CHAPTER - II

TOPOGRAPHY AND GENERAL FEATURES
LOCATION:

The modern configuration of the Indian peninsula is defined by the Western and Eastern Ghats that face the Arabian sea and Bay of Bengal respectively which converge in Southern most India.

A long chain of isolated hill ranges adjoining the plains along the east coast of peninsular India are generally called as Eastern Ghats. They are ‘tors’ of geological antiquity with isolated hill ranges along the eastern border of Deccan plateau and coastal plain. They pass mainly in 3 states of peninsular India viz., Orissa (South of river Mahanadi), Andhra Pradesh and Tamil Nadu (mostly north of river Cauvery). Eastern Ghats, mainly pass through the following districts. In Orissa-Phulbani, Khalahandi, Ganjam, Gajapathi, Koraput and Rayagad, in Andhra Pradesh - Srikakulam, Vijayanagaram, Visakhapatnam, East Godavari, West Godavari, Khammam, Krishna, Guntur, Mahabobnagar, Prakasam, Kurnool, Cuddapah, Anantapur, Nellore and Chittor districts, in Tamil Nadu-North Arcot, South Arcot, Dharmapuri, Salem, Tiruchirapalli and Coimbatore.

The Eastern Ghats do not form a continuous range, but are assemblage of discontinuous ranges of hills, plateaus, escarpments, buttes, tors, narrow basins, gorges, with elevation ranging from a few meters to more than 1600 m. Almost all the major rivers like The Mahanadi, The Godavari, The Krishna, The Pennar and the Cauvery taking their rise from the Western Ghats have cut extensively through the Eastern Ghats to escape into the Bay of Bengal, hence they do not form a continuous range.

The Eastern Ghats cover an area of about 75,000 sq. km. traversing the Coromandal between 11° 30’ to 22° N latitudes and 76° 50’ to 86° 30’ E longitudes. Its northern boundary is marked by the river Mahanandi basin while the Southern boundary is the river Cauvery, to the west lies the tips of Bastar, Telanagana and Karnataka plateaus and Tamil Nadu uplands. The Coastal area in the east limits its eastern part.

The Eastern Ghats, based on climatic, Topographic and Geomorphological features are broadly divided into two regions, viz., (1) The Northern-Eastern Ghats and (2) The Southern-Eastern Ghats.
1. The Northern-Eastern Ghats:

The Northern-Eastern Ghats stretch between the South of the river Mahanadi and North of Godavari basin. It includes the Khondmal hills, Kotraboriparbat, Gandhamardenparbat, Singarazuparbat, Mahendragiri, Devagiri, Chandragiri, Subarnagiri, Raegara hill, Deomali, Sinkaram Gutta, Turiakonda, Hatimali, Kondamali, Meghasani, Malyagiri, Sambarikonda, Dharakonda, Dummakonda, Arma Konda, Simhachalam and Rampa hills.

2. The Southern-Eastern Ghats:

The Southern-Eastern Ghats stretch between the South of river Godavari to North-West of river Cauvery. Papi hills, Kondapalli range, Nallamalais, Yerramalais, Palkonda hills, Veligonda range, Nagari hills, Horsely hills, Seshachalam hills, Kambakkam hills, Javadi hills, Gingee hills, Shevaroy hills, Kollimalai hills, Kalrayan hills, Bodamalai hills, Pachamalai hills and Sathyamangala Range are the prominent hills in the Southern Eastern Ghats.

In the last section the Eastern Ghats run in a West-South-West direction meeting the Western Ghats in the Nilgiris. (Fig. 1).

