CHAPTER II
TOPOGRAPHY AND PHYSIOGRAPHY

Andhra Pradesh, the land of the Telugu speaking people, is the fifth largest State in India Union. It lies between 12°37' and 19°54' North latitudes and 76°46' and 86°46' East longitude (Fig. 1). Andhra Pradesh with its 2,75,909 Sq.Kms and 8.4% of geographical area in India territory extends from Chittoor to Srikakulam and from Anantapur to Adilabad districts. The State is bounded in the East by the Bay of Bengal and on the North by Orissa and Madhya Pradesh, on the South by Tamil Nadu on the West by Karnataka and Maharashtra.

The State comprises 23 revenue districts (Fig. 2). These are subdivided into 1106 revenue mandals. Three distinct administrative and geographical regions can be identified viz. Circars or Coastal Andhra, Telangana and Rayalaseema.

1. Coastal Andhra:

It comprises of 9 districts viz., Srikakulam, Vizayanagaram, Visakhapatnam, East and West Godavari, Krishna, Guntur,
FIG. 1
Map of India showing the position of Andhra Pradesh
Map of Andhra Pradesh showing the position of District Headquarters.
Prakasam and Nellore district with 92,906 Sq.Km. of geographical area.

2. Telangana:

It comprises of 10 districts. 9 districts in between Godavari and Krishna rivers and Adilabad district towards north of Godavari river. The 9 districts are Nizamabad, Karimnagar, Hyderabad, Ranga-Reddy, Warangal, Khammam, Nalgonda, Mahaboob Nagar and Medak with an 1,14,863 Sq.Km. geographical area.

3. Rayalaseema:

It comprises of 4 districts, Kurnool, Cuddapah, Chittoor and Anantapur with 67,299 Sq.Km. geographical area (Fig. 2).

PHYSICAL FEATURES

Physiographically the State falls into 3 distinct zones viz., Coastal plains, Eastern ghats and western peneplains. In each zone the land form, altitude and cropping patterns are different demarcating vividly one zone from the other. The first two units stretch from North-East to South-West in narrow strip while the western peneplains occupy rest of the area.
1. **Coastal plains**:

It is a flat plain stretching from the foot of the Eastern Ghats to the Bay of Bengal, i.e. from Kalingapatnam in the north to Pulicat in the south along a narrow strip which broadens in the middle to about 80 Kms where the Krishna and Godavari rivers have breached the Eastern Ghats and built their deltas. Between the two deltas is a depression called the Kolleru lake. The coastal plain is a peneplain in the western part and a depositional plain in the eastern part. The altitude of this region ranges from sea level at the coast to about 150-200 m on the west.

2. **Eastern Ghats**:

The eastern Ghats are chain of broken hills and locally high relief covered with forests, extends between the coastal plains and western plateau from Orissa in the north to Tamil Nadu in the south, these ghats are assemblage of hills of different heights. In the northern section the hills stretch over a width of 60-70 Kms and in Srikakulam and Visakhapatnam districts. These ghats reach elevations up to 1500 m. They are composed of charnokites and kondalite rocks and formed as home place to number of small rivers and streams.
The ghats are less massive to the south of the Krishna river. They occur in two series of ridges, the outer ridge composed of Nallamalais and Velikonda ranges and inner ridge composed of Erramalais, Lankamalais, Sesha-chalam and Palakonda ranges. These hills have their heights ranging from 700 to 900 m. The Velikonda range south of the Pennar reaches a height of 1,105 m. Ratnajiri hills, Seshachalam hills with Tirumala temple, Nayari Nose, and Horsely Hills are the ghats' famous landmarks, these ghats have profound influence on the climate of the State.

3. Western Peneplains:

This is an old peneplain made of the Archaean gneisses and granites. This is a plateau like area formed by continuous loss of top layer of soils due to soil erosion from centuries. The peneplains are the savannah of the State with scattered, little open barred hillocks with small valleys in between, widely spaced scrubs and bushes, small rivers and tanks with minor water streams and red soils cover Kurnool and Anantapur districts and whole of Telangana region. The peneplain has a rolling topography with flat or gently undulating tracts. This plateau in the interior of Andhra Pradesh extends largely between 150-160 m contours, except at places where it is over-lain by basaltic lava, the elevation of
which ranges from 600 to 900 m. The capital city of Hyderabad is located in the central part of the plateau at an elevation of about 600 m.

