

CHAPTER II

PROFILE OF THE REGION

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2.1 INTRODUCTION

The origin, distribution and utilization of water resources of any region are profoundly affected by its physical features. The physical environment plays a significant role in determining the development of irrigation. Hence in the present chapter the study of physical bases viz terrain, drainage, climate, soil water resources have been attempted in the context of irrigation. However due to some limitations. The researcher has discussed some salient features based on the Survey of India's toposheets No 47 L/7.

2.2 PHYSICAL SETTING :

2.2.1 The Terrain :

The relief of an area is one of the primary determinants of the spatial differences in the intensity of agricultural activities. The need for irrigation and drainage is mainly determined by geological, topographical and meteorological conditions (Fukuda, 1976). As such, there are three significant physical aspects of terrain such as altitude, slope and drainage pattern. The nature of terrain determines the areas unfit for irrigation in general and lift irrigation in particular. Hence, it needs investigation of the physiographic condition which leads to the possible irrigational and agricultural plans for development.

- **Relief:**

The Chikotra basin lies between the Chikotra range in the south and Bhudrgad rage in the north. Chikotra river flows between these ranges from west towards the east. The western border of the region is well defined by the watershed of Sahyadri

and the Northern and southern watershed by Bhudargad range and Chikodi range respectively.

The major topography of the region consists of 'Deccan trap'. The hills, foot-hills and plain divisions are made by close examination of topo-sheet published by the survey of India. These variations in the land are due to the geographical complexity of the region and varied geomorphological evolutions (Deshpande, 1971). The topography of the region consists of three divisions viz. hill ranges, food-hills and erosion plain. (Fig No 2.1)

- **Hill Ranges :**

The hill ranges comprises Chikodi range in the south and Bhudargad range in the north. These ranges are the eastward extension of Sahyadri mountain following the southwest to Northeast orientation. It is a part of basaltic plateau of Maharashtra having the characteristics of lava topography consisting of flat tops and steep escarpments on the flanks which carry several terraces. The ranges rises in to about 700 metres.

Theses ranges show how a number of sub branches extended towards the valley. The height of the ranges has increased (above 700 meters) towards the west and decreased (600 meters) eastward of the region.

The hill portion covers (10%) of the total geographical area. Some ranges work as a water divider in Chikotra basin.

The general nature of the ranges is featured by the occurrences of alternate spurs and small valleys setting the limits to agriculture. The abruptness of their rise is the main character of these ranges.

- **Foot- Hill zone-**

Foot hills zone lies between the river plain and hills covering about 65 percent of the total geographical area. The altitude ranges from 550 meters to 600 meters presenting undulated topography. Generally this transitional landscape is that of series of spurs extending towards the river basin. This zone consists the scrubs with forests in the east and grasslands are located between the sub-tributary is terraces. Here some cultivation is practiced with irrigation.

- **Plain area:**

This is relatively plain area in the region, it share's about 25% of the total area of basin. Chikotra river has formed a narrow plane (below 500 meters) which open towards the east. This region though small in extension is suitable for agricultural activities. The narrow alluvial tracts along the river sides have proved their suitability for irrigation and subsequently for sugarcane cultivation. The rolling topography, availability of water in the river course and substantial ground water table have lead to the development of irrigation.

2.3 DRAINAGE:

It is very important to know about drainage pattern of the region . The variations in the relief of the study region has influenced the drainage pattern also and it is closely related to the pattern of irrigation. The length and number of streams focus the volume of water which further affectes the possible development of irrigation.

