

## Chapter - 2 Physical Features

### 2.1 Geographical Disposition

The Polavaram - Vijayawada link canal takes-off from the head works across Godavari river near Polavaram. The canal runs between Godavari and Krishna rivers roughly in east to westward direction. The canal passes through the taluks of Polavaram, Kovvur, Tadepalligudem and Eluru of West Godavari district and the taluks of Nuziveedu, Gannavaram and Vijayawada of Krishna district.

### 2.2 Topography of Basin, Reservoir and Command Area

#### (a) Topography of Basin and Reservoir

The Godavari basin extends over an area of 312813 km<sup>2</sup>, which is nearly 10% of the total geographical area of the country. The basin lies between latitudes 16° 16' N and 22° 43' N and longitudes 73° 26' E and 83° 07' E. The basin comprises areas in the States of Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and Orissa. The State-wise distribution of the areas is given in Table 2.1.

**Table 2.1**  
**State-wise drainage area of Godavari basin**

Sl.No.	Name of the State	Drainage area (km <sup>2</sup> )	Percentage of the total basin drainage area
1.	Maharashtra	152199	48.60
2.	Madhya Pradesh	65255	20.90
3.	Andhra Pradesh	73201	23.40
4.	Karnataka	4406	1.40
5.	Orissa	17752	5.70
	Total	312813	100.00

The Godavari basin is bounded on the north by the Satmala Hills, the Ajanta Range and the Mahadeo Hills, on the south and east by the Eastern Ghats and on the west by the Western Ghats. It is roughly triangular in shape and the main river itself runs practically along the base of the triangle.

Except for the hills forming the watershed around the basin, the entire drainage basin of the river Godavari comprises of undulating country, a series of ridges and valleys interspersed with low hill ranges. Large flat areas which are characteristic of the Indo-Gangetic plains are scarce except in the delta. The Sahyadri ranges of Western Ghats form the western edge of the basin. The interior of the basin is a plateau divided into a series of valleys sloping generally towards east. The Eastern Ghats, which form the eastern boundary, are not so well defined as the Sahyadri range on the west. The northern boundary of the basin comprises of tablelands with varying elevation. Large stretches of plains interspersed by hill ranges lie to the south.

## **(b) Command Area**

The Polavaram - Vijayawada link canal runs for a length of about 174 km starting from Polavaram head works in West Godavari district and terminating into Budameru river near Velagaleru regulator in Krishna district. The GCA of the canal is 162691 ha. The alignment runs almost parallel to NH-5 as well as to Chennai - Howrah railway line. The terrain of the command en route is partly rugged and partly plane due to abruptly rising hills with numerous hill streams like Kovvada Kalva, Yerra Kalva, Gunderu, Tammileru, etc. The soils available in the command area are predominantly alluvial soils, black cotton soils and red soils with clay base.

## **2.3 River System and Basin Characteristics**

The Polavaram - Vijayawada link canal project basically involves two river basins i.e., Godavari and Krishna as it envisages diversion of surplus Godavari water for use in watershort Krishna basin. As such, the salient details of both the river basins are briefly discussed.

### **2.3.1 The Godavari**

#### **(a) River System**

The river Godavari is the second largest in the country and the largest in Southern India. It rises in the Sahyadri hills at an altitude of about 1067 m near Triambakeswar in the Nasik district of Maharashtra State and flows across the Deccan plateau from the Western Ghats to Eastern Ghats. Rising in the Western Ghats about 80 km from the shore of the Arabian sea, it flows for a total length of about 1465 km in a general south - eastern direction through the States of Maharashtra and Andhra Pradesh before joining the Bay of Bengal at about 97 km south of Rajahmundry in Andhra Pradesh.

The major tributaries joining the Godavari are the Pravara, the Purna, the Manjra, the Maner, the Pranhita, the Penganga, the Wardha, the Wainganga, the Indravati and the Sabari.

#### **(b) Basin Characteristics**

Like most of the parts of India, the Godavari basin receives the major portion of its rainfall during the south-west monsoon period. The other rainy seasons are not so well defined and well spread as the south-west monsoon season. They contribute about 16% of the total annual rainfall in the Godavari basin.

The Godavari river receives the drainage from a length of about 129 km of the high rainfall zone in the Western Ghats. The annual rainfall varies from 3000 mm to 1000 mm in this reach. East of the Western Ghats, the annual rainfall decreases rapidly to less than 600 mm along a line appearing approximately from Chitradurga to Sangli and Pune to a point north-east of the line connecting Kurnool, Raichur, Bijapur and Ahmednagar. East of this line the rainfall again gradually increases to about 900 mm in and around Guntur.