**CLIMATE**

According to its location Andhra Pradesh comes under tropical region. There are not many areas of higher altitudes in Andhra Pradesh. Based on climate there are three seasons in Andhra Pradesh. They are:

- **Summer**: March to June
- **Rainy season**: July to October
- **Winter**: November to February

Ranges of Temperature is highest in May and below minimum in January. There is fluctuation of temperature between 37°C to 44°C in summer. Highest degree of temperature (i.e. 50°C) is recorded in Rentacnintala of Guntur, Bhadra-chalam in Khammam, Ramagundam of Karimnagar, Vijayawada in Krishna district and in winter lowest recorded temperature throughout the State is 13°C - 19°C. Andhra Pradesh is characterized in having summer with temperatures and pleasant winters, on the whole State enjoys warm climate. The districts of Anantapur, and Chittoor which are adjacent to
the plateau of Mysore are comparatively cooler even in summer. Horsely hills in Chittoor district and Araku valley in Visakhapatnam district, with minimum temperatures, are recognised as pleasing centres in summer.

Rainfall:

Rains start in Andhra Pradesh in the second week of June along with the onset of south-west monsoon. State receives its rainfall both from the south-west as well as north-east monsoon. The south-west monsoon occurs from June to September and covers most of the State and north-east monsoon from October - December. Rains of south-west monsoon and north-east monsoons are also called as western rains and eastern rains respectively. The onset of south-west monsoon in June - September months is the starting period to spring season itself.

Annual average rainfall in Andhra Pradesh is about 895 mm including 693.4 mm by south-west monsoon and 204.1 mm by north-east monsoon (Fig. 3).

Andhra Pradesh receives 56% of rains by south-west, 32% of rains by north-east monsoon and 9% of rains in summer also. Rayalaseema area receives an average rainfall of about
Fig. 3
Map of Andhra Pradesh showing distribution of Rainfall.
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<td>Year</td>
<td>South-west monsoon (June to September)</td>
<td>North-east monsoon (October to December)</td>
<td>Winter period (January and February)</td>
<td>Hot weather period (March to May)</td>
<td>Total</td>
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<td>1989-90</td>
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<td>88</td>
<td>37</td>
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670.4 mm, Telangana area 893.2 mm and northern coastal Andhra 130 mm. North Andhra Pradesh receives about 30 cms of rain during south-west monsoon as against 40 cms in south Andhra Pradesh. Telangana receives 80% of rains, coastal region 57% and Rayalaseema 54% of rains during south-west monsoons.

The rain fall in Andhra Pradesh is not uniform or normal year to year. Rayalaseema region with less amount of rainfall is noted as drought area. The rainfall in Andhra Pradesh is irregular, sometimes it gets in soon and sometimes it is delayed.

Rainy days:

In Andhra Pradesh the total number of rainy days vary from lowest of 35 days in Anantapur district to the highest of 58 days in West Godavari district.

Temperature:

During the rainy season the maximum temperature ranges from 29°-32°C while the minimum temperature varies from 20°-25°C. The atmospheric humidity is maximum during this period. The winter season in Deccan plateau is characterized by cool and dry weather. The night temperatures
are fairly low and associated with clear skies and low atmospheric humidity. The coastal districts however are more humid. The maximum temperature during this period varies from 24°C to 29°C and the minimum temperature from 12°C to 19°C. Low temperature below 12°C is recorded in Nizamabad, Hyderabad and Sanga Reddy. In the Coast, as also in Rayalaseema, the temperature does not go below 16°C.

The summer season is usually hot with high day temperatures up to 44°C in the months of May and June.

**GEOLOGY AND SOILS**

**Geological formations:**

Archeaologically and geologically the land of Andhra Pradesh is one of the most ancient and oldest in world itself. A wide variety of geological formations occur in Andhra Pradesh ranging from oldest Archean group of rocks to recent alluvium. Major portion of Andhra Pradesh constitutes a past of a stable land mass known as peninsular shield of the Indian subcontinent formed about 4000 million years ago.
Kondalites:

These Archean group of rocks are thought to have originated 4000 million years ago and found in parts of Srikakulam, Polavaram taluk of West Godavari, Bhadrachalam area of Khammam District. They are rich in minerals like chromites, Graphite, Manganese, Bauxite, Iron ore etc.

