Chapter – III

PROFILE

OF

THE STUDY AREA
3.1. INTRODUCTION

Anantapur district was formed in the year 1882 by separating from Bellary district and was later on extended with the addition of Kadiri taluk from Cuddapah district in the year 1910 and Rayadurg taluk from Bellary district in the year 1956. Anantapur is the southern-most district of the Rayalseema region of Andhra Pradesh. While agriculture remains the most important economic activity of the district, it is characterized by high levels of instability and uncertainty. Being located in the rain-shadow region of Andhra Pradesh, the district is drought-prone. It is well established that while a generalized rural crisis is prevalent across the country, a disproportionate burden has fallen on its drier tracts. In 2006, Anantapur was one of the thirty-one districts identified by the Government of India as being prone to agriculture-related suicides.

Anantapur district is bounded by Kurnool District in the north; Cuddapah District in the north-east; Chitoor District in the south-east; and Karnataka State on the West (Map 3.1). The district has a total geographical area of 19.13 lakh hectare. For administrative purposes, the district is divided into three revenue divisions, namely, Anantapur, Dharmavaram, and Penukonda; there are sixty-three revenue mandals. As per 2001 census, the district has 10 towns and 964 revenue villages and a total population of 3.64 million. Almost 75 percent of the population in the district lives in rural areas.

Agriculture remains the predominant activity in the villages, with 80 percent of total workers engaged in agriculture, either as cultivators or agricultural labourers. In urban areas, about 11 percent of the workforce is engaged in agriculture. Mining is also an important activity in Anantapur District as it is endowed with rich deposits of iron ore and lime stone, as well as other minerals. There are more than fifty small-scale industrial units in the district, of which nearly one-half are to do with granite. There are also couples of cement industries and steel industries in the district.
3.2. GEOGRAPHY

Anantapur District is situated in the western part of Deccan plateau and forms the southern most part of Rayalaseem region of Andhra Pradesh. The geographical area of the district is 10130 sq. kms and is situated within the geographical co-ordinate of 13.40' and 15.15' northern latitude and 76.50' and 78.30' of eastern longitude bounded on the east and north by Cuddapah and Kurnool districts respectively and on its southern and western flanks by the state of Karnataka. Anantapur is the biggest districts of Andhra Pradesh accounting 6.7 per cent of the total geological area of the state.

3.3. DEMOGRAPHIC FEATURES OF ANANTAPUR DISTRICT

There are 929 inhabited villages, out of 964 total Revenue villages of the district. The number of villages in size group of 500 to 1999 forms 36.71 per cent of the total inhabited villages. The size group of 2000 to 4999 forms 38.64 per cent and the size group of 5000 to 9999 forms 12.81 per cent only out of total villages, while 84 villages (9.04 per cent) of total inhabited villages are having population less than 500.

Table 3.1: Trends in the Growth of Population in Anantapur District (1941-2001)

<table>
<thead>
<tr>
<th>Period</th>
<th>Rural Population</th>
<th>Urban Population</th>
<th>Total Population</th>
<th>Population Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1941</td>
<td>1019639</td>
<td>146590</td>
<td>1166225</td>
<td>--</td>
</tr>
<tr>
<td>1951</td>
<td>1139998</td>
<td>221558</td>
<td>1361556</td>
<td>16.75</td>
</tr>
<tr>
<td>1961</td>
<td>1459837</td>
<td>307627</td>
<td>1767464</td>
<td>29.81</td>
</tr>
<tr>
<td>1971</td>
<td>1739531</td>
<td>375790</td>
<td>2115321</td>
<td>19.68</td>
</tr>
<tr>
<td>1981</td>
<td>2017095</td>
<td>530917</td>
<td>2548012</td>
<td>20.46</td>
</tr>
<tr>
<td>1991</td>
<td>2435761</td>
<td>748053</td>
<td>3183814</td>
<td>24.95</td>
</tr>
<tr>
<td>2001</td>
<td>2720915</td>
<td>919563</td>
<td>3640478</td>
<td>14.34</td>
</tr>
</tbody>
</table>

There are 26 villages with more than 10000 population excluding towns. The table 3.1 indicates steady growth of urban population in the district and registered highest growth rate during the decade of 1971 – 1981. The overall growth rate is not constant in the district over the last six decades. The overall growth rate of the district population is high during 1981-1991. In the last decade (1991-2001) registered very low growth rate of only 14.34 per cent.

The district has populating 37.94 lakhs as per 2001 census accounting for 6.00 per cent of the state’s population. The decimal growth rate between 1991 and 2001 is 25.93 per cent slightly higher than state average. The density of population is 190 per sq. Kms in the district against 275 per sq. Km. of the state. The literate population constitutes 18.27 lakhs of the total population compared to state population of 40.36 lakhs. About 74.71 per cent of the population lives in villages. Scheduled Caste population constitutes about 14.19 per cent, Scheduled Tribe about 3.40 per cent and minority communities about 12 per cent. The work force in the district constitutes about 48.92 per cent of the population, of which 37.58 per cent are in agricultural sector. There are 954 women per 1000 men.

3.4. ADMINISTRATIVE SET UP IN ANANTAPUR DISTRICT

Consequent on the introduction of the mandal system of administration in 1986, the district is being administered through three revenue divisions, namely Anantapur, Dharmavaram and Penukonda and 63 Mandal Parishads. The district has been divided into 3 Revenue Divisions viz., Anantapur division (20 revenue mandals), Dharmavaram division (17 revenue mandals) and Penukonda division (26 revenue mandals) consisting of 63 revenue mandals and Panchayati Raj mandal with identical jurisdiction which are the basic administrative and development units. The district has 12 towns 964 revenue villages of which 24 are uninhabited. There are 2415 hamlets indicating an average of 3 hamlets for each revenue villages. All villages are covered under 866 Gram Panchayats.
3.5. LIVE STOCK POPULATION

As per stock census 2001, the total live population in the district is 53.60 lakhs of which 12.40 lakhs is the bovine population. The cattle and buffaloes accounted for 40.93 and 4.67 lakhs respectively and the population of sheep and goat aggregated 16.79 and 3.15 lakhs respectively. This is attributed to continuous droughts experienced by the district and resultant disposal animals.

3.6. INDUSTRIES

The district is industrially backward with the lowest number of workers employed in registered factories. The industrial development is concentrated mostly in urban areas. The District Industries Centre has been functioning since 1978. There are (1) 7 industrial estates at Anantapur, Tadipatri, Guntakal, Kadiri, Hindupur and Gooty. (2) There are 4 Mini Industrial estates to benefit Scheduled Caste. The industrial estates and industrial development areas are expected to be developed in Dharmavaram, Madakasira and Rayadurg.

