CHAPTER II

TOPOGRAPHY AND GENERAL FEATURES

Eastern Ghats, one of the nine Floristic Zones in India are located between 11°30' and 20° North latitude and 76°50' and 86°30' East longitude in a North East to South-West strike. Eastern Ghats is an assemblage of a chain of much broken hills because the rivers like Mahanadi, Godavari, Krishna, Cauvery and Gundlakamma cut across them.

Eastern Ghats are spread over three states of India namely Orissa, Andhra Pradesh and Tamil Nadu covering an area of about 75,000 Sq. km, with an average width of 200 km in North, 100 km in the South.

The distribution of Eastern Ghats is shown in Table 1.

<table>
<thead>
<tr>
<th>STATE</th>
<th>DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orissa</td>
<td>Pulbani, Kalahandi, Ganjam, Gajapathi, Koraput, Rayagad, Sambalpur and Dhenkanal.</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Chengalput, Dharmapuri, North Arcot, Salem, Tiruchirapalli, Namakkal, South Arcot and parts of Coimbatore.</td>
</tr>
</tbody>
</table>
1. Location map of Eastern Ghats in India.
Eastern Ghats can be broadly divided into

Northern Eastern Ghats, Central Eastern Ghats and Southern Eastern Ghats.

The meeting point between Northern and Central Eastern Ghats is Kondapalli (Krishna district).

The Hill ranges that represent the Eastern Ghats are shown in Table II

<table>
<thead>
<tr>
<th>State</th>
<th>Division</th>
<th>District</th>
<th>Hill ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orissa</td>
<td>Northern Eastern Ghats</td>
<td>Pulbani, Kalahandi, Ganjam.</td>
<td>Mahendragiri</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>Northern Eastern Ghats</td>
<td>Srikakulam</td>
<td>Palakonda, Pathapatnam, Mandasa, Sompeta.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>East Godavari</td>
<td>Addatigala, Rampachodavaram hills, and Bison hills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vijayanagaram</td>
<td>Sal forest, Manda forest, Peddakonda forest, Duggeru forest, Kurupam forest.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visakhapatnam</td>
<td>Galikonda hills, Sunkari metta, Anantagiri.</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>Central part of Eastern Ghats</td>
<td>Krishna</td>
<td>Kondapalli ranges,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kumool, Prakasam, Mahaboobnagar</td>
<td>Nallamala ranges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cuddapah</td>
<td>Yerramala, Palakonda ranges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nellore</td>
<td>Veligonda ranges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chittoor, Cuddapah</td>
<td>Seshachalam, Lankamala Nagari, Kambakkam ranges.</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Southern Eastern Ghats</td>
<td>North Arcot</td>
<td>Javadi hills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Arcot</td>
<td>Gingee hills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Salem</td>
<td>Shevaroy hills, Kalryan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Namakkal</td>
<td>Kollimalai, Bodamalai, Nainamalai</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dharmapuri</td>
<td>Melagiri hills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tiruchirapalli</td>
<td>Pachamallai</td>
</tr>
</tbody>
</table>

Mahendragiri hill ranges lies between 18°50' and 19°05' Northern latitude and 84°10' and 84°10' East longitude. Mahendragiri hill ranges are
2. Eastern Ghats, Hills, Plateaus and plains.
surrounded by Devagiri hills in the West, Singaraja and Mahendragiri in the East, Udayagiri and Ramgiri hills in the North, Narayanpur and Gandahati hills in the South.

North Coastal districts – Srikakulam, Vijayanagaram, Visakhapatnam and East Godavari are one of the biodiversity rich areas of Eastern Ghats. About 30% of the Andhra Pradesh state forest with good biological resources is located in the North Coastal districts.

The Nallamalai hill ranges lie between 15°30’ - 16°30’ Northern latitude and 78°30’ - 80°10’ Eastern longitude. These are a group of low hill ranges of Central Eastern Ghats. These hill ranges cover an area of 7,640 Sq. km in Kurnool, Mahaboobnagar and Prakasam districts of Andhra Pradesh. Mantralakanuma and Nandikanuma divide the hill from East to West. The centre of the hills is the Gundlabrahmeswaram (GBM). It is now declared as a Wildlife Sanctuary. The highest point in the range is Mantikonda which is about 910 m, above MSL. Some other prominent peaks are the Durgappakonda 907 m, Katalakonda 863 m and Gundlakonda 851 m.

