CHAPTER - TWO

GEOGRAPHICAL PERSONALITY OF WARANA BASIN

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CHAPTER-TWO

GEOGRAPHICAL PERSONALITY OF WARANA BASIN

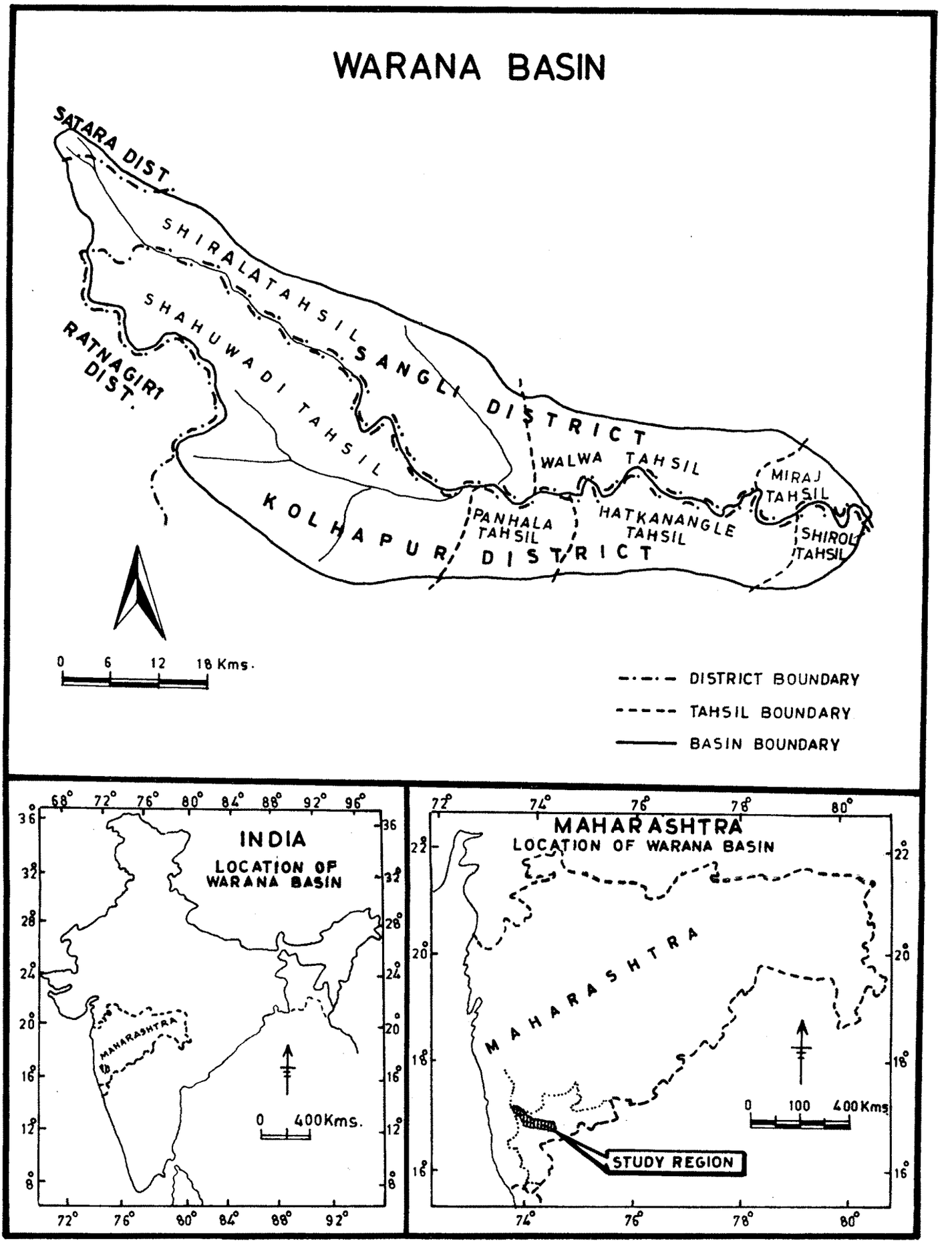
2.1 Introduction:

The location and the factors of physical environment which are directly or indirectly influencing the dairy development in Warana basin are presented in this chapter.

2.2 Location:

Warana basin is drained by river Warana which is an important tributary of river Krishna. Warana basin extends from 16°30' North to 17°15' North latitudes and 73°30' East to 74° East longitudes. The east-west length of the Warana basin is 150 Kms. and north-south width 21 Kms.. Total area of the basin is 2,095 sq. Kms.. The basin is much narrower towards the west and slowly widens in the eastward direction. The basin has an eastward slope.

River Warana forms boundary between Sangli district to the north and Kolhapur district to the south. This river basin is shared by both these districts. The northern part of the basin comprises part of Shirala tahsil, Walwa tahsil and very little part of Miraj tahsil. All these tahsils are in Sangli district. The southern part of the basin comprises northern part


WARANA BASIN
SATARA DIST.
SHIRALA TAHSIL
SANGLI DISTRICT
SHAHUWADI TAHSIL
RATNAGIRI DIST.
WALWA TAHSIL
MIRAJ TAHSIL
PANHALA TAHSIL
HATKANANGLE TAHSIL
SHIROL TAHSIL
KOLHAPUR DISTRICT
0 6 12 18 Kms.
DISTRICT BOUNDARY
TAHSIL BOUNDARY
BASIN BOUNDARY
INDIA
LOCATION OF WARANA BASIN
MAHARASHTRA
0 400Kms.
MAHARASHTRA
LOCATION OF WARANA BASIN
MAHARASHTRA
0 100 400Kms
STUDY REGION

Map 2·1

of Shahuwadi tahsil, Panhala tahsil, Hatkanangale tahsil and Shirol tahsil of Kolhapur district. Thus the basin is mainly shared by seven tahsils.