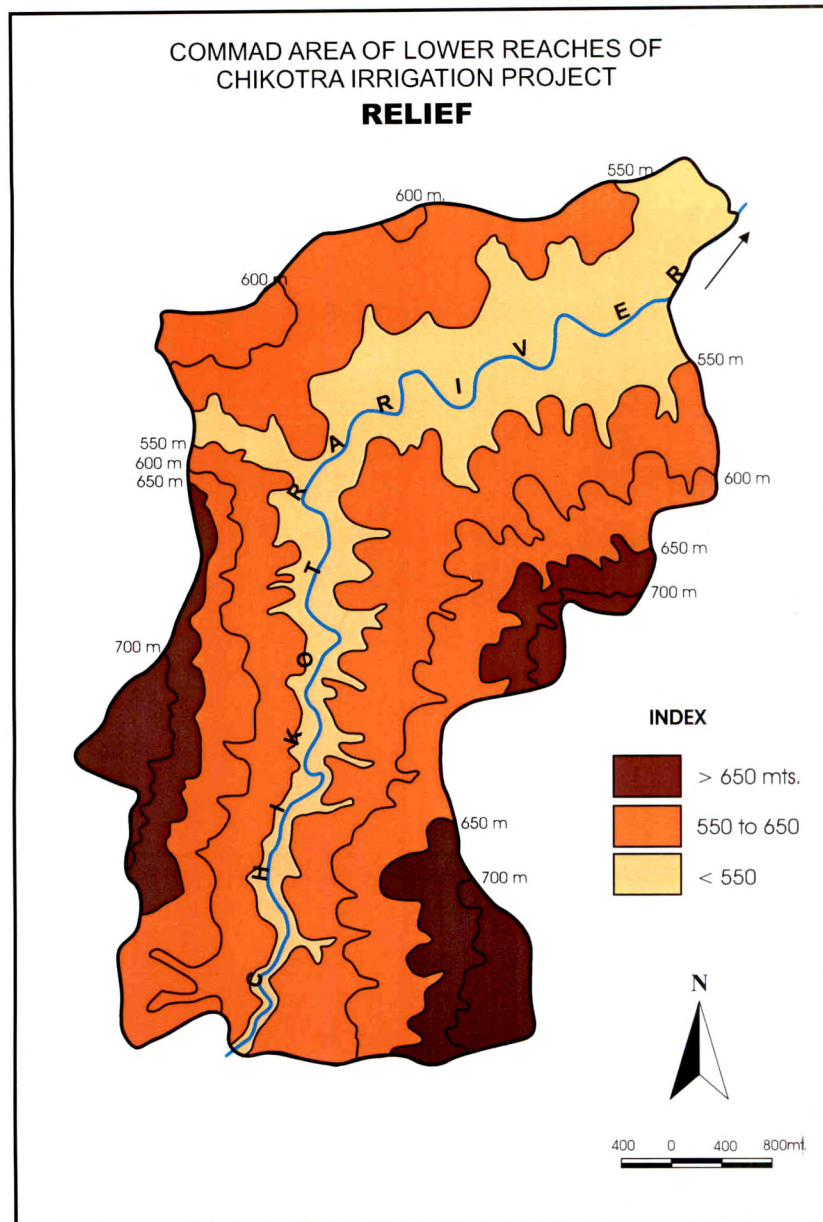
The region under study is mastered by Chikotra river. There are number of (208) small streams in the region, but they are seasonal (fig No 2.2). They provide water to some rabi crops like wheat, gram etc. No much variation is observed in the network of drainage pattern. In the plain areas along the river are highly praised for their fertility and are important areas of irrigation particularly for sugarcane cultivation. The physical setting of the Chikotra river basin is ideal for the constructing of K.T. weirs. Due to weirs water is artificially impounded within the river course and such impounded water is lifted to near by cultivation land. There are five K.T. weirs at present in operation for irrigating the crops. They are:

- 1) Galgale K.T weir.
- 2) Metage K.T. weir.
- 3) Arjunwada K.T. weir.
- 4) Nandyal K.T. weir.
- 5) Kapshi K.T. weir (Fig.No 2.3).

Their names also suggests their locations. The river Chikotra plays a significant role in the development of irrigation in the region. The K.T. weirs help to store the seasonal flow of water as well as water released from Chikotra dam which is utilized for irrigation through lift irrigation.

2.4 CLIMATE:

Climate is the principle aspect of physical environment affecting agriculture. (Symons 1967). The temperature and rain fall being two important elements of climate have been



