CHAPTER II

PHYSIOGRAPHY

Before we proceed to describe the relief features of the area under consideration, it would be useful to point out how, from the physiographic point of view, the area is significant. It consists of the out-liers of the Aravalli Range which runs in N.E.—S.W. direction from near Delhi to Gujarat. In northern Gujarat these outliers commence from beneath the alluvium at Pavagadh, some 28 miles northeast of Baroda. From this point they tend to spread out in the south, one part leading towards the Western Ghats and the other towards the Satpudas of Madhya Pradesh.

A chain of hills, or more strictly a line of tableland, which is 6 to 9 kms broad and 240-360 kms above the sea level, stretches from the Ratamnal range northwards and forms the watershed between the Mahi and the Anas, whose courses demarcate the boundaries of Dohad, Jhalod and Limkheda Talukas of the Panchmahals.

The spur of the Vindhya Range which extends from Ratamnal in the east to Pavagadh in the west lies across the centre of the Devgadh Baria and forms the watershed between the valleys of the Narmada and the Madi.

With this introductory emphasis on the physiographic significance of the area under study, its relief features may now be described. A glance at the relief map (Fig. 4) of the Central Gujarat shows that it can be divided into three well marked physiographic divisions, viz., (1) the Eastern Hilly tract and Plateaus; (2) the Western Plain; (3) and the Gulf area (Fig. 5). The latter part of the region lies within the area of the coastal band of alluvium which has been formed by the encroachment on the shallow Gulf of Cambay, of the detrital deposits brought down by the many large and small rivers, which drain the State of Gujarat, the western slope of Malwa and the southern part of Rajasthan.

This basic division of the region is quite significant not only for the study of the structural basis, but also for an understanding of the nature of land use, the distribution of settlements and the means of communications, as these are closely related to the distinct relief features.

These three physiographic divisions also differ in respect of slopes which vary considerably between two extremes. In the east, both in the Ratnagiri plateau (south of the Panam river) and in the rugged Rewa Kantha hills (immediately north of the Narmada river), the slopes are quite steep, on the other hand, the plain proper towards the west is a broad flat level region widening gradually as one proceeds south and east. It is but natural that such a plain should be intensively cultivated and well populated while the rugged mass in the east be occupied only by aboriginal tribes.
THE EASTERN HILLY TRACT AND PLATEAUS

The eastern hilly tract lies north-east and south-east of the river Orsang and covers about 25 per cent of Central Gujarat. This extensive elevated undulating tract is essentially a much eroded peneplain and presents a diversified countryside consisting of rocky hills, straight or sinuous ridges alternating with narrow valleys or flat alluvial plains. Except in the tamer valleys of the Panem, Orsang and Heran, the country is PAL land, hilly and forest-clad yielding little more than the three 'Ps', PAHN, PADI, and PAN, i.e., stones, water, and leaves. Though there are no high mountains in the area it certainly has one principal range across the centre of the region—the spur of the Vindhya Range which run east and west from the flat topped sandstone crowned tableland of Ratanmal, about 60 kms. west to Pavagadh.

The relief features of Ratanmal plateau are very complicated. It is heavily forested and much broken. The river Panem flows north-west from this plateau. The plateau is scarcely inhabited and large number of deserted hamlets speak of the extreme poverty of this land which grows mainly maize, gram, and groundnut.

1. The Survey of India 1": 4 miles Toposheet (No. 46J)–JHABUA–1919, shows the hill features by shaded hatched lines and not by contours.
Apart from this main range, there are other hills lying north and south of the Ratanmal plateau, which are discussed separately.

**Hills lying North of Ratanmal Plateau:**

North of the Ratanmal Plateau is a tableland (known as Bohad plateau) formed by the extension of the Aravalli Range from Rajasthan southwards. The surface of the country is uneven, broken by many water courses, low abrupt stony ridges in the south. The soil is reddish and light fawn coloured in the uplands, but black at the lower levels. The area is well supplied with water both by streams and pools and it is not wanting in beauty.

