The region of Gujarat geographically can be subdivided into three principal divisions. The region of Kutch and the Rann formed the northern and north-western boundary of the province. The peninsula, also known by the names of Saurashtra, Sorath, or Kathiawar, is bounded by the Gulf of Kutch in the North, the Arabian Sea towards west and South and by the Gulf of Cambay towards Southeast. The peninsula is connected with the mainland towards Northeast by a narrow and shallow strip of land, which until about a century back used to be covered with sea water, thus almost connecting the Gulf of Cambay and Rann, converting the peninsula into an island in the process.

The Mainland of Gujarat can be further subdivided into three distinct geographical zones. Gujarat is separated from the other parts of the subcontinent; by a chain of low lying although steep mountains of Sahyadris and Satpuras which form a chain running almost from beyond the valley of Tapti to North till the base of Mount Abu, near the borders of Rajputana, merging into the Aravali mountains. The plains of Gujarat slope westwards in a gentle manner from the eastern mountains towards the Kathiawar peninsula, and towards the Gulf of Cambay in South. Towards south the plains merge into low lying hills forming the northern spurs of Western Ghats.

Each of these regions are characterised by their typical landforms and physiographical and climatic features. The relief exhibits marked variations, but the general landscape is marked by the plains of aggradational and degradational characteristics. Geologically, about 55% of the land area of Gujarat is covered by the alluvial deposition brought down by the rivers and the coastal deposition, while the rest 45% is made up of large varieties of exposed rock formations of different ages spanning a period of more than 2500 million years, preserving in
them a long history of depositional environments, structural evolutions and tectonic disturbances.¹

The region holds a unique bio-climatic position in the subcontinent. It possess several bio-climatic gradations ranging from dry thorny ecosystem to humid sub-ever greens and dry hilly scrub lands to swamp forests. The vegetation variation is result of variations in climate, rock type, topography and water regime. Major concentration of forests is observed all along the eastern highland as well as in hilly regions of south Saurashtra. The plains are usually devoid of full stocked forest cover. The major types of forest covering almost 10% area of Gujarat are grouped as:²

1. Tropical Moist deciduous
2. Tropical Dry deciduous
3. Tropical scrub
4. Dry grassland
5. Littoral and Swampy forests

**CLIMATE OF THE PROVINCE:**

The region falls within the subtropical zone, with Tropic of Cancer almost dividing it into two equal halves; however the climate is decidedly governed by the Southwest Monsoon winds and rains, and by the physiography of the regions under consideration.

² ibid, p. 10.
RAINFALL DISTRIBUTION:

Gujarat received an annual rainfall of about 20 to 30 inches, with a brisk cold season and oppressive heat in summers. The temperature comes down on the approach of Southwest Monsoons, however the heat and humidity in the air remains constant till about the onset of winters in the month of October. The mean annual rainfall varies between 300 mm to 2500 mm, with rainy days ranging between 10 to 70 days. The mean annual temperature ranges around 26° with a mean maximum of 37° to 42° and mean minimum of 8° to 10°. The coastal areas enjoy a typical maritime climate, with coastal winds determining the humidity and temperature quotient to a large extent. The climate of the region is temperate and varies from hot and oppressive summers to cool winters.

MONSOON RAINS:

The most influencing element that determines the length of the seasons, the temperature and humidity factors in the area as well as across the subcontinent, is the annual rainfall, which falls during the months from July to October.

On account of the cessation of almost all mercantile and trading activities as well as of movement along the highways, European observers confused the rainy season as the beginning of winters, as they associated such trends with the similar rainy weather which occurs in Europe during winter months. Thus van Linschoten wrote:

The (times and) seasons of the yeres are as followeth. Winter beginneth on the last of April, throughout the whole coast, which is called India, from Cambaia to the Cape de Comorin, and commeth with a westerne wind, which bloweth out of sea upon the coast: beginning thereof is with thunder and lightning; and

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3 ibid.
by the reason of that continuall raine, it is called winter... but in warne weather
when fruit time (commeth on); it is then right summer for the time, which in
India is called summer because of the clearenes and drines of the weather, is
the colder and holsomer, and then there blowe the east windes, so that the
nights are as then very coole and somewhat shame...  

Bernier, interestingly made quite an accurate observations on the causes behind these rains
and attributed them to the heating which took place over the subcontinent, thus accurately
establishing the correlation between the heat in the summers and the abundance of rainfall and
the time of arrival of monsoons:

I have also remarked one thing, about which, indeed there perfect opinion in
these parts – that according as the heat of the summer comes earlier or later, is
more or less violent, or lasts a longer or shorter time, so the rains comes sooner
or later, are more or less abundant, and continue a longer or shorter period.  

Further elaborating, Bernier continues:

From these observations I have been led to believe that the heat of the earth
and the rarefication of the air are principal cause of these rains, which they
attract. The atmosphere of the circumjacent seas being colder, more condensed,
and thicker, is tilled with clouds drawn from the water by the great heat of the
summer, and which driven and agitated by the winds discharge themselves
naturally upon land, where the atmosphere is hotter, more rarefied, lighter, and

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4 A.C. Burne & P.A. Tiele (tr. & eds.) The Voyage of John Huyghen van Linschoten to the East Indies, 2 Vols.
less resisting than on the sea; and thus this discharge is more or less tardy and plentiful, according to the heat comes early or late, and is more or less intense.\(^6\)

However, his observations regarding the causes behind the regularity of winds and ocean currents in the Indian Ocean and over the subcontinent reflect the limitations of geographical understandings from which most of the observers of the period suffered. He quite interestingly, attributed this regular flow of winds and ocean currents to the supposed depression and elevation of the earth's poles in conjunction to the movement of the sun across the equator in the summers, resulting in consequent displacement of water and air from the southern pole, which during the period gets elevated.\(^7\)

**PENINSULA OF KUTCH:**

The 'barren and sandy' country of Kutch formed the northern and north-western boundary of Gujarat. The region of Kutch is cut off from the continental mainland by the 'Great Rann' in

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\(^6\) ibid.

\(^7\) ibid, pp. 435-436. I have imagined in the first place, that the air by which our globe is surrounded ought to be considered one of its component parts, just as much as the waters of the seas or rivers; because both the one and other gravitating on this globe, and tending to the same common centre, are in this manner united to our sphere. The globe then is formed of three bodies – air, water, and earth. Secondly our globe being suspended and balanced in that free and unresisting space where in it pleased the creator to place it, would be easily displaced if it comes in contact with some unknown body. Thirdly, the sun after having crossed the line, while moving towards one of the poles...produces sufficient impression to depress in some measure the Arctic pole, which is depressed more and more in proportion as the sun advances towards the tropics; and in the same manner, the Sun permits it again to rise gradually in proportion as it returns towards the equator; until same effect is produced by the power of its rays on the side of the Antarctic pole.