Base : S.O.I. Toposheet No. 47 $\frac{L}{7}$

Fig. 2.1

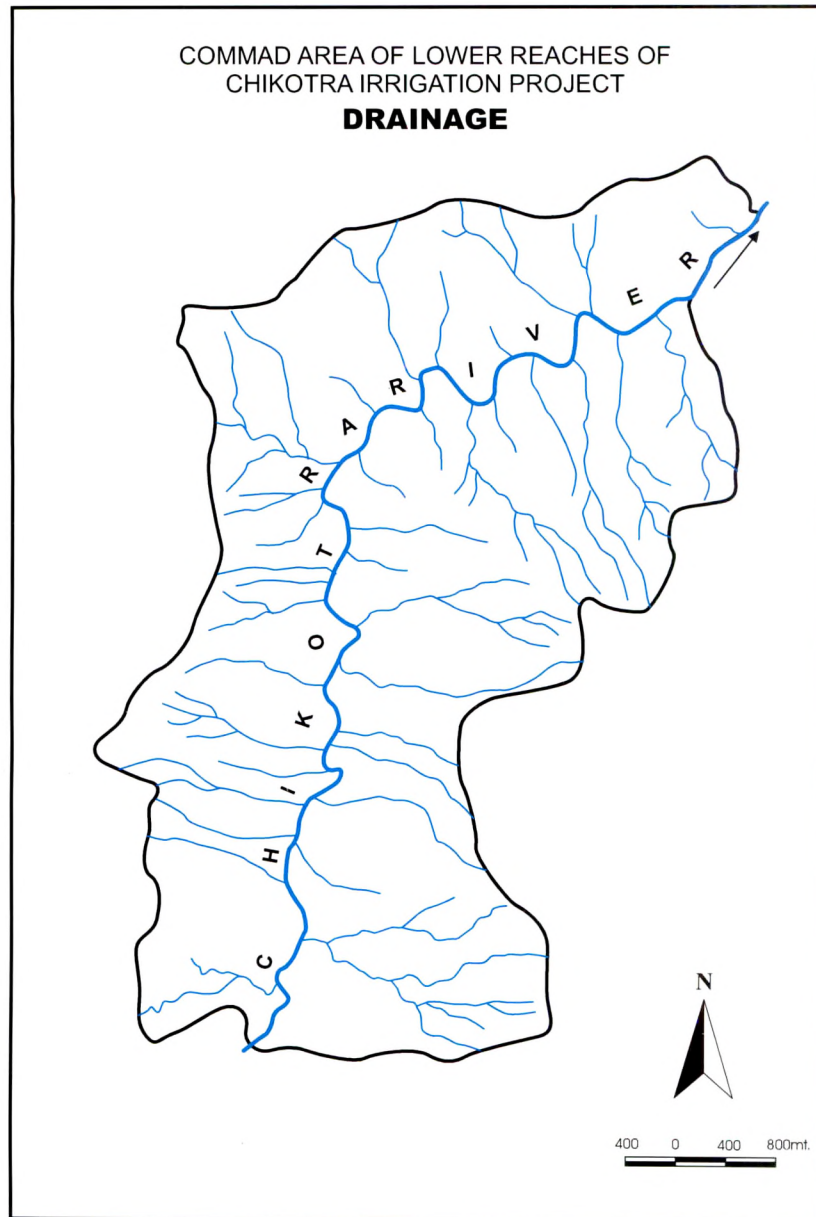


Fig. 2.2

COMMAD AREA OF LOWER REACHES OF
CHIKOTRA IRRIGATION PROJECT
LOCATION OF KOLHAPUR TYPE WEIRS

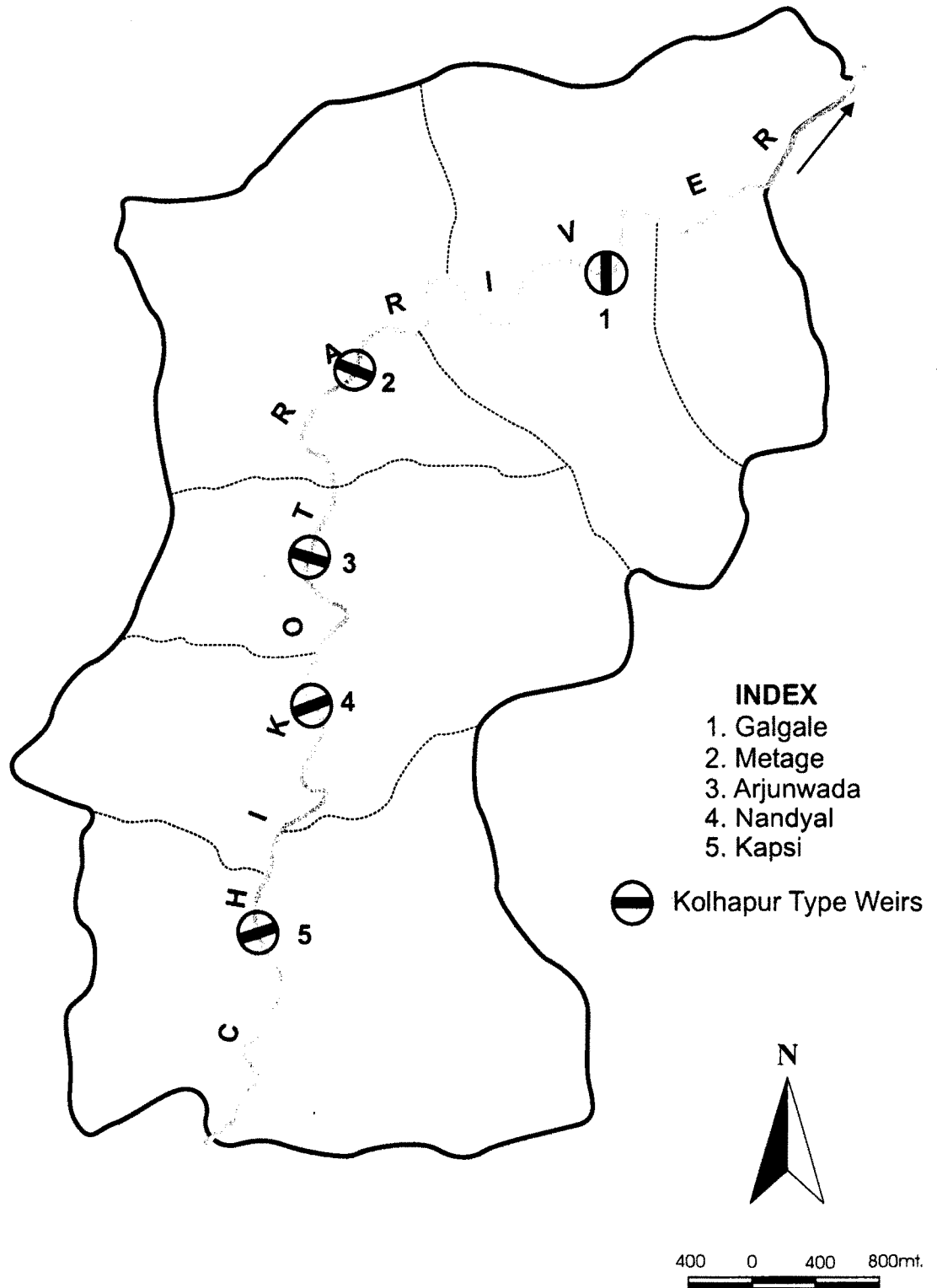


Fig. 2.3

considered in the present analysis. The nature of distribution of these elements determines the necessity of irrigation.

The period from March to May is the summer season. But in the remaining months the climate is healthy. During the hot season the warm winds are very aggressive but in the evening time due to entry of cold sea winds the temperature falls down. It makes cool and pleasant afternoons.

The following are some of the important climatic parameters discussed in the context of agriculture.

2.4.1 Temperature:

The lower reaches of Chikotra basin being a small region and due to absence of meteorological station the data observed at Kagal meteorological station has been considered for present analysis.

TABLE NO. 2.1

**COMMAND AREA OF LOWER REACHES OF CHIKOTRA
IRRIGATION PROJECT: MONTHLY AVERAGE
TEMPERATURE AND RAINFALL OF THE REGION 2005-06.**

Sr. No.	Months	Temperature °c	Average monthly rainfall in m.m	Rainfall Percentage to total
1	January	21.5		-
2	February	24	6.02	0.40
3	March	27	6.02	0.40
4	April	29	1.50	0.10
5	May	30	7.37	0.49
6	June	25	333.44	22.17
7	July	23	496.47	33.01
8	August	26	457.66	30.43
9	September	25	108.14	7.19
10	October	25.5	72.19	4.80
11	November	23	14.89	0.99
12	December	22	0.3	0.02
	Total	-	1504	100

Source: Scio-economic review and District statistical Abstract Of Kolhapur district 2005-06.

Table No. 2.1 and Fig. 2.4 show average monthly temperature which varies from month to month. The average maximum temperature of 30°C in the study region is record in the month of May while the average minimum temperature (21.5°C) is recorded in the month of January. The western part of the basin is cooler than the eastern part. The high temperatures in summer season enhance the rate of evaporation of water .