In the cold season, on a background of soft well wooded hills, rich deep-green stretches of gram and wheat, unbroken by hedges-rows, are studied with mounds and knolls, some clad with bamboo and brushwood, others bare and capped with masses of shining snow-white quartz. Here and there are compact well built villages. But the scattered dwelling of Bhils enclosed by creeper-covered bamboo, on the rising ground, near the agricultural land are more striking. Later in the season one may see the gold of the ripening wheat fields along the edges of streams, and in the hot months, though baked and bare, the land is in many places relieved by the brilliant scarlet masses of Khakhra or Buteafrondosa. During the rainy season the whole country becomes fresh and green.
Due to rugged topography and availability of shallow light-red soil mixed with gravel, this area cannot grow the cash crops such as cotton and groundnuts, which have played an important part in the agricultural development of Central Gujarat. Jhalod tract is always liable to bad years although the land is 'be-fasli' (double cropped) i.e., produces kharif and rabi. Dohad taluka is invariably the area of scarcity.

Owing to the rocky and undulating nature of the country the ordinary cart tracts are very bad. The state highway between Godhra and Dohad climbs the plateau about 10 kms. west of Dohad. Roads run from Devgadh Baria, Santrampur and other places to Dohad, Jhalod and Limdi.

From the Dohad plateau many side spurs run west, decreasing in height and importance as they stretch further from the table-land.

North of the Panam river, long lines of hog-backed hills run north-west nearly parallel with the boundary of Limkheda Taluka till it reaches Sanjeli. None of the hills rise to more than 366 metres above the mean sea-level.

Further to the north, while going from Jhalod to Santrampur, one observes hilly tracts on either sides. At some places it is much rugged covered with long craggy lines of hills. Arable land is found in the valleys where the soil is suitable for rice, maize, gram, groundnut, wheat, and banni. The forest yields a large quantity of timber.
Hills lying West of Ratlamal Plateau:

Higher and more connected hills are projecting from Ratlamal plateau towards east, west and south, for a distance of about 18 kms. These hills are very steep with an average height of 244 metres, known as Baria Hills, named after the State of Devgadh Baria. These hills are very complex and complicated, more regular and unbroken, lying north and south parallel to each other in ranges separated by narrow valleys and form a link between the Aravalli and Vindhy Mountains. The tops of the Baria hills, at an elevation of about 305 metres above sea level, forms a well-defined boundary between the Panchmahals and Baroda districts for a distance of about 36 kms. Elsewhere, the boundary is formed by the long, narrow valleys of the tributaries of the River Mahi.

At some places the top is flat, in others rising into a number of lofty peaks, ranging between 300 and 400 metres above the mean sea level. They are very picturesque and a traveller halting at Kadval Village, which lies to the south of these hills and north-east of Pani Mines railway station, can see these Baria peaks. Occasionally the traveller may go for miles along the foot hill without finding an opening, and in some parts, to move from one village to another he has to make long detours. However, in the range, are several passes, two of them at Kadval in Jabugam taluka and the other near Sagtala in Devgadh Baria taluka, fit for carts.

Further south-west, towards Pavagadh, we have a zone of Hills. First our attention is drawn by Jambuwada Hills, from where, the river Dhadhar rises. Panimines, Ramankua and Shivrajpur famous for their manganese ore, lie within the environs of Jambuwada Hills. They are an imposing
sight when viewed from the main road which runs between Pavagadh and Jambughoda. Apart from these hills, there are many irregular branches timber-covered spurs, steep and high with jagged tops on the east, growing gradually lower as they pass west, and finally disappearing in the basin of the Mahi.

The Narukot Hills are wild with thick forests and are composed of the quartzite and conglomerate of the Chapapan series. About 15 kms. south east of Pavagadh and north of Targol in Jambughoda taluka rises the Jhand Hills, once a favourite place of refuge for outlaws, and still, from the thickness of its woods, very difficult to approach.

Southwest of Jhand Hills, is a Achhali quartzite ridge, which extends for about 11 kms from west to east with its highest point being 270 metres above the mean sea level in Sankheda Taluka of Baroda district. About 8 kms. east of Achhali ridge, and 5 kms. north of Bodeli railway station, we have another quartzite Masabar Hill, which has a fine peak rising 354 metres above the mean sea level. These two ridges in question are separated by Samadi and Salpur rivulets, which are named after two villages, standing on them respectively.

