an average are able to get employment opportunities in the village itself or in the surrounding areas for a period of not more than 90 days on an average in a year during the drought period.

MAHBUBNAGAR DISTRICT

In Mahabubnagar district, the three villages where the survey was conducted are Raikal, Marchala and Patherchad. The major crops grown in this area are groundnut, paddy, jowar, ragi, castor, and vegetables like tomato, bhindi and brinjal. Even in this district all the class categories of farmers and agricultural labourers have been taken into consideration for the study.

The employment situation in Raikal village is shown in Table 4.8, where during the drought period most of the male and female cultivators are able to find employment for alsmost 150 days on an average. In the case of male and female agricultural

TABLE 4.8

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(Raikal)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	**19**	10	**150**	**150**
b) Agricultural Labourers	**33**	**34**	**145**	**146**
2. DROUGHT YEAR				
a) Cultivators	**19***	**10***	**150***	**150***
b) Agricultural Labourers	**30***	29**	120**	105**

Source Field Survey

Note : * Indicates non-migrant household
**** Indicates** migrant **household**

TABLE *4.9*

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(Marchala)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	36	25	150	150
b) Agricultural Labourers	38	46	142	120
2. DROUGHT YEAR				
a) Cultivators	18*	13*	120*	120*
b) Agricultural Labourers	12 (8*+26**)	11 (13*+27**)	100 (75*--90**)	82 (60*--90**)

Source Field Survey

Note : * Indicates non-migrant household
** Indicates migrant household

TABLE 4.10

KHARIF SEASON EMPLOYMENT OF SAMPLE CULTIVATING AND AGRICULTURAL LABOUR HOUSEHOLDS

(Patherchad)

Normal/Drought Year	Number Employed		Average Number of Days of Employment	
	Male	Female	Male	Female
1. NORMAL YEAR				
a) Cultivators	9	7	150	90
b) Agricultural Labourers	46	50	149	102
2. DROUGHT YEAR				
a) Cultivators	9*	r	150*	90*
b) Agricultural Labourers	46*	46*	45*	45*

Source : Field Survey

Note : * Indicates non-migrant household
** Indicates migrant household

labourers, about 90% and 85% of them are able to get employent for about 110 days on an average, which is comparatively lower than the number of days they find employment during the normal year. During the drought year none of the labourers migrate to other areas in this village.

In Marchala village (Table 4.9) we find that about 80% of the males and 75% of the female cultivators find employment for about 90 days on an average during the drought year as compared to 150 days of employment during the normal year. In the case of agricultural labourers about 76% of the males and 70% of the female agricultural labourers, were engaged in agricultural activities for about 100 days on an average. None of these agricultural labourers and cultivators migrate to other places for work.

In Patherchad village, (Table 4.10) about 30% of the agricultural labourers from the village had migrated to other places for employment when the survey was conducted. As none of these households were in the village at the time of the survey, we had to take into consideration only the non-migrant households and undertake the study. Almost all the male and female cultivators of our sample households were engaged in agricultural activities during the drought year for almost the same number of days as that of the normal year. In the case of agricultural labourers, almost all males and 92% of the females found employment during the drought year for about only 45 days on an average which is almost about one-third of the days that they are employed during the normal year. None of the households taken into the sample had migrated to other areas for work.

Looking at the employment situation in the three villages of Mahbubnagar district, we find that during the drought year the farmers are able to engage themselves in agricultural activities for a period of of about 90 days on an average. The employment situation in Anantapur and Mahbubnagar districts shows that, during the drought season the number of days that the farmers gets employed is considerably lower compared to that of the normal year. And, even when most of them do get employed, even then some of them are forced to migrate to other places to get some work.

4.6. DISTRESS SALE OF CATTLE DURING DROUGHT PERIOD

It was observed in the villages that there had been distress sale of cattle during the drought period. During drought the farmers in order to supplement their income sold their cattle, buffaloes, cows and other animals they possessed. Many of the farmers also sold their unirrigated land to supplement their income. The price structure also moved against rural population during drought year, as the farmers had to content themselves with lower prices for various assets sold by them.

The particulars of distress sale of cattle during drought period is provided in Tables 4.11 and 4.12 respectively for both Anantapur and Mahbubnagar districts. Table 4.11 refers to the four villages in Anantapur district and gives information of distress sale for different categories of households such as cultivators, agricultural labourers, others and landless persons. Altogether 87.5% of cattle, 70.3% of buffaloes, 95.0% of cows, 100% of sheep, 89.6% of goats and 100% of calves, were sold due to drought. It accounted for 92.4% of the total livestock population owned by these categories of households.

Table 4.12 shows that in Mahabubnagar, in the three villages of the study area, 78.2% of cattle, 93.5% of buffaloes, 88.8% of cows, 84.3% of sheep, 36.3% of goats and 100% of calf population owned by different categories of households were sold away in distress. Table 4.13 shows different prices of livestock which were sold during the drought in the seven villages of Anantapur and Mahabubnagar. The prices of livestock during drought distress are reported to be on an average about fifty percent than in normal times. It is not uncommon for many small farmers to sell their draught animals in distress and again get into debt to buy similar stock at higher price once the monsoon starts. Purchase of of cattle is an important cause for many small farmer indebtedness.

It is necessary to point out here that there are a number of difficulties faced in the assessment of the impact of drought on area of cultivation, agricultural production and employment. Aggregate data at state, district or even at mandal level do not give a proper picture of variation in area cultivated, crop production and employment during

drought and non-drought years. Often, **the** data given relate **to** area **sown but may not** show the actual extent of the crop management. Often the **substantial** area sown is abandoned because of drought. Aggregate data often ignore the extent of area abandoned.

The village level household survey presented above, on the **other hand,** takes into consideration only the area where the crops have reached the harvesting stage but ignores the area that was sown but where crops have not reached the harvest stage. Often a casual enquire into the area sown may get a distorted view of the actual area which was subjected to broadcasting of the seed. But the actual stay in the village and observation of the activities of the farming communities enable the research to observe substantial gap between thc area sown and the actual area harvested during the drought years. Often, not only docs drought need to lower area cultivated, and lower productivity but also losses in the form of ploughing, preparation and seed costs which are dead costs due to crop withering without any harvesting prospects.Thhough the intensity of drought may of the same magnitude the extent of its impact varies from village to village and from one type of household to the other. The worst affected are the small marginal farmers who experience not only loss of employment and income but also depletion of their assets like cattle. They often end up in debt. Though agricultural labourers also suffer lack of employment consequent loss of income, the extent of distress suffered by them during drought may not vary widely compared to the normal year, largely due to their ability to migrate in bad season to other areas for work.

TABLE 4.11

DISTRESS SALE DURING THE DROUGHT PERIOD

(In East Kodipalle, Chintarlapalle, Pillalapalle and Adavigollapalle Villages of Anantapur District)

Category	No.	Land	Cattle	Buffaloes	Cows	Sheep	Goat	Calves	Total
1. Cultivators	29	5 (5)	8 (12)	16 (24)	113 (118)	150 (150)	90 (100)	4 (4)	381 (408)
2. Ag. Labourers	15		27 (29)	3 (3)	11 (11)	-	113 (115)		154 (158)
3. Others			7 (7)	-	7 (9)	8 (8)	10 (25)	-	32 (49)
4. Landless	–				–		20 (20)	-	20 (20)
Total	44	5 (5)	42 (48)	19 (27)	131 (138)	158 (158)	233 (250)	4 (4)	587 (635)

Source : Field Survey

Note : No. in brackets indicates the stock actually possesed.

TABLE 4.12

DISTRESS SALE DURING THE DROUGHT PERIOD

(In Raikal, Marchala & Patherchad Villages of Mahabubnagar District)

Category	No.	Land	Cattle	Buffoloes	Cows	Sheep	Goat	Calves	Total
1. Cultivators	19	60 (85)	1 (2)	11 (12)	8 (8)	20 (40)	-	4 (4)	44 (66)
2. Ag. Labourers	17	3 (10)	39 (51)	6 (7)	8 (11)	-	2 (6)	5 (5)	60 (91)
3. Others			12 (14)	12 (12)	8 (8)	96 (96)	2 (5)	2 (2)	132 (137)
4. Landless		–	2 (2)			3 (5)	-	-	5 (7)
TOTAL	36	63 (95)	54 (69)	29 (31)	24 (27)	1 19 (141)	4 (11)	11 (11)	241 (290)

Source : Field Survey

Note : No. in brackets indicates the stock actually possessed.

