Chapter 2
Physical Features

2.1 Topography of the Basins

The link project lies in Krishna and Pennar basins which are described below:

2.1.1 Krishna Basin up to Srisailam Dam Site

The Krishna basin is bounded on the north by the common ridge separating it from Godavari basin, on the south and east by Eastern Ghats and on the west by Western Ghats. Except for the hills forming the watershed around the basin, the entire drainage basin comprises of rolling and undulating regions and a series of ridges and valleys interspersed with low hill ranges. Large flat areas of the type as seen in the Indo Gangetic plains are scarce, except in the delta areas.

The interior of the basin is a plateau, greater part of which is at an elevation of 300 to 600 m. Its general slope is eastwards. Great undulating plains divided from each other by flat topped ranges of hills are the chief characteristics of this plateau. The hill sides are marked by conspicuous, wide terrain except in the southern part of the plateau where the hills are frequently crowned with great 'tors' or rounded hummocks of bare rock due to constant weathering.

The river Krishna is the second largest river in Peninsular India flowing eastwards and draining into Bay of Bengal. The river rises in the Mahadev range of the Western Ghats near Mahabaleshwar at an altitude of about 1337 m above mean sea level and flows through the states of Maharashtra, Karnataka and Andhra Pradesh. The total length of the river from source to its outfall into Bay of Bengal is about 1400 km, of which 305 km is in Maharashtra, 483 km in Karnataka and 612 km in Andhra Pradesh. The Ghataprabha, the Malaprabha, the Bhima, the Tungabhadra, the Musi, the Palleru and the Muneru are the principal tributaries.

The basin extends over an area of 258948 km^2, which is nearly 8% of the total geographical area of the country.

Srisailam is one of the three proposed points identified for diverting water from the river Krishna to Pennar. The catchment area of the river Krishna up to Srisailam dam site is 211657 km^2 and lies in the states of Maharashtra, Karnataka and Andhra Pradesh.

2.1.2 Pennar Basin up to Somasila Dam Site

Pennar basin is fan shaped and is bounded on the north by Erramala hills, on the east by Nallamala and Velikonda hills of Eastern Ghats, on the south by Nandidurg hills and on the west by narrow ridge separating it from Vedavathi valley of the Krishna basin.

There are a number of hills and peaks of varying heights in the Pennar basin. A few notable hill ranges are Nallamala to the east of the basin, Erramala to the north, Palkonda ranges to the south of the river. The highest hill appears to be Horsely hill with an altitude of 1314 m. The interior of the Pennar basin has long ridges with isolated hills and small streams.

Pennar river is one of the major rivers of Indian Peninsula flowing eastwards and draining into the Bay of Bengal. The Pennar river rises in Chennakesava hill of Nandidurg range in Kolar district of Karnataka state. The total length of the river from the source to its out fall into the sea is 597 km, of which about 61 km is in Karnataka and the remaining 536 km in Andhra Pradesh.

The total catchment area of Pennar basin is 55213 km^2 of which 6937 km^2 is in Karnataka and 48276 km^2 in Andhra Pradesh. The principal tributaries of the river are Jayamangali, Kunderu and Sagileru from the left and Chitravati, Papagni and Cheyyeru from the right.

Existing Somasila project is identified for the diversion of water from Pennar to Cauvery River. The catchment area upto Somasila dam site is 50492.5 Km^2 and lies in Karnataka and Andhra Pradesh.

2.2 Geology of the Basins

The Krishna basin consists largely of Archaean formations, parts of which are covered by Deccan trap lavas, Cuddapah and Vindhya basins and faulted blocks of Gondwanas.

Hydrogeological investigations in the basin Krishna have been carried out by the Groundwater Departments of the respective states and the Central Ground Water Board. The studies indicate that groundwater occurs in all the geological formations. The occurrence and movement of groundwater in these rocks is controlled by the nature and extent of weathering and presence of joints and fractures.

In Pennar basin, important rock formations are hard or crystalline rocks of Archaean age, Dharwar super group, Cuddapah series of rocks belonging to Proterozoic age, Kurnool series comprising of Guvvalacheruvu quartzites, Vempally dolomites, lime stones and shales of Papagni series and Cheyyeru series. The Nallamala series comprise of Cumbum shales which are metamorphosed to slates and phyllites.

Hydrogeological studies in the Pennar river basin have been carried out by the Ground water departments and the results are the same as those observed in Krishna basin.

2.4 Basin Characteristics

2.4.1 Krishna Basin

2.4.1.1 Rainfall

The catchment mainly experiences the south-west monsoon during the period from mid June to mid October. The rainfall during the non-monsoon period is not significant. The annual rainfall over the catchment varies from 377 to 3048 mm.

2.4.1.2 Temperature

The climate of the catchment remains dry except in the monsoon months. From the climatological data observed at various IMD stations, it is seen that the mean daily maximum temperature in the basin varies from 27.7^{o} to 40.4^{o} C and the mean daily minimum temperature varies from 20.6^{o} to 27.2^{o} C.

2.4.1.3 Relative Humidity

Mean relative humidity is high during the monsoon period and comparatively low during the post monsoon period. In summer, the weather is dry and the humidity is low. Relative humidity in the basin ranges from 17 to 92 percent.

2.4.1.4 Wind Speed

Winds are generally light with some increase in force during the later half of the summer. The catchment is influenced by winds from the south-west during the monsoon season. In the post monsoon season, they blow from north-west to north direction. In the winter season, the winds blow from north-west and south-west directions. The wind speed in the basin varies from 4.0 to 21.7 km/hr.

2.4.1.5 Cloud Cover

Sky is generally heavily clouded during the monsoon season. In the post monsoon months cloudiness decreases. In the rest of the year the sky is clear or lightly clouded. The cloud cover in the basin varies from 0.8 oktas to 8.00 oktas.

2.4.2 Pennar Basin

2.4.2.1 Rainfall

The catchment receives rainfall both during the south-west and north-east monsoons. The rainfall during the non-monsoon period is not significant. The annual rainfall over the basin catchment up to Somasila project varies from 550 to 900 mm.

2.4.2.2 Temperature

From the mean daily maximum temperatures and mean daily minimum temperatures recorded at various IMD stations, it is seen that the mean maximum daily temperature varies from 40.3^{o} C observed at Cuddapah to 34.7^{o} C observed at Arogyavaram and the mean minimum daily temperature varies from 20^{o} C observed at Nellore to 15.3^{o} C observed at Arogyavaram.

2.4.2.3 Relative Humidity

In general, humidity is high during the monsoon period and moderate during the non-monsoon period. Relative humidity in the catchment of Pennar upto Somasila dam site ranges from 21 to 84 percent.

2.4.2.4 Wind Speed

Winds are generally light to moderate with some strengthening in monsoon season. The catchment is influenced by winds from south-west and north-west during the period from May to September and from north-east and south-east during the period from October to April. The wind speed in the catchment varies from 4.3 to 21.3 km/hr.

2.4.2.5 Cloud Cover

Sky is generally heavily clouded during the monsoon months. In the post monsoon months cloudiness decreases. During the rest of the year, the sky is clear or lightly clouded. The cloud cover in the catchment ranges from 1.3 oktas to 7.1 oktas.