Taking for granted the truth of these suppositions, and considering them conjointly with the diurnal motion of the earth, it is not without reason that the Indians affirms that the sun conducts and draws along with it both the sea and the wind; because if it be true that having passed the line on its way towards one of the poles, the sun causes a change in direction of the earth's axis and a depression of the pole, it follows a necessary consequence that the other pole is elevated, and that the sea and the air, which two fluid and heavy bodies, run in this declension. It is therefore correct to say, that the sun advancing towards one of the poles causes on that side two great and regular currents – the currents of the sea and the current of the air, which latter constitutes the Monsoon winds; as the sun is the cause of the two opposite currents when it returns towards the other pole.
the north and the little Rann in the east. The Gulf of Kutch and the Arabian Sea marked the southern and the western boundaries respectively.

The region has been addressed by the name ‘Kutch’ even in Puranic literature, and also in records and tales of travellers and in the stone and copper plate inscriptions. The region in Ancient Greek records finds mention by the name of ‘Abhir’. The author of the *Periplus of Erythrean Sea* called the region as ‘Aberiai’. However over the period of time it came to be known as Kutch, due to its unique geographical setting, being surrounded by water and waste land, thus resembling a tortoise shell.

The region may be described as treeless, rocky and barren, marked by range of hills and isolated peaks. The rivers with deeply cut and rugged bed, which get filled with water only during rainy season, generally flow from the centre outwards towards the great Rann in the north or the Gulf of Kutch in the south. An area of low lying grassland, known as Banni, separates the mainland of Kutch from the Great Rann in the North. A strip of land, 20 to 30 miles across to South, along the seacoast, behind the high sand banks and the Banni plains in the North were the only areas which displayed any sign of vegetation and was much used as pasture land.

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9 See, J.W. McCrindle (tr.,) *The Commerce and Navigation of the Erythrean Sea: being a translation of the Periplus Maris Erythraei by an anonymous writer and of the Arrian's account of the voyage of the Nearkhos, with introduction, commentary, notes and index*, London, 1879, p. 113


11 ibid
HILL RANGES:

The region consisted of three hill ranges – those of Kutch proper, of Vagad in the east and Rann islands in the north.\textsuperscript{12} The hills are generally steep and slope towards the south. In Kutch proper, the hills are widely spread in the west, which gradually narrows down into single range. The highest hill in the central districts is Dinodhar, rising 381 meters above the level of the Rann and consists mainly of coarse and fine sandstone with a basalt capping.\textsuperscript{13} The other hills in the area are called Dhola Jhurio, Varar, Viehia, Lakordi, Jandharia, Haliman, Khatrod, and Dhrabra.

The hills of the Vagad region, i.e. the Black range in the north and the Gora range in the south rise to a height of about 81 meters and are lying broadly east-west. In the black range the most impressive hill is Pahcham Pir, rising 465 meters above the Rann and commands a magnificent view of the region.

DRAINAGE PATTERN:

The region is intersected by large number of small rivers, which either flows northwards into the Great Rann or south into the Gulf of Kutch and Arabian Sea. Due to scanty rainfall, these rivers are dry for most of the year and flow only during the rains.

The rivers flowing North from the central region of Kutch are: Bhurud, Kali, Godhatad, Suvi (Suvai), Dhudad, Malan, Chang, Nara, Khari, Rav, Kaila, and Kaswati (Kans).\textsuperscript{14} The rivers flowing from centre towards the west and the South empties themselves in Arabian Sea and

\textsuperscript{12} ibid
\textsuperscript{13} Jagat Pati Joshi, \textit{Memoirs of the Archaeological Survey of India, No. 87: Excavations at Surkhotada, 1971-72, and explorations in Kutch}, New Delhi, 1990, p. 8
the Gulf of Kutch. Some of them are: Naiero, Kankawati, Kharod, Khari, Mithi, Sakra, Ruknnavati, Nagmati, Lakadiawali, Bhukhi, Sakra, Sang, Sai, and Rakhdi.15

Besides these, the Kori in the West and Banas and Luni in the east, by pass Kutch on their way to the sea and help in flooding Kutch during the rainy season. These rivers have deep channels and high precipitous banks and also due to their seasonal nature, have little effect on agriculture or affording vegetation.

**RANN OF KUTCH:**

Due to action of the wind, primarily during rainy season, and due to low gradient of the country, the sea water from Gulf of Kutch inundates a large area, which is known by the name of Rann. The region acquires the name from Sanskrit word ‘*irina*’, literally meaning ‘waste.’16 Ain-i Akbari described the area as:

Between Jhalwar and the sarkar of Ahmedabad and Pattan and Sorath is a low lying tract, 90 kos in length by 7 to 30 in breadth...before the rainy season, the sea rises and covers this area and falls as the rains ceases. A considerable part dries up and is covered with salt.17

The region is divided into two parts, the Great Rann to the north and the little Rann to the east. Edward Thronton estimated the total area of Rann to be around 8000 sq. miles.18 The Imperial gazetteer compiled towards the end of the 19th century gives the area statistics of the region as follows:

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15 ibid, pp. 13-15.
The Northern or larger Rann, measuring from east to west about 160 miles and from North to South about 80 miles, had an area estimated at not less than 7000 sq. miles. The eastern or smaller Rann (about 70 miles from east to west), which is connected with the larger Rann by a narrow channel, covers an area estimated at nearly 2000 sq. miles.\textsuperscript{19}

However the later estimates have put the area to be around 9000 sq. miles. (14,400 sq. Km.)\textsuperscript{20}

The land towards the west of the Rann is low lying and swampy. To the northwest, for about 80 Km stretches the level ridge of Allah Bandh. Towards the north are the sand hills and towards the northeast are the Kalingar hills. On the east, the fringes are low, and along the south, beyond the row of bluff steep elevations, a narrow belt of low alluvial land, stretching into the long low Banni, and lastly from near the Nara, runs west, a series of capes, cliffs and promontories. Where the edge is not rocky, Rann stretches inland, fringed some times by a belt of grass yielding land, and in other places, passing up the sandy bed of rivers. The margins of the Rann are low throughout, rich and wet on the south and dry and rock on the north.