There are 44 large and medium scale industries and 10,043 small scale industries with investment of Rs. 311.39 crores and Rs. 96.35 crores providing employment to 8,052 and 54,172 persons respectively. Further as per the information available from DIC, the following large and medium scale industries are coming up in Anantapur District.

3.7. POWER

The domestic and industrial power requirements of the district are drawn from Thungabadhra Hydel Project at Hospet. Integrated power grid is established at Gooty connecting Nagarjunasagar, Kothagudem and Thungabadhra. The district is provided with 88 electrical sub-stations with 2,474.16 kms. length transmission lines as on 31.3.2001. All the revenue villages in the district have been electrified and some hamlets are yet to receive the electricity. Power shortage has been constraining factor in
improving agricultural productivity and also industrial development in the district.

3.8. TRANSPORT AND COMMUNICATION

Anantapur district has 9,239 kms of road and 5,898 kms of railway line. The district is linked with Chennai, Delhi, Mumbai, Bangalore and also Hyderabad by the railways. Guntakal is one of the biggest railway junctions in the country. Andhra Pradesh State Road Transport Corporation provides commuting facilities in the district for the movement of goods.

There are 861 post offices, 98 telegraph offices and 100 telephone exchanges. Number of cities in the country are connected through the STD facilities. Anantapur town is provided with a TV relay station with 75 km. radius of operation and TV relay stations are at Hindupur and Guntakal and FM Radio Station is situated at Anantapur. The district has also an Airport at Puttaparthi which has been inaugurated in the 1991.

3.9. FINANCIAL INSTITUTIONS

The district is having 137 Commercial Bank Branches, 72 Grameena Bank Branches (Sree Andhra Pragathi Grameena Bank) and 17 Branches of Cooperative Bank with 233 Primary Agricultural Co-operative Societies and One Branch of A.P.S.F.C. 62 per cent of the bank branches are in rural areas and 40 per cent of bank branches in semi urban/urban areas.

3.10. PLACE OF TOURISM

Anantapur district is "home of tourist centres' worth visiting. Gugudu is village in Narpala mandal is situated among the Muchukota hills. It is known for its grand celebration of Moharam Festival and Kullaiswamy, a village deity attracting the worshippers irrespective of caste and religion.

Lepakshi of Hindupur mandal is popular for its Veerabhabra temple and the huge monolithic Nandi stands nearby. The place is also associated
with worshippers of Lord Sri Rama. Temple and is a veritable treasure of sculpture and architecture. Pilgrims visit the place largely for Shivaratri.

Penna Ahobilam is famous for its temple of Sri Lakshimi Narasimha Swamy. The temple of Lakshmi, the Lords consort is situated by the side of the main shrines. There is a spring channel known as Bugga Koneru.

Puttaparthi situated on the banks of Chitravati is in Penukonda mandal which is universally famous with the abode of Lord Sri Satya Sai Baba who is credited with occult powers. Super specialty hospital is also located where free treatment is given to one and all which is famous all over the world.

Like wise Penakacherla dam is also a sightseeing place. Kadiri, Alurkona, Kasapuram. Gutibayalu, Gorantla and Hemavati are also of important tourist attractions because of the temples situated in these areas. Thimmamma Marri Manu has become an important tourist center which is near Kadiri town Lakshmi Narasimhaswami Temple.

3.11. HILLS IN THE DISTRICT

The forest in the district is thin and scanty. The Muchukota hills about 35 kms in length run from North of Gooty town upon extreme southern corner of Tadipatri, Yadiki mandal. Another line of hills starts from west of Gooty mandal, run 80 kms called by name Nagasamudram hills. The Mallappakonda range begins at Dhrmavaram runs into Karnataka State. The Penukonda range starts in the south of Dhrmavaram through Penukonda and Hindupur proceeds to Karnataka State. In Madakasira, the hill divides Rolla and Agali mandals into southern and northern portions. There are numerous isolated peaks and rocky clusters which are devoid of any vegetation.

3.12. EDUCATION

The district is provided with two universities viz., Sri Krishnadevaraya University, Anantapur and Jawaharlal Nehru Technological University and on deemed university namely Sri Satya Sai Baba Institute of Higher Learning
at Puttaparthi. There are several private Engineering Colleges, two Polytechnic Colleges, nearly 40 Degree Colleges, 71 Junior Colleges, 275 High Schools, 198 Upper Primary Schools and 6 Industrial Training Institutions in the district. Oil Technological Research Institute only one of its type in the south and dry land agriculture research station are situated in Anantapur.

3.13. DRINKING WATER FACILITIES

Out of 3361 inhabited villages in Anantapur district, public water supply facility is available in 2335 villages. The drinking water through bore wells is available in 988 villages and in 38 villages, the drinking water facilities are available through other sources. However, 976 villages have been identified as fluoride villages in the district and in 14 villages; the people are using blackish water for drinking purpose.

3.14. SALIENT FEATURES OF AGRICULTURE IN ANANTAPUR DISTRICT

The salient features of agricultural sector in Anantapur district of Rayalaseema region are briefly presented in the following lines.

3.15. AGRO-ECOLOGICAL CHARACTERISTICS

Anantapur district is in the arid agro-ecological zone and is marked by hot arid bioclimatic condition with dry summers and mild winters. The district is characterised by hills, ridges, and undulating and gently sloping lands. Of the total geographical area of the district, hills and ridges cover 14 percent; undulating lands, 27 percent; gently sloping lands and very gently sloping plains extend over 54 percent; and valleys cover 5 percent.

3.16. RIVERS

The district is not endowed with perennial rivers. Seasonal rivers like Pennar, Jayamangala, Chitravati and Vedavati or Hangry rivers flow during the rainy days and benefit the seasonal requirements of the farmers on river
banks in 3317 kms. route of the rivers. Streams like Kushavati in Hindupur, Swarna Mukhi in Madakasira, Tadakaleru and Pandameru in Anantapur block, Maddileru in Kadiri block and Papagni in Tanakal mandal are the important water supply sources to various large and medium irrigation tanks in the district.

3.17. NATURAL RESOURCES

Anantapur district is rich in mineral resources and is well known for Gold and Diamond deposits. The main mineral deposits are lime stone, barites, dolomite, iron ore, corundum, steatite, white shale, serpentine and quartz. Black, pink and multicolored granites are also available in the district. Tadipatri area is rich in cement grade like stone deposits.

3.18. FOREST RESOURCES

The district is very poor in forest wealth both in terms of area and richness or flora 4.86 lakhs acre constituting 10.3 per cent of the total geo-area is classified as forest against optimal area of 33 per cent indicated in the National Forest Policy. The value of forest produce such as beedi leaves, custard apple, tamarind and soapnut is meager. Another resource is agave (sisi) which is a wild growth plant from which fiber is being extracted. The forest in Anantapur district means only wild bushes, bald hillocks and rocky terrain.