COMMAD AREA OF LOWER REACHES OF
CHIKOTRA IRRIGATION PROJECT
MONTHLY AVERAGE TEMPERATURE

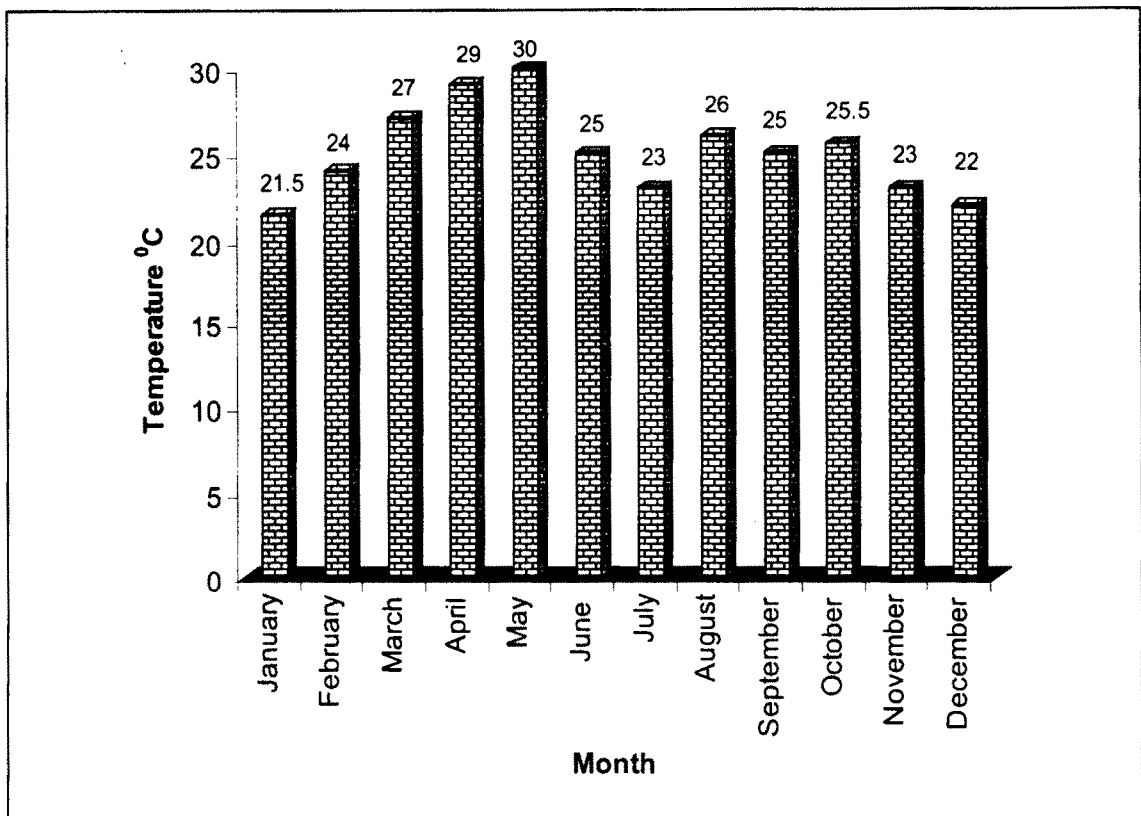


Fig. 2.4

2.4.2 Rainfall :

The necessity of irrigation is determined by the amounts of rainfall received during the period when plants require water. The variation in rainfall characteristics affect agriculture as a whole, therefore, it needs detail investigation.

The rainfall is a source for both surface and underground water. The availability of the rainfall and groundwater influence the land use of an area. The study area gets the rain from south-west and north-east monsoon. As there is no rain gauge station in the region rainfall recorded at nearest I.M.D. station Kagal is considered for analysis. The average annual rainfall of the region is '1504 m.m.', it receives maximum rainfall in the month of July (Fig. 2.5).

- **Seasonal distribution of Rainfall:**

The region receives about 1504 mm of average yearly rainfall which decrease slightly from west to east. The need of irrigation arises when the distribution of rainfall is unequal in time and space as the crops require timely and adequate water supply. Table No (2.1) shows the temporal variation in rainfall in the area which is very remarkable.

In view of the fluctuations occurring in rainfall the year can conveniently be divided into four seasons :

- **Rainy season (June to September) :**

The temporal variation in rainfall in study area is predominant. The rainfall is highly concentrated in this season as it falls about 92.80 percent of the total rainfall. The rainfall is heavy, mostly assured and very much useful for kharif crops.

The intensity of rainfall during this season (11.44 per day) is valuable in the context of water availability for irrigation for the rest of the season.

- **Post monsoon season (October to November):**

The climatically this season is transitional. The south-west monsoon is replaced by north-east monsoon associated with cyclonic type of its total rainfall and this is useful for Rabi crops. It shares nearly 5.79% of total rainfall of the region.

- **Winter season (December to February):**

In this period the region receives almost insignificant rainfall (0.42%) which is characterized by the irregular cyclonic rainfall, it is beneficial, though not adequate for rabi crops.