English surveyors considered Rann to be of recent geological formation, and believed it to be an arm of the sea raised by some recent natural convulsion such as an earthquake or series of them over a period of time, above the original level and thus cut off from the sea.\textsuperscript{21} The region is still seismically very active, and some of the recorded earthquakes have occurred in 1819, 1844, 1845, 1864, 1956, and as recent as 2002. It has been observed that:

The folding together with the other major structural features resulted from comprehensive stresses which probably began in Miocene times and continued immediately up to the Pleistocene, and even to the recent times.\textsuperscript{22}

The bed of the Rann is flat and so little lower than the nearby land that it's almost impossible to discern between the land and the bed of the Rann. The surface is almost completely flat, though in four places in west, north and in the south between Pacham and Khadir; and southeast near Adesar, it is lightly depressed. The surface and the sub soils are regular layers of sand and clay, with a large mixture of salt, which by drawing moisture from air, in some places damps the surface. Edward Thronton described the country as:

An extensive salt morass which bounds the western frontiers of Gujarat province, communicates with the Gulf of Cutch, and sweeps round the north side of that province, which during the rains it insulates, and at other times exhibits a wide variety of appearances. In some parts it is a widely expanded sheet of shallow water, only a few inches deep, at others an impassable salt swamp, elsewhere a dry unproductive hunk of sand, in some places covered for miles with a salt incrustation.\textsuperscript{23}

The whole area, almost in its entirety gets inundated during rainy season, by the brackish waters brought down by such rivers as Bhadar and Luni and by local drainage. At the same time strong southwest winds, which blows primarily during monsoons or otherwise also, brings water up such streams as Lakhpat from the Gulf of Kutch. In the West, whenever the

\textsuperscript{22} Jagat Pati Joshi, \textit{Excavations in Surkhotada}, p. 9.

\textsuperscript{23} Edward Thronton, \textit{A Gazetteer of the territories}, p. 480.
flooding in the Koři river takes place as it happened in 1826 and 1874,\textsuperscript{24} the Rann remains covered with water round the year.

Due to frequent inundation by sea water, the region was largely devoid of any vegetation and only some on the raised plots of rocky land where water could be found, does one comes across some vegetation. The depth of the water is normally around 10 to 12 centimetres and even during the rainy season the depth is never more than 2 to 2.50 meters.\textsuperscript{25} Imperial Gazetteer described the view of the country after receding of waters:

The water recedes with the season leaving behind sheets of salt and as the summer wears on, and the heat increases the ground baked and blistered by the sun, shines over large tracts of salt with dazzling whiteness, the distance dimmed and distorted by an increasing mirage.\textsuperscript{26}

**BANNI PLAINS:**

Probable exception to general rule is the ‘Banni area’, which as noted earlier is a strip of land separating the northern great Rann from the mainland of Kutch. The area is also covered by water during the rains, except towards the west, but the sediments brought down by the rivers flowing north, produce grass and is used as grazing land in dry season.\textsuperscript{27} The area extends to about 1072 sq. Km out of which about 777 sq. Km are superior grasslands. A bank or bar of soil brought down by the north flowing Kutch rivers, stretches almost parallel to the coastline of Kutch and is about 105 Km long from West to East and 16 to 26 Km broad. Near the mainland, the Banni is so low that it can hardly be distinguished from the Rann. Further out it


\textsuperscript{27} Jagat Pati Joshi, *Excavations in Surkhotada*, p. 9.
rises gently, but, except one narrow strip in west, is all apt to be covered with water in times of high flood. The whole is scantily covered with coarse grass and babul trees.\textsuperscript{28}

**CLIMATE:**

The region experiences a more or less arid climate with desert conditions. It is characterised by wide range of extremes of different climatic parameters. The mean annual temperature is 26 degrees with mean maximum and minimum of 40 degrees and 1 degree respectively.\textsuperscript{29} The range of extremes is more than 45 degrees.\textsuperscript{30} The relative humidity is less than 40\%, while the average annual rainfall is lowest in the state, being only 250 mm to 450 mm.\textsuperscript{31} Average wind velocity is around 10 to 15 Km per hour, and the summer and monsoon winds blow from west to South, while winter winds blow from North.\textsuperscript{32}

**COASTLINE ALONG THE GULF OF KUTCH:**

The coastline along the Gulf of Kutch has extensive mud flats and is highly indented with cuffed rocky islands.\textsuperscript{33} The coastline is also brokered by number of creeks - big and small. The big creeks were usually formed by strong water currents received from the sea, and the smaller creeks are usually formed at river mouths. The amount of water in creeks fluctuates with the tidal flow, with some being filled with water only during the tides. Of the few natural deep water creeks along the coastline of the Indian subcontinent, the northern coastline of

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\textsuperscript{28} *Gujarat State Gazetteer – Kutch District Gazetteer*, pp. 8-9.
\textsuperscript{29} P.P. Patel, *Ecoregions of Gujarat*, p. 44.
\textsuperscript{30} ibid
\textsuperscript{31} ibid
\textsuperscript{32} ibid
Gulf of Kutch has three of them: Kori, Bocha, and Godia. Besides these there are Maliridi creek, the Mandvi creek, the Nakti creek, etc.

KATHIAWAR PENINSULA:

The peninsula as said earlier is known variously by the names of Kathiawar, Saurashtra or Sorath. The name Saurashtra is the ancient name of the peninsula of Gujarat, and the region has been so addressed by the ancient Greeks and Romans and finds mention in Puranic and ancient Jain and Sanskrit texts. The author of the *Periplus of Erythrean Sea* calls the region as *Surastrene*. Sorath is the name given to a tract situated within the peninsula towards the Southwest; however, author of *Mirat-i Ahmadi* uses the name to describe the entire peninsula. Kathiawar was originally a name given to the tract situated in the northeast of the peninsula, which was inhabited by the Kathi tribesmen, who entered the peninsula during the 15th and the 16th century from Kutch. The name was applied to the entire peninsula by the Marathas who came into contact with the Kathis, in course of their forays in the region during late 17th and 18th centuries. The author of Mirat-i Ahmadi described the region in following words:

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34 It is the largest of all the creeks on the northern coast of the Gulf of Kutch. The entrance is blocked by the sand banks, except on the east where the channel leads into the creek. *Gujarat State Gazetteer – Kutch District Gazetteer*, pp. 9-10.