Tirumala hills are geographically located between 79°19’ - 70°23’ East longitude and 13°37’ to 13°43’ North latitude.

Kolli hills lie in Salem and Namakkal districts of Tamil Nadu. They extend an area of 418 Sq. km, with an elevation of the hill ranges between 1000 - 1500 m above MSL. The Shevaroy hills come under Salem forest division. It lies between 11°45’ and 11°55’ North latitude and 78°10’ - 78°20’ East longitude and covers an area of 470 Sq. km.
3. Eastern Ghats elevation.
The Pachaimalais are situated in the North border of Tiruchirapalli district and extend into the adjoining Salem district. They lie between 11°13' and 11°20' North latitude and 78°35' and 78°51' East longitude. They cover an area of 450 Sq. km.

Pachaimalais are separated from the Kollimalais by the narrow Thammampaty valley.

Javadi hills of North Arcot district lies between 12°15' and 12°40' North and 78°2' and 79°10' East. The hills running approximately North East and South West towards eastern portion of Alangayam and Thirupattur. It attains a maximum length of about 60 km and width of about 25 km. A special feature at the top of these hills is the place of plateaus extending for ten kilometers. The average height is 1053 m above MSL. The highest point is Kumbukudi (1273 m).

Burgur hills lies in North Eastern side of Erode district between 11°28' to 12° North latitude and at 76° 47' East longitude and has an area of 64,729 ha. Elevation of the hills ranges between 975 to 1300 m above MSL.

The Alagar hill comes under Alagar Koil range in Dindigal forest division. It is about 22 km East of Madurai city and it lies at 78°5' 30'' East longitude and 9°55'10'' North latitude. It has total areas of 68.11 Sq. km. The hill is about 16 Km long with three valleys. The main water shed area is Vaigainatham. The highest peak is Thalaianalparaj and is about 879 m above MSL.
The Sirumalai / Chinnamalai group of hills lie in four districts of Tamil Nadu, i.e Tiruchirapalli, Dindigul, Karur and Sivagangai. The Sirumalai lies in Dindigul district and it is 16 km away from Dindigul. It's total area is 25.26 Sq. km. It is situated between 77°33' and 78°15' East longitude and 10°00' and 10°39' North latitude.

The Piranmalai hill is located in Sivagangai district and it covers an area of 90.23 Sq.kms.

Semmalai hills fall in Trichy and Dindigul districts and reaches a maximum elevation of 1031 m MSL. It forms one of the largest conglomerations of hilllocks and dominate the Sirumalai group of hills.

The highest peak in Eastern Ghats, is Deomali Parbat 1673 m (Koraput district). Other notable peaks are Mahendragiri 1501 m, Singaraju Parbat 1516 m, Devagiri 1382 m, Sambari Konda near Gudem village 1670 m, Nallamalais 800 m, Seshachalam hills 850 m, Javadi hills 1275 m and Pachamalais hills 1000 m.

Geology

The Eastern Ghats in geological nomenclature are known as Eastern Ghats granulite belt. The granulites are high-grade metamorphic sequences that usually form at pressures of over 8-10 K bars and temperatures of 700-800°C. Such granulite terrains of 2.5 By old are quite widespread not only in India, but in Australia and South America (all these continents constitute the formar Godwana land). The belt in East –West direction can be divided into
the western hilly terrain the central plateau and the coastal belt. The average pressure, temperature of formation of the belt is around 7-8 K bar and 700-800°C.