TOPOGRAPHY OF EASTERN GHATS

Topographically the altitude of the Eastern Ghats is uneven due to broken hills. However in the North-East region the Eastern Ghats are continuous aligning in North-east, South-west direction in between the Godavari and Mahanadi rivers. The altitude in this part of the region ranges from 300 to 1500 m above mean sea level. The altitude rises to more than 1000 m above MSL in the Central parts of the North-East Eastern Ghats. There are many broken hill ranges in North-East region. Among them Mahendragiri 1501 m, Singarazuparbat 1516 m, Sonkaram Gutta 1620 m, Sambari Konda 1527 m, Meghasini 1250 m, Dharakonda 1365 m, Dummakonda 1361 m and Devagiri 1382 m are the conspicuous features. Deomali Parbat rises 1666 m above MSL, it is the highest peak point in the Eastern Ghats. The Eastern Ghats in North-Eastern region align parallel to the East Coast in north-east, South-west direction. From South of Godavari river up to Palar river, the Eastern Ghats are broken and constitute of Papi hills, Kondapalli range, Nallamalais, Erramalais, Palkonda hills, Veligonda range, Nagari hills, Horsely hills, Seshachalam hills and Kambakkam hills. The altitude in this hills varies from 300 to 600 m above MSL. The
EASTERN GHATS
PHYSICAL RELIEF

Fig. 2
Southern-Eastern Ghats consist of Javadi hills, Shevaroy hills, Kollimalai hills and Pachamalai hills, the altitude in this varies from 300-900 m above MSL.

The alignment of this hills is north-East, South-West and East- North-East and West-South-West. The Eastern parts of the Nilgiris forms the diverging point of both Eastern and Western Ghats. The altitude in this hills varies from 600 to 2500 m above MSL. The alignment is East-North-East and West-South-West direction. (Fig.2).

GEOMORPHOLOGY :

The Eastern Ghats stretch from North of river Cauvery in the South-West to South of river Mahanadi in the North-East of Peninsular India. The Eastern Ghats are interspersed by a number of hills, elongated dissected ridges, residual isolated hillocks, buttes, plateaus, pediment and plains.

The northern part of Eastern Ghats show continuous hills with dissected ridges. The Central Eastern Ghats are broken and very much disturbed due to degradation. The Southern-Eastern Ghats are also discontinuous.

The North Eastern Ghats are more dissected and consists of Domal structures with lateratic fashions. They have raised to above 1000 m. The Central Eastern Ghats are relatively less in altitude and consists of mainly shale-formation in Nallamalai hills. Nallamalais have raised to above 600 m. The South-Western Eastern Ghats are discontinuous and have raised to more than 1000 m. So there is a clear discordance in altitude among Northern, Central and Southern Eastern Ghats. (Fig. 3).

The Eastern Ghats are interven in major rivers like Godavari, Krishna and Pennar. A number of small rivers rise in Eastern Ghats and debit into Bay of Bengal. The rivers Godavari, Krishna and Pennar have developed prominent deltas filled up with alluvial soils. In between Godavari and Pennar rivers the Deccan plateau is noticed in the form of upper and lower plateaus. The plateaus are more in Central Eastern Ghats of Nallamalai hills due to rapid Denudation.

The Coastal plains lie parallel to the Eastern Ghats and are included by precambrian rocks between Visakhapatnam and Srikakulam districts. There are 3 prominent lakes mainly Chilka lake in Orissa, Kolleru in Andhra Pradesh and Pulicat both in Andhra Pradesh and Tamil Nadu.
CLIMATE:

The Eastern Ghats lie adjacent to the East Coast and show a tropical monsoon climate. The Eastern Ghats receive rainfall from both South-West monsoon and North-East retreating monsoon. Eastern Ghats are affected by the heavy torrential downpour with raging cyclonic storms from the Bay of Bengal.

MEAN ANNUAL RAINFAL OF EASTERN GHATS:

Mean annual rainfall distribution in Eastern Ghats is above 1500 mm in Northern Eastern Ghats. It gradually decreases to 1000 mm in and around Nallamalai hills and exceeds 1000 mm around the last section of Southern Eastern Ghats. Rainfall also exceeds 1000 mm along the Coastal plain of the East Coast. The lowest rainfall of 507 mm noticed in around Bellary station and highest rainfall of 1669 mm is found in extreme Northern-Eastern Ghats (Sambalpur Climatological Station). The general trend of rainfall follows the Broken Eastern Ghats viz., in North-East, South-west and North-South, East-North-East, West-South-West (Fig.4).