35 The entrance is identified by a range of sand hills of about 9 meters high, towards the northern side. The entrance is the northern extremity of a narrow sand pit, which extends eastwards from the entrance for about 18 Km, where it joins the coast forming a narrow and shallow inlet between it and the coast eastward. *Gujarat State Gazetteer – Kutch District Gazetteer*, p. 10.

36 ibid, p. 10.


70
The border of this country on west and south joins the sea...the region is divided into several districts known by a name such as Halar, Kathiawar, Golwar, and Babriawar. It contains ports, small as well as big rivers, great new forts. Hindu temples, such as Dwarka, Somnath, Shatrunja, etc. and many others.\(^{40}\)

Detailing the internal divisions; the peninsula was divided into 5 divisions of Halar, Sorath, Babriawar, Goelwar, and Kathiawar. Halar formed the north-western part of the peninsula, immediately bordering south of the Gulf of Kutch. Sorath lied to the Southwest. Babriawar formed the southern end of the peninsula, the region between the Arabian Sea and the southern chain of hills and mountains.\(^{41}\) The region was named after the Babree tribe of Kolis who migrated here following being displaced by Kathis in the north.\(^{42}\) Goelwar is the coastal region in the southwest, bordering the western coast of the Gulf of Cambay, and is named after the Goel tribes of Rajputs.\(^{43}\) Kathiawar is the space bordering the peninsula and the mainland towards the northeast, inhabited by the Kathi tribe.\(^{44}\)

Lying between the deserts of Sind and Kutch and Rann in North and the wetlands of central and South Gujarat, Kathiawar represents the nature of both. The peninsula can be physically subdivided into three regions:

1. Central Highlands and the outcrops
2. The Inland plains
3. Coastal plains


\(^{42}\) ibid, p. 98.

\(^{43}\) ibid, p. 584.

THE CENTRAL HIGHLANDS:

Interior of the peninsula contained an intricate mix of hills, plateaus, and forests, and as a region remained less traversed and accessible than other regions of Gujarat. The interior of the peninsula is hilly and rocky, particularly towards the south, which was also heavily forested. Although flat towards the north, the southern end of the peninsula has Gir Ranges run parallel to the coast and at a distance of about 20 miles from it, along the north of Babriawar and Sorath to the neighbourhood of Girnar. The Girmar Mountains principally constitute of granite rocks and the highest peak reaches to about 3500 ft. above sea level. Opposite Girnar are the Osam hills and moving further westward are the Barda groups, between Halar and Barda.

The hills in the central parts of the peninsula can be subdivided into north-eastern and south-western series. The north-eastern hills are generally sterile except in the west near Barda Hills, and throws off several branches in different directions. They are indented by numerous streams into ridges.

BARDA HILLS:

The Barda hills stand isolated from the north-eastern and south-western series of hills as well as the central highlands of Saurashtra. Stretching to about 16 Km north-south and 11 Km east-west, the Barda hills covers an area of about 181.20 sq. Km. It contains porphyritic quartz bearing felsites, more common in the northern half than the southern. The rocks have an appearance of having undergone partial decomposition. They contain free quartzite in abundance, some at least of which are secondary products. In the southern half the rocks are similar but beside the crystal of quartzite, there is another vitreous constituent – the colour of

45 ibid, pp. 345-346.
46 ibid, p. 347.
Amber, and below quartz in hardness. There is also a third variety, a pale grey trachytic ash which contains a decomposed wax green soapy mineral. These rocks weather into huge spherical or boulder like masses piled upon one another, making quite a spectacular scenery.\(^48\)

**THE GIR RANGE:**

The Gir range comprises of five small hills, viz. Sakarla, Rojmal, Chakrosar, Nandivela, and Lapla.\(^49\) The Sakrala hill is located in extreme west and is 2,128 ft. in height; while Rojmal attains the height of 1623 ft. The Chakrosar hill reaches the height of 1,450 ft. The Nandivela is about 1,741 ft. high, and the Lapai has a maximum altitude of 1,547 ft.\(^50\) The highest peak of the Gir Hills does not exceed 2000 ft. (609.60 meters).

**GIRNAR MOUNTAINS:**

The Girnar hills have five principal peaks: the Amba Mata, which is 1,066 meters above sea level; the Gorkhnath, the highest of all, about 1117.40 meters (3666 ft.) above sea level; the Oghad Shikhar, the Guru Dattatrey, which is 1066 meters and Kalka’s peak which is 1004.3 meters above sea level.\(^51\)

**INLAND PLAINS:**

The inland plain is not a stretch of continuous plain, but is broken by southern range of hills, which is almost parallel to the bend of the southern coastline of the peninsula. This fertile alluvial plain runs almost parallel to the coastline. Taking the section across the plain from north-western highlands to the Cambay coast in the southeast, the land has an average height

\(^48\) ibid

\(^49\) Gujarat State – Amreli District Gazetteer, Ahmedabad, p. 9.

\(^50\) ibid

of 500 ft. in Northwest and breaks rather abruptly to a plain of about 250 ft. Thereafter it steadily slopes towards the coast. 52 The upward slope of the alluvial land from seaboard eastward is very gradual, so that, except where the windblown accumulation of loam or sand make small local eminences, the surface of the country appears to be a flat level plain. As one approaches the interiors, the monotony of the flat plain is broken by the low hills or surface irregularities, formed the courses of small rivers. South of Bhavnagar, laterite deposits occupies continues stretch of land through a narrow belt of about 20 miles is extent, for the most part also covered and overlapped by tertiary and alluvial deposits. 53

Many travellers have written of Kathiawar as an island, cut off from mainland by one of the larger channels of Indus. Alexander Hamilton wrote that one of the largest branches of Indus running into the sea at Cambay makes Kathiawar an island. 54 However such description is nothing more than a result of limited understanding of the complex regional geography of Gujarat and its rivers by the early travellers. In fact they have confused the channels formed during the seasonal inundation of area during the monsoons, with an arm of the Indus. In this regard the statement of Capt. MacMurdo is important:

A tract similar to Rann and known partially by the name connects the Gulf of Cambay and Cutch, forming an island of the peninsula of Gujarat for six months in the year. 55

The Imperial gazetteer actually states that the mainland is connected to the peninsula by a neck of low lying land, which until 1813, was flooded during the parts of the year, and is still

53 ibid, p. 9
covered by a large lagoon, 'the Nal.' The neck of land is also known as 'Wadhwan gateway.'