TABLE 4.13

AVERAGE PRICES OF LIVESTOCK SOLD DURING THE DROUGHT PERIOD

(Seven Sample Villages of Anantapur & Mahabubnagar Districts)

District	Cattle (Rs.)	Buffaloes (Rs.)	Cows (Rs.)	Sheep (Rs.)	Goats (Rs.)	Calves (Rs.)
1. Anantapur	970.00	513.00	293.00	244.00	214.00	175.00
2. Mahbubnagar	1020.00	797.00	354.00	212.00	350.00	315.00

Source : Field Survey

CHAPTER 5

DROUGHT AND SURVIVAL STRATEGIES THE CASE OF PASTORALISTS

5.1. INTRODUCTION

Sheep comprise 11.6 percent of the livestock population in India (Qureshi 1990: 19) which are reared for meat as well as wool. Sheep are more numerous in Andhra Pradesh and Tamilnadu but their wool is short stapled and inferior to the wool of the sheep reared in north- western India. Marwari breed of sheep of Rajasthan give good quantity of wool. Sheep flocks are also reared by the nomadic grazers in the Himalayas, such as Bakerwals of Jammu and Kashmir and Gaddis of Himachal Pradesh.

Goats are in larger number compared to sheep and account for 22.7 percent of the livestock of the country. Goat is a poor man's cow. These are found in larger numbers in the north Indian plains and the hills. The sheep and goats provide ready cash to the shepherds as they can be sold at the time of need.

Pstoralism is an important adaptive strategy in the upland zones of the southern Deccan. The pastoralists of this region are the Kuruvas (called Kuruma in Telangana and Kuraba in Karnataka) and the Gollas . Like the other pastoral castes of India (such as the Ahirs, Gowla, Gonda,Yadava (Jadev), Gavli (Gowli), Kolari, Dhanagar, etc) the Kuruvas and Gollas live in permanent dwelling places in villages and are involved in agriculture in a supplementary capacity (Murty 1993 : 33).

The Raikas are the largest group of nomadic pastoralists in India. They reside, for the most part, in permanent dwellings in the Western Indian states of Rajasthan and Gujarat but migrate with their sheep for more than two-thirds of the years. Women and children often accompany the males in migrations, contributing equally to the success of the enterprise. Migration with sheep is a strategy to manage environmental risks by diversifying investments into mobile assets whose output is determined by a production function independent of that which controls farm production (Kroeber 1948 : Sadr 1991).

Each year **after the rains,** hundreds of thousands **of shepherds migrate from Rajasthan** into regions of greater forage. Their migration lasts 7-10 **months** on **the** average and spans distances between 500 and 1000 miles (Agarwal **1991** : **264).**

Pastoralism is most typical tor landscapes of alluvial plains of Rajasthan. Under conditions of increasing livestock population, there is a sharp growth of pressure on pasture areas and decrease of pasture productivity. Primary natural vegetation in this region practically everywhere is reduced as a result of felling for buildings, fuel and fodder purposes. Many species are used by man for food especially in the years of droughts (Sharma 1991 : 298).

The migration of men and livestock (Kavoori 1991 : 255) between complementary ecological zones is a frequent feature of arid and semi-arid regions, which includes the vast arid and semi-arid tracts of Rajasthan. Thus agriculture and pastoralism combine to support the region's rural economy; the utilization of large tracts of unarable and marginal land, along with the use of seasonally fallow rain crop tracts, as pasture, forms the primary basis of the success of the transhumant system. Broadly speaking, the direction of migration is towards areas bordering Uttar Pradesh, Madhya Pradesh, and Gujarat. Recent years have seen a widespread drought in the region, when the extent of transhumant migration was thought to be near the 80 percent mark.

Agarwal (1991 : 264) has shown that duration, distance, and flock size are positively correlated; smaller herds may migrate less frequently and to shorter distances. Adjustments by pastoralists to risk cannot be studied in isolation from the survival options of other communities. At the same time survival in a normal year cannot be completely distinguished from survival in an abnormal period like an year of drought (Gupta 1991 : 335).

Pastoralists need access to grazing land, water, places for right shelter, food and other necessities like veterinary medicine, during migration. The need for assurance about security of a person and livestock in the unknown or lesser known regions generates institutions for collective survival. Agarwal illustrates how some migrating

groups of shepherds in the Dangs have a sort of relay race for night watchmen duty. Every person has to watch the herd in the night by moving around the herds.

Villagers in Andhra Pradesh receiving herdsmen from Rajasthan have an informal arrangement for deciding whose fields should be penned in a particular year, and by whose herd. An assembly of village elders negotiate with the scout party of the pastoralists about these arrangements. There have been many cases of violence against pastoralists on the issue of grazing in forests (with or without sanctuaries), private fallows, roadside fallows, on interstate borders. But there remains a vast range of traditional medicine systems or knowledge about combinations of stress lodder and feads during drought which need to be properly analysed, screened and diffused (Gupta 1991 : 335).

Traditional herd management in the present study area is apprarently intunc with the theory of " cattle complex " (Herkovits 1926) and supports pastoral conservatism. Herdsmanship occurs heriditorily among the Kuruvas and Gollas. The herdsman's ideology is to maintain a good quantity of livestock to keep up his prestige; it is lessened if he possessed a small stock (Janzen 1991 : 9).

5.2 PASTORAL ECONOMY IN THE STUDY AREA

Sheep/goat pastoralism is an important economic strategy in this low rainfall (400 mm - 600 mm), semi-arid region with expanses of grassland savannas and thorny thickets. The sheep/goat pastoralists of this region are the Kuruvas (also pronounced as kuruba) and Gollas. The Gollas identify themselves as Yadavas. The main distinction between the Kuruva and Golla communities can be made on the basis of 'Gotras' to which they belong. Even among the Gollas there exists an intercommunity distinction based on the 'vamshamu' (clan). For example shepherds in Basaram village belong to Yerra Golla vamshamu. Sherpaherds of Yerra Golla vamshamu claim higher rank than the others such as Mustigolla vamshamu. Pakanatigolla vamshamu. etc. Though the Kuruvas and Gollas maintain cordial relations, they do not exchange boys or girls in marriage. There exists 'Kancham Pottu' (i.e., they dine together but do not exchange brides)

The other difference between the Kuruvas and Gollas is that it is only the Kuruvas who are skilled in shearing the wool and making woolen blankets. Gollas do not know shearing of wool and blanket weaving though some of them are getting trained in such an activity. In the three villages namely Peddakothaplly, Basaram and jonnalaboguda, Kuruvas and Gollas are not distributed equally. Kuruvas arc found to be more in number than the Gollas, and they also possess more land and sheep than the Gollas. The discussion presented in this chapter is based on the tieldwork conducted by the researcher in these three villages located in the Kollapur taluk of Mahbubnagar district.

Two main breeds of sheep in this region are Deccani and Nellore and the important goat varieties are Osmanabadi and a local variety. The Deccani variety of sheep have less wool than Nellore variety.

THE SHEEPFOLD

The sheep are penned in the evening just after the sun set in the open fields in a net enclosure made of theege vala (link-chain mesh). This net is made of crisscrossing cotton or fibre strands or iron wire. To make the net enclosure, wooden posts are planted in the ground at intervals of two to three feet, in a circular fashion and the net is secured to these posts. Sheep are driven into the enclosure through an entrance, and the latter is also closed with the net. An elder person looks after the sheep as they graze throughout the day and leads them into the net at dusk. The young shepherds identify the young sheep and take them to their respective mothers for milk feeding. The elder shepherd goes home and returns in the night. He is usually accompanied by two dogs and two boys. The shepherds hardly sleep for two to three hours in the night as they have to keep a watch over the sheep. Early in the morning before the dawn, the sheep are again freed for grazing by opening the gate of the net enclosure. During the winter season, due to moisture, the sheep are freed for grazing around 7.30 a.m. Where as during the summer the sheep are freed early in the morning at 6 a.m.

53 SHEEP GRAZING AND PASTURES

Kuruvas and Gollas used to go in earlier times to far off areas. The fodder for sheep is getting scarce. The degradation of forest resources over the years, particularly burning of trees to prepare coal by the government and wood cutting by private parties, are said to be the main reasons for forest depletion and decrease of fodder resources. Absence of trees deprive the shade for the sheep to rest. Due to drought conditions for the last three years (and also during the previous drought periods), the shepherds went to Banala, Balmur and Kondanagula which are 50 km away form this region for short term grazing. They start moving during Ugadi (April) and they stay until summer for a period of four months. Usually two elders and three youngsters accompany one sheep unit. Shepherds in this region usually graze their sheep in and around the villages. During rainy season they do not go to other areas as the fodder is available at local place. When there are no rains they move to surrounding villages into Lingala and Peddapolam for grazing. The shepherds with small herd size do not go to such interior areas However during prolonged droughts they move into the interior forest areas.

