

Ananthapuramu offers some vivid glimpses of the pre-historic past. It is generally held that the place got its name from 'Anantasagaram', a big tank, which means 'Endless Ocean'. The villages of Anantasagaram and Bukkarayasamudram were constructed by Chilkavodeya, the Minister of Bukka-I, a Vijayanagar ruler. Some authorities assert that Anantasagaram was named after Bukka's queen, while some contend that it must have been known after Anantarasa Chikkavodeya himself, as Bukka had no queen by that name.

Anantapur is familiarly known as 'Hande Anantapuram'. 'Hande' means chief of the Vijayanagar period. Ananthapuramu and a few other places were gifted by the Vijayanagar rulers to Hanumappa Naidu of the Hande family. The place subsequently came under the Qutub Shahis, Mughals, and the

Nawabs of Kadapa, although the Hande chiefs continued to rule as their subordinates. It was occupied by the Palegar of Bellary during the time of Ramappa but was eventually won back by his son, Siddappa. Morari Rao Ghorpade attacked Ananthapuramu in 1757. Though the army resisted for some time, Siddappa ultimately bought off the enemy for Rs.50, 000.

Ananthapuramu then came into the possession of Hyder Ali and Tipu Sultan. Tipu hanged all the male members of the Siddappa family except Siddappa who escaped from his confinement at Srirangapatnam. After Tipu's death, it was once again taken back by Siddappa. Siddappa submitted himself to Nizam because of the treaty of 1799, who took the total control of the area. He was later pensioned off when British occupied the territory.

Ananthapuramu district was formed in the year 1882 having been separated from Bellary district. Later on, it was expanded with the addition of Revenue Mandals of Kadiri, Mudigubba, Nallamada, N.P.Kunta, Talupula, Nallacheruvu, O.D.Chervu, Tanakal, Amadagur and Gandlapenta (previously Kadiri Taluk) from Kadapa district in the year 1910.

During the year 1956, the present Revenue Mandals of Rayadurg, D.Hirehal, Kanekal, Bommanahal and Gummagatta of Bellary district were added to Ananthapur district.

Presently the district has been divided into 3 Revenue Divisions consisting of 63 Revenue Mandals (Ananthapuramu Division 20, Dharmavaram Division 17 and Penukonda Division 26).

Topography of the District

Ananthapuramu district lies between 13°-40 and 15°-15' Northern Latitude and 76° -50' and 78° -30' Eastern Longitude physically.

The district may be divided into 3 natural divisions. They are,

- (1). Northern Mandal of Rayadurg, Kanekal, Beluguppa, Gooty, Guntakal, Vajrakarur, Uravakonda, Vidapanakal, Yadiki, Tadipatri, Putlur and Yellanur containing larger areas of black cotton soils.
- (2). Kalyandurg, Kambadur, Settur, Brahasamudram, Ramagiri, Kanaganapalli, C.K.Palli, Dharmavaram, Bathalapalli, Tadimarri, Mudigubba, Ananthapuramu, Kudair, Pamidi and Peddavadugur in the center which are mainly made up of arid treeless, expense of poor red soils.
- (3). High level land of Penukonda, Roddam, Somandepalli, Hindupur, Lepakshi, Chilamathur, Madakasira, Rolla, Gudibanda and Agali which connects with Mysore plateau at higher elevation of the rest of the district. This part has average sandy red soils of normal productivity.

Boundaries of the District

It is bounded by Bellary, Kurnool district on the North, Kadapa and Kolar district of Karnataka on South East and North respectively. The district is roughly oblong in shape, the longer side running North to South with a portion of Chitradurg district of Karnataka State intruding into it from West between Kundurpi and Amarapuram Mandals.

Demographic Profile of the District

As per 2011 census, the density of population of the district is 213 per Sq.km, against (308) of the state, which is growing at a decadal growth rate of 12.16 per cent. District is largely dominated by rural population comprising of 71.19 percent of the total district population. Male population with nearly 68 per cent literacy rate dominates the literate population in the district.

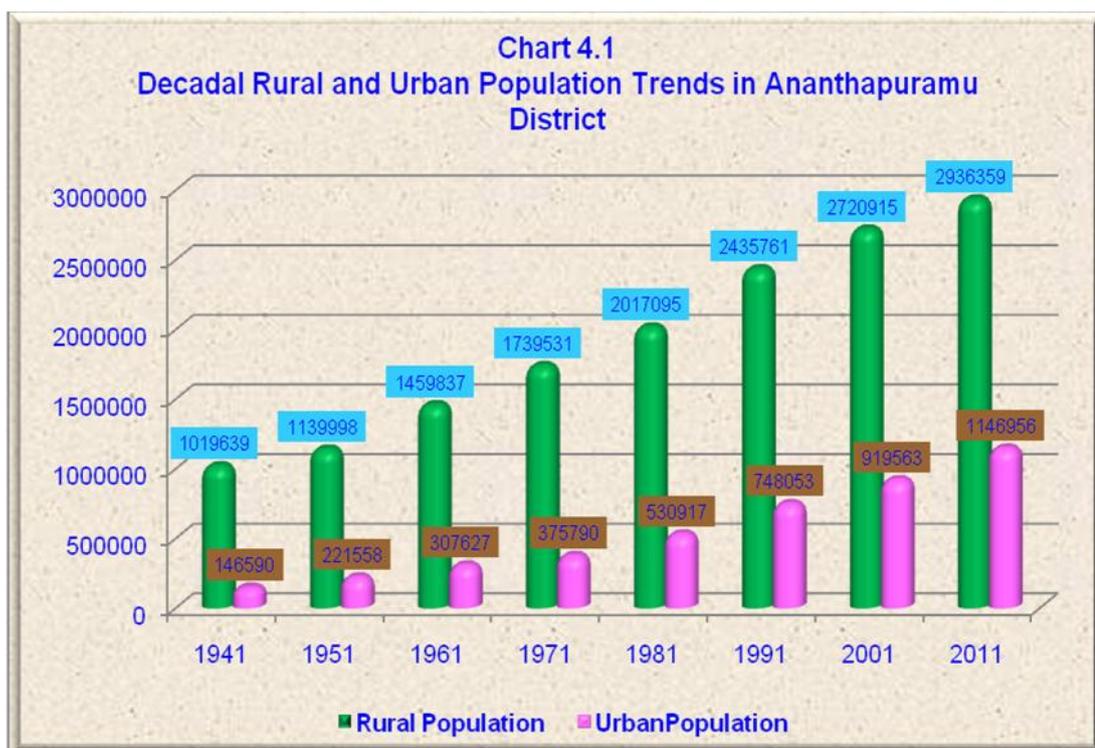
According to the 2011 census, Ananthapuramu has nearly 7.8 lakh households with an average household size of five members. The growth of population in Ananthapuramu since 1941 is given in the table 4.1.