Table 2.1: Warana basin: Tahsilwise distribution of villages

Sr.	District	Tahsil	No.of villages
1	Sangli	Shirala	81
		Walwa	25
		Miraj	4
2	Kolhapur	Shahuwadi	99
		Panhala	27
		Hatkanangale	22
		Shirol	2
3	Satara	Patan	3
4	Ratnagiri	Sangameshwar	1
Total number of villages:			264

(Compiled by the researcher)

The total number of villages in Warana basin is 264, out of which 110 villages are from Sangli district and 150 from Kolhapur district. Tahsilwise break-up of villages is presented in Table 2.1, which also reveals that the basin includes 3 villages from Patan Tahsil of Satara district and one village in Sangameshwar

tahsil of Ratnagiri district. However, these four villages being in the hilly part of western Ghat, are not linked to major part of the basin by easy means of transportation.

Recently due to the construction of dam on river Warana near Chandoli village, there is a reservoir of 36 TMC. As a result of this reservoir 36 villages in the catchment area of Chandoli dam have been rehabitated. Thus, the actual number of villages in Warana basin is 228.

2.2 Physical Setting:

The physical setting of the Warana basin is influenced by geological and geomorphological complexities of the deccan plateau. The physical setting in turn influences the economic activities of the people in the basin. Geographically Warana basin is located in the southern part of deccan plateau with hills of the Sahyadri to the west and Ashta hill ranges in the north and Panhala-Jotiba hill ranges to the south. The basin can be divided into two sub-regions, namely,

1. Hilly region, and
2. River valley.

(1) Hilly Region:

The hilly region encircles the basin from almost

all sides except for the eastern side. These hilly parts can be further divided into three sub-divisions:

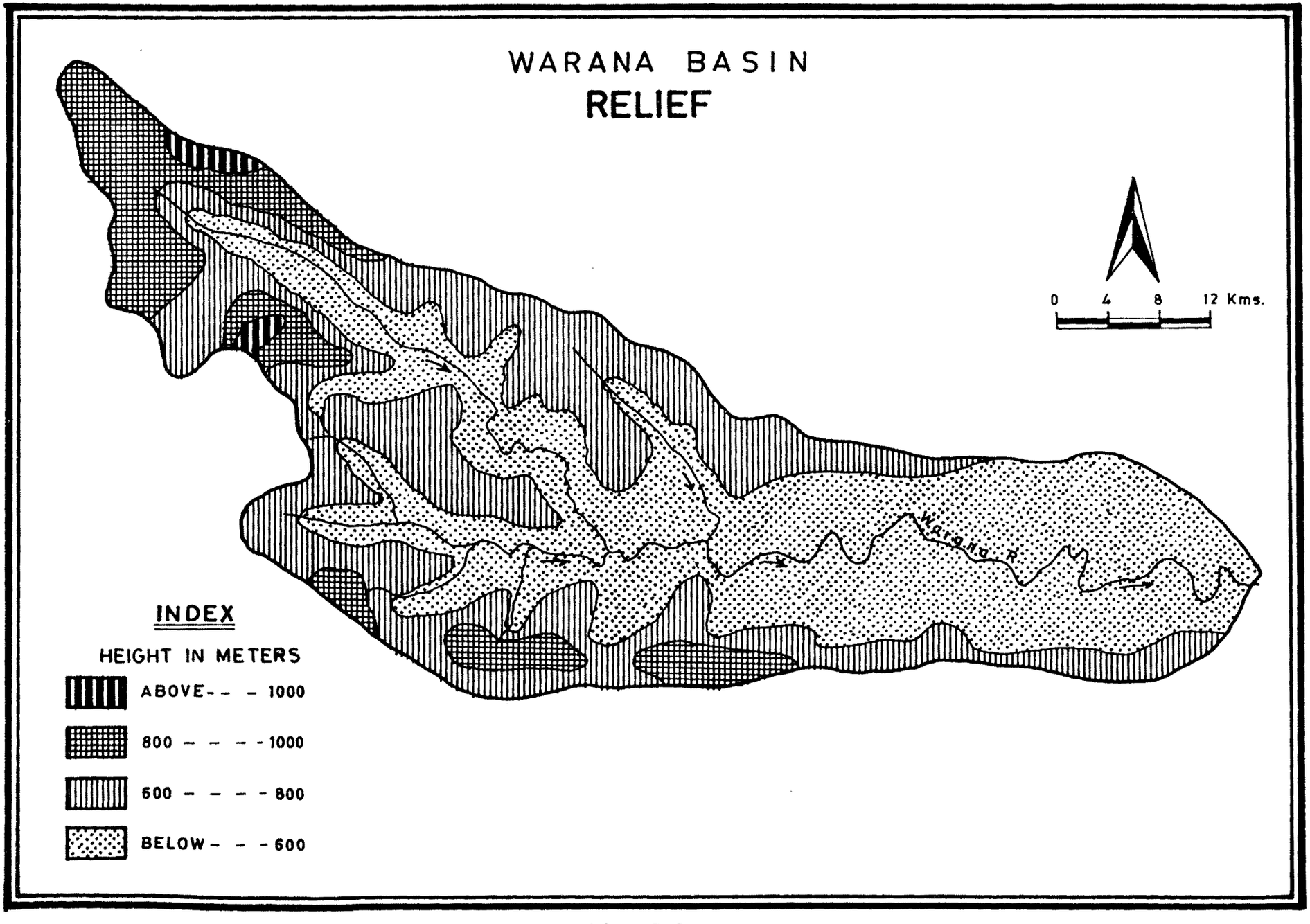
(A) Sahyadri Hills:

The western part of the basin bordered by the main Sahyadri range near Patharpunj, extends towards the southward direction upto Vishalgad for 16 Kms.. Thus, the range has steep slope towards west and gentle slope towards east and acts as water-divide between the Shastri river in Konkan and Warana river on the plateau.