The shepherds have a system of grazing which represents a contract between the shepherd and the land owner. Sheep are grazed in their fields after harvesting of jowar, ragi and groundnut crops. The land owners allow the shepherds to graze their sheep in the field. Apart from this, they also allow the shepherd to use the trees and foliage to be given to sheep and goats as fodder. The shepherd in return provides manure by 'folding' the sheep in the lands of owners. Such a folding lasts for two to three days, to manure one acre. The droppings of sheep and goat is a natural manure which makes the land and soil fertile. Such a manure is good for ragi, castor, paddy and jowar crops and also it prevents crop diseases in fields. They establish such camps just before the land is ploughed for cultivation. During ploughing the farmer spreads such manure throughout the field. It is not good for groundnut, as it makes the soil hard to hold the groundnut inside resulting half-harvesting of groundnut crops. While establishing such camps in local places, they do not get any other benefits than grazing. But when they go outside

the village on short-range movement they establish camps for **one or two** days **on new** lands on the transhumant route. They do not get any **thing in return from** the camps established during the travel. During the normal period, the land owners give the shepherds 4 kg of jowar or 2 kg of rice for 2 persons per day. Some landlords give shepherds an amount of Rs.5 to 10 per day as remuneration, and some farmers provide arrack.

The shepherds provide rams (yatalu) for annual sacrifices to the village deities to the riots. Rams or annual provision of sheep or goat is given to washermen (chakali), potters (kummari) and other rural artisans on rotation basis. In the case of those shepherds who are not in a position to offer sheep/goats, they give some money because such an offering is a tradition and is given once in every year.

Shepherds with small holdings of sheep do not form units in the normal grazing season (non-migration). It is only during the transhumance they group the sheep into units. Shepherds with small number of sheep do not migrate into forest. They feed the sheep locally in and around village pastures. This sort of local grazing is for a period of ten months and during the summer, due to fodder and water scarcity, they graze in other village for a period of two months. shepherds with big holdings of sheep form into units during Dipavali festival.

In Peddakothapally village there are 10 farmers of different land owning castes leasing out sheep. They hire shepherds for grazing their sheep. They pay Rs.5() per sheep for grazing to the shepherd. The shepherds graze their (farmer's) sheep along with their own sheep. In this way the lease system helps cooperation between the farmers and shepherds. The medicinal costs of the sheep are paid by the sheep owning farmers in case of disease to the sheep. Free grazing is allowed in the post-harvest season. But pre-sowing grazing is done on agreements. Shepherd members numbering 3 to 4 group their sheep and make manuring camps in the fields. This is done as a return, for, the land owner earlier allowed the shepherds to use foliage on land owner's fields for 45 days in a year. The shepherds establish camps twice or thrice in a year for manuring the fields. The manuring is free and is not charged. There exists a traditional contract between land

owner and the shepherds to make manuring camps. A sheep **unit with 100** sheep **gets Rs.50** per day as renumeration. This amount is divided among **the individual** shepherds who grouped their sheep into unit during the manuring camps.

5.4. TRANSHUMANCE WITH SHEEP

Shepherds of the region belonging to Pcddakothaplly, Basaram and Jonnalaboguda village migrate along with their sheep into the forest areas near the Nallamala Hills. There are 150 shepherd families in Peddakothapally village out of which 100 families are Kuruvas and 50 families belong to Golla caste. Four sheep units (manda) are managed by 6-10 members and each unit apporximately consists of 1500 sheep. In Jonnalaboguda there are 3 units with a flock size of 100 to 150 sheep in each unit. Shepherds during their transhumance maintain the Hocks on rotation i.e., two members remain with the flock while two members shuttle between the shepherd's forest camp and the village to carry the essentials. Usually one shepherd is needed year round to graze 100 sheep. In the forest they have to pay Rs.10 per goat for grazing for a period of six months to the forest official. In case of sheep free grazing is allowed following the central government's forest regulations allowing only the sheep into the forest as they cause least damage to the local tree species than goats.

The shepherds make transhumance into the forest along with sheep during the month of April (Aswini Karti). at the time of Ugadi festival./They stay in the forest for a period of five months/:' After grazing the sheep for three months the shepherds find **it** difficult to maintain the herd at a single place, and the herd scatters. During the month of July the grass becomes thick and is not relished by the sheep, and they start moving. Even then the shepherd stay on in the forest for two more months. They return to their respective native villages in the month of August when the Aslesha Karti (Asaleti) starts. They return during this time particularly to participate in Kharif agricultural operations.

Shepherds of the near by Bijinepally mandal move **towards Karivena** of Srisailam forest zone in the month of June (Mrugasira Karti) and return after the rainy season in the months of mid-septembcr and first week of October (Hasta Karti). Shepherds shear

the wool twice in a year once in every six months in June (Mrugasira Karti) ana November (Anuradha Karti) (Anuraga Karti). After returning from the forest these shepherds engage in cultivation of paddy (Oryza sativa). jowar (Sorghum vulgare), ragi (Elucine corocana). groundnut (Arachis hypozea) and castor (Riscinus communis) crops during the Kharif season (August to September). Some of the shepherds stay on till the completion of Rabi crops (until March). During April, May and June they either go to forest or stay in the village to graze the sheep.

5.5 TRANSHUMANCE ROUTES AND CAMP SITES (fig. 5.1)

The shepherds start from Peddakothapally and proceed towards Nallamala forest area which is 60 km away via Lingala and Achampet. Peddakarpamula is another starting point of the transhumance route which passes through Chinnakarpamula, Ambatipally, Yapatla, Hausailkunta, Lingala, Ayyampally, and Chennampally. The forest area starts from Ayyampally into the Nallamala forest range. The important forest camp locations of transhumance arc Ramapuram near Kota, Appapur, Bowrapuram Cheruvu, Gornala, Watlapally and Pathuru Bailu. They camp at Pathuru Bailu for two months and they return on the same route. The transhumance in this region starts from Peddakothapally in the month of April, proceeds towards Peddakarpamula. It takes a day for a shepherd to move his sheep from Peddakothapally to Peddakarpamula. They stay here for one night. The next day they move towards Ambatipally which again takes a day to reach. They stay for one night at Ambatipally. From Ambatipally they travel for one day to reach Lingala and spend a night. The next day they move to Chennampally. It takes one day to move from Chennampally to Ayyampally. The shepherds stay for 3 to 4 days at each camp site and they move from one site to the other within the same time. In the forest they stay for 3 months and return in the month of August. Lonkas are low water yielding areas in this region which are used for watering the sheep. Chenchus and Yerukalas who are tribals of this region also undertake sheep rearing, particularly in Lingala forest zone. For making short-range movement, each sheep unit is headed by two elders and a younger one. During the long-term transhumance only elders go. Figure 5.1 shows transhumance routes and camp sites in the study area.