1. Blanford, W.T. 'On the Geology of Tapti and Narmada Valleys'. Mem. Geol., Surv. Ind., Vol. VI, 1869, p. 41. Blanford was the first worker who made geological traverses in this region and he described the quartzite of the Aravalii age near Shivrajpur as the Chapapan series. The name is after an old historic town of Chapapan, the capital of the Mohammedan Kingdom of Gujarat, as this differ in some respect from the Bijawar and the other transition rocks recognised till then.
Crossing the Orsang river southwards, lies scattered group of small rock hills which are conspicuous only because of their rising abruptly out of a dead flat. To the east northeast, at a distance of about 5 kms, rises a low ridge close to the south bank of the Heran river, among which lies the well known Songir sand stone quarries. The ridge is prettily scarped on the north, or river side but slopes gently to the south. This Songir quarry ridge is about 3 kms. long and is much higher at its north-eastern end which abuts on the Heran river in the precipitous scrap; the highest point is 110 metres above sea level and about 45 metres above the river. This sandy stone ridge merges into the general slope of the country and is completely lost sight of under a great expanse of cotton soil, which extends beyond Palasni Village, of Naswadi taluka.

A number of scattered hills found in Chhota Udepur taluka are known as Chhota Udepur Hills. In Tejgadh, near the centre along the Orsang valley, these hills though rugged in outline, are of no great height. In the south east of Chhota Udepur a range of hills runs north-east and south through Panvad village, and they continue further south, towards the Narmada. The whole area around Kawant is covered with high rugged hills. At the west of Karavi village, noticeable for kilometres round, a flat-topped Trap ridge known as Rewa Kantha hills, stretching east and west for kilometres, rises at its western end into two sharply marked peaks, locally known as Handav Dongar (637 metres) and Savada Dongar (742 metres). These Dongars are known for their
fluorine occurrence. Further to balance this ridge, after a gap of about 5 kms., we have a beautiful volcanic peak of Phenai Mata*, supposed with good reasons to have been one of the active vents within the great Deccan Trap Area. Phenai Mata is surrounded by several fine hills over which it towers considerably. It attains a height of 510 metres above sea-level. Beyond it, to the east, the spurs of the distant Malwa Hills may be seen.

Pavagadh Hill:

Pavagadh1 is about 40 kms south of Godhra and 45 kms north east of Baroda, and it can be clearly seen from the Baroda Godhra track.2 Nearer at hand with its far stretching spurs, the hill, about 40 kms. round, rises with massive but clear cut outline about 823 metres above the plain.3 Its base and lower slopes are thick, covered with rather stunted timber. But its shoulders and centre crest are on the south, west and north, cliffs of bare trap, too steep for trees. Less inaccessible, the eastern heights are wooded and topped by massive masonry wells and bastions rising with narrowing fronts to the scarped rock that crowns the hill.

1. Pavagadh was in old inscriptions Pavakgad or the fire hill. Major Weston's article 'Ind. Ant. LXIII), January 1879, pp. 1-9
2. Mr. Forbes 'form Pavangad the castle of the winds (Ras Mala, 285) is seldom used.
3. Before the fall of the Ahmedabad Jama Mosque minaret (1819) Pavagadh though more than sixty miles off was visible from the minaret—Trans. Bomb. Lit. Soc. I, p. 140.

* The Goddess of boat.
According to the SKANDH PURANA\(^1\), a valley ran where Pavagadh now stands. On the high ground overlooking the valley lived an ascetic Vishwamitra Rishi. He owned a cow, the famous KAMDHENU, gifted with speech and an unerring store of milk. Grazing on the brink of the hollow she one day slipped and unable to climb the steep side filled the valleys with milk and so swam home. Learning what had happened the holy man, to prevent another mishap, prayed that the valley might be filled. His prayer was granted, the gods sending so large a hill that three quarters of it filled the hollow. The rest standing out of the plain was called the quarter-hill, Pavagadh.