MEAN ANNUAL TEMPERATURE OF EASTERN GHATS:

The mean annual temperature in the Eastern Ghats ranges from a minimum of 14.5° C in Ootacamund where as maximum 36.5° C in Tiruchirapalli and Cuddapah stations. Spacial distribution shows that the temperature is less than 20° C in Northern Eastern Ghats. In Nallamalais, Seshachalam hills, Kolli hills, Shevaroy hills, the temperature decreases as altitude increases due to lapse rate. The temperature decreases to a maximum of 6.5°C per every 1000 m increase in altitude, due to this reason the temperature is low in the hill terrain whose altitude is above 1000 m.

In the Central Eastern Ghats due to broken nature and low altitudes the temperature exceeded 30°C. In the Coastal plain along the Eastern Ghats the temperature is above 30° C. (Fig.5)

GEOLOGY:

The available geological history and radiometric data reveal that the Eastern Ghats group consists the oldest Dharwar schists to the recent alluvium.
Fig. 4
The charnockites and khondalites rocks are found in the Eastern Ghats. But they occur extensively in North-Eastern Ghats and they continued up to river Krishna. The khondalite, charnockite rocks terminate near Guntur, just South of the Krishna.

In the North-Eastern Ghats most of the terrain lies above 400 m with a few peaks exceeding 1300 m. They are composed of gneisses, charnockites and khondalites. They are also extensive in plateaus of the Koraput and Khalahandi districts with average elevation of 1100 m.

The culminating point is Mahendragiri (1501 m) in the Gajapathi district and exceeds to Srikakulam, Visakhapatnam and the upland of East Godavary and West Godavary districts. The charnockites bands also occur in Krishna, Guntur and Prakasam districts. In the Southern-Eastern Ghats charnockites occur in the Javadi, the Kollimali, the Pachamalai, the Kalrayan and the Shevaroy hills and are composed of gneisses and varied metamorphic rocks.

The charnockites and khondolites formations are rich in minerals, particularly in Graphite and Manganese ore (charnockites) and Bauxite, Chromite and Iron (Khondolite).

The Quartzite and slate formations predominate in the middle section of the Eastern Ghats from the Krishna to near about Cauvery river. It includes the Nallamalai, Palkonda, Velikonda hills whose average elevation is 750 m above MSL.

The Archaean or Peninsular gneisses dominate the rock formation in Kurnool and Cuddapah districts. The rock formation consists of Granites, Granodiorids and branded gneisses. In this region the purenas are also found; these rocks include limestone, sand stones, slates and shales.

The Dharwar formations extend in Nellore, Prakasam, Guntur, Anantapur and Mahaboobnagar districts. These formations contain important minerals like mica, copper and gold.

The upper Gondwanas are extending from river Godavary to Krishna rivers. The tertiary formations are represented by the low hills composed of Rajahmandry sand stones and conglomerats, covering small areas in East and West Godavary districts. The laterites occur in Coastal districts such as Nellore and Visakhapatnam.
Alluvium occurs extensively in the deltas of Krishna Godavary rivers. A belt of alluvium is found deep in land along the valleys of Vamsadhara and the Nagavali rivers. The alluvium consists of sand, gravel, silt and clay with silt predominating in the deltas.

SOILS:

The Eastern Ghats has a wide variety of soils. But however the regional climatic variations, its other associated elements and factors such as temperature, precipitation, wind, chemical actions and vegetation cover have played a vital role in determining the character of the soil. The following are the predominant soils found in the Eastern Ghats.

1. Red soils,
2. Black soils,
3. Laterite soils and
4. Alluvial soils (Fig. 6.).

Red Soils:

Red soils are predominantly present throughout Eastern Ghats. Red soils show increasing trend to south to north region i.e., Seshachalam hills, Palkonda, Velikonda, Nallamalais, Papi hills, Rampa hills, Simhachalam, Armakonda Turiakonda, Meghasini, Mahendragiri hills, South and South-East, Gentle slopes to the West and North-West Dandakaranya and the Machkund, ranging the elevation from 300 to 1600 m, have predominantly red soils.

In the Southern Eastern Ghats, they are also present in Alluvial plains, these are located at the Krishna, The Godavary, The Cauvery and The Pennar rivers adjacent to plains.