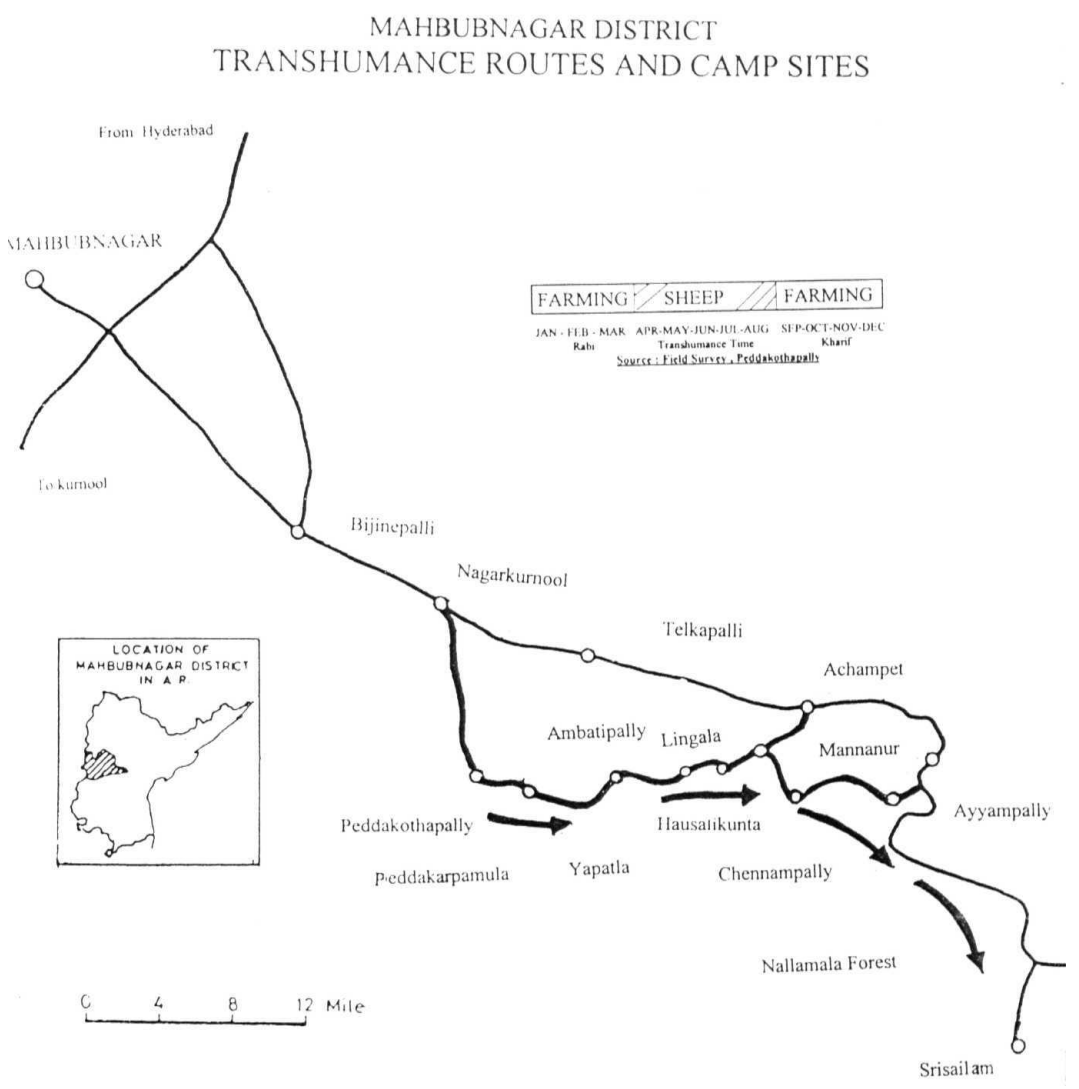


Fig. 5.1 : Transhumance Routes and Camp Sites in the Study Area

In forests shepherd graze the sheep and goats with neem leaves (Azadirachta indica). foliage of tree species such as subabul (laucaena Leococephela). nalla thumma (Acacia arabica). thumma (Acacia nilotica). The leaves as well as pods of such trees are used as fodder to sheep and goats. The grass varieties of which the sheep graze in this region are anjan gaddi (Ccnchrus ciliaris) nendra gaddi (Se hi ma nervosum) and dhub grass (Cvnodon dactylon), and spear grass (Heteropogan contratrus). In the forest 'Bauhinia racemosa'. mangalu (Zyzyphus jujuba), and narukudu are the local trees and foliage of these trees is used as fodder to the sheep. Jowar and paddy stubbles are also used as fodder after harvesting these crops.

Pods and leaves of subabul. avisa (Sesbania sesban). ravi (Ficus bengalensis) rhodes grass (Chloris guayana) and (Stylosanthas hamata) are the prominent fodder sources. The cultivated crops on which sheep can be grazed are hybrid napier and guinea grass (Panicum maximum). There are legume crops such as lucerne, cowpea, siratro, berseem and sun hemp which can be used as fodder. Certain cereals and pulse crops such as jowar, maize, greengram or bluckgram can also be used as fodder to sheep.

Sheep are affected by several diseases. Important diseases are pedda rogam or musara vyadhi (rinder pest), galikuntu vyadhi (foot and mouth disease), neelinalika (blue tongue), doma vyadhi (anthrax). gontu vapu vyadhi (hamorragic scepticemia), jabba wapu vyadhi (block quarter), chituku vyadhi (entro toxaemia). and ecthyma. Sheep arc also affected by gomari (ticks or mites caused by flies and pests). The other minor diseases of sheep are milk fever, ketosis, tuberculosis, brucellosis, roundworm, tapeworm, (mastitis milk diseases) and pox and mange (skin disease).

5.6 PASTORAL DEITIES AND RITUALS

The Kuruvas and Gollas worship their Gods Beerappa, Mallaiah and Goddess Yellamma. They have temples of each of these gods and goddesses. They go to Yellamma temple on Mangala-waram (Tuesday) and to Beerappa and Mallaiah temples on Adiwaram (Sunday). They sacrifice goats on August 30th to Beerappa and offer clothes, food, curd saffron, coconut and leaves collected from 12 trees. Chandraiah who is a native of the

Peddakothapally village conducts these rituals. After assembling at the temple, the devotees sing songs related to Beerappa. During the Mallayya festival they eat food prepared with jowar and jonna sankati (gruels of jowar). Dogs are also fed with such food. Lingamayya is their another god. At Saleshwaram, Kuruvas and Gollas provide coconut and sweets (Kaya chekkara) as offerings. They visit Sri Mallikarjuna temple near Srisailam on every Sivaratri festival. The marriage ceremony is celebrated with Unni Kankanamu (wollen wrist band); food is carried in blankets during wedding occasions. Every year on festival occasion Mallanna's story (Uggu Katha) is narrated for 3 to 7 days. Dandi Yellaiah used to narrate Uggu Katha but at present his son Dandi Mysayya narrates Uggu Katha. Golla suddhulu are recited by Guruvayyalu, who hail from Konipaka, once in every five years. Each Kuruva and Golla family gives an amount of twenty five rupees as aranam (gift). He (Guruvaya) wears panche-dhovathi of red colour. He is guruvu for them. He tells the names of sheep and is also called bondulaina. He is given food, rice, jaggery and is respected like god. He advises the Kuruvas and Gollas not to quarrel and not to learn manthras. He possesses a dastram made of copper leaves, and it is like a diary containing all the details.

Mallanna jatara (fair) is celebrated during the Ugadi festival (Telugu new year day) and it is one of the important festivals of both the Kuruvas and Gollas. Religious priests for this jatara are called as manda pechulollu. These are mataguruvulu. These leaders, who are five in number, form a group and visit the villages once in every five years. They originate from Marikanti village of Mamboobnagar district. They belong to either Kuruva or Golla caste. They narrate the stories in the village and stay for three days. At the end of three days the shepherds offer one sheep per household or sheep unit. Mandapechulollu are originally of brahmin origin in performing rituals of kurvas. Beerlollu are another category of religious leaders who perform marriages of Golla community. The death rituals are performed by Matherlu.

The priests carry with them during their visit to the respective villages, the images of Mallayya, the images of two dogs and tiger which (according to their belief) protect shepherds, their sheep and goats from wild animals in the forest. An image of

disease causing fly (goriteega) is also carried. During their visit to the villages Mallamma and Gouramma stories are narrated and in return the shepherds offer food grains and other essentials and also an young sheep as a mark of respect to their priests.

According to the shepherds God Mallanna is in human form and is black in colour. He is said to be visible in twelve forms. He possess a horse, a flute and rears sheep. God Mallanna protects the shepherds and their sheep from wild animals such as leopards, wild dogs and wolfs and thefts and diseases. During the transhumance they have to stay in the forest watching and protecting sheep in the night. Each shepherd unit is accompanied by two dogs (more in some cases) to guard the sheep from wild animals. Their belief in God Mallanna gives them psychological strength; they say that they are not scared of even lightening or thunder. But they believe that sheep are affected by witch-crafts, particularly when the sheep catch diseases. When the sheep are carried away by wild animals, a shepherd identifies his own sheep by looking at the remnants of carcass. They locate the spot where the sheep was killed by the wild animals. They satisfy themselves by at least identifying their dead sheep.

5.7 OCCUPATIONAL BACKGROUND AND ECONOMY

Sheep rearing is an activity complimentary to subsistance agriculture in which not only men but also women and children are involved in working together in farming, sheep rearing, grazing, and blanket making/Usually the elder shepherds stay at home while the younger ones go out for grazing. Shepherds with land undertake farming as well as sheep rearing where as shepherds without land work in agricultural activities in the cropping season and concentrate on sheep rearing in the off-season. Male children of shepherd families are employed as labourers in transhumant shepherd camp units on either yearly or half yearly basis for sheep rearing.