The 'Wadhwan gateway' acts as a corridor between the peninsula and the mainland. The northern and southern extremities of the corridor as salt wastes, while the central depression forms the Nal Lake. The tip near the Gulf of Cambay known as Bhal is a flat low-lying plain drained by sluggish streams and subject to annual floods. The coastal fringes towards Bhauvnagar and further south are also marshy. The Nal Lake is said to cover an area of 49 sq. miles.

**THE DRAINAGE PATTERN:**

The two belts of hill country that cross the breadth of Saurashtra, constitute two distinct watersheds and from them, as well as from the narrow stretch of table land which constitutes the centre of the region and forms a connecting link between them, flows all the rivers and streams in a radial pattern, by which the peninsula is drained. They are very swift at their headwaters, but wind their way sluggishly as they pass through the flat alluvial plains before emptying themselves into the sea, nearly opposite to the points of their origin.

During the southwest monsoon they pour seaward in turbid floods. The more important rivers are Bhogava, Bhadar, and Shetrunji, discharging into the Gulf of Cambay, the Saraswati, Bhadar, Ghelo, and Kalubhar joining the Arabian Sea and the Rangmati joining the Gulf of Kutch.

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56 ibid, Vol. 1, p. 2.
THE BHADAR:

The Bhadar is the largest of the rivers in Kathiawar. It rises from the springs in the range of hills a few miles to the north of the town of Jasdan and joins the sea at Navi Bandar. For one third the distance from its source, it has the character of a hill stream flowing in rocky channel. In the next third of the distance, it receives a number of streams among which the Utavali, Phophal, Moj and Vinu are important. At Kutiana, the Bhadar comes in the influence of sea tides and forms a tidal river for next 20 miles and receives the waters of Minsar and Ojat, till it reaches sea at Navi Bandar. The lowness of land and proximity to the sea has rendered the estuary salty over an area of several hundred square miles.58

SHETRUNJI:

It raises in the Dhundi hills of Gir. It receives a number of small streams, and winds its way to Sultanpur, before entering the Gulf of Cambay. The river lower down is joined by two streams having dangerous quicksand and flowing through nitrous soil, whose brackish waters are said to affect Sheirunji for the rest of its course.59

SUKHA BHADAR:

The Sukha Bhadar rises on the eastern flanks of the same hills on which Bhadar rises, and is about 120 miles in length. Flowing eastward past the town of Rangpur it enters the Rann of Cambay near its junction with the Gulf. Originally the Sukha Bhadar flowed past Dhanduka and formed the creek of Dholera. It left its old bed once in 1812, and again in 1833-34 and cut the present channel four miles west of Dhanduka.

58 Junagarh District gazetteer, p. 13
59 Amreli District Gazetteer, p. 9.
OTHER STREAMS:

The streams such as Keri, Ghelo, and the Kalubhar are similar in character to the Sukha Bhadar. Rising in central hills, they flow eastwards and meet on the coast before joining the Gulf of Cambay near the town of Bhaunagar. Many other small streams flow radially and rising on the flanks of the central hills, some joining the Rann of Kutch and others Arabian Sea. The Hiran and Saraswati, rising in Gir, meet near the temple of Somnath Pattan. The confluence known as Treveni is held sacred, as lord Krishna is said to have left his mortal remains here. Eight miles towards the hills, the Saraswati passes through a reservoir called the Prachikund, another sacred place.

KATHIAWAR COASTLINE:

The northern coastline which forms the northern extremity of Kathiawar peninsula, and is the southern coastline of the Gulf of Kutch, is a built up coast. Marshes, sand and mangroves are common features of this coast, alternating with rocky outcrops and islands in the Gulf of Kutch. A variety of deposits, marine, estuariac, fresh water and sub aerial are found in Gulf coastal plains. Raised coral reefs borders the Gulf of Kutch and marine concretes with oyster beds extends beneath the alluvial soil almost throughout the northern plains. They are exposed along the coast of the Gulf. The whole sea facing the Gulf of Kutch including the islands off the coast is fringed with dead coral reefs. In some places the coral floor extends inland up to the high tide levels. The existence of dead coral reef proves that the country has been rising during late times. Dead oyster beds also indicate upheaval.

The coast can be further sub divided into five sections, each having its own peculiarity. From the western most point, the island of Dwarka, the stretch for a good distance is covered with reefs and small islands, and except for a few isolated hills the physical aspect of the coastline
is monotonous and low continuous sand banks or dunes runs along the coast. The second section stretches from about the vicinity of the town of Navanagar to about 48 Km east. Here the mainland falls back from 6 to 10 Km. within the face of the sea, and is bounded by reefs for about the entire stretch. The reef is covered with sporadic mangrove vegetation. The third stretch from Jamnagar towards the east is muddy, fronted with coral reefs and banks. Moving further east, coast becomes sandy and marshy. The inner most part of the Gulf, the coast is one long mud-flat covered with mangroves on which camels may sometimes be seen.

**REEFS AND ISLANDS IN GULF OF KUTCH:**

Of the southern coast of the Gulf of Kutch are several reefs and islands, especially near the entrance off the western most part of the coastline, popularly known as Okhamandal. One of the largest is the great Baral or Chanka reef, the north face of which is a 16 Km. long coral reef. The north end of the reef forms a full semi-circle with a radius of two to four Km. round Chanka Island. After the first quarter ebb the rocks at the margin begin to show themselves. This vast coral reef surrounds four islands, namely, Chanka, Nora, Bhaidar, and Chusra. It is completely covered at high water and only four islands are visible. The north face of the reef is very steep, the sounding here being 20 to 26 fathoms and the tide rushes by with the velocity of 4 to 6 knots. Off the north-east of the Baral reef is a shoal some 15 to 19 fathoms deep on which rocky patches of 7 to 8 fathoms are seen. The bank extends some two Km

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60 *Jamnagar District Gazetteer*, Ahmedabad, 1979, p. 11.
61 ibid
62 ibid, p. 12.
63 ibid, p. 13.
64 ibid
north-east of the Chanka island, which is at the extreme north-east of the four islands and is also the smallest of the four. 65

Situated in the Gulf of Kutch about 5 Km. north of the mainland of Okhamandal and to the east of the Okha port, is situated the island of Beyt or Shankhodhar, which is a narrow about 13 Km. long crooked piece of land patched with rocks. Of Shankhodar, it has been mentioned that, “island has sweet water and abounds in fruit trees, and other trees and fields, and is one of the great temples of the Hindus.” 66 The island received its name from a Hindu mythological demon who is said to have his dwelling in a large conch shell. 67 The island was also recognized by the name of 'Bate', especially by the European mariners and travellers. William Milburn in his Oriental Commerce described the island as:

It is about 5 miles long along its longest axis in the direction from northeast to southwest; something is a shape of an 'S' with its lower part cut off. He further writes that the island produces cocoa nuts, betel nuts and grains in small quantities, and some trade is carried on by inhabitants in dates, sugar and rice. 68

It is famous for its temples and shrines dedicated to Krishna.