(B) Panhala-Jotiba Hill Range:

This hill range is an offshoot of the Sahyadri. It starts near Vishalgad and extends towards the east. The range has a height of about 900 metres near Vishalgad which gently decreases towards east. The important hills in this range are Masai hill, Panhala hill, Pavangad hill, Jotiba hill and Shidoba-Sadale hill. There is flat plateau on the top of Masai hill known as Masai Pathar. Panhala-Jotiba hill range ultimately emerges into flat region near village 'Top' on the National Highway No. 4. However, some residual hillocks of this hill range are seen near Kumbhoj and Hatkanangale.

Panhala-Jotiba range separates Warana basin from the Panchganga basin and acts as a water-divide between these two river systems. The famous shrine


WARANA BASIN
RELIEF
0 4 8 12 Kms.
WARNA R.
INDEX
HEIGHT IN METERS
ABOVE- - - 1000
800 - - - - 1000
600 - - - - 800
BELOW- - - 600

Map 2·2

of Jyotiba or Lord Shiva is located on the top of Jotiba hill and is known as Jotirling or Jotiba. Panhala fort is located on the Panhala hill.

(C) Ashta Hill Range:

The hill range which starts at Patharpunj near the source of Warana river in Patan Tahsil of Satara district traverses eastward upto Ashta in Walwa Tahsil in Sangli district. This range forms the northern boundary of Warana basin. It divides Warana basin from the Krishna basin in the north. This range has steep slopes on either sides and acts as water-divide between river Krishna and Warana.

(2) River Valley:

Warana river valley is well defined due to the Ashta range in the north and Panhala-Jotiba range in the south. The valley starts at the source of Warana river near Patharpunj and ends near Haripur in the east where the river is joining river Krishna. Warana valley is a narrow valley and is interrupted due to the presence of deep V-shaped valleys of the tributaries of Warana, namely, Morana on the left bank and Kadavi on the right bank.

Upper Part:

From Patharpunj to Sagaon the slope of river

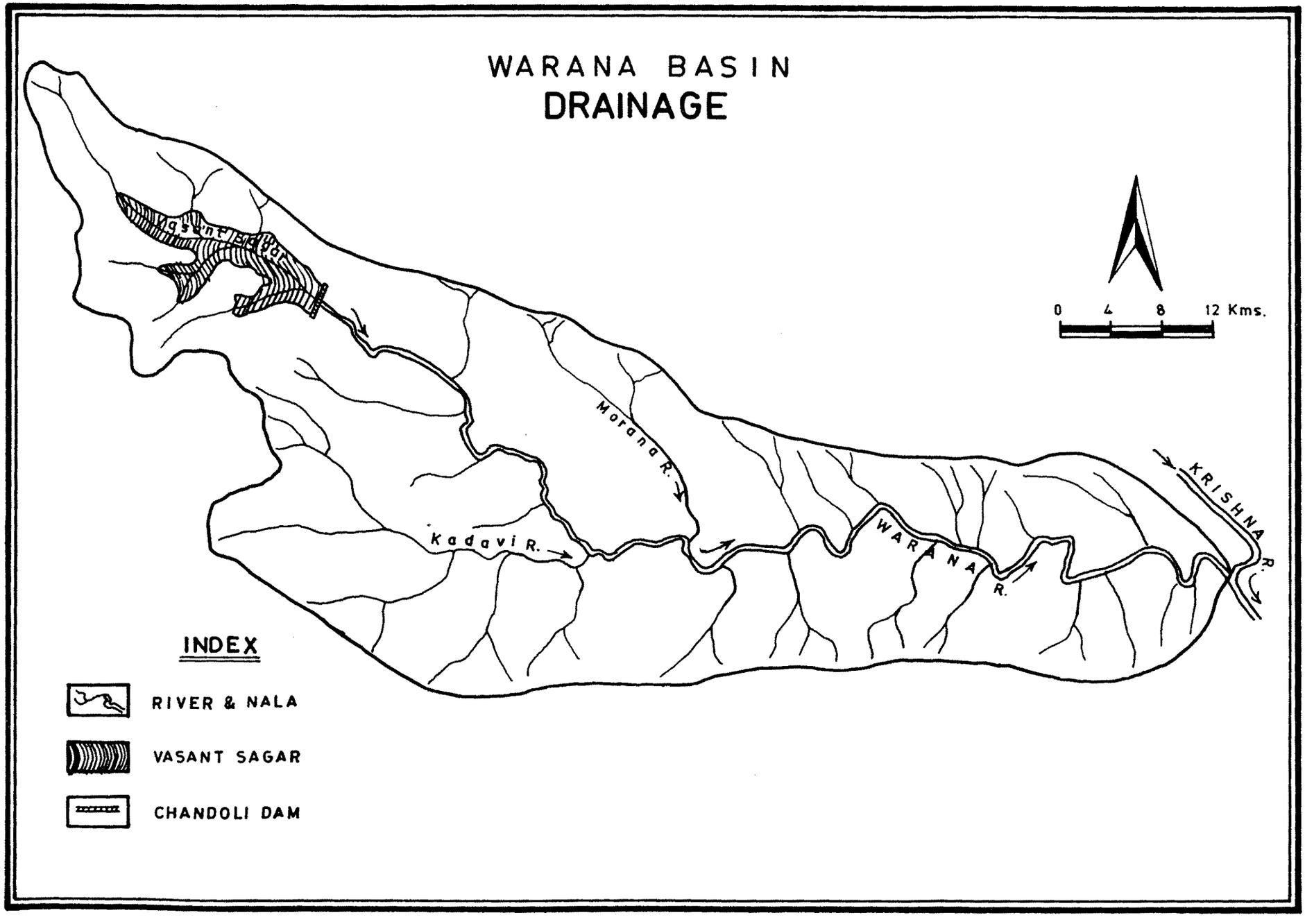
valley is very steep and on either sides there are many fast flowing tributaries. There is no land available for cultivation. The terrain is steep and difficult. The settlements are sparse and due to the construction of Chandoli dam, 36 villages of this region have been displaced.