/Women belonging to both the Kuruva and Golla communities participate in grazing the sheep within the village surroundings, agricultural operations and sometime also work as agricultural labourers. They carry food to the shepherd camp units. Some of them are engaged in woolf processing, blanket making and in the sale of blankets in villages./

WOOL SHEARING AND BLANKET MAKING

Kuruvas are skilled in wool shearing and blanket making. There are 25 looms (spindles) for making woolen thread and blanket making in Peddakothapally. One week is enough for 2 males and 1 female to make thread from processed wool. Twelve families from the three villages arc involved in blanket making. Two hundred blankets are made per year with 100 blankets in each season. Some of the shepherds purchase wool on agreement terms of shearing the wool of sheep in the nearby villages of Satapur, Gantraipalli. Shepherd employing a shepherd provides Rs. 6000 per annum to the labour shepherd. Male children work as labour in sheep herding and are paid Rs. 2000 per anum as wages. Some times these landless, sheepless shepherds work for a period of one season (non-migration period) in the village for six months on daily wage basis with Rs. 25 per day per male and Rs. 20 per day per female. Out of 15 families who do not have any land or sheep, five families are engaged in agricultural activities such as ploughing, sowing, weeding and harvesting.

A shepherd in this kind of agreement shears wool of approximately 200 sheep of other sheep owners. For this the shepherd gets paid Rs. 2 per sheep and also gets some quantity of wool.

Wool is shorn in two season ie., once in the month of December and once in the month of June. The wool shearing in this season is hard as the shepherd can shear only 25 to 50 sheep per day. The wool shorn during June is not sold and is used for making blankets. The wool is kept because processing of wool shorn during this season (June) is easy and the shepherd can shear as many 100 sheep per day. Local wool is purchased by the merchants from Yetigadda and Mahaboobnagar who visit the village to purchase wool. They purchase each quintal of wool at the rate of Rs. 1000/- each. They collect 3 to 4 quintals of wool at a time from the shepherds and transport it in lorries.

Wool selected for blankets is first washed and sundried for two days. Then it is processed in the Hour mill (wool) at the rate of Rs. 15 per a quantity of 10 kg of wool. Firstly they have to make thread from the wool, for this the wool is boiled in jowar liquid

mixed with tamarid seeds. The boiled wool is **cleaned and** is **ready for making thread.** Two male persons take two days to weave one **blanket on loom. Blanket making on loom** is faster than weaving by hand. They sell each blanket **at the** rate of Rs. 350/- in nearby market centres and villages.

Fifty families belonging to the Kuruva community in the region are involved in shearing wool which provides employment upto 75 days (30+45) in the Ist (December) and 2nd (June) seasons. One person shears 100 sheep per day. But during December one person can shear only 25-50 sheep per day. This is because the wool is sticky with thorns and other extrancos material inside it, it takes more time to shear the sheep. Hence the shepherd shears less number of sheep when compared with the number of sheep shorn during the next season (June). For shearing the wool the shepherds arc paid two rupees for each sheep. During winter season 5 males arc needed to shear wool from 100 sheep.

Five kg of raw wool is needed to prepare 3 kg of processed wool; 3 kg of processed wool is needed to prepare to make one blanket. The average price of raw wool is Rs. 90 per kg. The average price of processed wool is between Rs. 100 and 150 per kg.

In the earlier decades there was much demand for the wool. Due to the growth of quality cotton and synthetic nylon, the demand for wool has decreased. Blanket makers have switched over from wool to cotton and synthetic nylon, since then the demand for wool has decreased. The price and quantity of wool during past years from 1985-86 to 1994-95 showed that the price of wool per kg was Rs. 120 in the year 1985-86 and during 1989-95 year price was Rs. 1 10 and is further reduced to Rs. 90 per kg during the year 1994-95. The quantity of wool collected per sheep during the December season (Ist cut) from 1985-1986 to 1994-95 showed that is was 1/2 kg and did not change until 94-95. However the quantity of wool collected during the June season for the years from 1985-86 to 1994-95 remained constant at 1/4 kg per sheep per season. The wool shorn in the second season (June) is of low quality and is cheaper. It is sold at the rate of Rs. 2 per kg for preparing low to medium quality of blankets and the wool collected during the season is locally called thuggu. Wool which cannot be sold is dumped in the paddy fields at the time of pre-sowing and land levelling operations for manuring.

After making the blankets these are **transported and** sold **in market centres near** Nagarkurnool and Singotam. Cost of medium quality blankets ranges between **Rs. 200** and 350. White blanket is priced at Rs. 400. Good quality black blankets are priced at Rs. 450.

More lands are purchased and own individual houses are being constructed by the Kuruvas. Out of 100 families belonging to Kuruvas only two families owned land earlier. Those with limited land have purchased lands since fifteen years. At present 90% of the Kuruva households possess lands. They have purchased lands from incomes from sale of sheep and borrowings from money lenders, incomes from abnormal sale of sheep apart from annual sale of sheep is diverted to the purchase of lands. The attitude of the Kuruvas is that sheep rearing involve certain risks and that sheep are a variable assest due to environmental (drought and cold), ecological (fodder, water, grazing, desease) and market (demand of wool, price of wool and sheep) factors. Kuruvas without land and without sheep are engaged in agricultural operations during Kharif and Rabi season on current wages. Some migrate to Hyderabad for working. Some of them who remain in the village work as outside labour in sheep herding with other shepherds.

5.8. HOUSEHOLD SURVEY OF KURUVAS AND GOLLAS

The household survey of Kuruvas and Gollas has been conducted in 3 villages namely in peddakothapally, Basaram and Jonnala Boguda. A sample of 20% of the shepherd households belonging to Kuruvas and Golla caste have been studied by using questionnaires and participant observation.

A total of 26 households is selected from the Kuruva caste group and 4 households from the Golla caste group. The information collected and analysed is as follows.

Among the Kuruva households studied, there are 40 (33%) males and 34 (28%) females. There arc 122 children out of whom 65 (53%) are males and 57 (47%) are females. There are 24 children out of whom 14 are males and 10 are females, consisting of 58% and 42% respectively. Among the Gollas there are 6 males (25%) and 5 females

(21%) and 24 children, out of whom 14 are males (58%) and 10 are females (42%). Tables 5.1 and 5.2 shows the household composition of Kuruvas and Gollas in the study area.

Among the Kuruvas, out of 65 males 49 (75%) are illiterates and 16 (25%) are literates; and among the females, out of 57, 56 (98%) are illiterates 1 (2%) is a literate.

The literacy among Gollas reveals that out of 12 males, 5 (42%) are illiterates and 7 (58%) are literates; and among the females, 12 out of 12 are illiterates.

5.9. ASSET POSSESSION, INCOME AND EXPENDITURES

Among the Kuruvas, out of 26 families, 11 families possess sheep and the remaining 15 do not have sheep. Out of the 11 families 2 households are from 150-200 sheep size group, 1 family is from sheep size group of > 75 - < 150 and there are 8 families which are from < 75 sheep size group. In the three categories of shepherds, i.e., 150-200, > 75 - < 150 and < 75, as many as 350 sheep are possessed by the sheep size group of 150-200.

The average annual number of sheep sold also shows variation. It is high among the sheep size group of 150-200, i.e. 70 per year. Where as it is less, 40 among the sheep size group of > 75 - and < 150. It is further less, 10 among the sheep size group of < 75.

The average annual value of sheep sold also changes with the size of herd. It is Rs.28,000 for herd size of 150-200 group and Rs. 16,000 for herd size of > 75 - < 150 group, and Rs.4,000 for herd size group of < 75.

Similarly the average annual veterinary costs, income from sale of wool, income from sheep camps and from sale of manure arc subjected to variations in correlation with herd size. All these aspects show increasing tendency along with the decrease in the herd size. The total income from sheep rearing after balancing and from asset per household for the shepherd households in the herd size of 150-200 is Rs.36,968 per annum. It is Rs.21,125 per annum in herd size of >75 <150, and Rs.5,245 per annum for the shepherds in herd size of < 75. Tables 5.3 and 5.4 shows the particulars of asset possession, income and expenditures of Kuruvas and Gollas.

However it does not mean that shepherds without any sheep do not get any income from the asset of sheep. Some of them get additional incomes indirectly but not to a considerable extent to meet their requirements.

Among Gollas there are only 2 households which have sheep with a herd size of (less than) < 75. Two families do not have any sheep. The two households own 70 sheep altogether. They sell on average 7 sheep each per year which yields an amount of Rs.2,800 each. They get an annual income of Rs.2,362 equally from wool and Rs.100 from sheep camps and Rs.75() from sale of manure etc. The total income after adjustment from veterinary and other costs is Rs.5,872 per year per household.

POSSESSION OF LAND

Out of 26 Kuruva households 8 (31%) are landless families, 18 (69%) households have lands. More land is concentrated among less number of Kuruva households, 2 households own 14 hectors within the land size group of 5-10 hectors. In this group the average land possessed is also more with 7 hectors.