3.19. RAINFALL AND CLIMATE

Anantapur district is the driest part of the country with the second lowest average rain fall of 520.4 mm. after Jaisalmer district in the state of Rajasthan and is classified as tropical arid with and aridity index of 72.5. The rainfall is highly erratic. Normally southwest monsoon favours with 60 per cent of the total rainfall (310.8 mm.) and being far away from east cost. Northern monsoon will not be vigorous in the district (147 mm.).
Intermittent dry spell ranging from 4 to 6 weeks in the crucial stage of crop growth period coupled with high velocity winds often result in low productivity of crops. 32 rainy days in a year yield meager precipitation of 520.4 mm, but this too is not realized many a year. The altitude varies from 990' above MSL at Tadipatri to 2000' above MSL in Madakasira taluk. Maximum temperature ranging between 20.1 degrees Celsius to 38.4 degrees Celsius recorded during the months of March, April and May. November and January are the cooler months with a minimum temperature of 17.2 degrees Celsius.

The geographical location of Anantapur district is such that it does not get the full benefit of either of the monsoons. The south-west monsoon gets cut off by the Western Ghats, while the full benefit of the north-east monsoon is not derived, either, as the district lies far from the eastern coastline. The district is in the rain shadow area and the normal rainfall is 553 mm. There are four distinct rainfall zones in the district. An analysis of monthly rain fall over ninety-four years—from 1911 to 2004—indicates an annual mean rainfall of 568.5 mm with a coefficient of variation (CV) of 28 percent. That the coefficient of variation of rainfall is higher than the threshold level of 25 percent for annual rainfall suggests variability and lower degree of dependability on rainfall in the district.

In more than one-half of the years studied, the actual rainfall is below the annual mean rainfall of 568.5 mm. That is, fifty-one out of ninety-four years have experienced below mean rainfall in Anantapur district. Further, on average once in every five years, the district experiences drought conditions. Eighteen out of ninety-four years are classified as drought years, as the annual actual rainfall in these years has been 75 percent below the annual mean rainfall of 568.5 mm. Fourteen out of these eighteen years are moderate-drought years while four may be classified as severe-drought years.

An analysis of the contribution of seasonal rainfall to total annual rainfall of the district, from 1911 to 2004, shows that the south-west monsoon (June to September) contributes 58 percent; north-east monsoon (October to
December) 28 percent; hot weather period (March to May) about 13 percent; and cold weather period (January and February) one percent. Normal rainfall shows a marginally declining trend across all the seasons in the district over a ninety-year period, as indicated in table 3.2.

In addition to the marginally declining trend of the quantum of rainfall, variability in rainfall is also an important issue affecting the agricultural prospects of Anantapur District. Variability in rainfall is noticed in all seasons, except the southwest monsoon, as testified by the values of the coefficient of variation calculated over 1911 to 2004.

Table 3.2: Normal Rainfall (in mm) Across Seasons in Anantapur District

<table>
<thead>
<tr>
<th>Period</th>
<th>South-West Monsoon</th>
<th>North-East Monsoon</th>
<th>Cold Weather Period</th>
<th>Hot Weather Period</th>
<th>Annual Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911-40</td>
<td>350.27</td>
<td>166.57</td>
<td>13.58</td>
<td>72.93</td>
<td>603.35</td>
</tr>
<tr>
<td>1941-70</td>
<td>315.97</td>
<td>148.88</td>
<td>2.06</td>
<td>84.35</td>
<td>551.26</td>
</tr>
<tr>
<td>1971-00</td>
<td>335.58</td>
<td>157.51</td>
<td>2.06</td>
<td>64.30</td>
<td>559.46</td>
</tr>
<tr>
<td>2001-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


That is, on average, about 42 percent of annual rainfall is subject to a high degree of variability. However, rainfall is assured during the south-west monsoon, though with a low mean of 329.9 mm. Yet, the effective rainfall (which indicates the part of the rainfall that is available as soil moisture in the root zone to meet the crop evapo-transpiration requirement) is computed to be 198 mm for south-west monsoon over the period 1911 to 2004.

The effective rainfall in the district is at least 50 percent below the amount required to reap potential groundnut yield. Further, comparing mean rainfall and potential evapo-transpiration (PET) indicates that during the main crop-growing period of south-west monsoon, quantum of rainfall is lower than the levels of potential evapotranspiration in the district. The rainfall deficit with respect to PET was 70 percent in June; 64 percent in July; 52 percent in August; and 2 percent in September. The soil-moisture stress condition under different stages of crop growth would result in inadequate
plant population; higher percentage of flower drop; poor seed setting etc; and thereby have implications for crop yields.

The length of growing period (LGP), which is an assessment of the period during the year when both moisture availability and temperature are conducive to crop growth, is calculated to be 119 days in Anantapur district. The mean growing period dates between 7th July and 2nd November. An analysis of the probability of dry spell occurrence during the mean growing period (7 July to 2 Nov) by employing Markov-Chain Analysis indicates that out of a total of eighteen weeks of growing period in the district, thirteen weeks experience dry spells with a probability of more than 60 percent and fifteen weeks experience dry spell with a probability of more than 50 percent.

A high probability of dry spell would have significant implications for yield of rain-fed/dry land crops as yield would depend not only on the quantum of rainfall but also on the distribution within the season. Gadgil notes, “Dry spells induce moisture stress and have a major impact on growth and development when they occur at some life history stages.

Dry spells and wet spells can also trigger the growth of pests/diseases/weeds and hence have impact on the yield. The impact may also be on the operational efficiency, as in the case of an intense dry spell during harvest which results in difficulty in retrieving all the pods from the hard soil.” Level of rainfall as well as effective rainfall is low with a high probability of dry-spell occurrence in the growing period. During southwest monsoon, the quantum of rainfall is lower than potential evapo-transpiration, thus having serious implications for crop growth.

3.20. SOIL CHARACTERISTICS

The soils of Anantapur originated from both the granite and granite-gneisses land forms, as well as the Dharwar landforms. Both these land forms are characterized by hills and ridges and undulating and gently-sloping lands. There are about thirty four soil families in the district of Anantapur, and among these, the Anantapur and Penukonda soil families are the most

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predominant. The land capability classification which describes the capability of soils for different uses classifies soil into eight classes.

The classification is based on inherent soil characteristics as well as external land features and other environmental factors that limit the use of land. Any land capability class is thus a grouping of land units that have equal relative degrees of limitation or advantage. Soils suitable for cultivation are grouped under classes I to IV while soils not suitable for cultivation but very well suited for forestry, wild life, and grassland are under classes V to VIII. In Anantapur district, less than 4 percent is classified as class II; 44 percent as class III; and 25 percent as class IV (table 3.3).