Lower Part:

The area from Sagaon to Haripur forms the lower part of Warana river valley. In this region the valley slope is comparatively gentle and the valley is wide. River takes meandering course till it joins Krishna at Haripur. The shape of this part of the valley is triangular. In the lower part of the valley due to the gentle slope and strips of plains on either sides of the river, the topography permits agricultural activities.

2.4 Drainage Pattern:

Warana basin is drained by river Krishna and its tributaries. The drainage pattern is well developed and it is geared to the base level of Krishna river. There is a good tributary development. The pattern is of dendratic type. The upper part of drainge, that is, western part of the basin has many tributaries, primary as well as secondary. In the lower reaches there is absence of tributary development. The main


WARANA BASIN
DRAINAGE
Vasant Sagar
Morna R.
Kadavi R.
WARANA R.
KRISHNA R.
0 4 8 12 Kms.
INDEX
RIVER & NALA
VASANT SAGAR
CHANDOLI DAM

Map. 2·3

source of Warana is at Patharpunj at an altitude of 914 metres from MSL in Patan Tahsil of Satara district. The river flows in the south-eastern direction upto Sagaon village covering a distance of 70 Kms. and then the river flows in the eastward direction upto Haripur where it joins the river Krishna. In the upper reaches Warana river flows through a rugged region with many high hills and deep valleys. The region is characterized by steep slopes and gorges.

The total length of Warana river is 150 Kms. from its source at Patharpunj to its confluence at Haripur. It declines by about 366 metres. Their average grdient is about 2.5 metres per Km. throughout the course of the river. In the lower reaches from Sagaon to Haripur the river has many meanders and tributary development. Warana river receives major tributaries from either sides. River Morana which is an important left bank tributary, whereas the important right-bank tributary is Kadavi.

(1) Morana River:

Morana river is a major left bank tributary of river Warana. Its source is near Yelapur in Shirala tahsil. It collects water from the Ashta Range and runs in south-eastern direction for about 28 Kms. to meet river Warana near Mangle village.

(2) Kadavi River:

River Kadavi is an important right bank tributary of Warana river. Its source is near Amba pass and flows in the eastward direction for about 35 Kms. and joins river Warana near Sagaon. Shali and Ambardi are the important tributaries of river Kadavi.

The drainage pattern is well developed in the western hilly part of the basin. However, in the eastern part there are very few streams which join Warana river because the eastern part is a plain region.

River Warana and its tributaries have drained the basin in a favourable way. This has resulted into three important aspects which have direct linkage with animal husbandry and dairy farming:

a) The river system provides sufficient water for irrigation and drinking purposes.
b) The soil on either sides is suitable for cultivation especially in the eastern part of the basin.
c) A good quality of grass grows in the valley sides which provides very good green fodder for bovine population in the basin.

2.5 Climate:

Warana river basin is located in the southern part of Maharashtra plateau. Hence the climate of the basin is temperate. The western hilly part of the basin is cooler than the eastern plain region. The nights over the entire basin are generally cool throughout the year. The seasons show considerable uniformity and are not subject to the abrupt changes like extreme heat or cold. Within the region there are changes in the climatic condition. For example, the rainfall decreases from the west to east and temperature increases in the same direction.

(a) Seasons:

There are three distinct seasons, namely,

1. Hot weather season
2. General rainy season
3. Cold weather season.

(1) Hot Weather Season:

March to May is the hot weather season in the basin. There is a rapid rise in the temperature in March reaching the maximum in April and May. April and May are the hottest months in the basin. Daily maximum temperature frequently exceeds 40°C in April and May. The mean value of diurnal range varies from 24°C in May. In the hilly region the temperature during

hot weather season is not above 20°C. The average night temperatures are 18°C to 20°C. The mean relative humidity during summer is 60 to 70 per cent. Thunder-storms occur in the months of April and May. These thunder-storms bring rain which is 2 to 3 Cms. in April and 3 to 4 Cms. in May.

(2) General Rainy Season:

The normal period of the onset of the south-west monsoon is the second week of June. The rapid fall in the day temperature is recorded alongwith the first break of monsoon. The mean daily maximum temperature in June is 32°C which falls to 28°C in August. By the end of September the temperature increases with a maximum of 34°C in the eastern part of the basin, average minimum temperature during this season being 20°C. The relative humidity is as high as 80 to 90 per cent. There is a great variation in the amount of rainfall. The western hilly part of the basin receives more than 300 Cms. rainfall whereas the eastern part receives less than 50 Cms. of rainfall.