Black Soils:

The black soils mostly occupy the centenary plains of the Eastern Ghats, average elevation ranges from 50 to 150 m. It is widened mostly in the East-West of the rivers Krishna, Godavari, Mahanadi and Pennar. By the deposition of heavy load of sediments, the black soils are deep to very deep in colour. Black soils often occur in close proximety to red soils, this type occupy the higher slopes and hill tops.
SOILS IN EASTERN GHATS

ALLUVIAL SOILS
- RIVERINE: CALCAREOUS
- COASTAL ALLUVIUM
- RIVERINE: SALINE

BLACK SOILS
- UNDIFFERENTIATED BLACK

RED SOILS
- RED SOILS

Fig. 6
In the Eastern Ghats black soils are mostly found in the Mahanadi river catchment, Ganjam and Prakasam districts.

The deep black soils are found mostly in intervening basins of the South and South-West interspersed by the dissected Nallamala hills, Vellikonda range, Cuddapah catchment and Khammam districts.

The medium black soils are found in many parts of Southern Eastern Ghats.

Mixed red and black soils occur in Coimbatore, Dharmapuri, Cuddapah, Anantapur districts of Southern Eastern Ghats.

Black soils of deep to very deep varying in shades from red to black alternatively spread from north to south in Eastern Ghats.

**Laterite Soils:**

The high level lateritic soils occur especially on the summits of Eastern Ghats of East and West Godavari, Ganjam, Gajapathi, Rayagad and Koraput districts. But the low level lateritic soils occur along the east margin of the ghats adjoining the coastal plains. Lateritic pockets occur in Srikakulam and Visakhapatnam districts.

Lateritic brown colour soils are present in Phulbani district of Northern Eastern Ghats.

**Alluvium Soils:**

The river deltas, flood plains, the Coastal plains and adjacent to the Ghats region are occupied by the older and younger alluvium soils.

**RIVERS:**

A number of large and small rivers traverse the Eastern Ghats. Larger rivers are the Mahanadi, the Krishna, the Godavari and the Cauvery which rise in the Western Ghats and run across the Eastern Ghats and drain into the Bay of Bengal. Many smaller and ephemeral rivers have their origin only in the heart of Eastern Ghats. (Fig 7).
Fig. 7
Rivers of Northern Eastern Ghats:

The Mahanadi:

It is east flowing major river of the North-Eastern Ghats. It originates near the Amarkantak of the Raipur district in Madhya Pradesh. Its important tributaries with in the Eastern Ghats are the Tel, the Ib the Ong and the Hatti. This river finally enters the Coastal plain at Naraj after cutting across the Eastern Ghats through a 23 Km length sat Kori gorge and drains into the Bay of Bengal.

Bahuda:

It is East flowing small river. It originates from Singaraj and Ramagiri hills of Gajapathi district in Orissa. Its important tributary within the Eastern Ghats is Batarada. After passing quite a good distance in Eastern Ghats it drains into the Bay of Bengal in Andhra Pradesh.

Rushikulya:

It is East flowing small river. It originates from Rushikulya hills of Phulbani district in Orissa. Its important tributaries within the Eastern Ghats are Padma, Badnadi, Baghua, and Ghodanada. It runs nearly 165 Km length in the Eastern Ghats and drains into the Bay of Bengal.

Vamsadhara:

As its banks are fringed with Vamsa (Bamboos) it is called "Vamsadhara". Vamsadhara is 221 KM long south flowing small river in the Eastern Ghats. It originates in Lingaraj hills of Kalahandi district in Orissa. Its important tributaries within the Eastern Ghats are Paladi, Sahanai and Damani.

After crossing the Ghats region, it enters the Coastal plains of Andhra Pradesh and empty into the Bay of Bengal in Srikakulam district of Andhra Pradesh.

Nagavali:

It is also called as the Langulya. It is south flowing small river and originates in Bilipur hills of Kalahandi district in Orissa. Its important tributaries are Jhanhabati, Vegabati and Swarnamukhi. It runs nearly 102 KM length in Eastern Ghats. After crossing the Ghats region it enters the Coastal plain of Andhra Pradesh and empty into the Bay of Bengal.
Indravati:

It originates in the Western slope of the Eastern Ghats section of Kalahandi district. Its important tributaries within the Eastern Ghats are Bhaskel, Muran, Telingir, Narangi, Kotri and Bandia. It drains into the Godavari basin.