- **Hot summer season (march to may) :**

The region receives a negligible amount of rainfall (0.99%) in this period which is associated with thunder storms. It is very usefull for sugarcane as there is very much scarily of water for irrigation during this period and leads fair growth of this crop.

2.4.3 Need of irrigation :

The rainfall and irrigation are closely related to each other. The spatio-temporal distribution of rainfall in the Chikotra basin as a whole are very much varied. There is fair concentration of rainfall in the rainy season but still the region experiences dry spells in rainy season also. The dry months are characterized by acute shortage of water for crops as they receive insignificant

COMMAD AREA OF LOWER REACHES OF
CHIKOTRA IRRIGATION PROJECT
MONTHLY AVERAGE RAINFALL

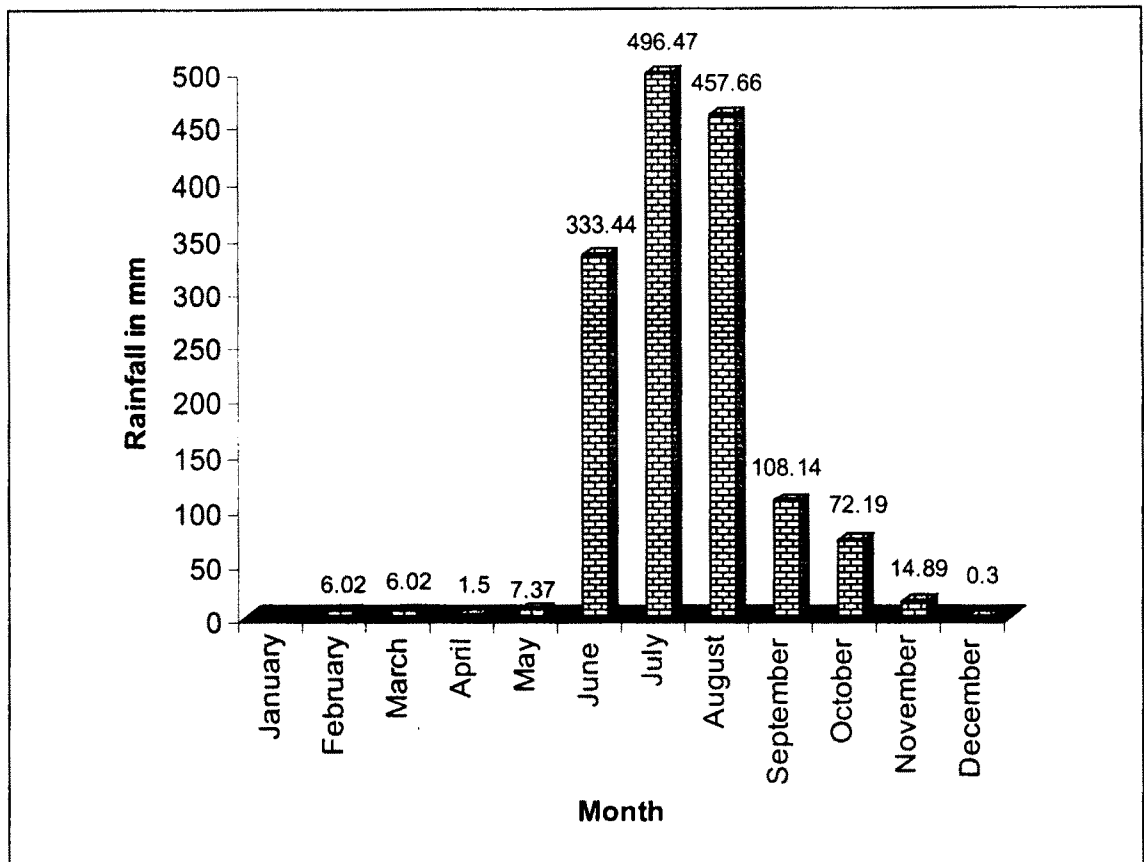


Fig. 2.5

amount of rainfall. This has created the need of irrigation in the region.

There fore, the region has only alternative to store rainfall water within the dams and K.T. weirs and regulate it when it is required to standing crops. Thus there is link between rainfall and development of irrigation so these two element are closely related in any region on surface of the earth.

