CHAPTER 2

CAUVERY RIVER BASIN
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If we look into the river basins of India we have three important categories, based on catchment areas (Rao, 1975).

i) Major rivers - catchment area > 20,000 sq.km

ii) Medium rivers - catchment area 2,000-20,000 sq.km

iii) Minor rivers - catchment area < 2,000 sq.km.

As per this classification, India has fourteen major, forty-four medium and several minor rivers. Cauvery flowing across the Peninsular India is one of the major rivers of South India. In this chapter, the catchment characteristics, geology and geography of the basin are described in brief.

Location and catchment Characteristics of River Cauvery

River Cauvery is physically perhaps the most remarkable river of the Peninsular India (Spate et al., 1972). The Cauvery rises in the Brahmagiri range of the Western Ghats in Coorg district of Karnataka at an elevation of 4340 m. Its basin is located between the latitudes 10°7' N and 13°28' and longitudes 75°28' E and 79°52' E.

Cauvery has a drainage area of 87,000 sq.km of which Kerala has 3.3%, Karnataka 41.2% and Tamil Nadu 55.5% (Rao,
The basin runs roughly in a NW-SE direction. This SE trend of the Cauvery river is due to the uplift of the Western Ghats and slight tilt of the Peninsular Indian mass to the east during the Miocene age (Krishnan, 1981). Cauvery flows for about 800 kms and breaks into a large number of distributaries before emptying into the Bay of Bengal.

The drainage basin map of Cauvery is given in Fig. 3. The river Cauvery flowing south-east has its flow across the foliation direction of rocks. Hence, dendritic pattern of drainage is very well noticed in the river basin. Furthermore, the long profile of the river Cauvery through terraces and knick points clearly indicate the possible uplift and erosion in the geological past (Paramasivam, 1968).

The tributaries of the river Cauvery include Kanaka, Hemavathi, Shimsha, Arkavathi, Lakshman Thirtha, Kabini and Suvarnavati in Karnataka and Bhavani, Noyyal and Amaravathy in Tamilnadu. Beyond the present Krishna Raja Sagar dam, the river is a simple rocky mountain stream (Spate et al., 1972). Here a small stream known as Kanaka joins the river Cauvery at Bagamandala which is almost 32 km from Tala Cauvery. The river turns towards northeast and east shortly before it is dammed at Krishna Raja Sagar Lake. The river,
Fig. 3 Drainage Basin Map of Cauvery River Basin
Hemavati originates near Belur at an altitude of 1500 m, flowing southeast and joins with its tributary namely Yagachi near Gorur. From Gorur the Hemavathi flows east-south and finally joins the river Cauvery. The other tributary Lakshmanthirtha originates near Kurichi at an elevation of about 1,500 m and flows northeast and joins river Cauvery at Krishna Raja Sagar lake. The upper course of the main river and tributaries are at higher altitudes, which get abundant rainfall spread over more than 8 months of the year. Thus, it keeps the river a perennial one.

Kabini is an important tributary which originates in the Western Ghats in Kerala state at an latitude of 2060 m and joins the river Cauvery near T.Narsipur. Another important tributary, Suvarnavati joins the river just before the Sivasamudram falls. After a much tumulus course the river maintains Southeast-East direction but with a number of curves producing rapids and falls, till it reaches Sivasamudram falls. Here the river leaps into a steep drop of 90 m and gives rise to the celebrated Sivasamudram falls. Shimsha and Arkavathy are the tributaries which join the river Cauvery after Sivasamudram falls just before the river enters Tamilnadu.

Below the Sivasamudram island the river Cauvery plunges through a succession of wild gorges with right angle bends
conforming to the northwest/southeast and southwest / northeast stresses of the plateau's edge the Hogenekal falls may be taken as the end of its plateau course. There is however, another narrow straight gorge, northwest of Salem and this provides the emplacement for the Mettur dam.

The river Cauvery crosses the 150 m contour at the Bhavani confluence. The rivers, Bhavani and Moyar drain from Nilgiris. But the tributaries, Noyyal and Amaravathi which originate from Karimalai (1966 m) and Anaimudi area of Western Ghats are important in the southern part of the Cauvery basin. The small tributaries like Thirumonimuthar and Aiyar flow from Shevroy hills and Pachaimalai towards south and join the river Cauvery. Below the Mettur dam, the river Cauvery flows in almost a plain. After Srirangam (near Trichy) the gradient is gentle and flow of water becomes very sluggish. As the velocity is checked because of a very gentle gradient, it cannot carry its load of sediment. Naturally, the river which is in its last part of the mature stage, deposits the material brought from the Western Ghats and rugged plateau of upland. This time the action of the river is aggradation and the continuous process of deposition leads to the development of distributaries. The distributaries divide and sub-divide into a number of small branches which form a network all
over the delta. The branch which retains the name of the Cauvery through its course, enters the Bay of Bengal at Kaveripatnam about 13 km north of Tranquebar.