Table 3.3: Land capability Classes in Anantapur District

<table>
<thead>
<tr>
<th>Land Capability Class</th>
<th>Area in Hectares</th>
<th>Percentage of Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>II</td>
<td>65,082</td>
<td>3.43</td>
</tr>
<tr>
<td>III</td>
<td>8,31,895</td>
<td>43.89</td>
</tr>
<tr>
<td>IV</td>
<td>4,82,122</td>
<td>25.43</td>
</tr>
<tr>
<td>V</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>VI</td>
<td>1,77,453</td>
<td>9.36</td>
</tr>
<tr>
<td>VII</td>
<td>339048</td>
<td>17.89</td>
</tr>
<tr>
<td>Geographical Area</td>
<td>18,95,600</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Hand Book of statistics, Office of CPO, Anantapur District.

Fig.3.1: Land capability Classes in Anantapur District

To bring to recall the significance of this soil classification, Class I lands are defined as, 'level lands with deep, well-drained soils of a satisfactory
texture and structure. They are suitable for growing a variety of crops by adopting ordinary good farming practices. They are very fertile lands. These are totally absent in Anantapur district. Class II lands are those that may be cultivated regularly although special conservation practices like contour farming are to be followed for maintaining the productivity of lands. The available nutrients on Class II lands are poor. Class III lands, which account for the majority of cultivable land, can be cultivated only by following intensive soil-conservation practices like terracing.

Class III lands are 'moderately sloping lands with a moderately deep soil. They are more severely affected by salinity and alkalinity and soil erosion than Class II lands. They have poor nutrient content and moisture-retention capacity'. Class IV lands are suitable for occasional cultivation. That is, Class IV lands can be brought under intensive cultivation only once in four years, and the remaining years it should be left under grasses. Land capability classification in a nutshell indicates that while 73 percent of geographical area of the district is cultivable, 25 percent of this can be cultivated only once in four years and the remaining 48 percent can be cultivated only if conservation measures are adopted rigorously. In other words, water erosion; shallow rooting depth; gravelliness; moderate slopes; and salinity, as well as climatic limitations affect successful crop cultivation in the district.

In the district, red alfisol soils are predominant, accounting for 78 percent, while black soils are found in 20 percent of the total geographical area. It is estimated that 63 percent of the total geographical area of the district is covered by sandy loam; 14 percent is under rock land; and about 19 percent is under clay. Large areas in the district have coarse soil-surface texture, are poor in water and nutrient retention, and are prone to wind and water erosion. The strong westerly winds that blow across the district are also a factor that contributes to soil erosion.

An estimate of soil loss due to erosion suggests that the total estimated soil loss from the entire district to be 91.7-lakh ton per annum. Using this estimate, in the total geographical area of 19,10,000 hectare of the district, the
estimated soil loss per hectare is 4.8 ton per annum. In addition to this, large areas in Anantapur have shallow rooting depth for plant growth. Further, it is estimated that about 59 percent of soils of Anantapur have low ‘available water capacity’, a measure which indicates the amount of moisture that can be easily absorbed by the plant from the soil for its optimum vegetative growth. The soils of the district having very low water storage capacity, Anantapur suffers from excessive water runoff.

In the district, 31 percent of the total geographical area is classified as strong water erosion class; 2 percent as extreme water-erosion class; 50 percent as moderate water-erosion class and 17 percent under slight water-erosion class. This again is attributed to the predominantly sandy loam texture of the soils and the poor water-holding capacity of the soils. The high water-erosion tendency exhibited by the soils make the already scarce rainfall unavailable for effective plant growth, thereby reducing the length of the growing period. The soils of Anantapur are classified to have medium caution-exchange capacity, an indication of the medium capacity of the soils to supply nutrients as well as the medium responsiveness of the soil to application of fertilizers.

3.21. TYPE OF SOILS IN THE DISTRICT

The soils in Anantapur, Singanamala, Dharmavaram, Kalyanadurg, C.K. Palli, Kambadur, Rayadurg, Penukonda, Kadiri, Hindupur and Madakasira blocks is predominately red. In Uravakonda and Gooty blocks the red and black soils are almost in equal proportions. Red soil constitutes 76 per cent and black soil 24 per cent of the total area in the district. The soil can be classified as red clay, red loamy, red-sand, black loamy and sand. The soils are shallow, poor in nutrients, with high water absorption capacity. Nearly 30 per cent of lands in the district are saline and alkaline, especially under the ayacut of irrigation tanks and river banks. The pH of dry lands generally ranges from 7.5 to 8.5. Thus 76 per cent of soils are red and 24 percent black.
3.22. LAND USE PATTERN, LAND HOLDINGS & PRODUCTIVITY

In the district 11.54 lakhs hectares are owned by 4.14 lakh farmers. The average farm holdings are 2.78 hectares. The percentage of the small and marginal farmers holding below 2 hectares has gone up from 46.8 per cent in 1977 to 56 per cent in 1989 mainly on account of land reforms policy of the Government and some of the landless labourers have become the owners of agricultural land. Except for groundnut crop, the yield of other crops is less than the average yield in the state. The fertilizers used in the district are the least in the state.

While a cursory look at the land-use pattern in the district of Anantapur, over 1961-62 to 2005-06, suggests a more or less stable pattern, a more thorough analysis brings out two important changes in land use. First, cultivable waste land has declined sharply over the years, from an extent of 1.7-lakh hectare in early 1960s to about 0.5-lakh hectare in mid-2000s. In 1961-62, cultivable wastes formed 9 percent of geographical area, while by 2005-06, this percentage decreased to less than 3 percent.

The decline in cultivable wastes is accounted for partly by an increase in land put to non-agricultural use; an expansion in area that remains barren; an increase in area under trees; as well as a general tendency to bring cultivable waste land under cultivation. The cultivable wastes that are brought under cultivation in a year, however do not get cultivated every year and perhaps remain as fallows in some years, as is suggested by a fluctuating pattern of current and other fallows in the district. Non-agricultural land has increased from 5.83 percent of geographical area of the district to 7.73 percent over 1961-62 to 2005-06.

As regards other classifications of land-use, the area under forests remains stable at about 10 percent of geographical area throughout the period under consideration while the areas cultivated with trees and pasture land, each accounting for less than 2 percent of geographical area, have registered moderate increase in the recent years.
Though a considerable extent of the area is under forests in Anantapur District, the nature of these forests is such that this does not contribute towards improving the arid climate in the region. The Anantapur District Gazetteer, published in 1905, notes, 'The forests of the district nowhere consist of really dense growth or large timber and in many parts they contain practically no tree at all' (GOAP. 1993)

That the nature of forests have remained as pathetic as they were a hundred years ago is clear from the description of forests in the recent publication of the state government as, 'The forests in the District are thin and scanty. There are numerous isolated peaks and rocky clusters which are devoid of any vegetation'. (CPO. 2006-07) Second, net sown area as well as gross cropped area in the district of Anantapur over four and a half decades fluctuates a great deal.