2.5 SOILS :-

Soil is the important natural resource. An understanding of the physical and chemical make-up of soil is indispensable to an agricultural geographer as this constitutes a number of geographical factors together with fertility and special quantities. The combination of physical, chemical and biological characteristics of the soil determine the standard of agriculture and quality of crop raised on them. (Pawar and Phule 1999)

The study of soils is essential in the analysis of irrigation too as irrigated agriculture depends on the control of moisture in soil. The region consists of following soil types. (Fig No 2.6)

2.5.1 Coarse shallow soils:

Coarse shallow soils are located on the slopes of the northern and southern hill ranges, particularly on the foot hills and share about 41.00% of total area. These are brown in colour loamy to sandy in texture having less depth, poor in nutrient status and thus moderately productive. Generally rice, jowar, groundnut are grown on this soil group. These soils occupy the two side area of the region away from the east and west side of

the river. This soil observed in the village namely Kapsi, Kardyal, Galgale and west part of Hamidawada, Nandyal, Alabad.

TABLE 2.2
COMMAND AREA OF LOWER REACHES OF CHIKOTRA
IRRIGATION PROJECT: AREA PERCENTAGE UNDER
DIFFERENT SOIL GROUPS

Sr. No	Soil groups	Area in percentage
1	Coarse shallow	41.00
2	Medium deep black	34.00
3	Alluvial	25.00
	Total	100.00

Source : Compiled by the researcher.

2.5.2 Medium and deep black soils :

These soils occupy 34% of the lower part of basin at the centre (Fig. 2.5). These are loamy to claye in texture and suitable for crops like sugarcane, wheat, jowar, chilies, tobacco, soyabin, etc. This is observed in parts of mostly Kardyal, Kapsi, Hamidwada, Nandyal, Alabad and Khadakewada villages.

2.5.3 Alluvial soils:

These rich soils are confined to the narrow flood plain of the river and occupy 25% of total area, They are medium brown and are suitable for sugarcane and rice. These soils are confined in some part of Lingnur, Galgale, Kapsi, Arjunwada, Khadakwada, metage, villages.