(3) Cold Weather Season:

November to February is the cold weather season in the basin. The mean maximum temperature ranges from 30°C to 32°C. The lowest temperature is recorded in January which is very low, some times lower than 8°C

in Western hilly part, especially Amba, Udgir and Patharpunj. The diurnal range in the cold weather season is 20°C. The average relative humidity is 50 to 60 per cent in the morning and 20 to 30 per cent in the evening. There is little rainfall in the month of November. The rest of the season is practically dry throughout the basin.

(b) Rainfall:

Rainfall is an important factor which influences the agriculture and dairy farming in Warana basin. The important aspects of the rainfall studied here are:

(a) General distribution of rainfall

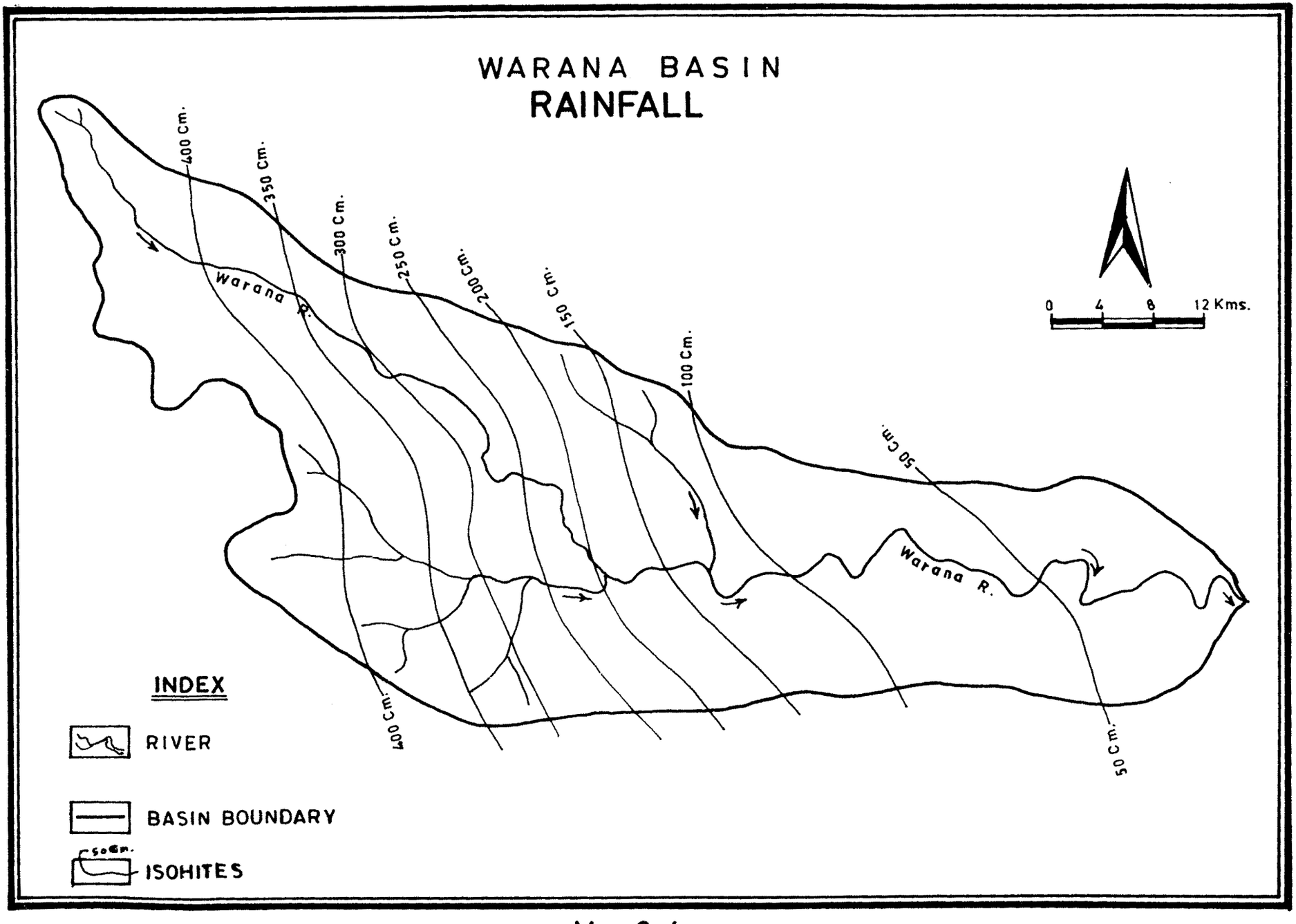
(b) Seasonal distribution of rainfall

(c) Intensity of rainfall, and

(d) Number of rainy days.

(c) Distribution of Rainfall:

Map No. 2·4 shows the general distribution of rainfall in Warana basin. The distribution of rainfall is uneven throughout the basin. The rainfall decreases from the western hilly region to eastern plain region. Amba, Udgir and Patharpunj villages receive more than 300 Cms. of rainfall, whereas Samdoli, Kavathepiran, Kumbhoj and Danoli villages in the eastern part receive


WARANA BASIN
RAINFALL
400 Cm.
350 Cm.
300 Cm.
250 Cm.
200 Cm.
150 Cm.
100 Cm.
50 Cm.
Warana R.
Warana R.
0 4 8 12 Kms.
INDEX
RIVER
BASIN BOUNDARY
ISOHITES

Map 2.4

less than 50 Cms. rainfall. On the basis of the distribution of rainfall the basin can be divided into four rainfall regions.

(I) Very High Rainfall Region:

The western-most hilly part of the basin receives very high rainfall. Vishalgad, Amba, Udgir and Patharpunj receive more than 400 Cms. of rainfall. The rest of the western Ghat region upto Chandoli and Malkapur receives 300 to 400 Cms. rainfall. The rainfall received by this region is mainly during the general rainy season, whereas little rain is received in the months of April and May. The intensity of rainfall in this region is 2 Cms. per day and some times more than 5 Cms. per day also.