In Central Gujarat, Pavagadh during the hot season, provides a most refreshing change as compared to the plains. The hill top is well supplied with water from a spring about half way down near the line of the lower fort. During the hot season, on the top of Pavagadh the thermometer on the warmest day does not rise above 30.5\(^\circ\)C and on other days do not climb above 28.3\(^\circ\)C. Throughout the year a constant breeze blows from the south-west.\(^2\)

**THE WESTERN PLAIN**

The plain is fully described in the chapter on Agricultural Regions and hence it is being treated briefly here. On the whole, the area represents a more or less continuous alluvial deposit which broadens

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2. As a Sanitarium the only drawback of Pavagadh is that in summer the wind blows so fiercely that, unless of very great strength, nothing but a domed roof can stand, these winds.
in the south and rises gradually in the east. It forms three belts, Northern, Central and Southern.

The Northern Belt:

The Northern Belt extends from the northern tip of the region up to Mahi River, say north of Godhara town. This sector is not absolutely flat. Around Kadana town the country is rugged, covered throughout with smaller forested hills. The Mahi breaks through the country in a curved line and crosses through the middle of Santarampur and Lunawada talukas. From there the area slopes very gently towards the south-west and west in the direction of the various tributaries of the river Mahi.

The soils of this region are chiefly residual soils formed by the decomposition of underlying granites and gneisses. They are light-coloured, shallow and infertile but the valley soils are however, darker in colour, clayey and fertile, well suited for rice, maize, gram, groundnut, bajri, ragi, banit (Panicum miliare) etc.

The Central Belt:

It is about 32 kms. broad and 40 kms. in width and is bounded by Kalol in the north and Pavagadh in the south. This area slopes mainly westwards. The belt is highly cultivated, with rich brick-built villages, the lands laid out in hedged fields, studded with mango and mahua groves, and marked by rows of palmyra palms whose heads rise quaintly from a growth
of banian and pipal that clings to and hides their stems. South of Kalol the plain grows gradually wilder till, after about 12 kms. near Halol plain 'rises', into a series of hills ending up in the great Pavagadh peak.1

The soil of this belt comprises sandy loam (locally known as goradh) and coarse shallow soil derived from granite and medium black clay. The north-east half of Kalol has shallow granitic soil while the remaining area has sandy loam. The medium black clay soil extends towards the south from Wishwamitri to Narmada. Groundnut, cotton, jowar, maize are the main crops of this region. In some parts Kodra, is also grown.

Southern Belt:

It lies south of the Pavagadh hill. This plain is open, broad, uniformly rich and level in aspect, with a vast alluvial deposit of medium black and deep black soils, well suited for cotton, jowar, and rice cultivation.

A change in the soil conditions is noticeable as one moves from Karjan towards Savli and also towards Waghodia taluka. For agricultural purposes the area may be divided into three parts; viz., (i) Wankal the area lying in between the Mahi and Wishwamitri rivers (cover about 1500 sq. k.ms) The 'Wankal' is derived from a Gujarati word 'Wank' meaning

fertile. Therefore, this Wankal area is the most fertile area of Central Gujarat. It has 'goradu' (sandy loam) soil which is extremely suitable for rice, cotton and other crops. Towards Savli taluka the goradu soil yields good tobacco (Nicotiana tabacum) crop. The Wankal area includes some parts of Savli, Baroda and north western portion of the Padra talukas, of the Baroda district.

(ii) The second portion is known as the 'Chorasi' which covers about 1,000 sq.kms. and lies in between the Vishwamitri and Dhadhar rivers. It comprises 84 villages, from Waghodia, Baroda, Babhor, and south west of Halol. Locally, Chorasi means eighty-four. The area has medium black and in some portions deep black soils. The main crops of this area are cotton, rice, jowar, (rabi), tobacco and groundnut.

(iii) The third area (which roughly covers 1,400 sq.kms) is known as 'Kanham', which lies between Dhadhar and Narmada rivers, famous for cotton and jowar cultivation in central Gujarat. It includes Karjan Sinor, eastern portion of Padra and the western southern part of the Dabhoi taluka.