**COASTLINE ALONG THE ARABIAN SEA:**

The Kathiawar coast at the extreme northwest and towards west facing the Arabian Sea, rises sheer off the sea and is a faulted coast. The land here rises from 84 to 308 feet. At Okha point it is about 52 feet above sea level. The Barda hills are not very far from the coast, Parts of it

65 ibid
are salt charged while near Okhamandal it is a sandy waste. The coast is generally flat and fringed with a line of windblown sand hills. There are few offshore cliffs and muddy stretches broken up by small creeks. Except for the Dwarka inlet, there are very few inlets of note on this coast.

On the whole it presents a remarkably straight and unbroken line which slopes from the central highland towards the margin; it is fringed with low parallel ridges of consolidated shore deposits and sand hills.

In the south the coastal strip is muddy and occasionally fringed with a line of windblown sand hills. However from the extremes south, as the coastline moves eastwards and converges to face the Gulf of Cambay, it starts showing mark of breaking up and more signs of creeks and islands. Some of the principal creeks in the area are the Chanch creek, the Mandva creek, the Somar creek, the Motapat creek, and the Jafrabad creek. The coastal land here is of alluvium, which is brought down by the rivers like Sabarmati and Bhogava.

**COASTLINE ALONG THE GULF OF CAMBAY:**

The coastline facing the Gulf of Cambay is heavily indented with, many creeks and inlets, and also sand banks, which allowed many ships of varying sizes to seek shelter in stormy weather and during high tides.

**Creeks, Shoals and Sandbanks in Gulf of Cambay:**

Of the saltwater creeks in the peninsula, the most important were; Bhauvnagar, forming the channel between the town and the Gulf of Cambay; the Sundrai, 8 miles north of Bhauvnagar, the Bavliari, 2 miles north of Sundrai; and the Dholera, leading from the Gulf of Cambay, 10

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69 Jamnagar District Gazetteer, p. 22.

70 Amreli District Gazetteer, p. 11
miles inland to the town of Dholera.\textsuperscript{71} There were large numbers of ports and docks in the area, which during high tide were converted into islands. Mirat-i Ahmadi mentions such docks or baras as Sultanpur (in pargana Talaja, near Ghoga), and Qutubpur which were encompassed by tidal waves.\textsuperscript{72}

The coastal plains of south-eastern Gujarat overlooking the Arabian Sea and the Gulf of Cambay can be divided into 3 main sections and many subsections:

1. From Sonrai (Sundrai) creek to Gogha is a 19 mile stretch of low muddy foreshore of marsh and swamp and mangroves, partly sandy and partly rocky. The coastal marsh extends to about 3 or 4 miles from the Gulf. But they penetrate into the interior along the river courses such as Kalbi and Kalubhar and along the Bhavnagar and Sonrai creek to a distance of about 12 miles. Up to Bhavnagar and several miles inland the coastal belt is lined with mangrove thickets, covered in parts with coarse grass unfit for grazing. It is seamed by several creeks besides the Bhavnagar and Sonrai and over flowed by high tides for a considerable distance inland.

2. The Bhavnagar shoal is 6 to 7 miles from the town and one and a half miles from the shore. It is a sand bank and the ship channel is to its west. Bhavnagar is difficult to reach, being approached by a winding creek. The central bank, formerly 5 miles east of Bhavnagar shoal, consists of shifting sands and may be said to be connected with the Rhook bank at the north end of the Bavliari creek. There is a patch of 3 and half fathoms in the tail of the great Mal bank east north-east of Gogha and rather more than 6 miles from Piram. The position of this bank is also uncertain and it seems to be moving south. South of Bhavnagar, the coast rises towards Gogha and it becomes rockier.

3. From Gogha to Gopnath point, for a distance of about 39 miles, the coast is sandy and over
flowed during high water. From Gogha to Morchand, a distance of about 20 miles the sandy
coast is comparatively broad and tolerably broken by ravines and trees near the villages.
South of it, up to the mouth of Shetrunji, the sandy coast becomes very narrow, fringed
with sand hills. Beyond Shetrunji the coastal belt widens out again and merges with the
marshes of Sultanpur and Tarsara. The country is low and over flowed at spring tides and
dry banks run out two miles from the shore. Several points on this stretch from Gogha to
Gopnath used to be landmarks for sailors right up to the early part of the 20th century. The
passage from Broach to Gogha was quite clear for the ships, but the Mal bank now seems
to be drying more to the south than before.

East of Gogha town is the Gogha shoal, a narrow sand bank lying in the direction of the
stream and its south end is 3 miles east of Gogha. The Gogha shoal is one of the sandy
patches on the Mahumadi bank, the shores of which stretches from the rocky reefs of the
Kuda point to the entrance of the Bhavnagar creek. The bank is chiefly composed of red
and yellow clay with occasional sand patches. The Gogha shoal is one such sand patch.
There are two shoal banks nearly dry at low water two and three miles east of Gogha. At
the mouth of the Shetrunji river is the small trading port of Sultanpur. The Sultanpur shoal
is rock, sand, and clay, with a patch of sand nearly dry at lowest spring tide. It lays 4 and
half miles east of the entrance to the Shetrunji River. The shoal is almost joined with the
Gopnath point by other banks between which there were passages for small boats to pass.

4. From Gopnath point to Gadhada the coast is about 32 miles and it is rather rocky and
strewn off shore with rocky islands. They are of moderate height and sometimes hollowed
by sea into caverns. From the sea, this coast up to Diu is a uniform line, not much broken.
Islands:

Apart from Diu which was a well-fortified Portuguese settlement during the period, Mirat mentions the islands of Piram Bisram, lying some miles from Gogha, between Ghoga and Surat. Piram was an important island situated in the Gulf of Cambay, 4 and half miles south of Gogha and 2 and half miles from the nearest point off the Kathiawar shore.