(II) High Rainfall Region:

From Chandoli in the west to Kodoli village in the central part of the basin, is the region of high rainfall. Rainfall decreases from 300 Cms. at the area near Waranawati to 100 Cms. at Kodoli. The spatial variation in the rainfall is very high in this region.

(III) Medium Rainfall Region:

From Kodoli in the west to Khochi in the east there is medium rainfall in the basin, which is between 50 Cms. and 100 Cms.. Bagni and Khochi receive 45 Cms.

to 50 Cms. rain per year and Chikurde receives 70 Cms. rain per year.

(IV) Low Rainfall Region:

Eastern-most part of Warana basin, which includes eastern part of Walwa tahsil and Hatkanangale tahsil, western part of Miraj tahsil and Shirol tahsil receive less than .50 Cms. rainfall. Kavathepiran and Samdoli are the villages located on the eastern fringe of the western part of the basin which receive 40 Cms. to 45 Cms. rainfall per year.

The intensity of rainfall in this part is less than 1 Cm. per rainy day. In Warana basin rainfall variability increases from east to west. It is 20 per cent and more in the eastern part, whereas it is 80 per cent and less in the western hilly part. Lower the rainfall variability higher is the assurance of rainfall.

(d) Number of Rainy Days:

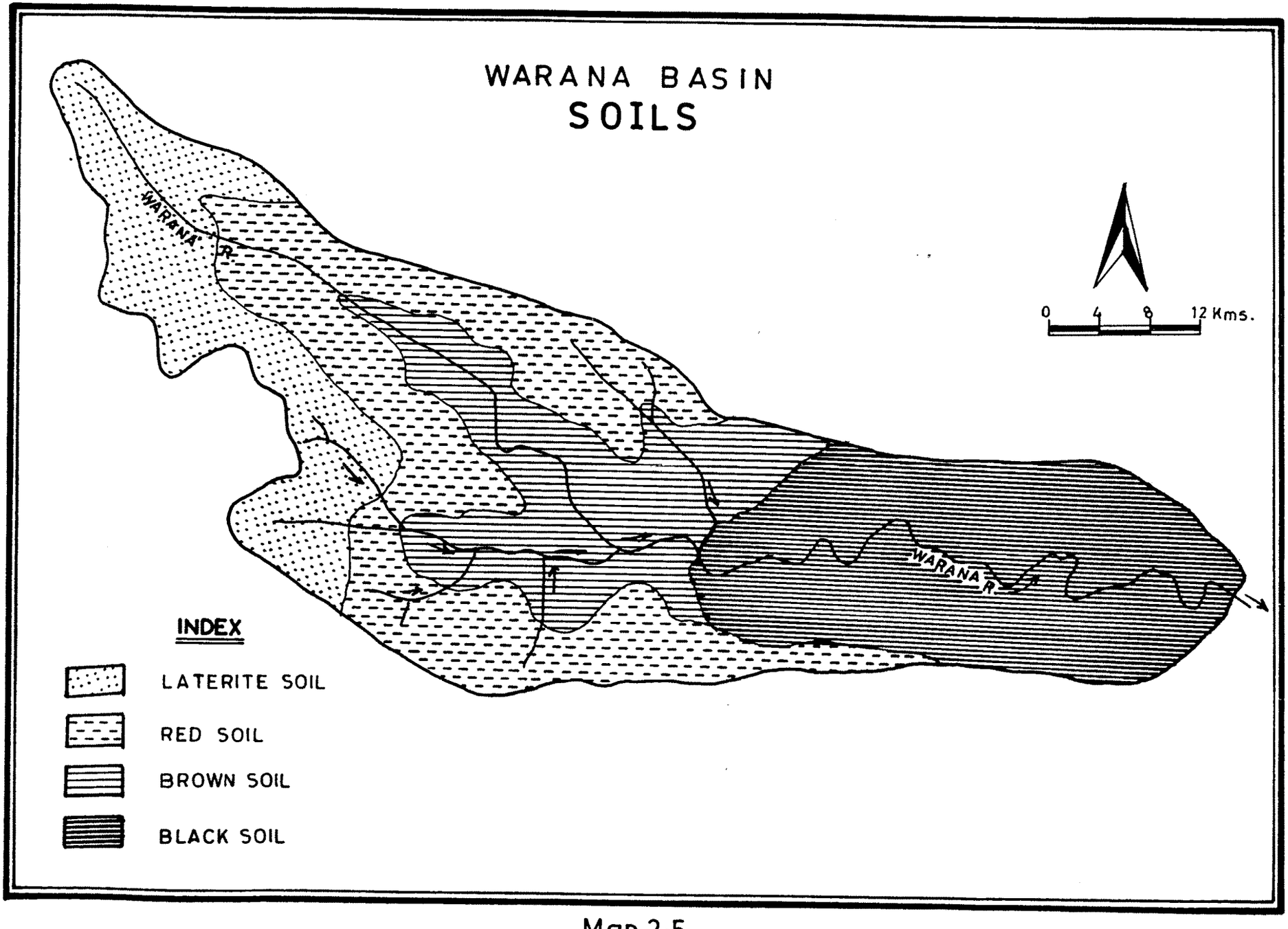
The number of rainy days decreases from west to east. The rainy days are more than 100 in Amba and Patharpunj in the western hilly region of the basin. In the eastern part of the basin 50 to 60 rainy days are recorded and in the central part, rainy days are between 60 and 90.