Table-4.1
Population of Ananthapuramu District-1941-2011

| Period | Rural Population | Urban Population | Total Population | Population Growth in % |
|---------------|-------------------------|-------------------------|-------------------------|-------------------------------|
| 1941 | 1019639 | 146590 | 1166229 | - |
| 1951 | 1139998 | 221558 | 1361556 | 16.75 |
| 1961 | 1459837 | 307627 | 1767464 | 29.81 |
| 1971 | 1739531 | 375790 | 2115321 | 19.68 |
| 1981 | 2017095 | 530917 | 2548012 | 20.46 |
| 1991 | 2435761 | 748053 | 3183814 | 24.95 |
| 2001 | 2720915 | 919563 | 3640478 | 14.34 |
| 2011 | 2936359 | 1146956 | 4083315 | 12.16 |

Source: hand Book of Statistics -2013, Chief Planning Office, Ananthapuramu

Table 4.1 shows that the population of the district increased more than three times in seven decades. During the same period the growth of rural population increased less than three times, whereas the urban population increased more than six times. It indicates that the people in the district are migrating to towns for several reasons. It is important to note that the decennial growth population during 1991-2001 was sharply declined from 24.95 percent to 14.34 percent. It further declined to 12.16 percent in 2011.



The population of rural and urban to the total population of the district works out to 71.19 percent and 28.81 percent as per 2011 Census as against 75 per cent and 25 per cent of 2001 Census. There are 977 Females per 1000 Males in the district as per 2011 Census.

The working force in the total population of district forms 48.83 per cent as per 2001 census out of which 26 per cent are in the agricultural sector.

2011 Demographic Profile – Ananthapuramu district

As per 2011 census, the total population of Ananthapuramu district is 4,081,148. Among them 2,064,495 constituting 50.59 per cent are males and 2,016,653 constituting 49.41 per cent are females. Nearly 71.93 per cent of the population lives in rural areas of the district. Among the rural population, nearly 50.73 per cent are males and the remaining 49.27 per cent are females. In case of urban areas, the male population is 50.22 per cent and remaining 49.78 per cent are females. There are little variations among the

male (51.88 %) and female (48.12 %) population in the age group of 0-6 years. The share of 0-6 population is 10.93 per cent of total population of the district. The Scheduled Caste (SC) population of the district is 583,135 (14.29 %). Among them, 292,379 (50.14 %) are males and 290,756 (49.86 %) are females. The Scheduled Tribes (ST) constitutes 3.78 per cent of total population. Among the ST population, 50.98 per cent are males and 49.02 per cent are females. The sex ratio of general population is 977 and the sex ratio of the age group 0-6 population is as low as 927. The sex ratio of SCs is higher (994) than STs (962) in the district.

The literacy rate of the district is 63.57 per cent against 67.02 per cent of state literacy. The literacy rate of both males and females is lower than the state averages. In the district the male literacy rate is 57.92 per cent against state average of 55.88 per cent. In the same way the literacy rate of females in the districts 42.08 per cent against state average of 44.12 per cent. Among the age of seven and above population 1,770,188 are illiterates in the district. With regard to illiteracy rate, there are wider variations among the males and females. The illiteracy rate of females is 58.99 per cent, whereas males are 41.01 per cent.

Table 4.2
Demographic Profile of Ananthapuramu

| Sl. No. | | Male (%) | Female (%) | Total (%) |
|----------------|-----------------------------|-----------------|-------------------|------------------|
| 1 | Number of Households | | | 968160 |
| 2 | Population | 2064495 | 2016653 | 4,081,148 |
| 3 | Population – Rural | 1489157 | 1446280 | 2935437 |
| 4 | Population – Urban | 575338 | 570373 | 1145711 |
| 5 | Population (0-6 Years) | 231369 | 214587 | 445956 |
| 6 | S.C. Population | 292379 | 290756 | 583135 |
| 7 | S.T. Population | 78573 | 75554 | 154127 |
| 8 | No. of Literates | 1338474 | 972486 | 2310960 |
| 9 | Literacy Rate | (73.02) | (53.97) | (63.57) |
| 10 | No. of Illiterates | 726021 | 1044167 | 1770188 |
| 11 | Total workers | 1208544 | 827622 | 2036166 |
| 12 | Main workers | 1065582 | 614073 | 1679655 |
| 13 | Marginal workers | 142962 | 213549 | 356511 |
| 14 | Non-workers | 855951 | 1189031 | 2044982 |
| 15 | Cultivators | 278360 | 134893 | 413253 |
| 16 | Agricultural Labourers | 394357 | 485180 | 879537 |
| 17 | Workers in Household | 61572 | 43771 | 105343 |
| 18 | Other workers | 474255 | 163778 | 638033 |
| 19 | Household size | | | 4.22 |
| 20 | Sex ratio (Female per 1000) | | | 977 |
| 21 | Sex ratio (0-6 Years) | | | 927 |
| 22 | Sex ratio (SC) | | | 994 |
| 23 | Sex ratio (ST) | | | 962 |

Source: Primary Census Abstracts 2011, Chief Planning Office, Ananthapuramu 2013

Table 4.2 reveals that nearly half of (49.89 % Total working population per cent) the population are engaged in one or other types of work. The data reveals that a preponderant majority of women are not working in the district. Among the total workers, male and female share is 59.35 per cent and 40.65 per cent respectively. The non-working female population is 1,189,031 (58.96 %) and male non-working population is 855,951 (41.86 %). Among the total workers nearly 82.49 per cent are main workers and the remaining 17.51 per cent are marginal workers. Among the working population a preponderant majority i.e. 43.20 per cent are agricultural labourers. About 20.30 per cent are farmers and 5.17 per cent are working in household industry. The remaining 31.34 per cent are engaged in other works like industrial labour, construction labour, private employees, government employees etc.

Agro-climatic Conditions

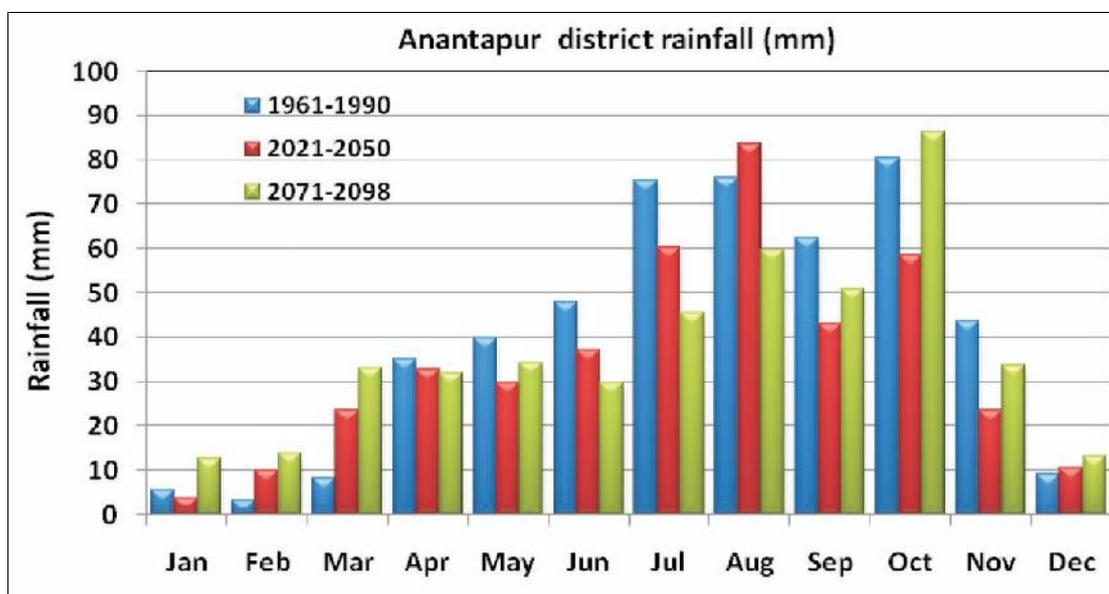
As per the agro-climatic classification adopted for India, Ananthapuramu region is described as the scarce rainfall zone of Rayalaseema in the state of Andhra Pradesh in the Indian southern plateau and hills region.