In the belt predominate litho units are Khondalites, Charnockites, basic granulities leptynites, megacrystic granites, ceptynites, myacrystic granites while the intrusives consists of alkaline ultramafic, anorthositic (layered and massive) rocks distributed at many tectonically disturbed zones of the belt. The age and data available about the belt suggest, basin initiation around 2,200 MY (early proterozoic) and the belt also shows pronounced metamorphic ages of 1,000 MY (mid to late proterozoic) and also 500-600 MY (Pan-African ages). Eastern Ghats is the union of a wide variety of geological formations ranging from the oldest Dharwar schists to the recent ploopleistocene (Alluvum).

The extension of Dharwar formation is seen along Anantapur, Prakasam, Nellore, Mahaboobnagar, and Guntur districts. The Dharwar formation contain most important minerals like mica, gold, and copper. Whereas in the hills of Orissa, Dharwar rocks are absent, but mica, quartz, quarzites and schists are common and resemble those of the Dharwars.

In the districts of Kalahandi, Koraput, Rayagada, East and West Godavari and Salem, Kondalites are most widespread. It forms on the top of the hills where it is covered by laterite or bauxite and gives rise to reddish soils.
The charnockites, mainly hyperstone gneiss in nature are seen near Koraput, Rayagada, Krishna and Prakasam districts. This formation is rich in graphite and manganese minerals.

The Archaean or Peninsular gneisses dominate the rock formation in Telangana, Rayalaseema regions and many places of Eastern Ghats of Tamil Nadu. Granites, granodiorides are main rock formation.

The formation of Cuddapah resemble the Gondwanas and Vindhyas, but it is older. These hill regions consist of limestone, sandstone and shales with granaitite intrusions and is met with in Sambalpur. Such Cuddapah rocks being very hard, promote very poor forest growth and the rocks become quite bare.

In the parts of Koraput, Sambalpur, Guntur, Mahaboobnagar, Kurnool and Cuddapah districts purenas are found. These rocks contain limestone, sandstones shales, and phyllites slates. Whereas lower Gondwana contains coal seams among sandstones and shales. The coal seams are being exploited at Kothagudem and Yellandu and Khammam district. The upper gondwanas consists mostly of shales and sandstones extending from Rajahmundry to Vijayawada along Godavari.

In coastal districts of Nellore and Visakhapatnam laterites are present. In the belts of Krishna and Godavari rivers alluvium occurs extensively. The alluvium consists of sand, gravel, and clay with all predominating in the deltas.
Ultramafic rocks are important for platinum group of elements and chromite, but ultramafic rocks occur in minor form. There are two well studied chromite bearing ultramafic sequences in the belt Kondapalle in Andhra Pradesh and Sukinda in Orissa. These ultramafics contain "Chromitite" a rock rich in chromite.

River System

Rivers are the most important natural source of water, power and vegetation of earth. Many rivers flow through the Eastern Ghats in which major rivers are Cauvery, Krishna, Godavari, Mahanadi, whereas Bahuda, Vamsadhara, Nagavali, Indravati, Rushikulya, Sileru, Sabari, Gundlakamma, Poleru, Sagileru and Penna are minor rivers of Eastern Ghats. All these rivers terminate in Bay of Bengal.

The Mahanandi rises near the Amarkantak in Madhya Pradesh. It is one of the prominent East flowing rivers of Northern Eastern Ghats. It has three tributaries in which most important one is Tal and the other two are lb and Hatti.

The river Bahuda rises from Singaraj of Ramgiri hills of Gajapathi and Ganjam district of Orissa. The important tributaries are Bogi, Kantaijhar, and Poichandia etc.

From the Rushikulya hills of Pulbhani district the river Rushikulya rises. Its important tributaries are Badanadi, Baghua, Ghodhada and Padma.
4. Rivers of Eastern Ghats.
The Nagavali, also called as the Langulya, originates in Kalahandi district of Orissa and enters Andhra Pradesh near Parvathipuram taluk of Srikakulam district. After flowing through Vijayanagaram and Srikakulam districts it joins the sea near Mofaz Bandar in Srikakulam district. Its chief tributary, the Swarnamukhi also originates in Orissa.

The Vamsadhara rises in the Eastern Ghats of Kalahandi district of Orissa State. It enters Andhra Pradesh near Pathapatnam taluk in Srikakulam district. It finally falls into the Bay of Bengal near Kalingapatnam. The important tributaries are Paladi and Sahanai.