This is clearly indicative of a high degree of instability in agriculture in the district. The extent of net sown area was more than 10-lakh hectare in early 1960s and it went down to 8-lakh hectare during the mid-1980s and it expanded again to reach 10-lakh hectare by the mid-2000s. A declining trend in net sown area as well as gross cropped area in the district is observed during the 1960s and 1970s but this gets reversed in the mid-1980s, a feature perhaps related to the promotion of tube-well irrigation around the 1980s in the district.

3.23. GROUND WATER POTENTIAL

The total ground water reserves as estimated by the ground water department are to the order of 1061.71 Mcm. The present level of utilization has been estimated at 391.20 Mcm, leaving a leaving a balance of 67.5 Mcm for further development. Ground water is available at a depth of 100' approximately. But the recharge of the underground water is very much dependent upon the quantum of rainfall.
3.24. IRRIGATION FACILITIES

Gross irrigated area in the district is 3.67 lakh acres. 52.9 per cent of irrigation is contributed by wells and 10.4 per cent by tanks. The net cultivated area under wells and tanks is very much dependent on the rainfall. The lands under wells and tanks will be fallow many a year on account of droughts. Thungabhadra high level canal is the only dependable irrigation source in the district, irrigation spreads 365 lakh acres through 152 villages.

There are 3 medium irrigation projects, Upper Pennar Project with an ayacut of 10,048 acres benefiting 13 villages, Byravanithippa Project with an ayacut of 12,000 acres benefiting 14 villages and Chenna Rayadudi Project with an ayacut of 1,100 acres benefiting 4 villages and are useful only during the years of heavy rains.

As is generally the case in drought-prone areas, in Anantapur too, there is a conspicuous absence of perennial rivers. All the rivers in Anantapur district—Pennar, Jayamangala, Chitravathi, Vedavathi (or Hagiri)—are non-perennial and have their origin in the neighbouring state of Karnataka. Given this environment, the earlier rulers had recognised the need to promote several indigenous water harvesting systems.

It has been observed that, 'The most indigenous rain water harvesting and management systems like feeder channels, cascading chains of tanks and networking water bodies could be seen in Anantapur district. The life and culture of Anantapur people revolved around these traditional water bodies. The whole village was responsible to use, to conserve and to maintain the safety of the water bodies through locally established institutions like khudi maramath, neerugatti and pinnapedda'. (Kadalika 2004) The Anantapur District Gazetteer notes that there were over 700 tanks in the district in the beginning of the twentieth century.

Analysing district-level data on irrigation, it is clear that the percentage of area irrigated was about 10 percent in the early 1960s and reached a peak of 16 percent to 17 percent during late 1980s. Then again there was a decline, and by the mid-2000s the percentage of area irrigated was only 11 percent to 12
percent. Gross irrigated area as a percentage of gross cropped area shows a similar trend too. While an analysis of the extent of area under irrigation, over the period 1960–61 to 2006–07, shows an overall increasing trend, there has been a decline in the extent of area under irrigation since late 1980s.

This decline in irrigated area is responsible for bringing about a fall in percentage of area irrigated in the district since the late 1980s. The fall in irrigated area since the late 1980s is largely related to a fall in area irrigated by tanks, open dug wells and other irrigation sources and even the increase in area irrigated by tube wells has not been enough to compensate the loss of irrigation from all other sources in this period.

It shows that while irrigation from tanks accounted for 40 percent of net irrigated area in the early 1960s, its importance waned significantly and it accounts for less than 5 percent of net irrigated area by the 2000s. During the 1980s, with active support from the government, tube wells were introduced in the district and their importance increased rapidly over the years and by 2005–06 more than one-half of the irrigated area is seen to receive irrigation from tube wells. Though the importance of open dug wells has declined over the years, they continue to remain a vital source of irrigation in the district. The rapid increase in bore-well irrigation resulted in the depletion of water levels and defunctioning of some of the bore wells and most of the dug wells in the district.

Data available with the ground water department further shows that of the sixty-three mandals in Anantapur district, thirty-three mandals fall in the over-exploited category; five in critical; thirteen in the semi-critical; and only twelve in the safe category, as on 2004-05. That is, only in 12 mandals the percentage of ground water utilization to groundwater availability is below 70 to 75 percent.

Further indicates that ‘other sources’ which include spring channels, supply channels, small waterways etc have registered a tenfold decline over the four-and one-half decades under consideration. Though ‘other sources’ account for a very small percentage of total irrigated area, the decline in this
source combined with a decline in tanks clearly point towards a neglect of traditional water sources over the years. Figure 10 also indicates the decline in importance of surface irrigation over the years in the district.

In 2008-09, 305 minor irrigation tanks (that is, those with ayacut area above 100 acre) and 200 Panchayat tanks (that is, those with ayacut area below 100 acre) were counted in the district of Anantapur. Except for two tanks, Bukkapatnam and Dharmavaram, that are river fed, all other tanks are supplied by small streams or vankas or from local rainfall. By 2008, about 100 minor irrigation tanks have been converted into percolation tanks and their sluices have been closed because the ground water recharge that is possible due to storage of water is believed to be more beneficial compared to open irrigation from tanks in the context of their not filling up to full tank capacity.

Irrigation from canals has remained more or less stable over the entire period, accounting for about one-fifth of net irrigated area. As mentioned earlier, all the rivers that flow in Anantapur district, Pennar, Jayamangala, Chitravathi, and Vedavathi, are non-perennial and have their origin in Karnataka state. As regards surface irrigation there is one major irrigation project Tungabhadra Project High Level Canal (TBP HLC) which was sanctioned in 1959-60. The first stage of this project was completed in 1966. There are also six Medium Irrigation Projects, three of which are on river Pennar. Except one medium irrigation project, all the other medium and major projects have been completed during 1956 to 1966. The registered ayacut of the major and medium irrigation sources is 69,596 hectares, while less than fifty percent of the ayacut actually receives irrigation in any given year in the district.

A major surface irrigation project that shall have a significant impact on the irrigation scenario of Anantapur District in future is the ongoing project, Handri Niva Sujala Sravanthi (HNSS). This project is designed to benefit the districts of Kurnool, Anantapur, and Cuddapah for drinking water as well as irrigation purposes. The project has been proposed to lift surplus water of Krishna river at Malyala Village, Kurnool District. The water will be
conveyed through a 216-km-long canal by eight lifts to irrigate land in Kurnool and Anantapur districts.