**Geology of the Drainage Basin**

The network of the Cauvery river system drains largely through the Precambrian formations in Karnataka, Kerala and Tamilnadu states. The Precambrian formations of this part of South India are welded over the oldest craton (Naqui et al., 1978). The investigation by ONGC (Oil and Natural Gas Commission) has revealed the occurrence of a regional system of deep main faults. The parallel faults of the Cauvery system belong to this regional system (Grady, 1971). The study of LANDSAT imageries and space photography (Gemini II) has revealed the presence of a series of parallel to enechelon lineaments in the drainage area of the Cauvery which fit into the tectonic setting of South India as a whole (Katz, 1978).

Fig. 4 shows the geological map of the Cauvery river basin. The Precambrian formations of the drainage basin of the Cauvery river comprise of the Dharwar system, Peninsular granite gneiss, charnockite and closepet granite (Krishnan, 1981). Special rock types for example eclogites, kometites, carbonatites etc., have also been reported from
Fig. 4 Geological Map of Cauvery River Basin
the Precambrian terrain of the drainage basin of the Cauvery. The Dharwar system consist of slates, phyllites, chlorite schists, biotite schists, sillimanite schists, hornblende schists garnetiferous schists, staurolite schists, kyanite schists ferruginous quartzites, greenstones and quartzites (Krishnan, 1981; Naqvi et al., 1978). They occur in isolated strips and are limited to the northern part of the Cauvery drainage basin.

The Peninsular granite gneiss are the dominant group of rocks found in the Cauvery basin. They consist of a very heterogeneous mixture of different types of granites intrusive into the schistose rocks. They include granites, grano-diorites, gneissic granites and banded or composite gneisses. The banded gneisses consist of white bands of quartz-feldspar alternating with dark bands containing hornblende, biotite and minor accessories. The granitic group ranges in composition from granite through granodiorite to adamellite, augite-diorite, monzonite etc.

The middle Cauvery upland region is made up of charnockites. Charnockites are hypersthene bearing granites composed of blue quartz, feldspar and hypersthene. They range in composition from basic to acidic varieties. They are exposed in the Shevaroy hills of Salem, Coimbatore,
Nilgiri hills and Palni hills of Madurai, Coorg and other areas of the Eastern Ghats.

The closepet granite is drained by the river in the upper reaches of the drainage basin. The closepet granite is a pink coloured granite. It consists of porphyritic and non-porphyritic types. Mineralogically it consists mainly of quartz, plagioclase, myrmekite, microcline, perthite, subordinate amounts of hornblende, minor amounts of apatite, biotite, rutile, zircon and occasional fluorite (Chatterji, 1974). They occur as domeshaped discordant batholiths surrounded by the finer grained gneissic varieties.

With respect to the deltaic area, the Cretaceous beds form the oldest formation. These formations were deposited under marine environment. They rest upon an ancient surface of the archean gneisses or on upper Gondwanas. The Cretaceous formations of the coastal tract of the Cauvery basin consist of faunal rich marine sedimentary rocks namely limestones, sandstones, clays, sandy beds etc.

The Tertiary rocks overlie the Cretaceous formations. The outcrops here and there are seen in the form of Miocene and Pliocene formations of the upper tertiary period. The mouth of the basin is constituted by alluvium deposits which is composed of clays and silts.
Climate

The influence of South West monsoon is more pronounced in the northern part of the basin especially in the areas of northwest and southwest. Whereas southern part of the basin, especially the deltaic area is more under the influence of North East monsoon.

If individual elements of climate are taken into account, the temperature varies from upper reaches of the basin to the plain regions of the Cauvery delta, mainly because of variation in altitude. For instance, the average annual temperature is 15.6°C at Mercara as against 30°C at Thanjavur. Major part of Cauvery basin is free from any oceanic influences, partly because of elevation and partly due to interior location in the Peninsula.

The hilly zones in the northwest and southwest part of the basin receive high rainfall. The central part of the basin is landlocked and hence it suffers from inadequate rainfall. As indicated earlier, the northern part of the basin receives copious rainfall due to South West monsoon enriching the catchment capacity of northern tributaries. Cyclonic rainfall and flooding in low lying areas are common during the North East monsoon period in the eastern part of the delta.
In short, it is observed that the total amount of rainfall over the entire basin is about 1092 mm and it is uneven and irregular in occurrence. It is also noted that the modification brought about by the total storms, with their centres of origin in the Bay of Bengal and the Arabian sea are tremendous and their passage along with the monsoon currents to a large extent affect the total annual rainfall.