Less land is possessed by more no of shepherds i.e., within the land size group of less than 2-5 hectors, 11 families own only 27.6 hectors with average land of 2-5 hectors per household. Less land is possessed by more number of shepherds i.e., 5 households owning 6 hectors of total land with avarage of land of 1.2 hectors. It is observed that it is the shepherds of land owning category of less than 2 hectors who are not only less in number but also they possess very less land.

The possession of land among shepherds of Golla caste indicates that average land possessed by them is less, i.e., only 2.4 hectors per household, within the land owning category of more a 2-5 hectors.

Out of 18 land owning shepherd households of Kuruva caste only 2 households have acquired their land from ancestors. The average land acquired through ancestral means is 0.8 hectors. The remaining 13 households have, however acquired lands through purchases.

Among the shepherds of Golla caste there is no **household which acquired land** through ancestral property. The 4 households in the group of >2-5 hectors of **land** holding have **acquired their land through** purchases.

The shepherd's status discussed here is based on possession of land, sheep, and non possession of the same. Out of 26 households belonging to Kuruva caste there are 9 households who possess land and some sheep. Nine households possess land but do not have any sheep, 2 households possess sheep but do not have any land and the remaining 6 households do not have any land or sheep.

The possession of land among shepherds of Golla caste indicates that average land possessed by them is less, i.e. only 2.4 hectors per household, within the land owning category of less than 2-5 hectors. The shepherds of Golla caste consisted 4 households out of which 2 households have land and sheep and 2 households possess some land but do not have any sheep.

5.10 EMPLOYMENT

Tables 5.5 and 5.6 shows the employment particulars of Kuruvas and Gollas. The employment of shepherds in Kuruva caste indicate that the number of persons employed in sheep rearing increased with the decrease in number of herd or herd size, indicating more dependency of shepherds of less-herd or small herd group on sheep rearing.

In the herd-size of less than < 75 there are 8 households which have 16 persons employed through out a year. However their contribution towards herd growth, income and work remuneration suggests us to double counting of their working mandays. Though they are employed only for the year, their contribution in terms of returns suggests a hypothetical increase in number of their labour days. This indicates that sheep rearing is not as profitable as on expects. The wage rate of the above mentioned shepherds per day is Rs.7. There is only one shepherd household which employ 2 shepherds throughout year (though doubled in assumption) in the sheep size group of (greater than) > 75 - < 150. The wage rate is Rs.28 per day per person. This indicates

that there exists a differentiation in the herd size and the number of persons employed and variation in the wage rates. However there are only 2 households of shepherds within the herd size of 150-200 which employ 4 persons throughout the year (though doubled in assumption) and their wage rate per day is Rs.25. In total 22 persons are employed from 26 Kuruva families, particularly from those who possess sheep, for a total of 1095 mandays (doubled is assumption) with gaps in wage rates per day ranging from Rs.7,28,25.

Among the Gollas there arc only 2 households which employ 2 shepherds year round (in assumption) with average wage per person per day at Rs.16. These shepherds belong to the herd size group of less than 75. This indicates that then wage rate is high when compared with persons employed in Kuruva caste in sheep rearing.

5.11. OCCUPATIONAL STRUCTURE

Three types of activities are available for shepherds. Altogether there are 26 households out of which there are 40 males and 34 females. In sheep rearing 15 males (37.5%) are employed in main activity and only 5 as secondary activity, 18 are employed (45%) in agricultural labour as main occupation, and 8 are working as secondary occupation, 7 are (17.5%) working in farming as main activity, and 21 are working in secondary activity.

Similarly out of 26 households there are 34 females : 1 (31%) female is working in sheep rearing as main activity and 6 females took sheeprearing as secondary occupation. Thirty one females (91%) are working in agricultural labour activites as main occupation and 2 in as secondary occupation. 2(6%)females are employed in farming as main activity and 20 females are engaged in farming as secondary occupation. Table 5.7 shows the occupational structure of male and female Kuruvas.

5.12. OCCUPATIONAL STRUCTURE AMONG KURUVAS **(CHILDREN)**

In total, there are 26 households with 25 male kuruva children and 23 female kuruva children. Out of 25 male children, 4 (16%) are working in sheep rearing as main

activity, 3 (12%) are working as **agricultural labour as main activity, and no one is** working in farming activity. Regarding 23 female children, only 3 (13%) are working in agricultural labour activities as main activity. Table 5.8 shows the occupational structure among the male and female children of Kuruvas.

The overall observation of the occupational structure of Gollas shows that 6 (43%) persons arc working males (male and children) in sheep rearing as main activity and 2 arc working in agricultural activities as secondary activity and 2 (14%) males are working in farming as main activity and 4 persons are working in farming as secondary activity. The female composition consists of a population of 10. All the female (100%) members are working as agricultural laborers as main activity, they arc also working in farming as secondary activity. Table 5.9 shows the occupational structure of male and female Gollas and male children.

The observation from the above analysis is that among the kuruva males more are working as agricultural labour (45%), less arc working in sheep rearing (37%), and much less are working in farming (17%).

5.13. THE COMPOSITION OF WORKERS AND NON WORKERS

The overall observation of composition among the all land class categories (including landless) of kuruva males (males and children) shows that about 33 (82.5%) are workers and 7 (17.5%) arc non workers. Similarly the female (female and children) composition of Kuruva caste among all the land class categories (including landless) consists of 32 (94%) of workers and 2 (6%) of non workers.

Altogether, an overall observation shows that among the male Gollas (males and children) 6 (43%) of them arc workers and 8 (57%) of them are non workers. Similarly among the female Gollas (females and children) there are 7 (70 %) workers and 3 (30%) non workers.

5.14. PASTORALIST ADJUSTMENTS DURING DROUGHT

The shepherds (Kuruvas & Gollas) residing in the study area are often affected by drought. The earliest drought in this area occured 50 years ago i.e. during the year from 1945- 1965, as it existed for a period of 20 years. Lack of water for the sheep and fodder as well, were important problems during the 1950s drought. It existed mainly due to the absence of rains which resulted in lack of pastoral resources. The shepherds provided water to the sheep near the local open wells using Gadi Katta (Mota a kind of water lifting device prepared with leather and wood material). In those days there were no medicines to cure the sheep when infected. However good fodder was available within the sorroundings. Teak leaves, ponthenga leaves and nagulaku were the important feeds to the sheep during drought. The three villages were within the juridiction of 'Kalsai' area (Taluk). The other surrounding villages were in the area of 'Samsthanam' (state). The sheep of the 'Kalsai' area were not allowed into the 'Samsthanam[1] area for grazing. Similarly the sheep of 'Samsthanam' area were not allowed into the ' Kalsai' area. At present there is no such restriction on grazing. The shepherds faced with water and fodder problems. The shepherds migrated to Muddunuri Penta which is 18 km. away. They also went to Gunda Polam which is 12 km away. 'Narlinga Kaya' a type of fruit from a tree variety was used as feed to the sheep. Thus the drought existed for a period of 20 years. However the agriculture was good and it was not affected by the drought.

The latest occurance of drought to the shepherds was during the year 1987-88 and also 1991-92. The crops such as jowar, castor and groundnut were damaged and the rest of the crops were unsown. However such a drought was resultant of agricultural failure. Women, young children belonging to shepherd families migrated to Yetigadda to earn livelihood. They worked for 9 months in agricultural activities such as jowar cutting and paddy harvesting as well as earth project works. The shepherds migrated during that drought into Peddur Polam. They feed their sheep with yepa leaves and jana leaves as foliage.

In earlier droughts, the shepherds have not migrated, but during the present droughts the shepherds are migrating. Their migration is mainly for survival. In 1991-

92, 10 shepherds migrated for 9 months. They were paid Rs. 350 per month each with provision of meals. Mainly, women and children were the migrants.

The 1994-95 drought resulted in a loss of 150 sheep herd. Due to lack of fodder and water the sheep were sold away at the rate of Rs. 30 per sheep (the average price is Rs. 300 per sheep). Sheep are sold either due to lack of water and fodder or due to diseases during rainy season (Chittadi).

Shepherds perceive the drought as drought only when the sheep are diseased and died in large numbers. They do not perceive the normal agricultural drought as drought because they are not affected by the drought due to their migration and transhumance, an adjustment strategy at the time of scarcity, which results in reducing the drought effects. However the only problem they felt is that they had to travel long distances, than they used to travel during the ordinary time. When the normal drought occured during 1987-88, the shepherds sold away their lands measuring not less than 1 acre each. Their sale of land is due to expenditures on consumption goods. Some of the shepherds sold away their sheep to adjust with drought expencses. During the drought, there are more porblems to the shepherds than agriculturists because land is uneffected as much as the crops do, but the sheep are subjected to diseases and also, water as well as fodder scarcities.