3.25. CROPPING PATTERN

Dry land farming continues to be the main stay of the people of the district. Anantapur district has the largest gross cropped area in the state (25 lakhs acres) and 85 per cent of the cropped area is rainfed. Gross cropped area accounts for 52.6 per cent of the total geographical area of the district. Food crops are cultivated in 29.8 per cent of the total cropped area. The Principal crops raised in the district are groundnut (18.35 lakh acres), jawar (1.06 lakh acres) and paddy (1.5 lakh acres). The mulberry cultivation is fast improving. The total area under mulberry cultivation is about 26,521 acres and the cocoon yield about 12,000 tonnes per annum providing a very good scope for silk industry.

Kharif is the major crop season in Anantapur District. Of the 9.75-lakh hectares of gross cropped area in the district in 2006-07, 7.94-lakh hectares, that is, 81 percent of gross cropped area gets cultivated during the kharif season. Traditionally, food grains dominated the cropping pattern of the district. Minor millets such as samai, varagu, korra and major millet such as sorghum, various pulses and paddy were the major food grains in the district.

An analysis of cropping pattern in Anantapur district over 1960-61 to 2006-07 shows that during early1960s, more than two thirds of gross cropped area was cultivated with food grains, predominantly millets, with some amount of pulses and paddy. Among non-food crops, cotton and groundnut were important. The variety of groundnut that was grown during the 1960s was the spreading variety which was a 150-day crop grown during the kharif season. It shows that area under pulses and paddy has remained stable over time while millet area has declined sharply since the late 1970s, and the area under groundnut has increased. Around this period, the spread variety of groundnut was getting replaced by bunch variety in the district.
Farmers preferred the bunch variety over the spreading variety because it was a shorter-duration crop and involved less drudgery in cultivation. While the duration of the bunch variety was 90-110 days, that is, about forty to fifty days lower than spreading variety, the drudgery involved in harvesting the bunch variety was also lower. Two pairs of bullock were required to be employed for harvesting the spreading variety as against one pair required for the bunch variety.

The area under groundnut has increased fourfold, from being slightly less than 2 lakh hectare in the early 1960s to 8 lakh hectare by 2005-06. Nearly 50 percent of groundnut area in the entire state of Andhra Pradesh belongs to Anantapur district now (2006-07). In 1961-62 the area cultivated with millets was much greater than the total groundnut area; while by 2005-06 millet area was a mere 38,000 hectares. Minor millets have more or less disappeared from cultivation, while the area under major millets has reduced by 90 percent.

As groundnut is largely cultivated with pulses as an intercrop, the importance of pulses has remained more or less stable over the years. In Anantapur, groundnut is essentially a kharif crop with 98 percent of total groundnut area being cultivated during the kharif season. Cropping intensity is quite low, in the range of 1.02 to 1.06, over 1961-62 to 2005-06 in the district with area sown more than once increasing by a mere 20,000 hectare over this period. Quality of irrigation in Anantapur district is such that even the increase in net irrigated area has not resulted in pushing up the cropping intensity.

Cropping intensity in the irrigated area fluctuates a great deal and remains in the range of 1.24 to 1.34 and does not register an increasing trend over the four-and one-half decades under consideration. A considerable extent of area that is not receiving irrigation is getting cultivated in more than one season in the district in the recent years. This implies an increase in perennial crops in the district.

According to data provided by Department of Horticulture, area under fresh fruits in the district increased from 20,215 hectare in 1998-99 to
66,092 hectare in 2006-07. While increase in area under irrigation itself is quite scanty and the nature of irrigation is quite precarious, the irrigated area is cultivated with paddy, sunflower, groundnut and fruits in that order. In 2001-02, of the gross irrigated area, 33.93 percent was cultivated with paddy; 28.01 percent with sunflower; 16.04 percent with groundnut; and 13.96 percent with fruits.

3.26. CROP PRODUCTION

The changes observed in production of principal crops in the district over 1960-61 to 2006-07 reflects the changes that have occurred with regard to area under crops. There is a sharp decline in production of sorghum and millets, while pulses production has increased threefold. A striking feature of overall outturn of crops in the district is that though groundnut production shows an overall increasing trend, the rate of increase is far below the rate of expansion of area under groundnut. While groundnut area expanded nearly four times over the fortyfive year period under consideration, the production of groundnut barely doubled. Moreover, there is a great deal of fluctuation in the rate of growth of groundnut production over the years. These factors raise important questions regarding the level of groundnut yield.

3.27. YIELD OF GROUNDNUT

Analysing the yield of groundnut over the period 1971-72 to 2005-06 in Anantapur district, the state of Andhra Pradesh, and all of India it is clear that yield levels have always remained relatively low in Anantapur. The disturbing fact as far as the pattern of groundnut yield in the district is concerned is that the divergence between all-India yield levels and district levels have widened over the years. In 1972-73, the yield levels were more or less similar across the district, state, and the country at 762 kg/ha, 831 kg/ha and 751 kg/ha, respectively. However, for the triennium centred around 2004-05, yield of groundnut is recorded as 516 kg per hectare in Anantapur district, 760 kg. per hectare in Andhra Pradesh while it was 1,188 kg per
hectare in the country as a whole. Moreover, the district and state exhibit a declining trend in groundnut yield since mid 1990s.

In addition to the low level of groundnut yield, Anantapur district also experiences a very high degree of fluctuations in yield levels. Fluctuation in yield over thirty three years, running from 1971-72 to 2005-06, is much higher in the district compared to the state and all India. Instability in yield is measured as the average percentage deviation of actual value in each year around the three-year moving average value for that year. This simple measure of instability indicates that yield instability is highest in Anantapur at 27 percent as compared to 14 percent in the state and 12 percent in all India.

Another disturbing feature is the declining trend of groundnut yield in the kharif season in Anantapur district. As 98 percent of groundnut area in Anantapur district is sown during the kharif season, the fluctuating and declining pattern of groundnut yield has extremely important implications for the agricultural economy of the entire district. Given this context of low and declining yield of groundnut, it is extremely crucial that other factors, such as quality inputs, which have a bearing on crop yield, are strengthened. Addressing the issue of quality inputs is also absolutely necessary considering that agriculture operates under unfavourable natural conditions in Anantapur district.

3.28. INPUTS USED FOR AGRICULTURAL DEVELOPMENT SEEDS USED

One of the major constraints faced by farmers in Anantapur district is with regard to availability of good quality groundnut seeds. The ruling variety of groundnut in the district is TMV 2. This is a pure-line selection released from Tindivanam Oil Seeds Research Station in Tamil Nadu in the year 1942. During the 1970s, TMV 2 was introduced in Anantapur when the spreading variety of groundnut was slowly getting replaced by bunch varieties. This variety remains popular among farmers as it is seen to have
several advantages. It is a drought tolerant variety that is adaptable to local climatic conditions.