Climate change scenarios

The climate scenario for Anantapur district as projected by National Communication under A1b scenario suggests that compared to base line (1961-1990), the rainfall is going to decrease by about 14.4 per cent by 2021-2050 period and by 8.7 per cent during 2071-2098 period (Chart 4.2).

Chart 4.2

Baseline (1961-1990) and projected rainfall pattern in A1b climate change scenario (NATCOM)



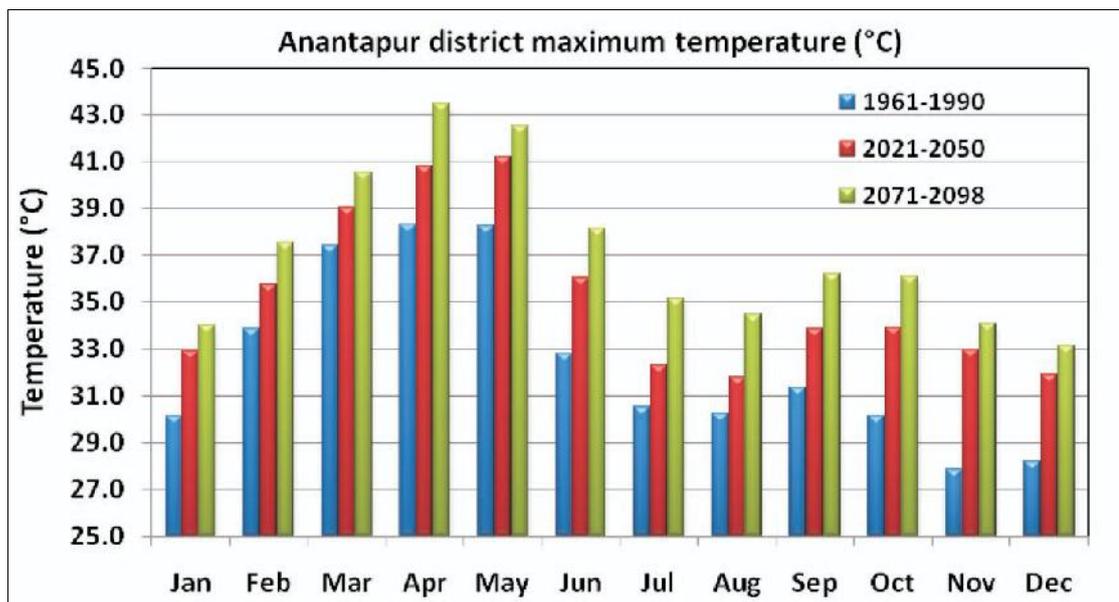
The south-west monsoonal rainfall (June- September) is projected to decrease by 17 per cent by 2021-2050 and by 29.4 per cent during the 2071-2098 period. The severity of drought during July and September months of 2021-2050 period may be of concern as 20 per cent and 30.8 per cent decline, respectively, are projected. The scenario during 2071-2098 for the month of July is further worse with a projection of 39.6 per cent decline from the base period 1961-1990. The deficit is projected to be continued in the month of September with 31 per cent decrease during 2021-2050 that was projected to improve marginally to a decline of 18.6 per cent by 2071-2098 period. The December to March rainfall showed significant increased trend in both the scenarios. Though small in amounts, the rainfall projections during December-March period may help during the critical periods of rabi crops leading to enhanced yields. A change in the cropping pattern is in offing.

Maximum temperature

The mean annual maximum temperature during the period 2021-2050 is projected to increase by 2.8°C and further to 4.7°C by 2071-2098 (Chart.4.3).

Chart 4.3

Anticipated Changes in Maximum Temperature in future A1b Climatic Scenario (NATCOM)

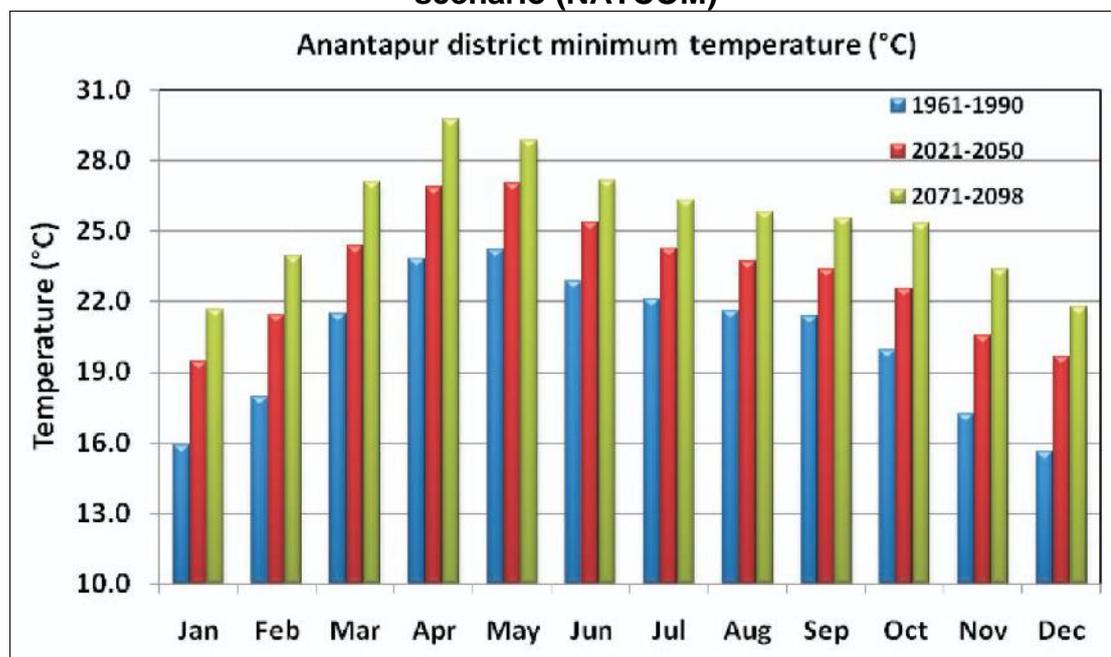


The mean maximum temperature during the southwest monsoon season is likely to increase by 2.3°C during 2021-2050 period and by 4.8°C during 2071-2098 period. The rabi (post monsoon) season mean maximum temperature is projected to increase by 3.9°C during 2021-2050 and which may further rise by 5.2°C during 2071-2098 period. The summer months of April and May are likely to experience a 2.8°C rise in mean maximum temperature during 2021-2050 and the temperature is likely to rise by 4.8°C by 2071-2098 period.

Minimum temperature

The mean annual minimum temperatures are likely to rise by 2.9°C during the 2021-2050 period and by 5.2°C during 2071-2098 (Chart.4.4).

Chart 4.4
Anticipated Changes in Minimum Temperature in Future A1b Climatic scenario (NATCOM)



The mean minimum temperature during the southwest monsoon season is likely to increase by 2.2°C during 2021-2050 and by 4.2°C during 2071-2098. The rabi (post monsoon) season mean minimum temperature is projected to increase by 3.4°C during 2021-2050 and which may further rise by 5.9°C during 2071-2098 period. The summer months of April and May are likely to experience a 2.9°C rise in mean minimum temperature during 2021-2050 and the temperature is likely to rise by 5.3°C by 2071-2098.