Shepherds normally purchase lands through the sale of sheep. But no shepherd sells the land to purchase the sheep. The shepherds during the agricultural drought suffer due to less income from farming. They borrow from money lenders at high intrest rates and banks to meet the credit towards agriculture. They even sell their sheep to clear their borrowings. The shepherds also have to spend on sheep and also on themselves towards the curing of diseases which involves purchase of medicines.

The shepherds adjust their migratory pattern during the drought. When drought occurs, the absence of rains results in delays in sowing operations. The shepherds did not return to the fields. They stay on in the forest areas until the arrival of rains. In the complete absence of rains, they stay for 9 months in the forests.

TABLE 5.1

HOUSEHOLD SIZE AND POPULATION
(Kuruvas)

Household Size	No. of Households	Average Size	No. of Adults Male	Female	No. of Children Male	Female	Total	Total Male	Female
2 to 5	18	4	26	20	13	11	39	31	70
6 to 10	8	7	14	14	12	12	26	26	52
Total	26		40 (33%)	34 (26%)	25 (20%)	23 (19%)	65 (53%)	57 (47%)	122 (100%)

Figures in parenthesis indicate percentage to total Households.
Source : Field Survey

TABLE 5.2

HOUSEHOLD SIZE **AND POPULATION**
(Gollas)

Household Size	No. of Households	Average Size	No. of Adults Male	Female	No. of Children Male	Female	Total	Total Male	Female
2 to 5	2	4	2	2	2	2	4	4	8
6 to 10	2	8	4	3	6	3	10	6	16
Total	4		6 (25%)	5 (21%)	8 (33%)	5 (21%)	14 (58%)	10 (42%)	24 (100%)

Figures in parenthesis indicate percentage to total Households.
Source : Field Survey

TABLE 5.3

ASSET POSSESSION, INCOME AND EXPENDITURE

(Kuruvas)

Sheep size	No of Hhs.	Average Sheep per Hhs.	Total Sheep Held	Average Annual No. of Sheep Sold per Hh.	Average Annual Value of Sheep Sold per Hh.	Average Annual Vaterinary cost Per Hh.	Average Annual Income from sale of wool	Average Annual Income from camp per Hh.	Average Annual Income from sale of manure per Hh.	Average Annual Balance from Asset per Hh.
150-200	2	175	350	70	28000	1400	5906	525	3937	36968
> 75-< 150	1	100	100	40	16000	800	3375	300	2250	21125
<75	8	24	195	10	4000	200	810	75	560	5245
Sheepless	15									
Total	26		645							

Note : Hh. = Household
Source : Field Survey

TABLE 5.4

ASSET POSSESSION, INCOME AND EXPENDITURE

(Gollas)

Sheep size	No of Hhs	Average Sheep per Hhs	Total Sheep Held	Average Annual No. of Sheep Sold per Hh	Average Annual Value of Sheep Sold per Hh	Average Annual Vaterinary cost Per Hh	Average Annual Income from sale of wool	Average Annual Income from camps per Hh.	Average Annual Income from sale of manure per Hh	Average Annual Balance from Asset per Hh
<75	2	35	70	7	2800	140	2362	100	750	5782
Sheepless	2									
Total	4		70	7	2800	140	2362	100	750	5782

Note Hh = Household
Sour e : Field Survey

TABLE 5.5

EMPLOYMENT OF SHEPHERDS

(Kuruvas)

Sheep Size.	No. of Households	No. of Sheep	No of Shepherds Employed in Year	No. of Days of Employment	Average Wage Per Person Per Day (Rs.)
150-200	2	350	4	365X2	25
> 75 - < 150	1	100	2	365X2	28
< 75	8	175	16	365X2	7
Sheepless	15				
Total	26	625	22	1095X2	

Source : Field Survey

TABLE 5.6

EMPLOYMENT OF SHEPHERDS
(Gollas)

Sheep Size	No. Of Households	No. of Shepherds Employed in Year	No of Days Employment	Average wage Per Person Per Day
< 75	2	2	365X2	16
Total	2	2	365X2	16

Source : Field Survey

TABLE 5.7

OCCUPATIONAL STRUCTURE

(Kuruvas)

MALE & FEMALE ADULTS

Size Class	No of Hhs.	Male Population	Sheeprearing					Agricultural Labour				Farming			
			Male		Female	Female		Male		Female		Male		Female	
			Main	Sec	Population	Main	Sec	Main	Sec	Main	Sec	Main	Sec	Main	Sec
5-10	2	4	3	1	5					4	1	1	3	1	4
2-5	11	19	5	4	13		2	8	4	12	1	6	11	1	10
< 2	5	7	3		6	1		4		5			7		6
Landless	8	10	4		10		4	6	4	10					
Total	26	40 (100%)	15 (37.5%)	5	34 (100%)	1 (3%)	6	18 (45%)	8	31 (91%)	2	7 (17%)	21	2 (6%)	20

Source : field survey

• Figures in paranthesis indicates percentage to the total households.

TABLE 5.8

OCCUPATIONAL STRUCTURE

(Kuruvas)

MALE & FEMALE (CHILDREN)

Size Class	No of Hhs.	Male Population	Sheeprearing					Agricultural Labour				Farming			
			Male		Female	Female		Male		Female		Male		Female	
			Main	Sec	Population	Main	Set-	Main	Sec	Main	Sec	Main	Sec	Main	Sec
5-10	2	3	2		2										
2-5	11	9	2		12			2		2					
< 2	5	2			3										
Landless	8	"			6			1		1					
Total	26	25	4 (16%)		23			3 (12%)		3 (13%)					

Source : field survey

• Figures in paranthesis indicates percentage to the total households.

TABLE 5.9

OCCUPATIONAL STRUCTURE

(Gollas)

MALE & FEMALE ADULTS

Size Class	No of Hhs.	Male Population	Sheeprearing					Agricultural Labour				Farming			
			Male		Female	Female		Male		Female		Male		Female	
			Main	Sec	Population	Main	Sec	Main	Sec	Main	Sec	Main	Sec	Main	Sec
2-5	4	6	4		5				2	5		2	4		5
Children	4	8	2		5					5					5
Total		14	6 (43%)		10				2	10 (100%)		2 (14%)	4		10

Source : field survey

* Figures in paranthesis indicates percentage to the total households

CHAPTER VI

CONCLUSIONS

"Throughout the ages, meteorological phenomena have occupied a central place in the pre-occupations of mankind. In no other field was man felt himself so constantly and intensively at the mercy of "natural forces" and so defenceless against events affecting his daily life, often with tragic consequences. Droughts, floods, freezes and other climatic disasters inimical to life have always been regarded inevitable. There was nothing else to do but to endure them. We still mostly endure them..." (Gracia 1981 : 3). This study is essentially an attempt not as much as an enquiry into the causes of drought but in a modest was an attempt to understand, with reference to a region, the magnitude of the impact of drought and how people struggle to endure it.

There has been extensive documentation of the drought related impact on economic, environmental and social sectors. The third world spread over all the three continents of Asia, Africa and Latin America especially are vulnerable to severe and frequent droughts. Agricultural production, livestock, employment opportunities and food security suffer severe set back causing extensive social convulsions of suffering. The slowness with which drought affects seem to often lead to ignoring of the phenomenon as a relatively of less severe consequence. But the impact of the drought, though not dramatically catastrophic, is traumatically crippling particularly on the poorer sections of the society. The regions subject to frequent droughts languish economically untouched by much of progress that by the passes these places and people.

The two districts chosen for the present study, viz. Mahabubnagar **and Anantapur,** form a part of the drought zone of Andhra Pradesh and languish as the poorest region of the state. The rainfall in these districts is scanty and highly variable. There is hardly any technological breakthrough that enables crop culture below a certain minimum precipitation. As a result the cropped area undergoes wide variations with the change in rainfall.

In Anantapur district, the elasticity of acreage response to rainfall is as high as 0.25. The output and productivity are also highly sensitive to variations in rainfall. Anantapur which is gradually emerging as a monocrop agricultural district with groundnut occupying almost three fourth of the area under cultivation, shows that sensitivity of output to rainfall variation is as much as 1.07. It is also high for the other two important crops viz. bajra (1.19) and jowar (0.49). Similar variability is noticed in the productivity of these crops. The sensitivity indices refer to the percentage deviations in production or productivity from the trend due to one percent deviation in rainfall. The instability indices of crop output also are very high for most of the important crops.