The rejuvenation level of TMV 2 is quite high as it is capable of producing more than one flush of flowers. The first flush of flowers usually occurs during twenty-two to thirty days of sowing. Suppose the pod-setting fails due to unnatural conditions, the second flush of flowers will come as soon as the natural conditions become conducive. Though the second flush of flowers may not be as abundant as the first flush, farmers will still manage to reap a harvest. Farmers believe that the varieties that have been released in the recent years, by the university Acharya N G Ranga Agricultural University (ANGRAU) as well as the The International Crop Research Institute for Semi-arid Tropics (ICRISAT), lack the ability to flush more than once.

In Anantapur, where incidence of dry spells and drought proneness is high, farmers prefer varieties that flush many times. Though TMV 2 is susceptible to all the major pests and diseases it still remains the most popular variety with the farmers as it has several advantages. The research system, ANGRAU and ICRISAT, have released several new and improved varieties of groundnut over the years for Andhra Pradesh. The State Agricultural University’s Agricultural Research Station at Kadiri in Anantapur district has its main focus on groundnut breeding and developing groundnut based cropping system for the scarce rainfall zones in Andhra Pradesh. The Agricultural Research Station at Tirupati in Chittoor district under the State Agricultural University also has its main focus on groundnut and groundnut based cropping systems in Andhra Pradesh.

Over the period 1971-2006, the University has released nearly thirty varieties developed by breeders in these two research stations. In March 2009, five more varieties were released by ANGRAU, out of which four are from Kadiri, and one is from Tirupati Research Station. ICRISAT also has groundnut as one of its mandate crops. In collaboration with Rural Development Trust, ICRISAT has conducted on-farm varietal selection of a
number of improved varieties on farmers' fields. A crop variety released in 2006, ICGV 91114, received wide acceptance among farmers and in kharif 2008 nearly 40,000 hectare (about 5 percent of groundnut area in the district) is cultivated with this variety. While Kadiri 6 and JL24 (released from Jalgaon) are preferred in some parts of Anantapur district, TMV 2 remains the ruling variety if one considers the district as a whole.

At present, the farmers in the district have three sources to access groundnut seeds from: his/her own retained seeds; seeds purchased from other farmers; and seeds they receive at subsidised rate through the department of agriculture. The public sector agencies that have a major share in groundnut seed production in Andhra Pradesh are: Andhra Pradesh State Seed Development Corporation; Andhra Pradesh Cooperative Oilseeds Cultivators’ Federation Ltd, Hyderabad Agricultural Cooperative Association etc. For a crop like groundnut, where seed volume is high and where retained seeds can be used by the farmers, the involvement of private sector in seed production is absent.

With the department taking on the responsibility of supplying seeds as a distress-alleviating measure, the quantity of seed supplied has increased significantly. More than one-third of the total seed requirement of the district is met by the department since 2006. This practice deviates from the earlier norm of supplying seeds on subsidy only when there was a crop failure in the district.

The system of seed production and distribution with regard to groundnut in Anantapur District has several implications for seed quality and thereby on yield:

- Seed production in the formal sector, that is, groundnut produced for purposes of seed by registered farmers or in seed villages, plays a very limited role in the overall seed requirement of the district. While one-third of seed requirement of farmers is met by the agricultural department, only a small portion of it, say, about 20 percent, is produced as certified seeds. The bulk of the seed requirement is met by
farmers themselves, either by way of their own retained seeds or from other farmers or friends or relatives or from middlemen who deal in seeds during sowing seasons. In other words, a large proportion of the seeds that are used are not carefully selected for the purpose of seeds. The ruling variety TMV 2 is a variety that was released six decades ago and is in use in Anantapur district for more than three decades. Given that the environmental effect is highly pronounced in groundnut, it is very likely that the 'pure lines selected as TMV-2' would have developed genetic variability due to natural hybridisation, mutation and mechanical mixtures. Therefore, when this variety is used continuously over many years the virility of seeds gets eroded as the genetic and physical purity of the seed wears down over the years. In sum, the extent of impurity of TMV 2 seeds leaves much to be desired.

Though the quantity of seeds that are produced by the formal seed production system is limited, it is believed that the entire quantity that is produced as seeds do not reach the farmers. The breeder-foundation-certified seed chain is often broken and seeds get diverted to the open market. For instance, even though the seed agencies enter into an agreement with farmers regarding procurement of seeds produced by them, the contracts often do not bind the farmers and seeds produced do get diverted into the open market. For instance, when there is a delay in declaring the procurement price by the seed producing agencies the farmers may go ahead and sell the produce in the open market. In the open market the product is bought for commercial purposes and not necessarily for seed purpose. Farmers may even sell part of the produce in the open market while selling the remaining to the seed agency. Thus, groundnut produced for seed purpose gets diverted for consumption purpose thereby reducing the availability of good quality seeds. Moreover, this practice also results in a lower seed multiplication ratio for groundnut.
It is an irony that while the quantum of seed supplied by the agricultural department from 1995 to 2008 has increased nearly thirtyfold, there has been no corresponding expansion in the infrastructure needed to produce the additional requirement of seeds. The bulk of the seed that gets distributed by the agricultural department consists of 'Truthful Seeds' that may not stand the test of the State Seed Certifying Agency. Moreover, there is not even a seed farm for groundnut that is being supported by the district's agricultural department.

- The quantum of seed supplied by the department of agriculture has increased from less than 0.2-lakh quintal to 5-lakh quintal. The rapid increase in 'seed' supply gives scope for varietal mixture, resulting in farmers not getting pure seed of any variety. Different varieties would have different maturing period and this would result in pest and disease infestation bringing down the yield and thereby increasing the cost of cultivation.

3.29. FERTILISERS USED

Recommendation of nutrients for rain-fed groundnut, as per the Package of Practices issued by ANGRAU, is 8 kg/acre of nitrogen; 16 kg/acre of phosphates; 20 kg/acre of potash; 47 kg/acre of sulphur; and 37 kg/acre of calcium. In addition to the recommendation of chemical fertilisers it is also recommended that 4 to 5 tonnes of farm yard manure (FYM) is applied per acre. Calcium has a major influence on pod formation and pod filling; sulphur helps in enhancing the oil content of the groundnut kernel; potassium helps regulate nutrient and water uptake by the plants and is therefore important for plant growth; nitrogen is needed during the vegetative phase of a plant's growth; and phosphorous is very crucial for initiation of flowering and in the reproductive phase of the plants.
3.30. PESTICIDES USED

In Anantapur, the Department of Agriculture has initiated special measures to enable farmers to reduce the use of chemical pesticides in pest management in agriculture. Polambadi or Farmers Field School has been launched by the Government of Andhra Pradesh through the Department of Agriculture, where the emphasis is given to the use of eco friendly measures (bio agents & bio pesticides) for control of crop pests. The main principles of polambadi are (a) grow a healthy crop; (b) conserve natural enemies; (c) conduct regular field observation; and (d) farmers become integrated crop management (ICM) experts. Integrated crop management is to be achieved through a combination of integrated nutrient management (INM), integrated pest management (IPM), and agronomic practice including farm mechanisation. A polambadi will have a maximum of thirty farmers.