Land Reclamation and Utilization

The pattern of land utilization in the district is presented in Table 4.3. The territorial changes the district had undergone during the last century do not seem to have affected the pattern to any considerable extent. It can be seen from the Table 4.3 that the percentage of area under forests has remained practically stationary while the proportion of the net area sown to the total geographical area has registered a fairly perceptible increase. The only persistent drawback is the vast extent of barren and uncultivable land. There is also a considerable extent of cultivable waste which, with the advent of mechanized agriculture is likely to be brought under cultivation.

Table - 4.3
Land Utilization Pattern of Ananthapuramu District
(Area in Hectares)

| S. No. | Category | 2010-11 | 2011-12 | 2012-13 |
|--------|--|---------|---------|---------|
| 1 | Total geographical area | 1913000 | 1913000 | 1913000 |
| 2 | Forests | 196978 | 196978 | 196978 |
| 3 | Barren & uncultivable land | 167469 | 167469 | 167469 |
| 4 | Land put to non-agricultural uses | 143462 | 149029 | 150140 |
| 5 | Cultivable waste | 48856 | 48856 | 48856 |
| 6 | Permanent pastures and other grazing lands | 5846 | 5848 | 5848 |
| 7 | Land under miscellaneous tree crops & groves not included in net area sown | 9416 | 9416 | 9416 |
| 8 | Other fallow lands | 86064 | 85754 | 86502 |
| 9 | Current fallows | 152050 | 200395 | 227945 |
| 10 | Net Area Sown | 1101744 | 1048140 | 1018735 |
| 11 | Total Cropped Area | 1178967 | 1114083 | 1083515 |
| 12 | Area Sown More than Once | 77223 | 65943 | 64780 |
| 13 | Fish & Prawn Culture | 1115 | 1115 | 1111 |

Source: Records of Chief Planning Office, 2013, Ananthapuramu.

Pattern of Irrigation in the District

Both on account of its location and' the light and uneven rainfall that it receives, the district has only a small proportion of its area under irrigation. Its tanks are mostly rain-fed and even if rivers and streams carry little supply. It is, therefore, not surprising that it has not witnessed any substantial increase in the proportion of its net irrigated area to the net cultivated between the turn of last century and now. Tadipatri area is irrigated by the canals taken from the Chitravati and the Penneru and Gooty by those of the Penneru, Pulivanka and Maravavanka have only 6 and' 4 per cent respectively under irrigation. It is not surprising that under these conditions even the doruvu wells in the district and the channels taken from Penneru, Chitravati, Jayamangali, Kushavathi, Papaghni and Hagari seem to improve no more its irrigational prospects. Hoyy effective these irrigation sources are and how vital their contribution has been, can be inferred by a study of the famine calendar of the district. A peculiar feature of the district is that the proportion of its net irrigated area to its net cultivated is markedly uneven.

Some of its tanks, with their long bunds and situated amidst picturesque surroundings, stand as monuments of the glory of ancient kings who "not content with reigning in the dispensation of happiness during the contracted term of human life, had strained, with all the Teachings and grasping of a vivacious mind, to extend the dominion of their bounty beyond the limits of nature, and to perpetuate themselves through generations to generations." They now lie at places like Dharmavaram, Ananthapuramu, Singanamala, Penukonda, Koddam, Parigi and Rayalacheruvu. References

have also been made to some of them in the old epigraphs. An inscription dated S. 1451 (A.D. 1529) in Matavapalle Agraharam (Dharmavaram) speaks of Kriyasakti Odayar as having constructed the tank at Dharmavaram. An undated inscription in Chinnarayapatnam (Dharmavaram) records the construction of a dam called Ananta Setu by Ananta son of Bukka. A third dated S. 1416 (A.D. 1538) in Gorrepalle (Hindupur) mentions the excavation of an irrigation channel called 'Nuttana Tungabhadra' in the village of Achyutarayapura by one Veerappa Nayaka.

RIVERS

i) Pennar

The important river in the District is Pennar. It has its origin in the Nandi Hills of Karnataka State where it is called "Uttara Pinakini" and enters this District in the extreme South of Hindupur Mandal and flows through Parigi, Roddam, Ramagiri, Kambadur, Kalyandurg, Beluguppa, Uravakonda, Vajrakarur, Pamidi, Peddavadugur, Peddapappur and Tadipatri Mandals and finally enters Cuddapah District.

ii) Jayamangala

River which has its origin in Karnataka State enters this District in Parigi Mandal and joins Pennar River at Sangameswarampalli of Parigi Mandal.

iii) Chitravathi

Another significant river in the District is "Chitravathi". Its origin is in Karnataka State. This river enters the District near Kodikonda village of Chilamathur Mandal and flows North over Rocky and Hilly uplands of Gorantla, Puttaparthi, Bukkapatnam, Kothacheruvu, C.K.Palli, Dharmavaram,

Bathalapalli, Tadimarri and Yellanur Mandals and falls into Pennar River at Gandikota in Cuddapah District.

iv) Vedavathi or Hagari River also an important one in the District has its origin in Karnataka State and flows through Gummagatta, Brahmasamudram, Beluguppa, Kanekal and D.Hirehal Mandals and enters Bellary District of Karnataka State. Bhairavanithippa Project (B.T.Project) constructed on this river.

Apart from these streams like Kushavathi in Chilamathur Mandal, Swarnamukhi in Agali Mandal, Maddileru in Nallamada, Kadiri and Mudigubba Mandals, Pandameru in Kanaganipalli, Raptadu, Ananthapuramu B.K.Samudram and Singanamala Mandals, Papagni in Tanakal Mandal are important water supply sources to various large and medium irrigation tanks in the district.

Rainfall and Climate

The District of Ananthapuramu has a fairly good elevation which provides the District with tolerable climate throughout the year. It has a gradual fall from the South North towards the valley of the Pennar in Peddavadugur, Peddapappur and Tadipatri Mandals. There is a gradual rise in Hindupur, Parigi, Lepakshi, Chilamathur, Agali, Rolla and Madakasira Mandals in the South to join the Karnataka Plateau where the average elevation is about 2000 feet is above the mean sea level. It is about 1100 feet at Ananthapuramu and the lowest 900 feet is at Tadipatri.

The Geographical position of the Peninsula renders it, the driest part of the State and hence, Agriculture conditions are more often precarious. Monsoons also evade this part due to its unfortunate location. Being far from

the East coast, it does not enjoy the full benefits of North East Monsoons and being cut off by the high western Ghats, the South West Monsoon are also prevented from penetrating and punching the thirst of these parched soils. It is therefore seen; the district is deprived of both the monsoons and subjected to droughts due to bad seasons. The normal rainfall of the district is 553.0 MMs. by which it secures least rainfall when compared to Rayalaseema and other parts of Andhra Pradesh. The normal rainfall for the South West Monsoon period is 338.0 MMs. which forms about 61.2 per cent of the total rainfall for the year. The failure of the rains in this South West monsoon period of June to September will lead the District to drought by failure of crops. The rainfall for North East monsoon period is 156.0 M.Ms. only, which forms 28.3 per cent M.Ms. of the total rainfall for the year (October to December). The other months are almost dry March, April and May are warm months when the normal daily maximum temperature ranges between 31.7°C to 38.9°C. November, December and January are cooler months when the temperature falls about 14.5° C, Hindupur, Parigi, Lepakshi, Chilamathur, Agali, Rolla and Madakasira Mandals being at High Elevation are more cooler than the rest of the Mandals in the District.