The Godavari is one of the mighty river systems of India. It originates near Triambak near Nasik in Western Ghats. Vashista, Gautami, Tulya, Atreyya and Bharadwaja are branches of Godavari river. It flows over a distance of 1465 Kms. before reaching the Bay of Bengal. Godavari is fed by the two monsoons. It also known as “Ganga of the South” or “Dakshin Ganga.” It flows through out the year in south

The Cauvery rises near Brahmagiri hills of Coorg district. It is one of the biggest river system of peninsular India. It flows over a distance of 805 Kms before reaching Bay of Bengal. It has different streams like Hemavati, Lokpavani, Arkarati, and Shimsa from north and Kabini, Lakshmanatirtha, Bhavani, Amaravati and Suvarnavati from the south.

The Krishna originates near Mahabaleswar of Satara district of Maharashtra. It has two important tributaries, the Bhima and the Tungabhadhra. In Andhra Pradesh the Krishna flows through Kurnool, Guntur
and Krishna districts, before reaching Bay of Bengal between Hamsala Deevi and Nachakunta of Krishna district. It covers 1400 Kms.

The Sileru rises from the Madgole hills of Vishakapatnam. It has one important tributary Sabari.

The Pinakini originates from the hills of Chennakesava in Karnataka and enters into Andhra Pradesh. It flows through the districts of Anantapur, Cuddapah, and Nellore. The important tributaries of this river include Kunderu, Jayamangali, Papaghni, Chitravati, Cheyyeru, Sagileru. After flowing through the sandy bed of Nellore district it falls into Bay of Bengal.

From Gundlabrahmeswaram of Nallamalais of Kurnool District, river Gundlakumma originates. It passes through the Prakasam district and reaches Bay of Bengal at Devarampadu.

The Swarnamuki originate from Chandragiri hills of Chittoor district. It flows through the Nellore district and falls into the sea near Siddavaram.

Climate

Eastern Ghats are situated under tropical monsoon climate. This region receives rainfall from both South-West monsoon and North-East monsoon. In the Northern Part the annual rainfall ranges from 114.2 cm to 165 cm, indicating sub humid climate (Sambalpur Station, Orissa) whereas in the Central and Southern parts the mean annual rainfall ranges from 60 – 106 cm (in between Machilipatnam and Tiruchhipalli station) exhibiting semi-arid climate except in the hilly station peaks. Heavy winter rains coupled with
cyclonic storms is normal in Eastern portion, especially in the Costal plains. The mean temperatures in January ranges between 20°-35°C. The maximum temperature increases up to 46°C during summer season. During rainy season relative humidity is quite high up to 70 to 75%.

Soils

Soils are one of the most important ecological factors. Plants depend for their nutrients, water supply and anchorage upon the soil. Soil is the meeting ground of inorganic and organic worlds.

The soil can be defined as “the weathered surface of the earth crust when mixed with organic material and in which plants grow”. Because its various components are inter-related and interact with one another, the soil is also called Soil Complex.

In the Eastern Ghats different types of soils are present namely black soil, Red soil, Alluvial soils.

The black soils are clayey and rich in lime. The black soils are found along the Mahanadi, Krishna, Godavary, Penna and Pravahita. The deep black soils are found in Nallamalais, Valikonda and Seshachalam hill ranges. In Southern Eastern Ghats mixed and black soils are found. Red soils occur throughout Eastern Ghats. They are found along Mahendragiri, Papi hills Simhachalam, Arumakonda, Chandragiri, Turiakonda, Rampa hills, Nallamalais, Palakonda, Seshachalam hills, Kolli hills, Shevaroy hills etc.
Alluvial soils are characteristic of the Coastal and in irrigated regions of Mahanadi and other river systems.

Laterite is alteration of surface of the rocks due to meteorological conditions. It occupies large areas of Gajapathi, Rayagad, Ganjam, Koraput, Sambalpur, Srikakulam, Visakhapatnam, West Godvari, East Godvari and Nellore districts.