COMMAD AREA OF LOWER REACHES OF
CHIKOTRA IRRIGATION PROJECT

SOILS

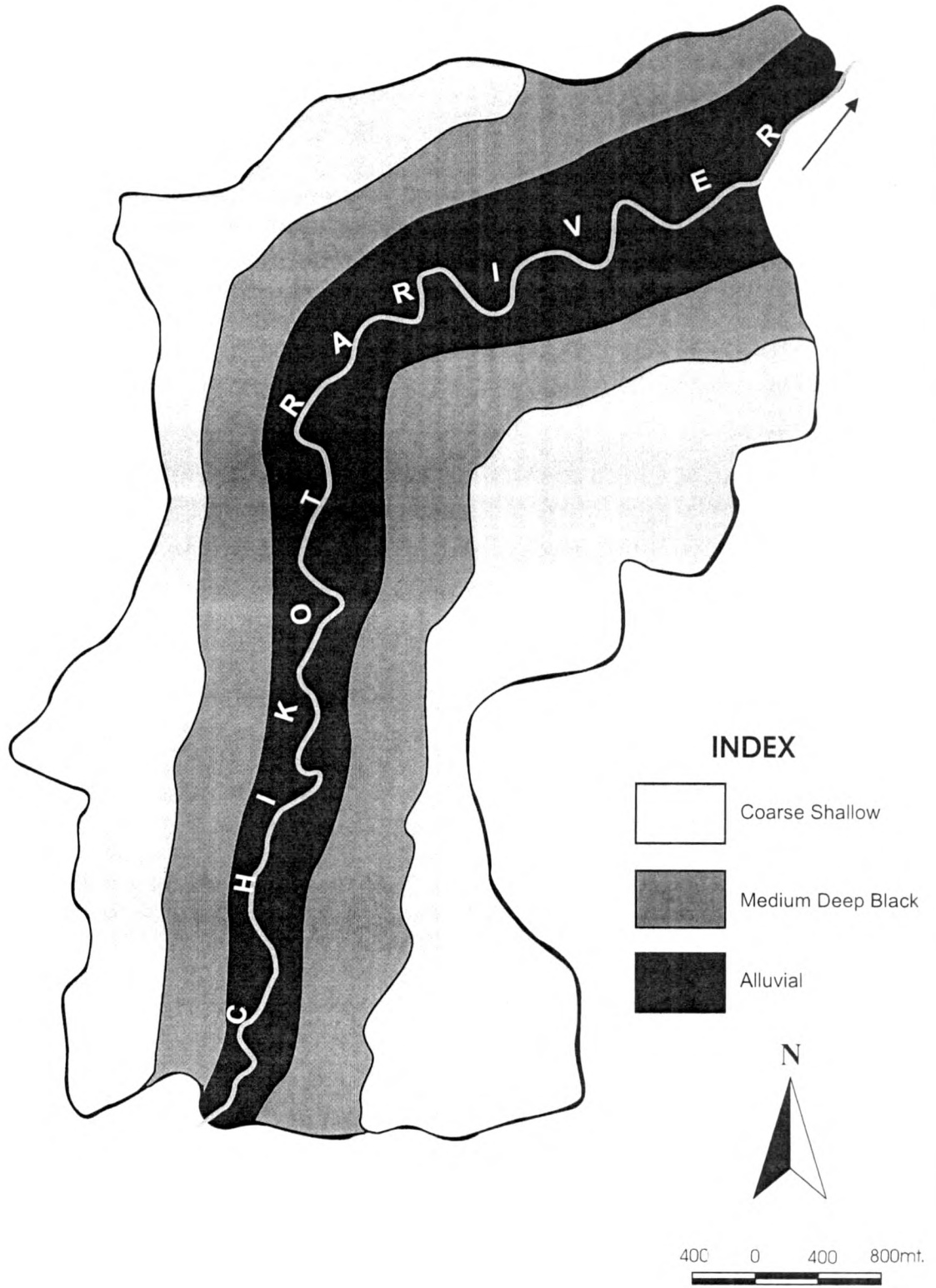


Fig. 2.6

Table 2.2 shows that a large share (41%) is contributed by coarse shallow soil followed by deep black soil (34%) and alluvial soil (25percent). It reveals that the lower reaches of basin particularly valley sides have share of fertile soils.

2.6 WATER RESOURCES :

There is no need to emphasize the importance of water resources in promoting the agricultural development. An uninterrupted and assured supply of water to agriculture is of immense importance for augmenting agricultural productivity. An assured and regulated supply to agricultural water from ground and surface resources is the basic essential aspect upon which any further planning of irrigation depends. (Singh, 1976)

Enough water resources are observed in the region but the need is to explore these sources for irrigation. The water resources i.e. surface water and ground water play an important role in the development of agriculture. Though the water resources in the region are adequate, they are yet to be utilized. Ground water level changes according to time and space in the study area. The watertable is near the surface during post-monsoon period whereas it deplit during pre-monsoon (May) period (Personal interviews), there were some restrictions for the development of well irrigation in the region.

But after the construction of K.T. weirs and high intensity of irrigation the fluctuation in annual average surface water in the form of river, streams, springs and ground water has reduced there by creating high potential for both surface and ground

water. Therefore the water resources of the region need be properly managed and carefully utilized.

2.7 DEMOGRAPHIC ASPECTS:

Agriculture is world-wide activity. It is practiced in the developed, developing and underdeveloped societies of the world. In addition to the physical factors, it is also governed and largely influenced by the socio-economic condition of the cultivators. (Hussain 1979)

TABLE NO. 2.3
COMMAND AREA OF LOWER REACHES OF CHIKOTRA
IRRIGATION PROJECT: LOCATION ENVIRONMENTAL
SETTING AND DEMOGRAPHIC PERFORMANCE.

Sr. No	Parameter	1995-1996	2005-06
1.	Location.		
	i) Latitude.		16°19'40"N to 16°25'50"
	ii) Longitude.		74°15'30"E to 74°20'10"
2.	Major Topographic feature.		Chikotra river basin
3.	Mean Annual Rain fall in m.m.		1000
4.	Mean Temperature c.		26°C
5.	Soil Types.		Coarse shallow, medium black, alluvial
6.	Agro-climatic zone.		Transitional Zone I
7.	Rural Density (Persons).		
	i) Per 100 hectare of cultivated area.	407.61	450.54
	ii) Per 100 hectare of irrigated area.	3576.70	808.93

Source: Compiled by the Researcher.

2.7.1 Population:

Population is one of the most important socio-economic determinants which provide the basic resource to agriculture in various forms.

According to 2001 census the population, of lower Chikotra basin was 23746. The density of population is 385 person per sq.km. Which is unequally distribution in the river valley and the hilly region of the north and south. The male population is 12029 and the female population is 11717.

2.7.2 Literacy:

The literacy suggests the development of society. The literacy of the region in the last decade was near about 58 percent. In the year 2001 the percentage of literacy has increased up to 70 percent in which male includes 41 percent and female 29 percent . The proportion of literacy is however low to that of Kolhapur district.

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