Ain-i Akbari described it as a rocky island 9 kos square and situated in the midst of the sea.\(^{73}\) The island was separated from the mainland of the Kathiawar peninsula by a channel which is about 3 miles wide and in centre about 60 fathoms deep.\(^{74}\) It is covered in part by the brown sand, its dimensions at high tide being one mile by about half a mile. A rocky reef, rising to the surface from a depth of about 60 to 70 feet, except in the south surrounds the island.\(^{75}\) Alexander Forbes gave a detailed description of the geographical setting of the island:

> The island is covered by a continuous range of sand hills, resting on a scanty bed of black soil. These hillocks form a barrier against the sea, along the whole western face of the island, and are continually augmented by drift occasioned in the fair season, by the prevalent winds; but the eastern side is comparatively free from sand, and its soil affords scanty subsistence to its few and temporary occupants.\(^{76}\)

Barring a few mentioned above, which were large enough to be well populated and fortified, and sometimes used to keep a tab on the maritime traffic in the vicinity, most of the islands


\(^{76}\) Alexander Forbes, Rasmala, p. 246.
were generally very small and provided little more than small pasture grounds and sweet waters to local communities.\textsuperscript{77}

**MAINLAND GUJARAT:**

The mainland of Gujarat is an alluvial plain partly formed by the annual flood-deposits of the Sabarmati, Mahi, Narmada and Tapti rivers. Physically, the region can be divided into the coastal areas, the plains proper and the highlands.

**HIGHLANDS:**

Mountains which bound Gujarat on the north and the east are steep, craggy and difficult to access. The southern part of the mountain chain was made by the northern spurs of the Western Ghats. From the western face of the Ghats numerous spurs or ridges move outwards, a few of them even reaching the sea; and in some parts they are replaced by isolated hills or rocks.

**NORTHERN HIGHLANDS**

The highlands can be further subdivided into two groups of Northern Highlands and Southern Highlands. The northern highlands on three sides has more or less natural boundaries. The northern limit is marked by the Banas river, while the western limit marks the junction of alluvial plains with the highlands, while the southern limit follows the Orsang river, which also form the geological boundary between the two, separating the pre-Cambrian rock formations of the Northern highlands from the Deccan traps in the South. However, there is

\textsuperscript{77} S. Nawab A Li & C. N. Seddon (eds.) *Mirat-i Ahmadi Supplement*, pp. 207-208.
no natural feature to mark the boundary on the east, which as it is extends far beyond the territorial limits of Gujarat.

The ecosystems of the northern highlands are dominantly influenced by the physiography of the Aravalli and Vindhya ranges. While the part of the highland between Banas and Mahi forms the southern terminal extension of Aravalli range, that between Mahi and Orsang forms the Western terminal extension of the Vindhya Range. The natural ecosystems exhibited are of dry and deciduous forests and tropical scrub forests. These systems however have their full extensions in the Aravalli and Vindhya ranges, while in Gujarat they only form geomorphic extensions. 78

Another important feature of these highlands is the drainage. While the highlands receive water and sediments from the sources located far into interiors, beyond the territorial limits of Gujarat, the discharge in form of rivers and rivulets towards Gujarat is considerable. However, the region in spite of such considerable water supply, suffers from acute shortage in summers due to the high run off of both surface and ground water. The region is drained by the rivers Sipu, Banas, Sabarmati, Hathmati, Majam, Watrak, Mahi, Panam, and Orsang.

The region experiences a typical semi-arid climate, with average rainfall between 700 mm to 1000 mm and about 30 to 45 rainy days in a year. The average temperature hovers around 26 to 27 degrees, with a mean maximum of 41 degrees and mean minimum of 11 degrees Celsius. The average wind speed remains between 5 to 15 Km per hour, and the high is only second to the speeds experienced in Saurashtra. The winds blow generally from West to Southwest for most part of the year.

Southern Highlands:

The ecosystems of Southern Highlands are influenced by the physiography of the Satpuras and Sahyadri ranges, geology of the trappean basalt and climate of the Western Ghats. The northern limit is marked by the Orsang river, while the western limit forms the boundary between coastal plains of South Gujarat and the Deccan traps. The region extends beyond the territorial limits of Gujarat towards the East and South. The area between Orsang and Narmada represents the Vindhya Range, while that between Narmada and Tapti comprising the Rajpipla hills forms the Satpura range. The areas south of Tapti formed of the hills of Dangs and Dharampur represent the Sahyadari Range. The area shows an altitude range of 100 to 1000 m, the average ground elevation being between 300 to 600 m. the slopes of the hills towards the coast are steep and craggy, and the overall topography is highly rugged. The hills are generally flat topped, while the valleys are deep and narrow. The hills from North to South shows a progressive increase in elevation and are formed of the Lava flow and plutonic intrusives of the Deccan trap.

The ecosystem of the region is characterised by the tropical moist deciduous forest. The system towards the plain and coastal areas is marked by significant influence of a high flow drainage system. The principal rivers, flowing from East to West are Narmada, Tapti, Mindhola, Purna, Ambika, Kaveri, Khapri, Auranga, Par, Kolak, and Damanganga.

The climatic conditions range from sub-humid to humid, with low aridity. The conditions remain moist, with soil retaining moisture throughout the year. The average temperature hovers around 26 degrees, while the mean maximum and minimum ranges from 41 degrees to 21 degrees respectively. The mean relative humidity is around 70% to 75%, and the average annual rainfall ranges from 1300 mm to 2200 mm. The average annual wind velocity remains around 5 to 10 Km per hour with wind flowing in Southwest direction.
PLAINS OF GUJARAT

THE NORTHERN ALLUVIAL PLAINS:

The plains of central Gujarat run from the base of mount Abu and the mountains nearby towards the east, in a continuous stretch till the head of Gulf of Cambay in the south and the Wadhwan gateway and Nal Lake in the west. Drained by the rivers Sabarmati and Mahi, and their tributaries, the soil is of sandy nature. To the east of the river Sabarmati the country is fairly well wooded and to the southeast it is picturesque with hills and fields. To the west the country becomes monotonous. On the whole, Ahmadabad and Mehsana districts consist of one continuous plain sloping gently from north-east to south-west, the monotony being broken by loessic hills.

Physiographically, the region forms the northern part of the Gujarat alluvial plains. The Sabarmati rivers forms the dividing line separating it from the plains of the south. The highest elevation reached towards the northeast border is around 200 m while the lowest is about 20 m at its western flank. The plains have a general ground fall of about 180 m towards southwest. However the ground slope is rather gentle and the landscape is characterised by a subdued topography comprising of a variety of depositional landforms.