All the three agricultural parts viz., Wankal, Chorasi, and Kanham, are concentrated in the south and west portion of the southern Belt. The eastern side of this alluvial belt is interrupted occasionally by eroded and dissected low hills, or by surface irregularities formed

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1. From Sanskrit Krishnam or black; in Hindi, Kanha; Gujarat, Kanham black soil.
by numerous courses of small parallel rivers. The sediments brought
down by them vary in quality and therefore, near the foot hills of
the plain, it is more diversified in scenery and soil conditions.
The beds of streams are highly fertile for rice, cotton and jowar
(rabi) but the raised lands which form the water-shed between the
small streams are devoid of any fertile soil and water which can only
be used as grazing grounds.

THE GULF AREA:

The Gulf region is characterized by a tract of salt marsh, forest
of acacia, clumps of bushes and numerous ditches occasionally flooded
by the tidal river, which, when it recedes, leaves behind a slippery
layer of salty mud. Gradually the bushes disappear, the creeks grow
wider and a vast plain is seen opposite the village of Tithor.

DRAINAGE:

Within Central Gujarat there are three river systems, viz., those
of the Mahi, the Narmada, and the Dhadhar. All the three river systems
drain into the Gulf of Cambay in the Arabian Sea.

The divide between three systems nearly coincide with the south
eastern boundary of Devgadh Baria taluka and then the divide line runs
south-westwards through the hills of Jambuwada and further southwards
through Jhand Hills which separate the Mahi from the Narmada. Thus north
east and west of this divide line lie almost the whole of Devgadh Baria,
Limkheda, Dohad, Jhalod, Santrampur, Lunawada, Godhra, Kalol and some
portions of Halol, Savli and Baroda talukas and they lie within the drainage basin of the Mahi and its tributaries. South of the divide line, Chhota Udepur, Jambughoda, Jambugam, Sankheda, Tilakwada, Naswadi and some parts of Dabhoi, Sinor and Karjan Talukas are entirely within the Narmada-Orsang catchment area.

The Pavagadh hill again forms a divide between the Dhadhar and the Mahi, so that the most of Halol Savli, Waghodia, Dabhoi, Karjan lies within the drainage system of the Dhadhar (Fig.6).

Of the total area of 16,740.4 sq km of the Central Gujarat, approximately 8,500 sq.kms. of land are drained by the Mahi system; of the rest of the land, 47 per cent of total lies within the catchment area of the Narmada and its tributaries. Only 19 per cent of the area is drained by the Dhadhar system.

A remark may here be made of the rivers in general that the region under consideration is unique in one respect, viz., that it represents the lower waters of the Mahi and Narmada. The main river, Mahi, with a total of about 560 kms. has its lower 216 kms. within this area. Similarly, the river Narmada has a course of about 1280 km. but its course across Gujarat before it meets the Gulf of Cambay is roughly 160 kms. This naturally means that from the point of view of drainage, one cannot expect them to be fast moving rivers. In fact they are winding in broad valleys and large flood plains.
THE MAHI RIVER SYSTEM

After the Narmada and the Tapti, Mahi is the largest of the Gujarat rivers, but for the area under investigation it is more important, not only because of its greater length and larger catchment area but also because it is the only river which drains the eastern and western regions.

The mighty Mahi, with its innumerable tributary streams draining the eastern hilly tract and the western alluvial region, is par excellence the river of the area. Rising in the Malwa plateau, the river follows a general north-northwesterly course in Madhya Pradesh and Rajasthan and enters into the area of Central Gujarat near Mulval village in the extreme north-eastern corner of Santrampur taluka in Panchmahals district. Hereafter Mahi flows/a general south-western course diagonally across the area and finally the Mahi river for about 130 kms. separates the district of Kaira on the right from the Panchmahals and Baroda on the left and falls into the Gulf of Cambay.

In between Kadana and Madhwas the Mahi has steep banks 15 to 24 metres high, sometimes rocky, but chiefly of clay or conglomerate furrowed by local drainage into deep ravines, the bed of the Mahi except in floods filling it from side to side, flows along a broad sandy or stony bed broken at times by rich alluvial soil.
After a stretch of about 136 kms. the river exhibits slight meandering features until it reaches Dabka. At Dabka, in Padra taluka the Mahi river makes a big loop and forms a shallow estuary and finally enters the Gulf. Here the river becomes broad with a width of about 8 kms. and is known as Mahi Sagar (because of its great width). Here its width has been compared with the sea (Sagar).