River Channels

The excavation of river channels often involves considerable labour and expense. The local practices connected with it reflect the salient features of the old Kudimaramath Act. The small surface flow in the rivers and streams is diverted by means of temporary sand dams during the rainy season and when the rivers become dry, channels are excavated with large wooden spades locally called 'Goralu drawn by bullocks. They are annually cleared of

their silt and sand by the united efforts of the local land'-holders who choose a 'Pinnapedda' to supervise the project. The contribution of labour from each land-holder is also fixed by common consent. The defaulter is liable to pay twice the value of labour as fine, locally known as 'Kuntu. The proceeds of the levy are credited to a common fund' and utilized on the performance of pooja at the commencement of the agricultural season, and also on some of the village festivals.

Spring Channels

Spring channels which are an interesting feature of the irrigation pattern of the district mostly abound in Ananthapuramu, Kalyandurg, Dharmavaram and Kadiri areas and the Yadiki Mandal of Tadipatri constituency. They are taken from hill-streams, valleys, springs in tank beds and in some cases in ordinary dry lands. Although more dependable than some of the tanks, they irrigate only small areas.

Wells

But what is striking is the contribution made towards irrigation by wells in almost all the Mandals. They sustain, in particular, the Mandals of Kadiri, Dharmavaram, Kalyandurg and Ananthapuramu. With the extension of power to agriculture and the popularization of well-subsidy scheme by Government, their number has steadily grown in recent years. During 1964 there were as many as 3,978 agricultural electricity connections and 1,989 oil engines, supplementing the irrigational sources in the district.

Irrigation Projects

It was remarked over a century ago by Col. Henderson, an Engineer, that "the construction of four or five anicuts across its (Penner) beef would

change the character of this district and diffuse happiness and plenty where there is now but misery and starvation, and all this could be accomplished by the judicious expenditure of five lakhs of rupees". This dream is likely to be realized, when the projects recently executed, the Penner-Kumudvati, the Upper Penner, and the Mid-Penner dam now in progress, yields their full benefit.

Upper Penner

During the early years of this century, the formation of a reservoir across the Penneru in Dharmavaram region engaged the attention of the Public Works Department. An estimate was, prepared during 1906-07 for about Rs. 23.85 lakhs and gaugings were taken consecutively for five years but the scheme was ultimately abandoned in 1915. The investigation of the project was once again taken up and work on it was commenced late in 1950 and completed in December, 1958 at a cost of Rs. 155 lakhs. The villages benefited by this project lie in Dharmavaram, Kalyandurg and Ananthapuramu areas. A regulator across the river Penneru about half a mile upstream from the Peruru village has been constructed. There are two main canals taking off from either side of the reservoir which pass through the undulating terrain involving deep cuttings, construction of aqueducts, under tunnels, bridges and other cross-drainage works.

The left canal, called the Chennampalle distributory, runs for about 3i miles and feeds an ayacut of about 600 acres. The canal taking off from the right, called the Upper Penner Project main canal, runs for & little over 15 miles and feeds directly an ayacut of about 3,073 acres. At its sixth furlong, it enters the Peruru small tank and emerging from it, runs through deep

cuttings and embankments and falls into the Thogarukunta vanka. The waters are picked up after about 3 miles by the Thogarukunta anicut from which distributaries take off on either side. Of these the Guntapalle distributory on the left feeds an ayacut of 1,130 acres, while the Gandlaparthi distributory first Beach on the right, after running for about 3½ miles and feeding over 1,500 acres, falls into the Jali vanka. At the Palacherla anicut four miles downstream, the waters are again picked up and let into the Pandameru which runs into the Ananthapuramu tank. At this anicut, the distributory on the right, known as Gandlaparthi Distributory second Reach, runs for nearly 6 miles feeding an ayacut of over 3,364 acres.

The gross area irrigated during 1962-63 was nearly 3,600 acres. It rose to 6,900 the next year and to over 9,809 in 1964-65. In 1965, owing to inadequate rains, the extent irrigated was only about 1,500 acres.

High Level Canal

The possibility of utilising the waters of Tunga- bhadra for the benefit of the endemic famine region of Rayalaseema engaged the attention of several engineers even from 1861. Various schemes for forming a reservoir across the Tungabhadra, with a high level canal to irrigate the valleys traversed by it, the Hagari, the Penneru and the Chitravati, were formulated from time to time. A note, presented to the Irrigation Commission in 1902 by Col. Smart, the then Chief Engineer, also envisaged the formation of a large reservoir and the excavation of a canal through the water-shed into the Penneru so as to supplement supplies to the famine ridden tracts of Rayalaseema and Nellore. The investigation of the scheme was taken up in 1902 on the recommendation of the Irrigation Commission. An estimate prepared in 1906

by Mackenzie provided for the construction of a reservoir at Mallapuram, three miles above Hospet (Bellary) for the irrigation of about eight lakhs of acres of first crop and one and a half lakhs of second and for the protection of over eight lakhs of acres in those districts. The project was then estimated to cost Rs. 17 crores. The Nellore section of the scheme was later eliminated. But nothing emerged as the Krishna and the Caveri projects secured preferential treatment.

The scheme came up again for consideration in 1929 but was delayed pending an agreement on the sharing of waters among the Governments of Madras, Mysore and Hyderabad which was ultimately reached in 1938. Investigations into the project were resumed in 1940. For the first time, excavation of a low level canal was also taken up in view of its lower cost and the possibilities of power generation it held out.

With the formation of the Andhra State, the areas in which the head works and some portions commanded by the High Level Canal were located were transferred to the Mysore State. Consequently, Inter-State discussions regarding the apportionment of costs and water were resumed. In 1956 an agreement was arrived at between the two States on the question of sharing the waters of the High Level Canal in the ratio of 35 to Mysore and 65 to Andhra. An estimate for Rs. 21.90 crores was prepared in 1957 and the scheme was split up into two stages on the suggestion of the Planning Commission and the Government of India.

The first stage of the scheme, estimated to cost Rs. 13 crores, is under execution. It involves the excavation of the main canal from the Tungabhadra dam up to Uravakonda cut, about 116 miles long, out of which the first 69

miles lie in the Mysore State. The canal below the 69th and up to the 116th mile is expected to irrigate 35,000 acres in Andhra Pradesh. In this reach, the canal traversing a fiat country crosses the Chinna Hagari and the Pedda Hagari by means of aqueducts. Below its 116th mile, it pierces the Hagari-Penneru watershed through the Uravakonda cut about 57miles long with a maximum depth of 81m. Following the course of Pedda vanka, it reaches a steep ridge at the Indravathi village. Cutting through this ridge, the canal is let into the Pennahobilam vanka which falls into the Penneru. The waters are picked up by means of a regulator across the Penneru near Penakacherla. It is called the Mid-Penneru -Regulator, in view of the Upper Penner Project near Peruru and a contemplated project lower down at Gandikota. The regulator is located about H miles upstream of Konamanayanipalle village and has two canals, one on the north irrigating 13,500 acres and another on the south bringing in 70,615 acres. The storage capacity of the reservoir would be 3 TMC ft., in its first stage and 5 TMC ft., in the subsequent stage. The villages of Rampuram and Udiripikonda thanda have been submerged by the construction of the reservoir. The inhabitants of the former have been settled in a new village bearing the same name, and a separate colony for the latter is under construction. Marutla is another village likely to be submerged during the completion of the second stage of the reservoir.