During the year 2007-08, in groundnut during kharif, a total of 180 polambadis were conducted, of which 60 polambadis were conducted by the concerned Mandal Agricultural Officers, and 120 polambadis by the farmer facilitators, namely adarsha ryuthus. During rabi season in 2007-08, a total of 135 polambadis were conducted in groundnut crop, of which forty-five were conducted by MAOs and ninety by the adarsha ryuthus’.

3.31. CONCLUSIONS

Anantapur district was formed in the year 1882 by separating from Bellary district and was later on extended with the addition of Kadiri taluk from Cuddapah district in the year 1910 and Rayadurg taluk from Bellary district in the year 1956. Anantapur is the southern-most district of the Rayalseema region of Andhra Pradesh. While agriculture remains the most important economic activity of the district, it is characterized by high levels of instability and uncertainty. Being located in the rain-shadow region of Andhra Pradesh, the district is drought-prone.

Anantapur district is bounded by Kurnool District in the north; Cuddapah District in the north-east; Chittoor District in the south-east; and
Karnataka State on the West. The district has a total geographical area of 19.13 lakh hectare. For administrative purposes, the district is divided into three revenue divisions, namely, Anantapur, Dharmavaram, and Penukonda; there are sixty-three revenue mandals.

Agriculture remains the predominant activity in the villages, with 80 percent of total workers engaged in agriculture, either as cultivators or agricultural labourers. There are 929 inhabited villages, out of 964 total Revenue villages of the district. The number of villages in size group of 500 to 1999 forms 36.71 per cent of the total inhabited villages. The size group of 2000 to 4999 forms 38.64 per cent and the size group of 5000 to 9999 forms 12.81 per cent only out of total villages, while 84 villages (9.04 per cent) of total inhabited villages are having population less than 500.

Consequent on the introduction of the mandal system of administration in 1986, the district is being administered through three revenue divisions, namely Anantapur, Dharmavaram and Penukonda and 63 Mandal Parishads. The district has been divided into 3 Revenue Divisions viz., Anantapur division (20 revenue mandals), Dharmavaram division (17 revenue mandals) and Penukonda division (26 revenue mandals) consisting of 63 revenue mandals and Panchayati Raj mandal with identical jurisdiction which are the basic administrative and development units.

Anantapur district is in the arid agro-ecological zone and is marked by hot arid bioclimatic condition with dry summers and mild winters. The district is characterised by hills, ridges, and undulating and gently sloping lands. Of the total geographical area of the district, hills and ridges cover 14 percent; undulating lands, 27 percent; gently sloping lands and very gently sloping plains extend over 54 percent; and valleys cover 5 percent.

The district is not endowed with perennial rivers. Seasonal rivers like Pennar, Jayamangala, Chitravati and Vedavati or Hangry rivers flow during the rainy days and benefit the seasonal requirements of the farmers on river banks in 3317 kms. route of the rivers. Streams like Kushavati in Hindupur, Swarna Mukhi in Madakasira, Tadakaleru and Pandameru in Anantapur
block, Maddileru in Kadiri block and Papagni in Tanakal mandal are the important water supply sources to various large and medium irrigation tanks in the district.

Anantapur district is rich in mineral resources and is well known for Gold and Diamond deposits. The main mineral deposits are lime stone, barites, dolomite, iron ore, corundum, steatite, white shale, serpentine and quartz. Black, pink and multicolored granites are also available in the district. Tadipatri area is rich in cement grade like stone deposits. Anantapur district is the driest part of the country with the second lowest average rain fall of 520.4 mm. after Jaisalmer district in the state of Rajasthan and is classified as tropical arid with and aridity index of 72.5. The rainfall is highly erratic. Normally southwest monsoon favours with 60 per cent of the total rainfall (310.8 mm.) and being far away from east cost. Northern monsoon will not be vigorous in the district (147 mm.).

The soils of Anantapur originated from both the granite and granite-gneisses land forms, as wells as the Dharwar landforms. Both these land forms are characterized by hills and ridges and undulating and gently-sloping lands. There are about thirty four soil families in the district of Anantapur, and among these, the Anantapur and Penukonda soil families are the most predominant. In the district, red alfisol soils are predominant, accounting for 78 percent, while black soils are found in 20 percent of the total geographical area. It is estimated that 63 percent of the total geographical area of the district is covered by sandy loam; 14 percent is under rock land; and about 19 percent is under clay. Large areas in the district have coarse soil-surface texture, are poor in water and nutrient retention, and are prone to wind and water erosion.

The soils in Anantapur, Singanamala, Dhrmavaram, Kalyanadurg, C.K. Palli, Kambadur, Rayadurg, Penukonda, Kadiri, Hindupur and Madakasira blocks is predominately red. In Uravakonda and Gooty blocks the red and black soils are almost in equal proportions. Red soil constitutes 76 per cent and black soil 24 per cent of the total area in the district. The soil can be
classified as red clay, red loamy, red-sand, black loamy and sand. The soils are shallow, poor in nutrients, with high water absorption capacity.

The total ground water reserves as estimated by the ground water department are to the order of 1061.71 Mcm. The present level of utilization has been estimated at 391.20 Mcm, leaving a balance of 67.5 Mcm for further development. Ground water is available at a depth of 100' approximately. Gross irrigated area in the district is 3.67 lakh acres. 52.9 per cent of irrigation is contributed by wells and 10.4 per cent by tanks. The net cultivated area under wells and tanks is very much dependent on the rainfall. The lands under wells and tanks will be fallow many a year on account of droughts. Thungabhadra high level canal is the only dependable irrigation source in the district, irrigation spreads 365 lakh acres through 152 villages.

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The changes observed in production of principal crops in the district over 1960-61 to 2006-07 reflects the changes that have occurred with regard to area under crops. There is a sharp decline in production of sorghum and millets, while pulses production has increased threefold. A striking feature of overall outturn of crops in the district is that though groundnut production shows an overall increasing trend, the rate of increase is far below the rate of expansion of area under groundnut. While groundnut area expanded nearly four times over the fortyfive year period under consideration, the production of groundnut barely doubled. Moreover, there is a great deal of fluctuation in the rate of growth of groundnut production over the years. These factors raise important questions regarding the level of groundnut yield.

Analysing the yield of groundnut over the period 1971-72 to 2005-06 in Anantapur district, the state of Andhra Pradesh, and all of India it is clear that yield levels have always remained relatively low in Anantapur. Fluctuation in yield over thirty three years, running from 1971-72 to 2005-06, is much higher in the district compared to the state and all India.
3.33. REFERENCES


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