Between Rabadia and Vasad, in the hot season, the Mahi becomes half metre deep and about 46 metres wide and flows between sloping alluvial banks seldom more than 6 metres high. In this season it can be forded. On account of the broken ground along its banks its water is seldom used for irrigation.

Of the other tributaries of the Mahi, the Anas and the Panam are the most important. Both these streams have their sources near the north-eastern corner of the area. With an average height of about 305 metres above sea level, this tract forms a small local water shed. On its north the country slopes northwards and the area is drained by many tributary streams of the Anas. The Anas continues its northerly course making the eastern boundary of the Dohad and Jhalod talukas, finally falls into the Mahi after attracting the entire drainage of the eastern-talukas of the Panchmahals district.

On the north eastern hilly land, the Panam, starts on its west-north-westerly course and rapidly gains in volume and importance by absorbing the streams of the Limkheda, Devgadh Baria talukas. West of
Devgadh Baria town, the Fanam takes a definite northerly turn where it is joined by the Hadaph near Nada village and ultimately flows into the Mahi, 9 kms. south-west of Lunawada Railway station.

The country west of this section of the Fanam slopes steadily towards the west. The western talukas of the Panchmahals district are thus drained by another series of tributary streams of the Mahi having a general westerly course. The Kun, the Mesri, the Goma, and the Karad are the most notable members of this series.

**NARMADA RIVER SYSTEM**

The Narmada marking for about 160 kms. the southern boundary of the area under study, has been described in various ancient texts as the 'Reva' (Padma Puran), the 'Purva-Ganga' and as the 'Dakshan Ganga' in Siva Purana, it is mentioned as one of the Sangat-Ganga.²

The Narmada (also spelt various as Narbada, Nerbada or Nerbuda) is the 'Namados' of Ptolemy.² The river is very important not because of its greater length but because of its sacredness. Amongst the Indian rivers, in terms of sanctity, the Narmada ranks next only to the Ganga.³

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2. Law, B.C: Historical Geography of Ancient India, Paris Societe Asiatique de Paris, p. 324.
3. The Narmada is perhaps, even more sacred than the Ganga for "whereas it is only the bather in the Ganga whose sins are forgiven, he who simply looks at the Narmada is purified."
Taking its source from Amarkantak at an elevation of nearly 1,066 metres above sea level, the Narmada flows for about 1,040 kms. in the State of Madhya Pradesh and then enters the State of Gujarat near Pendra village which stands at an elevation of 30 metres above sea-level on the left, (southern), bank of the river. From here onwards the river exhibits meandering features and flows in its serpentine serpentine course. The course is believed to have been formed by fault lines.¹

Near Chandod the height of the bank is 24 metres while south of Nanderia it is 21 metres. From Chandod to Nanderia the surfaces are cut with ravines and the height of the banks varies from 3 to 6 metres. Though the right bank is steep, the left is low, shelving and the stream is deep. The stream remains swift and deep in summer, while it rises to 12 metres above fair weather level and stretches for a mile across the low left bank during monsoons. The river falls into the Gulf of Cambay in the Arabian Sea in the form of an estuary, several kms. below the town of Broach.

¹ The Narmada river has long attracted attention both because of the geographical peculiarities and the complicated geological structure of its valley. There are two points worthy of note. The straight course of the river, especially in its valley section. It is said that Narmada does not flow in a valley eroded by itself, but has usurped for its channels a fault-plane or deep alluvium-filled rift in the rocks, running parallel with the Vindhyas. This fault is said to have originated with the bending or ‘sagging’ of the northern part of the peninsula at the time of the upheaval of the Himalayas. It is also possible that the faulting occurred at the time of the break-up of Gondwanaland. "The Deccan is thus a much faulted land-mass and the channels of the Narmada have been guided by the fracture-plane which gave rise to the prominent line of steeps in the Vindhyas"... D.N. Wadia (1942): The Making of India, Madras, Ind. Geog. Jour., 17, 2, p. 93

contd..
The chief tributaries of the Narmada are the Men, Ashwin, and Organg. Men is a small stream rising from the Rewakantha hills with a rugged south-west course of about 80 kms. 7 kms. up Ashwin, similar in size and course to Men joins Narmada from the right and after another 10 kms. the Organg falls into the Narmada from the same side. Organg is the largest feeder of the Narmada. It rises in the Malwa highlands. After a south-west course of about 160 kms. through Chhota Udepur, Jabugam Sankheda Talukas of the Baroda district, it joins the Narmada at the sacred town of Chandod. With banks from 6 to 9 metres high and a broad sandy bed, the Organg is, except in times of floods, a small stream. In its passage through Chhota Udepur taluka the stream running 18 kms. west, takes a sudden south bend and after 20 kms. again turns sharply towards the north. In this bend, stands the town of Chhota Udepur.