The north canal is about 34 miles long, almost the whole of it running in Gooty Mandal. At its tail end the canal falls into a vanka which ultimately flows into the Rayalacheruvu tank in Yadiki Mandal. The construction of this canal has been completed and water was let into it in October 1963. The south canal runs for about 60 miles in Ananthapuramu and Tadipatri areas,

directly serving an ayacut of 40,600 acres and terminates in the Narepalle vanka. The waters are to be picked up at the Amalladinne village from where originates the Tadipatri branch of the canal designed to supply water to 30,000 acres. The south canal at the second stage is designed to carry sufficient water for serving an additional area of 55,000 acres in Pulivendla constituency of the neighbouring Cuddapah district. Work on the scheme taken up in 1957 is expected to be completed by the middle of 1966. The ayacut contemplated is 1, 19,115 acres of which 82,000 acres have so far been localized.

Bhairavanithippa Project

Various schemes for the utilization of the Hagari waters for the parched soils of Kalyandurg and Rayadurg regions were examined from time to time but were deferred pending a decision on the construction of the Tungabhadra project. All the schemes that were investigated only envisaged the construction of an anicut across the river. Between 1922 and 1926, gaugings were taken up at Bhairavanithippa and Bhoopasamudram villages. In view of the uneven and untimely supplies of water in the Hagari River, it was later decided to construct a reservoir across it. Preliminary investigations, based on considerations of technical superiority and economic feasibility, resulted in the selection of Bhairavanithippa as the project site.

Work on the project was commenced in 1954 and completed in all aspects in 1961 at an estimated expenditure of about Rs. 142 lakhs, although water from the project was made available in 1958 itself. A special engineering feature of this project is the successful diversion of the course of the river itself. About 4,000 acres of area in the Mysore State was submerged

in the reservoir and the villages of Mallela, Vittalagutta and Basapuram were rehabilitated. The Bhairavanithippa village was, however, shifted to the other side of the project. The total length of the dam is 7,330' with canals taking off from the reservoir on either flank. The left canal runs with 24 distributaries entirely in the Rayadurg Mandal for a length of about 15 miles. The ayacut localized under this canal is 8240 acres and lies in the villages of Tallakera, Gum-maghatta, Kalugodu, Belodu, Bhoopasamudram, H. Hosahalli and Junjurampalle. The right canal, nine miles long runs with 14 distributaries, in Kalyandurg Mandal, and commands an ayacut of about 3,760 acres spread over the villages of Bhairavanithippa, Gundiganipalle, Vepulaparthi, Chelimepalle, Bhairasamudram and Kannepalle.

There is one Major Irrigation Project T.B.P.H.L.C., and 6 Medium and other Irrigation Projects. 1. Upper Pennar Project, 2. Bhairavanithippa Project, 3. Chennaraya Swamy Gudi Project. 4. Pennar Kumdvathi Project 5. Yogi Vemana Reservoir 6. Pedaballi Project. The Ayacut particulars of these projects are given in table 4.4.

Table - 4.4
Project Wise Coverage of Mandals, Villages and Ayacut in
Ananthapuramu District

| Name of The Project | Name of The Mandal | No.of Villages | Ayacut (In Hec.) |
|---|---------------------------|-----------------------|-------------------------|
| Thungabhadra Project, High Level Canal and Guntakal Branch Canal | 1.Ananthapuramu | 3 | |
| | 2.Garladinne | 15 | |
| | 3.B.K.Samudram | 10 | |
| | 4.Singanamala | 9 | |
| | 5.Narpala | 6 | |
| | 6.Vidapanakal | 12 | |
| | 7.Vajrakarur | 1 | |
| | 8.Uravakonda | 3 | |
| | 9.Tadipatri | 9 | |
| | 10.Putlur | 10 | |
| | 11.Yellanur | 5 | |
| | 12.Peddapappur | 1 | |
| | 13.Gooty | 12 | |
| | 14.Guntakal | 6 | |
| | 15.Pamidi | 18 | |
| | 16.D.Hirehal | 8 | |
| | 17.Peddavadugur | 8 | |
| | 18.Kanekal | 7 | |
| | 19.Bommanahal | 14 | |
| | Total | 157 | 51771 |
| Upper Pennar Project | 1.Kambadur | 3 | |
| | 2.Ramagiri | 3 | |
| | 3.Kanaganipalli | 3 | |
| | 4.Raptadu | 4 | |
| | Total | 13 | 4066 |
| Bhairavani Thippa Project | 1.Gummagatta | 8 | |
| | 2.Brahmasamudram | 6 | |
| | Total | 14 | 4856 |
| Chennaraya Swamy Gudi Project | 1.Tanakal | 4 | |
| | Total | 4 | 445 |
| Pennar Kumdvathi Project | 1.Hindupur | 8 | |
| | 2.Parigi | 11 | |
| | Total | 19 | 2639 |
| Yogi Vemana Reservoir | 1.Mudigubba | 13 | |
| | Total | 13 | 5212 |
| Pedaballi Project | 1.N.P.Kunta | 4 | |
| | Total | 4 | 607 |
| | Grand Total | 224 | 69596 |

Source: Records of Irrigation Department, 2012, Ananthapuramu.

Water potential and possibilities of further eco-plantation

It is estimated that 48,138 Mcft., of water is available for utilization in the district, consisting of 10,458 Mcft., from the Hagari catchment, 4,100 Mcft., from upstream Bhairavanithippa Project and 33,580 Mcft from the Penneru catchment. Out of this, 38,295 Mcft. is to be utilized through schemes existing or under execution and proposed for inclusion in the Plans, leaving a balance of 9,843 Mcft. for future utilization. New proposals for making use of this balance are circumscribed by the inter-state agreement in respect of the sharing of the Krishna and the Tungabhadra waters and also by the fact that the storage at the Gandikota weir depends on the supplies in the Penneru, downstream the Mid-Penner Regulator.

Soil Conservation

The district suffers from soil erosion caused more by rain than wind. A major portion of its surface soil is lost by runoff causing sheet and gully erosion. The problem is acute in almost all the Mandals and no particular area can possibly be high-lighted in the absence of any regular and scientific soil surveys. Even the traditional practice followed by ryots of raising huge bunds at the borders of fields often proved a failure as they breached frequently due to the pressure of water.

Encouraged by the experience of the Bombay State, the erstwhile Government of Madras launched in 1949 a scheme of soil conservation through contour bunding for the retention of soil moisture and an increase in crop yields. This scheme covering the deep black soil areas of Guntakal in Ananthapuramu district and Alur of Kurnool district and Hagari of the then Bellary district, was first sanctioned in January, 1949. The Madras Land

Improvement Schemes Act, 1949 provided the necessary legal sanction for its implementation. Work was carried on till 1957, and since then it was stopped due to breaches in bunds caused by heavy rains in 1955 and 1956.