Dharwar group of rocky formations:

These group of rocky formations are thought to have originated 2000 million years after origin of the Kondalites, extended in Nellore, Anantapur and parts of Mahabubnagar districts and rich in minerals like mica (Nellore district) Gold (Anantapur district), and Hematite mineral in Karimnagar and Adilabad districts.

Rocky Formations of Cuddapah:

These rocky formations are found extensively in Cuddapah, Kurnool, Anantapur, Achampet in Mahabubnagar, Palnadu in Guntur, Huzurabad in Nalgonda, Narasampet in Warangal, Ellendu in Khammam, Asifabad in Adilabad district and rich in minerals like limestone, Barytes, asbestos, sand stones etc.
**Gondwana rocky formations:**

The Gondwanas occupied by Godavari, Pranahita rivers along the eastern margin of Telangana is the main repository of the Gondwana rock formations and are rich in minerals like coal deposits, sandstone etc.

**Soils:**

Due to different changes in climate soils are formed from rocks. There are two types of this type in Andhra Pradesh (Fig. 4).

1. Soils formed from rocks and they are stable in one place and not changing.
   Ex.: Black, Red laterite and sandy soils.

2. Soils, of this type are formed in one place and bought to another place by means rains and river water flow.
   Ex.: alluvial soils which can form as deltas.

**Deltaic alluvial soils:**

As far as fertility is concerned these soils are most fertile and suitable for agriculture. This type of soils are restricted to Krishna and Godavari delta areas only.
Map of Andhra Pradesh showing types of soils.
Due to easterly flow of riverine waters such type of deltaic soils are seen towards eastern side of the State only.

2. **Coastal Alluvial soils**:

   This type of soils are distributed as a narrow belt all along the coast. In composition these soils are made up of sandy loam and not rich in plant nutrients and organic matter. Large portion of these soils are covered by swamps or mangroves. Casuarina, cashewnut plantations are raised extensively on this belt.

3. **Black cotton soils**:

   This type of soils are distributed extensively in Adilabad, Khammam districts, Adoni, Alur areas in Kurnool district, western side of Manaboobnagar, Hyderabad, Krishna, Guntur, Prakasam, Cuddapah, Tadapatri area in Anantapur district, West Godavari and Medak districts.

4. **Red soils**:

   Red soils cover about 70% of the total area of the State. These soils are characterized in having phosphorous in excess and nutrients in least amounts. These soils are derived from the weathering of gneisses and granite. Major
portion of Telangana, Rayalaseema,some parts of Srikakulam, Visakhapatnam, East and West Godavari, Nuziveedu in Krishna district, Palnadu in Guntur and parts of Nellore and Ongole districts are occupied by the red soils only.

5. **Sandy soils**: 

Crops can not be grown well in these soils. These soils are not fertile, sand content is more in these soils. These soils are distributed in Narayankhed, Jaheerabad taluks in Medak district, Peddapuram, Yellavaram taluks in East Godavari district, Gudur, Kovur taluks in Nellore district Puttur area in Chittoor district.

**RIVERS**

Andhra Pradesh is riverian State. Krishna and Godavari are the two largest rivers. After these Pennar in south, Nagavali and Vamshadhara in North and Moosi in Central Andhra Pradesh are large rivers (Fig. 5). In addition to these popular rivers, the State is endowed with number of small rivers, tributaries, streams etc. That is why Andhra Pradesh State is appropriately called as river State or riverian State. Due to slight slope in its texture the
FIG. 5
Map of Andhra Pradesh showing drainage and irrigation.

ANDHRA PRADeSH
DRAINAGE & IRRIGATION

BAY OF BENGAL

LEGEND
CANAL IRRIGATION

EXISTING
UNDER CONSTRUCTION
PROPOSED

majority of rivers flow easterly towards the Bay of Bengal while tributaries and minor streams flow in north-south, north-west, and south-easterly directions. The State has a river system of about 4,480 Kms and estimated to carry 15% of all the riverine waters of India excepting Brahmaputra. As all the rivers in the State are rainfed water is not found in them during summer.