Beyond Chhota Udepur 16 kms. to the north-west near Tejgadh the Organg is joined from the right by the Ani, a small stream with its source in the Ratanmal plateau. Then after 18 kms. west it bends south-west and is joined on the right (or north) bank by the Sukhi, a small stream also from the Ratanmal Plateau. 58 kms. further the Organg flows south-west through Jabugam and Sankheda talukas till close to the Dabhoi

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The irregular longitudinal profile of the Narmada invites attention. The extreme divergence of the river profile from the regular curve normally assumed by a river-course after long-continued denudation has been pointed out by Vredenburg. (E. Vredenburg, 1906): Pleistocene Movement as indicated by Irregularities of the Gradient of the Narmada and other Rivers in the Indian Peninsula, rec., Geol., Ind., XXXIII, pt.1, p.37.
village of Bhilodia, it is joined on its left (or south bank) by the Heran. This river from Ali Rajpur (Madhya Pradesh) in the east, with banks from 12 to 15 metres high and a bed divided by rocky barriers into long pools, may in the fair season be crossed by carts at every three or four kms. After its meeting with the Heran for 10 kms. through, the Orsang, shallow in the fair weather, but in floods from 6 to 15 metres deep, passes south between steep banks of 18 to 30 metres high. Its meeting with the Narmada is sacred, thousands, especially at the Chaitra (April-May full moon) come there for the holy bath.1

THE DHADHAR RIVER SYSTEM

Dhadhar river takes its rise in the Jambuwada hills which lie south west of Pavagadh near Shivrajpur. After flowing in a south westernly direction, the river passes through the southern parts of Baroda and Padra talukas, and empties into the Gulf of Cambay.

The river Dhadhar has an extremely winding course. At Bhilapur on Baroda Dabhoi road the banks of the river are 60 metres wide and about 15 metres high with about one metre of water in the dry weather. Midway, it is joined on its right banks by a small tributary, the Devr. Near

1. The April-May Vaishakh, springs pass as far as the islands of Devr, about 20 kms. higher.
Abdulpura, where the Dev river meets Dhadhar river, the height of the banks is about 18 metres. In the northern most portion of the taluka a tributary stream of the Jambua river flows. To the south of the Dhadhar, the tributary river Rangav flows.

The Dhadhar dries up during the summer and the carts and buses can easily cross its bed for the rest of the year as its banks are not more than the same height throughout its length. The banks of the tributary of the Jambua vary from two to two and a half metres, while that of Rangav river are not more than one metre high.

The Dhadhar-Dev rivers show a considerable change in the height of their banks. The banks of the Dev river varies from 6 to 18 metres. Near Karali, the northern bank of Dev river is 7 metres high, while the south bank is 15 metres high. The same feature is found near Kada-dhara where the northern bank is 6 metres high while the southern bank is 15 metres high. The height of banks of Dhadhar river varies from 9 metres to 15 metres while the height of its tributary streams varies from 3 to 9 metres. Further the river Dhadhar crosses through the southern portion of Baroda and from the north of the river Dhadhar is joined by the Vishwamitri river Vishwamitri at Pingalwada. After it has been joined by the size of Dhadhar considerably increases and it flows in a south westerly direction into the Gulf of Cambay and forms the creek on which the Tankaria port of Bandar is situated. 1

1. Captain French, Acting Resident at Baroda, in 1948-50, proposed to connect Tankaria port of Bandar by a small railway line with the Gaekwad’s capital, Baroda, in order that the latter might thus have access to the sea-traffic. But the scheme was not carried into execution. Tankaria port lies in Broach district.