A scheme for the conservation of red soils covering an extent of 10,000 acres in Itikalapalle and Mudigallu villages was taken up in 1954. By the end of 1956 an area of 9,000 acres was bunded and an amount of Rs 7.79 lakhs was spent.

Since 1961 considerable progress has been made, with the simplification of the legal procedure by the introduction of the Agreement Bond system.

A Soil Conservation Research Station was also started during 1964-65 at Rekalakunta in Ananthapuramu Mandal to evolve techniques of soil conservation suitable for red soils particularly in areas receiving less than 30 per cent of annual rainfall.

Apart from these measures, agronomical methods of demonstration, contour cultivation and sowing have also been undertaken by the Department. The difficulties encountered in respect of soil resistance owing to the age long practice of ploughing straight and in big plots are sought to be overcome by educating the ryots in the art of ploughing in smaller patches and in curves where needed.

Soils and their suitability

The soils of the district are predominantly of the black and the red type. During the course of conversion of estate areas to ryotwari tenure in 1948, it was estimated that 18 per cent of the soil was black and 82 per cent red.

The district falls into three natural divisions according to the types of soils therein. Fertile black cotton soil predominates in the northern division, consisting of Gooty, Uravakonda and Tadipatri Mandals. The central division, of which the regions of Ananthapuramu, Dharmavaram, Kalyandurg and Rayadurg form part, 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 regions contains chiefly red soils and is somewhat better than the central division. In the areas adjoining the Bellary district, one can see the Dharwar series of geological formations occurring in several long bands.

Soil classification was first undertaken in the ryotwari areas in 1887 in accordance with what was popularly termed the 'original settlement'. A number of resettlements were affected in various Mandals during the second and the third decades of the present century. Resettlements have also been carried out in respect of estate areas taken over and settled under the Madras Estates Abolition Act XXVI of 1948.

No systematic soil survey covering the entire district has been taken up. A survey conducted in 1931 in the Tungabhadra Project area revealed that the black soils of the area were irrigable with Tungabhadra water without any harmful effects provided precautions were taken by way of proper drainage, avoiding of indiscriminate use of water and continued laboratory testing of soils.

The soils of the Bhairavanithippa Project area were also the subject of a survey undertaken in 1950. 42 profile pits, representing various types of soils, were dug and 112 samples collected for analysis. Their examination

revealed that the mixed and black soils, which were irrigated with spring channel waters from the Hagari, developed alkaline patches in some places. They were found generally poor in fertility and organic matter. The project was, however, approved subject to the avoidance of water logging, provision of adequate drainage, incorporation of green manures, use of fertilizers and the cultivation of saline resistant varieties of paddy like S.R. 26 B.

A reconnaissance survey of Ananthapuramu region was also conducted in 1958 to assess the potentialities of the soils. It revealed that the soils were found to be similar to the three non-calcareous and the two calcareous series which are generally found in the neighbouring Chittoor district.

Again, a semi-detailed soil survey was taken up in 1963 in the Mid-Penner Regulator area. It revealed the existence of clay loams, sandy loams and sandy clay loams with considerable lime concretions. An area of about 41,000 acres was surveyed under the Tadipatri Branch Canal of which about 30,000 acres were expected to be brought under irrigation. An analysis of the water collected from the reservoir showed that it had a high degree of salts and was, therefore, unsuitable for irrigated dry and second crop paddy unless diluted with the waters of the Tungabhadra Project High Level Canal.

The crops now grown such as paddy, jowar, ragi, korra, horse gram, red gram, green gram, black gram and groundnut are found generally suited to the prevailing soil pattern. The red soils which range from brown to red in colour and are low in humus nitrogen and phosphoric acid are found congenial for rice cultivation. The light textured soils, however, are found particularly favourable for the cultivation of Kharif crops, while the clay loams,

with their high degree of moisture retention, are found congenial for the Rabi crops. The addition of tank silt, compost and green manures and the adoption of moisture conservation practices are likely to bring about a change in the cropping pattern.

Groundnut Area and Production

While the state of Andhra Pradesh has led the country in groundnut production and area in recent years, the Ananthapuramu region is the leading producer and has the largest area under the crop in the state.

Area under groundnut in Ananthapuramu District

The season wise area under groundnut in Ananthapuramu district is presented in table 4.5.

Table-4.5
Season Wise Area under groundnut in Ananthapuramu District
(Area in hectares)

| Year | Year | Kharif | Growth Rate | Rabi | Growth Rate | Total | Growth Rate |
|-------------|-------------|---------------|--------------------|-------------|--------------------|--------------|--------------------|
| 1 | 2001-02 | 758700 | - | 18773 | | 777473 | - |
| 2 | 2002-03 | 732262 | -3.48 | 17529 | -6.63 | 749791 | -3.56 |
| 3 | 2003-04 | 670935 | -8.38 | 15060 | -14.09 | 685995 | -8.51 |
| 4 | 2004-05 | 857823 | 27.85 | 14500 | -3.72 | 872323 | 27.16 |
| 5 | 2005-06 | 877029 | 2.24 | 22006 | 51.77 | 899035 | 3.06 |
| 6 | 2006-07 | 644007 | -26.57 | 18104 | -17.73 | 662111 | -26.35 |
| 7 | 2007-08 | 876000 | 36.02 | 21000 | 16.00 | 897000 | 35.48 |
| 8 | 2008-09 | 853577 | -2.56 | 16879 | -19.62 | 870456 | -2.96 |
| 9 | 2009-10 | 510874 | -40.15 | 19507 | 15.57 | 530381 | -39.07 |
| 10 | 2010-11 | 814077 | 59.35 | 19993 | 2.49 | 834070 | 57.26 |
| 11 | 2011-12 | 733960 | -9.84 | 19876 | -0.59 | 753836 | -9.62 |
| 12 | 2012-13 | 708708 | -3.44 | 20987 | 5.59 | 729695 | -3.20 |
| 13 | 2013-14 | 711145 | 0.34 | 17303 | -17.55 | 728448 | -0.17 |

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.

The data in table 4.5 shows that the area under groundnut in Ananthapuramu district during Kharif as well as Rabi seasons is not evenly distributed. The highest hectares 8.77 lakh hectares and 22 thousand hectares are registered in 2005-2006 during Kharif and Rabi seasons respectively. During Kharif season lowest area of 5.11 hectares is registered in 2009-2010. In Rabi season lowest area of 14.5 thousand hectares is registered in 2004-2005. Negative growth rate in area during Kharif as well as Rabi seasons is registered during 7 out of 13 years of study. The total area under groundnut in the district is also erratically distributed the highest and lowest area under groundnut in the district is registered in 2005-2006 and 2009-2010 respectively. In the total area under groundnut in the district registered negative growth rate during 8 out of 13 years of study. it can be concluded that the variation in the area in groundnut cultivation can be attributed to the factors like commencement of south-west monsoons, rainfall, timely supply of seeds by government etc.

Production of Groundnut in Ananthapuramu District

The production of groundnut in the district largely depends upon the spread of rainfall to different Mandals of the district. As the groundnut in the district is largely rainfed production depends on rainfall. The plant diseases like leaf webber, leaf miner, red hairy caterpillar and root grub were the important insect pests noticed in this district, which also influences the production of groundnut. Tikka leaf spot, root rot and rosette were observed. Tikka leaf spot was more on spreading type of groundnut and since the disease appeared late, it might cause in the lowering of production of

groundnut in the district. The production details of groundnut in Ananthapuramu district is presented in table 4.6.