Sileru:

It originates in the Southern slope of Madugula hills of Andhra Pradesh. Its main tributary is Gurepreonalala and make alien with Sabari.

Sabari:

It originates in Suikaram hills. Its main tributary is Sileru, it drains into the Godavari basin.

Other small rivers in North-Eastern Ghats are Champauathi, Gostani, Sarada, Varaha and Tandava and these rise at higher elevations of Eastern Ghats. These rivers after flowing quite a good distance in Eastern Ghats drain into the Bay of Bengal.

Rivers of Southern Eastern Ghats:

The Godavari:

It is East flowing largest river in the Peninsula. It originates in Western Ghats at Triambak near Nasik, at an elevation of 1,067 m. It enters the Eastern Ghats at 97 Km below Rajahmundry (Papi hills).

Rivers Indravati and Sabari are the important tributaries of the Godavari in Eastern Ghats. The Godavari splits into five branches viz., Vashista, Gautami, Tulya, Atreya and Bharadwaja before falling into the Bay of Bengal near Antarvedi, Bendarumulanka and other places in East Godavari district.

The Krishna:

The Krishna is the second largest east flowing Peninsular river. It rises near Sahyadris (Mahabaleshwar) at an elevation of 975 m of Western Ghats. It is flowing in South-East direction and enters Andhra Pradesh near Tangadigi village in Mahaboobnagar district. The Krishna river forms the northern boundary of Nallamalais. It flows through Kurnool, Guntur and Krishna districts.
After coursing through Guntur district it splits into three main branches and falls into the Bay of Bengal between Hamsala Deevi and Nachakunta in Krishna district.

The important tributaries of the Krishna river are Tungabhadra, Dindi, Wyra, Chandravanka, Tammileru, Naguleru, Hundri and Musi.

The Gundlakamma :

It originates in Gundlabrahmeswaram in the Nallamalais of Kurnool district. Its main tributaries are the Rollavagu, Tigaleru, Kandieru and Duvaleru. It drains into the Bay of Bengal.

Paleru :

It rises in the Velegandla hills. Its main tributaries are Mussi, Kanagaleru and Donaleru. It drains into the Bay of Bengal.

Kunderu :

The river Kunderu rises on the Western side of Yerramalais. It debut into Pennar river.

Sagileru :

It’s origin takes towards South-West of the Nallamalais, runs in northward direction and joins the river Pennar.

Chitravathi, Papagni and Cheyyeru rivers arise in middle part of the Eastern Ghats and join the Pennar.

The Pennar :

It is also called the Pinakini. It rises in Nandi hills of Kolar district in Karnataka State. It enters the Andhra Pradesh State near Chowluru, in Anantapur district. After flowing in Anantapur and Cuddapah districts it enters Nellore district through a fine gorge in the Veligonda at Somasila. It is mostly dry because of the denudation of forests. Its chief tributaries are Jayamangali, Chitravathi, Kunderu, Papaghnli, Sagileru, Cheyyeru and Kumudavathi. It drains into the Bay of Bengal.
The Caunvery:

The Caunvery is one of the important east flowing Peninsular river. It rises in the Brahmagiri hills at an elevation of 1341 m. Its principal tributaries are Hemavati, Shima, Lokpavani, Arkavak, Lakshmantirtha, Suvarnavati and Ponnaiyar. The Caunvery extends from Tiruchirapalli and it divides into 2 channels at Srirangam, the northern channel is called Coleroon, while the southern one retains the name Caunvery, finally it reaches the east coast at Cauveripatnam in Tamil Nadu and drains into the Bay of Bengal.

Other small east flowing rivers in Southern-Eastern Ghats are The Palar, Ponniyar, Araniyar and Nagari. These drain into the Bay of Bengal.

The smaller rivers having their origin in the Eastern Ghats have well developed basins in their water sheds. The basins are surrounded by natural steep sloping hills and the rivers generally flow out through a single outlet or at best through two outlets.

LAKES:

Three prominent lakes are present in the Eastern Ghats viz., Chilka lake (between the Mahanadi and Bahuda rivers), Kolleru (between the Godavari and the Krishna rivers) and Pulicat (between The Pennar and Araniyar rivers).