Interestingly, the sensitivity analysis of rainfall on area, output and productivity in Mahabubnagar district does not show much clear results, except for productivity. But the visitation of droughts, the disjunction in production and employment are no less severe in Mahabubnagar. In fact, the magnitude of seasonal migration, an important sign of distress, is very high in Mahabubnagar.

To study the extent of impact of drought on different sections of the society such as small and marginal farmers, agricultural labourers and rural artisans, household surveys were conducted in seven villages of Anantapur and Mahabubnagar districts. The four villages surveyed in Anantapur district are East Kodipalle, Pillalapalle, Chintarlapalle and Adavigollapalle. The village profiles show that most of these villages have been experiencing severe drought during the late 1970s and even during the later decade. There were shorter spells of drought in the area since 1988. Most of the villages are dependent on agriculture and are supported with livestock and other agricultural labour services. The social and economic infrastructure is not well developed and even credit facilities are available to limited extent. Most of the villages have drinking water problem and suffer from lack of rainfall leading to scarce irrigation. However, the villagers are resorting to in-well bores upto 250 to 300 feet of depth. The cropping is done in dry areas with sowing of groundnut, korra, bajra and castor.

In Mahabubnagar, the three selected villages are **Raikal, Marchala and Patherchad.** These villages are also affected by the drought. There is a problem of **drinking water** for human beings and fodder scarcity to cattle as the tanks **and** ponds have dried up. The important crops are groundnut, bajra, redgram, cowgram and greengram. The infrastructure like roads and communication facilities in these villages is not developed. Farmers of all classes suffer during the Kharif season in both the districts as substantial area remains unsown during the drought year. In the four villages of Anantapur district, during the drought year only about 7.10% of the normal area is cultivated. While in the three villages of Mahabubnagar district about 17.46% of the normal area is cultivated during the Kharif season. There is also a decline in the production of crops such as groundnut, bajra, rice, jowar and cotton in Anantapur district in 1990-91 when compared with 1987-88 and 1988-89.

During the drought period, it was observed in both the districts that employment got reduced and wages to males decreases from Rs. 20 to 25 to Rs. 15 to 18 and in the case of females there was a decline from Rs. 15 to 20 to Rs. 8 to 15. Even in the case of labourers who migrate, the wages were at lower level ranging from Rs. 18 to 25 per males and Rs. 12 to 15 for the females.

During a drought year, the employment situation in East Kodipalle village showed that 87.5% of the males and almost all the females in cultivator category found work for only about 60 days on an average. Agricultural labourers got employment upto 76.3% for males and 70.0% for females with work days ranging from 98 to 77 days. Similar situation prevailed in the remaining three villages with slight changes.

In Mahabubnagar, the employment situation in Raikal showed that even during drought, most of the female cultivators did get employment for almost 150 days on an average but much of it is thin employment on own farms. In the case of male and female agricultural labourers, about 90% and 85% of them, respectively were able to get employment for about 1 10 days on an average. In this village, there was no migration even during the drought year. The overall observation for the district on employment in

that during drought the farmers engage themselves in agricultural activities for a period of 90 days during the Kharif season. Though the level of employment of all households decline substantially during drought, the agricultural labour households experience much severe decline than the cultivators. The intensity of employment of even cultivator households declines considerably but even the thin employment offered by own farms helps them survive. Hence the continued aspiration of the landless for some land.

Under the pressure of drought the farmers adopt different strategies such as migration, resort to non-farm activities, sale of cattle and even land. In Anantapur villages, during drought 92.4% of total livestock has been disposed. In Mahabubnagar, 78.2% of cattle, 93.5% of buffaloes, 88.8% of cows, 84.3% of sheep, 36.3% of goats which accounted for 83% of the total livestock, were sold during the drought year.

The shepherds resorted to wool collection and blanket making which earn them Rs. 25/- per day for males and Rs. 20/- per day for females. Wool shearing provides employment upto 75 days to Kuruvas.

Of the 26 households of Kuruvas and Gollas in the three villages of Mahabubnagar district, there were 40 male and 34 female adult members. Of the 40 males, 37.5% of them are engaged in sheep rearing, 45% of them work as agricultural labourers and 17.5% as cultivators. Of the females only one person is engaged fully in sheep rearing, while 91% of them work as agricultural labourers and only six percent are cultivators.

The adjustment strategies adopted to drought differ among various sections of people. For cultivators, the strategies are short-term migration, farm and non-farm activities. For the shepherds particularly the Kuruvas and Gollas, the adjustment strategies lie in sheep rearing, farming and agricultural labour activities along with transhumance with sheep for six months. The shepherds rely to a great extent on their traditional pattern of sheep rearing, sale of sheep, wool etc., during drought. But they face problems such as scarcity of fodder, drinking water and diseases due to which the sheep perish. The problem of scarcity of fodder due to drying up of pastures is overcome by them by increasing their transhumance range, i.e. by moving into the forest edge

habitats and foothill zones of Nallamala where the sheep can feed on a variety of dry deciduous plant species. But several shepherd informants emphasised that the major effects of drought for them is a sizable decline in the number of sheep in their herds. The other effects are the low prices at which they have to sell their sheep and sheep products than in normal year. Since sheep are the asset for these shepherds, the above factors, destabilise their economic system and to withstand these conditions, shepherds with especially small herd size, most often make borrowings. However, those with larger herd-size manage to adjust without recourse to borrowing.

In Mahabubnagar, the shepherds (Kuruvas and Gollas) migrate with sheep seasonally to forest areas for grazing. During the drought it is their transhumance which provides them additional incomes and works as an escape strategy. Though the shepherds possess land, the returns from cultivation are only supplementary compared with the main returns from the sheep rearing. Many shepherds derive their sustenance and asset generating incomes from their main activity of sheep rearing. Among those shepherds who do not have sheep or goats, agricultural activities such as farm labour helps them to overcome drought effects.

Most of traditional societies have evolved indigenous survival strategies to tackle drought. They range from alternative occupations to migration, crop diversification and transhumance in the case of shepherd groups. In Anantapur, we observed crop concentration around groundnut crop over a long period between 1950s and 1990s. In Mahabubnagar, though the crop diversity is high, the castor stands out as the most important crop. Both the districts show over exploitation of groundwater, fodder shortage, distress sale of cattle and lack of proper adjustment leading to pathetic conditions of cattle and peasants. Lack of employment works resulted in the migration of labour. Construction work, short-term migration to near by villages, fruit and seed collection, and other alternative occupations to generate incomes sticking to traditional artisan activities, are the basic strategies in these drought affected villages.

The overall observation is that though the rural society is able to survive the drought with its indigenous characterstics of its people, there remains a long term

solution to stop **migration, restore cattle and stabilize cropping patterns. Proper organisation** of rural people particularly of small and marginal farmers, agricultural labourers, rural artisans and shepherd groups (specifically the Kuruvas and the Gollas) is essential at the grass-root level. At the administrative level the governmental programmes are to be reshuffled and should be made more beneficiary friendly to these groups in their content and approach in implementation and coverage.

Though The Government has been operating several developmental programmes for these groups, the benefits are not within the reach of many of the shepherds. Though some of the shepherds are organising into units and setting up establishments such as welfare societies, they suffer due to lack of financial support from banks and financial institutions.

The Government-run short-term drought mitigating programmes have certain limitations in implementation and lack demonstration ability of prevent the drought affected population from migrating and over utilisation of existing resources. The long-term measures taken during the past three and a half decade could not provide any drought proofing to the people in this semi-arid drought vulnerable region. This reveals that the efforts done in the previous years are scanty and meagre in nature when compared with the quantum and magnitude of the drought.

There is a need for reallocation of resources such as credit and infrastructural facilities so as to make these available to the stratified and marginal groups on whom the drought shows its differential impact. For the time being the Government will have to continue to rely on short-term relief and rehabilitation measures in the event of recurrence of droughts. Rural socio-political institutions (village panchayats, co-operative societies, voluntary agencies and charitable trusts) did not associate so far with the Government in delivering the relief materials to the people. All their efforts have been independent and scattered in nature with a very limited impact on the living conditions of the drought affected society.

It is necessary that all the pending projects be implemented on war-footing and accommodate drought programmes into the general development plan of the State Government as it's inevitable component. There is also a need to formulate an ecologically well balanced drought mitigating policy which shows concern for the cause and welfare of human and livestock as well as water, land and flora and fauna, over a period of time to attain sustainable rural development. There is a need to organise the village institutions like panchayats, co-operatives and voluntary agencies along with the Governmental agencies at the top level to protect the drought affected sections of the society to participate in drought eradication at the community level.

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