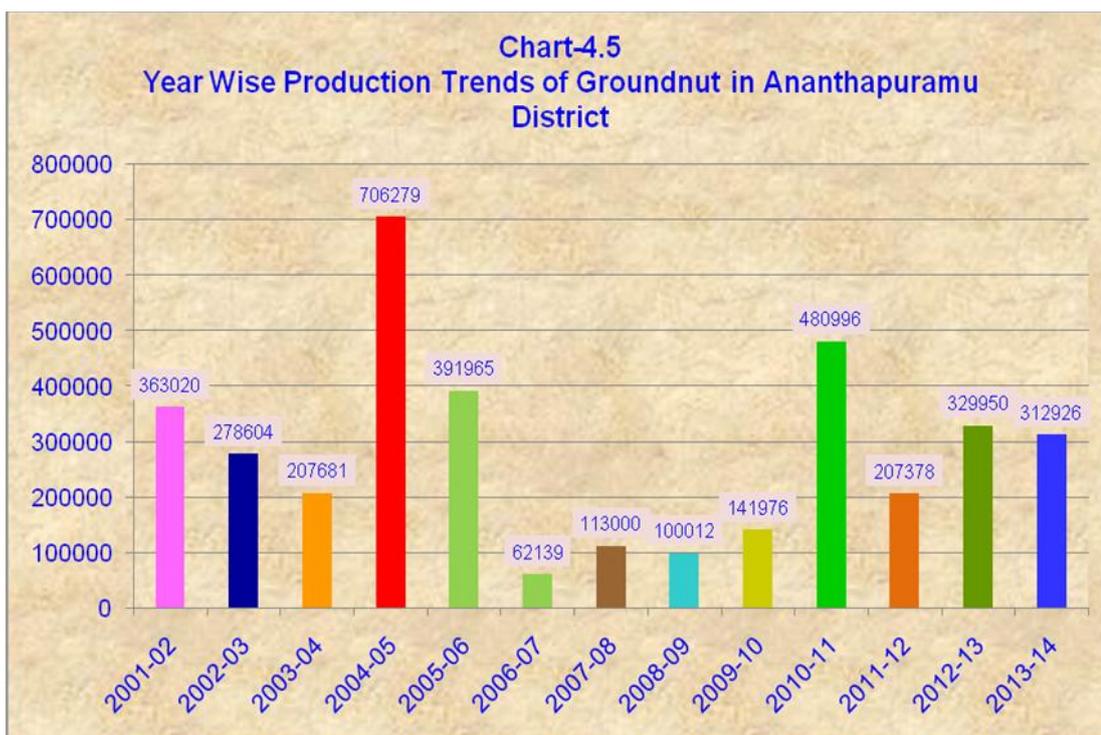
Table-4.6

Production of Groundnut in Ananthapuramu District

| Year | Year | Production(In Tonnes) | Growth Rate |
|-------------|-------------|------------------------------|--------------------|
| 1 | 2001-02 | 363020 | - |
| 2 | 2002-03 | 278604 | -23.25 |
| 3 | 2003-04 | 207681 | -25.46 |
| 4 | 2004-05 | 706279 | 240.08 |
| 5 | 2005-06 | 391965 | -44.50 |
| 6 | 2006-07 | 62139 | -84.15 |
| 7 | 2007-08 | 113000 | 81.85 |
| 8 | 2008-09 | 100012 | -11.49 |
| 9 | 2009-10 | 141976 | 41.96 |
| 10 | 2010-11 | 480996 | 238.79 |
| 11 | 2011-12 | 207378 | -56.89 |
| 12 | 2012-13 | 329950 | 59.11 |
| 13 | 2013-14 | 312926 | -5.16 |

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.

It is clear from table 4.6 that the production of groundnut in the district is gradually declining after 2004-2005 except with two exceptions. It is in 2004-05 the district produced 7 lakh tonnes of groundnut, which is highest during 13 years of study.



The groundnut production in the district touched the lowest ebb of 62 thousand tonnes in 2006-2007. Positive growth trends in the production of groundnut in the district are registered during 5 out of 13 years of study.

Season Wise Groundnut Yield in Ananthapuramu District

Visual symptoms of deficiency of phosphorus and zinc were observed in 50 per cent of groundnut growing soils in the district. About 5 to 10 percent of the groundnut growing soils in the district showed these deficiency symptoms. These symptoms were pronounced in Kadiri and Hindupur areas of the district. Chemical analysis of soil samples showed that 35 per cent of the soil samples were low in available P and 95 per cent of the soil samples low in available zinc. Chemical analysis of groundnut growing soils in the district has shown low in P content and 87 per cent low in Zn content. These are affecting the yield of the groundnut in the district. Improper seed treatment with fungicide by farmers in the district was also influencing the yield of

groundnut in the district. Table 4.7 gives the particulars of season wise yield of groundnut in Ananthapuramu district.

Table-4.7

Season Wise Yield of Groundnut in Ananthapuramu District

(Tonnes/Hect.)

| Year | Kharif | Growth Rate | Rabi | Growth Rate | Total | Growth Rate |
|---------|--------|-------------|------|-------------|-------|-------------|
| 2001-02 | 0.44 | | 1.55 | | 0.47 | |
| 2002-03 | 0.35 | -20.45 | 1.06 | -31.61 | 0.37 | -21.28 |
| 2003-04 | 0.28 | -20 | 1.32 | 24.528 | 0.3 | -18.92 |
| 2004-05 | 0.8 | 185.71 | 1.5 | 13.636 | 0.81 | 170 |
| 2005-06 | 0.41 | -48.75 | 1.35 | -10 | 0.44 | -45.68 |
| 2006-07 | 0.07 | -82.93 | 1.05 | -22.22 | 0.09 | -79.55 |
| 2007-08 | 1.26 | 1700 | 1.33 | 26.667 | 1.26 | 1300 |
| 2008-09 | 0.09 | -92.86 | 1.48 | 11.278 | 0.11 | -91.27 |
| 2009-10 | 0.22 | 144.44 | 1.44 | -2.703 | 0.27 | 145.45 |
| 2010-11 | 0.55 | 150 | 1.7 | 18.056 | 0.58 | 114.81 |
| 2011-12 | 0.24 | -56.36 | 1.64 | -3.529 | 0.28 | -51.72 |
| 2012-13 | 0.42 | 75 | 1.64 | 0 | 0.45 | 60.714 |
| 2013-14 | 0.4 | -4.762 | 1.52 | -7.317 | 0.43 | -4.444 |

Source: Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.

It is evident from table 4.7 that the yield rate of groundnut in the district is higher in Rabi season than Kharif season in the district. Positive growth rate during Kharif season is registered during 5 years out of 13 years of study. On the other hand, during Rabi season negative growth rate is registered

during 6 out of 13 years of study. the negative growth rate in total yield of groundnut in the district is registered 7 out of 13 years of study. During Kharif season highest and lowest yield per hectare is registered in 2007-2008 (1.22 tonnes per hectare) and 2008-2009 (0.09 tonnes per hectare) respectively. . During Rabi season highest and lowest yield per hectare is registered in two consecutive years i.e. 2011-12& 2012-13(1.64 tonnes per hectare) and 2006-2007 (1.05 tonnes per hectare) respectively.

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