**Godavari**:

It rises at Triambak in Western Ghats, near Nasik in Maharashtra and enters Andhra Pradesh near Bastar village of Adilabad district. It joins with Manjira river and flows along Adilabad-Nizamabad, Adilabad-Karimnagar as border. After that it joins with Pranahita and flows towards east of Karimnagar where it meets with Indravati. It flows through Warangal, Khammam, East and West Godavari districts and splits into five branches viz., Vashista, Gautami, Tulya, Atreya and Bharadwaja before falling into the Bay of Bengal near Antarvedi, Bendamurulanka in East Godavari districts.

Godavari with its total length of 1584 Km length is largest and longest river in South India and second largest river in India. In Andhra Pradesh it flows up to 720 Km with catchment area of about 90,650 Sq.Km. The river is
nearly six Kms wide just below the railway bridge near Rajamandry before it splits.

Kadam, Pranahita, Indravati, Shabari, Manjira, Manneru, Kinnerasani etc. are important tributaries to Godavari.

**Krishna:**

The Krishna river originates near Mahabaleswar in Western Ghats in Maharashtra State. After flowing in Maharashtra and Karnataka it enters Andhra Pradesh near Maktal taluk of Mahaboobnagar district. It joins the river Tungabhadra near Sangameshwaram in Kurnool district and flows through Kurnool, Nalgonda, Guntur and Krishna districts. It enters the Bay of Bengal near Hamsala Deevi in Krishna district. It is the second largest river in the State. Its total length is 1240 Kms and its flow in Andhra Pradesh is 720 Km.

Tungabhadra, Dindi, Moosi, Paleru, Bhavanasi, Naguleru, Chandravanka, Munneru, Varuna, Panchaganga, Shima, Ghataprabha, Malaprabha are its chief tributaries.

**Penner:**

Also called as Pinakini, it originates in Nandidurya hills near Kolar district of Karnataka and after flowing up to
40 Kms in Karnataka it enters Andhra Pradesh near Hindupur taluk in Anantapur district and flows through Anantapur, Cuddapah and Nellore and enters Bay of Bengal near Utukoor, 23 Km away from Nellore town. Its total length in Andhra Pradesh is almost 563 Kms.

Chitravati, Jayamanjala, Kunderu, Sayileru, Papagni, Kumudvati, Cheyyuru etc. are its chief tributaries.

Tungabhadra:

Among tributaries of all rivers, which are flowing in Andhra Pradesh, this is the biggest tributary of river Krishna. Tungabhadra starts from Gangamula in Varaha ranges of Western Ghats of Karnataka by the union of two small rivers Tunga and Bhadra near Kudali of Shimoga area of Karnataka and enters Andhra Pradesh near Adoni taluk of Kurnool district and flows between Kurnool and Mahaboobnagar districts, meets with Krishna near Sanyameshwaram. Hagari is the important tributary to Tungabhadra.

Manjira:

Manjira is most important among Telangana rivers. It starts from Balaghat hills of Maharashtra and after flowing
through Usmanabad of Maharashtra it enters Andhra Pradesh State in Medak district and flows through Medak and Nizamabad district where it joins Godavari river. Its flow in Andhra Pradesh is about 540 Km.

Vamshadhara:

It starts from Jeypur hills of Orissa. After flowing up to 96 Kms in Orissa it enters Andhra Pradesh near Pathaptnam in Srikakulam district, it flows up to 128 Km in Srikakulam district and enters Bay of Bengal near Kalingapatnam in Srikakulam district. With its 224 Km length of flow and 11,400 Sq.Km. catchment area this is the longest among rivers of Eastern ghats with their origin in Eastern Ghats and merging in Bay of Bengal.

Pranahita:

It forms by the union of two small rivers Weinganya, Peinganya in Satpura hills of Madhya Pradesh and flows through Adilabad district. It joins with Godavari river near Cninnur.

Moosi:

Also called as Muchukonda river. It starts from Anantagiri hills of Hyderabad and flows towards eastern side.
enters into Osmansagar tank near Hyderabad and flows through Nalgonda district up to 64 Km. It joins with Krishna river Vazeerabad.

Sakalavani, Eesi are the tributaries to Moosi.

**Nagavali:**

Also called as the Langulya, it originates in Kalaha river estate in Rayaghad taluk in Orissa. After flowing in Orissa up to 95 Km. long it enters Andhra Pradesh in Srikakulam district and flows up to 110 Km length in Andhra Pradesh before falling into Bay of Bengal near Mofaz Bandar in Srikakulam district.

Zamjumvati, Swarnamukhi, Vedavati are the three tributaries to Nagavali.