The climatic condition of the region is favourable and suitable for animal husbandry and dairy farming activities from August to November. Lush green grass is available for the milch animals in winter due to the cold weather and availability of fodder the milch animals are having good health and the production of milk is more. However, during summer months due to the shortage of green grass and for want of sufficient quantity of water and also due to the hot weather the milk production decreases considerably. Thus, conditions about milk production are too different in two seasons, that is, flush season and lean season. However, due to the favourability of the climatic conditions the lean season is considerably small.

2.6 Soils:

Soil is an important component for the development of agriculture and dairy farming. There are four distinct soil zones in Warana basin (Map No. 2.5). The Map reveals the four zones as follows:

1. Laterite soil in the western Ghat region
2. Red soil in the hill-top region
3. Brown soil in the western foot-hill region
4. Black soil in the river valley.


WARANA BASIN
SOILS
WARANA R.
WARANA R.
0 4 8 12 Kms.
INDEX
LATERITE SOIL
RED SOIL
BROWN SOIL
BLACK SOIL

Map 2·5

(1) Laterite Soil:

This soil is found in the western Ghat region of the basin, especially in the western part of Shahuwadi and Shirala tahsils. Laterite occurs in the region of heavy rainfall between 250 Cms. and 400 Cms. The soil is dark-red in colour and rich in aluminium and iron and is very poor in phosphate and calcium. This soil has poor water retention capacity and low fertility. These soils are subject to heavy erosion. Due to steep slope, hilly terrain and heavy rainfall, leaching is characteristic feature of this soil. All these factors have an effect on the green pasture.

(2) Red Soil:

Red soil is found on the hill-tops and on hill-slopes in Shahuwadi and Shirala tahsils and they have mixed characters and at some places merge in laterite soil. The soil is red in colour and differs greatly in colour, depth and fertility. Red soils have slightly high moisture retentive capacity as compared to the laterite soil. It is rich in iron-oxide, alumina and titanium and very poor in organic matter. This soil is locally known as Tambadi Mati. In Shahuwadi and Shirala tahsils this soil has extensive patches of green grass.

(3) Brown Soils:

In the foot-hill region brown soil is the predominant soil type. It is found in the western part of the basin as well as in the northern and southern flanks. Thus, this soil occurs in Shirala, Walwa, Shahuwadi and Panhala tahsils mostly away from the streams. The colour differs from light-red to brown and ultimately this soil merges in the black soil towards the river valley. The soil in general has moderate nitrogen and is poor in phosphate and potash. The soil is covered by rich green grass during the rainy season which is useful for grazing.

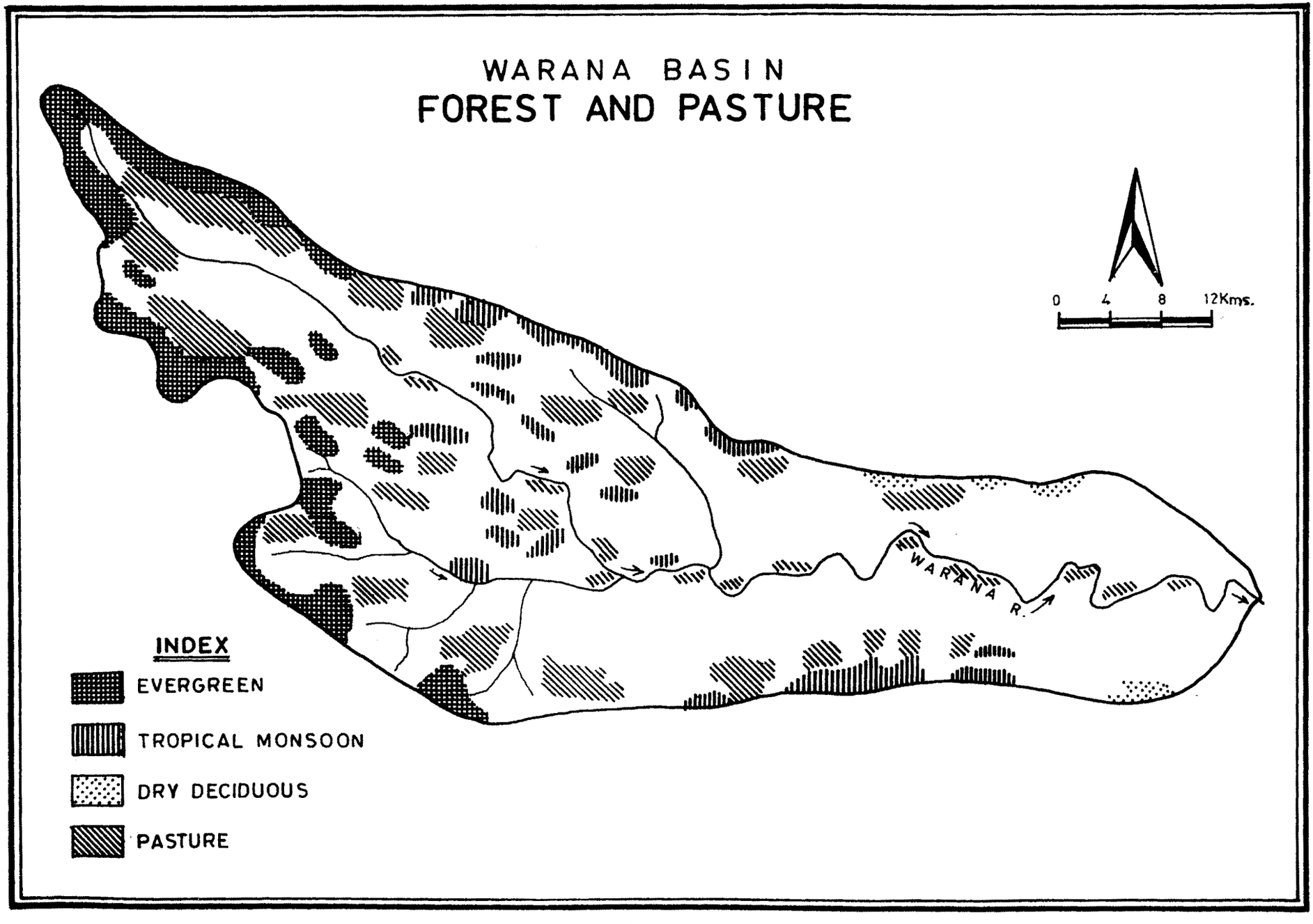
(4) Black Soil:

The river valley has predominantly medium to deep black soils. The local names of the soils are Madhyam Kali Mati and Bhari Kali Mati. Deep black soil occurs in the eastern part of Warana basin whereas in the central part of the basin the soil in the valley is of medium black type. These soils are fairly rich in phosphates and are responsive to nitrogen fertilizers. The water retentive capacity is very high. Thus, the soils are well irrigated and are mostly under cash crops like sugarcane. There are patches of green grass on either sides of the stream. The green grass as well as sugarcane tops are used to feed the milch animals.

There is direct correlation between the soil types and the milk production in Warana basin. The laterite region in the western Ghat has very low production of milk, whereas red soil zone supports larger number of sheep and goats. The brown soil zone with the presence of green grass and fodder crops supports considerable number of bovine population. It is the black soil zone which supports higher number of milch animals and has the highest milk production in the basin.

2.7 Natural Vegetation:

Out of the total geographical area of 2,095 sq. kms., the area under forest cover is only 310 sq. kms., which is hardly 15 per cent of the total geographical area of the basin. The uneven distribution of rainfall in the region affects the distribution of natural vegetation. Again, there is reduction in the area under forest cover due to the deforestation on the hill tops and in the catchment area of Chandoli dam. The patches of forest are mainly situated on the undulated terrain and on the slope of hills. The thick forest area is mainly confined to the western hilly region of the basin. Map No. 2.6 shows the distribution of natural vegetation. The Map reveals that there are three distinct types of natural vegetation in the region.


WARANA BASIN
FOREST AND PASTURE
0 4 8 12Kms.
WARANA R.
INDEX
EVERGREEN
TROPICAL MONSOON
DRY DECIDUOUS
PASTURE

Map 2·6

(1) Evergreen Forest:

In the western part of the basin, especially in Vishalgad, Amba, Udgir, Pethlond region due to the heavy rainfall there is a dense cover of evergreen forest. The climatic condition in this region alongwith the physiography and soils is favourable for the growth of thick evergreen forest. However, there is considerable under-growth of shrubs and grass which is used for grazing sheep and goats and bovine animals.

(2) Tropical Monsoon Forest:

In the medium and high rainfall area of the basin the tropical monsoon forest is predominant. It is mainly on the western hills, on the Panhala-Jotiba hill range and also on Ashta hill range. Due to deforest-ation there are patches of thin woods, in the remaining parts of the western hilly region.

(3) Dry Deciduous Forest:

The dry deciduous forest is seen in the eastern part of the basin where rainfall is very low. Due to the enormous cutting of forests in these areas and increasing cultivation the forests have remained in the form of sparse woods. The area is vigorously brought under cultivation. Patches of green grass on the up-land (Maal Raan) and in the vicinity of the stream supports a number of milch animals and the region is

rich in the milk production.

Thus, natural vegetation in the basin influences the animal husbandry and dairy farming activities to a great extent. The tropical monsoon forest and dry deciduous forest region support the major number of milch animals in the region. So, the dairy farming activity is well developed in this part.

2.8 Environmental Favourability:

The environmental factors in the region highly influence the agricultural landscape of Warana basin. The environmental factors which have been discussed here are the physiography, drainage, climate, soil and natural vegetation. It is clear from the foregoing discussion that the physiography, climate and vegetation have a direct influence on the soil, which in turn reflects in the cropping pattern and finally the distribution of livestock in the region. The environmental factors thus, have direct correlation with the activities of dairy farming in Warana basin.

It is clear from the previous discussion that the climate, vegetation and the soils in most parts of Warana basin are not only suitable but are also very much favourable for the development of dairy farming.

Good fertile soil alongwith the favourable climatic

condition supports grass, fodder-crops and many other crops which provide fodder to the bovine animals. The milch animals in the region owe their excellent health to the good physical and climatic conditions in the region. The production of milk is more in the post-monsoon season and especially from August to December and is considerably low during January to July owing to the less favourable climatic conditions.

Especially, the environmental conditions are more suitable for the development of dairy farming in the eastern part of the region as it is the plain region with fertile soil, good variety of grass and favourable climate. Agriculture in this part of the basin is well developed. In the western-most part of the basin, due to rough terrain, dense forest, unfavourable soils and heavy rainfall, the dairy farming activities are still in a developing stage.

2.9 Summary:

It will be evident from the physical description of the region that there is no physical uniformity in Warana basin. The western part of the region is subjected to severe handicaps on account of rough terrain, high hills, heavy rainfall, high rate of erosion, thick forest and poor soil. However, the percentage of area with physical unfavourability is considerably low whereas

the remaining major part of the basin is endowed with favourable natural set-up with plain region, fertile soil, well developed drainage system. The physical factors leave limited scope for expansion of agriculture in the northern and southern flanks and in the western part of the region. The natural conditions are favourable for expansion and development of dairy farming in Warana basin.