There is a belt, some distance east of the Western Ghats and in width varying from about 80 km in the south to about 97 km in the north, with less than 600 mm, the normal annual rainfall. This belt, which is about 10360 km<sup>2</sup> in area, includes portions of the Aurangabad and Ahmednagar districts of Maharashtra.

January and February are almost entirely dry in the Godavari basin, the rainfall during these two months being less than 15 mm. During the next three months up to end of May, it varies from 20mm to about 50mm in most parts of the basin.

The Godavari basin has a tropical climate. The mean annual surface temperature in the Western Ghats area is about 24° C, and it increases gradually towards the east and attains a maximum of 29.4° C on the east coast. During January, which may be taken as a typical winter month, the mean daily minimum temperature going from west to east, increases from 15° C, on the Western Ghats to about 18° C on the east coast; the mean daily maximum temperature generally exceeds 30° C in the western part of the Godavari basin and it is only slightly less than 30° C in the eastern part.

The population of the basin, based on 1991 census was 51.6 million out of which about 77% live in rural and remaining 23% in urban areas. The density of population is around 165 persons per km<sup>2</sup>. Nearly 40% of work force is engaged in cultivation, 30% as agriculture labour and balance 30% in mining, manufacturing etc.

### **2.3.2 The Krishna (a) River System**

The river Krishna rises in the Western Ghats at an altitude of 1337 m just north of Mahabaleshwar, about 64 km from the Arabian sea and flows from west to east through the States of Maharashtra, Karnataka and Andhra Pradesh to join the Bay of Bengal. 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 is in Karnataka and 612 km is in Andhra Pradesh.

The major tributaries joining the Krishna are the Ghataprabha, the Malaprabha, the Bhima, the Tungabhadra, the Musi, the Palleru and the Muneru.

### **(b) Basin Characteristics**

The Krishna basin extends over an area of 258948 km<sup>2</sup> which is nearly 8% of the total geographical area of the country. The basin lies between latitudes 13° 07' N to 19° 25' N and longitudes 73° 21' E and 81° 09' E. The basin comprises areas in the States of Maharashtra, Karnataka and Andhra Pradesh. The State-wise distribution of areas is given in Table 2.2.

**Table 2.2**  
**State-wise drainage area of Krishna basin**

Sl.No.	Name of the State	Drainage area (km <sup>2</sup> )	Percentage of the total drainage area
1	Maharashtra	69425	26.80
2	Karnataka	113272	43.80
3	Andhra Pradesh	76251	29.40
	Total	258948	100.00

The Krishna basin is bounded on north by the common ridge separating it from the Godavari basin, on the south and east by Eastern Ghats and on the west by the Western Ghats. The basin is approximately triangular in shape with its base along the Western Ghats, the apex at Vijayawada and the river Krishna itself forming the median.

The interior of the basin is a Plateau, the greater part of which is at an elevation of 300 - 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 the plateau. The hill sides are marked by conspicuous wide terraces except in the southern part of the plateau where the hills are frequently crowned with great 'tors' or rounded hummocks of bare rocks as the result of the constant weathering. Like most parts of India, the Krishna basin receives the major portion of its rainfall during south - west monsoon period. During this period the basin receives about 80% of its total annual rainfall.

The high rainfall zone along the Western Ghats forms the Western boundary of the Krishna basin for a distance of 708 km and many channels big and small carry the drainage of this area into the Krishna. The annual rainfall varies from 3048 to 1016 mm in this reach.

East of Western Ghats, the annual rainfall decreases rapidly until it is less than 600 mm along the line running approximately from Chitradurga to Sangli, to Pune and then to a point north and east of a line connecting Kurnool, Raichur, Bijapur and Ahmednagar. East of this, the rainfall again gradually increases to about 900 mm in and around Guntur.

The cold weather season from October to February is generally pleasant in the entire basin. In the hot weather season, the heat is unbearable in the central, northern and eastern regions. It is comparatively pleasant in the Western most parts.

The Krishna basin has a tropical climate. The mean annual surface temperature in the Western Ghats is about 24° C. It increases gradually towards the east and attains a maximum of 29.4° C on the east coast. During January, which may be taken as representative of the winter months, the mean daily minimum temperature increases from west to east from 15° C in the Western Ghats to about 18° C in the east coast; the mean daily maximum temperature generally exceeds 30°C in the western part of the Krishna basin and is only slightly less than 30° C in the eastern part.

The population of the basin based on 1981 census was 48.06 millions, out of which 72% live in rural and remaining 28% in urban areas. The density of population is around 187 persons per km<sup>2</sup>.