The transition zone between the plains and the highlands is marked by a pediment zone of undulating topography, characterised by low altitude mounds and hillocks of stabilized Aeolian sand dunes. There are also small alluvial fans and cones of materials brought by the rivers. The central part of the plain shows mix topography of fluvial plains marked by subdued fossil dunes. The western part is almost a level ground of saline wasteland with a thin upper layer of sand and silt.
The region is characterised by sparse drainage. In the central part, there are few rivers like Rel, Banas, Sabarmati, and Rupen, however with extensive gully erosion. The river courses are quite shallow, only about 2 to 10 m deep and very broad ranging about 100 to 400 m in width. The Rel river, in the area north of Banas, after flowing for some distance in the eastern part gets lost in sand. The area northwest of Banas is almost devoid of any drainage. Similarly in South between the Rupen and Sabarmati, there is hardly any drainage.

The sediments of the plain belongs to the youngest geological formation, mostly upper quaternary, and consists of thick succession of sandy and clayey layers of fluvial, fluviomarine and aeoline origin. The depositional environments provide a good example of the control of fluctuating of sea level and climate change, which was subjected to neotectonic disturbances from time to time. The deposition has taken place in the North-South Cambay structural depression, with maximum thickness of deposits being more than 500 m in the central and western parts. The sediments in the east are dominantly of fluvial origin. Towards west they progressively grade into fluviomarine to marine. The western part of the region along the Rann border represents as palaeomudflat.

The region experiences a semi-arid climate, with aridity increasing from East to West. The average temperature is about 26 degrees and the mean maximum and minimum ranges to about 41 degrees and 10 degrees respectively. The average relative humidity is about 60% to 65%, with average annual rainfall being low to about 450 to 600 mm. the average wind velocity is about 5 to 10 km per hour, and it blows from Southwest and West during Monsoon months, while during winters it blows from North.
THE CENTRAL ALLUVIAL PLAINS:

The region forms the extension of the Northern plains, however the two regions differs significantly due to the drainage pattern. The Northwest limit is formed by the Sabarmati river, while Northeast limit coincides with the boundary between the plains and the highlands. The Southeast limit is marked by the Narmada river while the southwest limit is bounded by the transitional zone between the fluvial inland and saline coastal environments.

The region shows more or less flat topography with a series of sections cut deeply by inscised channels of rivers flowing across the region. The sections are 10 to 10 m deep, and the river banks are generally marked by levee deposits, creating a ridge type banks with higher elevation than the ground level. The flat topography is dotted by low height sandy mounds of stabilized dunes. Formation of ravine landscape is quite common on most of the rivers due to deep gully erosion.

In the southern half of the great Gujarat plain there is, for the most part, a surface soil of black loam, a vast alluvial deposit. In the northern half the soil is light-red sandy loam, but on the borders between the two, it is an admixture of sandy soil. The black soil extending from Surat to Baroda is not only very fertile but also remarkable for the desert-like appearance it gives to the country where it predominates. Scrub jungle of Accacia seems to have formed the vegetation suitable for rhinoceros and wild bear. Occasionally, some trees are seen near the villages. Further north, the aspect changes with red soil. The entire region is cultivated, and the conspicuous absence of water-channels may be noted. South of Baroda there is a vast plain of black soil, and the region becomes picturesque with hills of Rajpipla. Beyond the Tapti, heaps of drifted sand can be seen along the coast.
The region is drained by rivers like Sabarmati, Khari, Meshw, Majam, Mohar, Shedhi, Mahi, Dhadhar, Orsang and Narmada. The rivers with large catchments extending in the eastern and north-eastern highlands carry a large discharge of water and sediments. The rivers are prone to heavy floods and land erosion. The flat topography causes monsoon inundation.

The climate is semiarid, with high moisture retention in soil, for most part of the year. The mean annual temperature is 27-28 degrees, with mean maximum and minimum range of 40 degrees and 11 degree respectively. The mean relative humidity is 60% to 65%, and the average annual rainfall is 700 to 1100 mm. The general wind direction is southwest and average wind speed is 5 to 10 Km per hour.

**COASTAL PLAINS:**

A narrow fringe of wasteland delimited by the tidal waters of numerous parallel streams that flow through Gujarat can be seen right from the Damanganga estuary in the south to the Gulf of Kutch in the north, and along the southern borders of Ahmadabad District. This region of salt and marsh built by the sea and rivers is, at present, little used for cultivation.

The southern half of the narrow coastal belt stretching from the river Damanganga to the river Kim is a barren stretch of sand-drift and salt-marsh fringed here and there with small hills. Except at a few places, water is brackish and scanty making cultivation difficult.

A belt of highly cultivable land lies beyond the reach of the tidal Waters. The deeper loam brought down by the rivers Tapti and Ambika gives a uniformly rich and level aspect to Kamrej and other areas. Towards Broach the coastal belt broadens and becomes fertile enough to be good pasture land. The average height of the plain is 40 to 50 ft. above the mean sea level.
In ancient times the land was much lower, and the sea much nearer, than what we see today. Sometimes the tidal waters find a ready entrance through the river estuaries, and passing behind the sand drifts, as at Mithli, make their way through miles of low-lying country. Around the head of the Gulf of Cambay the ancient channels of the rivers, which are now silted up, act as drains for springtides, but otherwise remain a salt-marsh. Other lands, generally beyond the reach of the sea are, at spring tides, covered with a shallow film of salt water.

**Drainage Pattern:**

Among the rivers of the mainland, the Sabarmati, Mahi, Namiada and Tapti are important from the point of view of water supply and drainage. The name Sabarmati is derived from the names of two rivers, namely, the Sabar and the Hathmati. The Sabar rises in the south-eastern spurs of the Aravalli hills and takes a southerly turn before it is joined by the Hathmati. Hereafter, it takes the name Sabarmati, and flowing for about 200 miles through Dehgam, Diskiroi and Dholka taluks, discharges itself into the Gulf of Cambay. It is joined by the Khari which rises in the hills near Ahmadnagar in Sabarkantha district (former Idar state) before receiving the Vatrak and Meshvo rivers opposite Vantha near Kaira. Both Vatrak and Meshvo rise to the south of Dungarpur. The Sabarmati has changed its course several times after silting up earlier channels especially near the gulf.91

The Saraswati is a small river rising in the hills of Mahikantha district. It joins the Rann near Anvapur after flowing past Siddhpur, and disappears underground for some distance before rising again near Radhanpur.

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**THE MAHI**

The Mahi is referred to as Mophis by Ptolemy and is identified with Mais of the Periplus. Rising near Gwalior, it enters Rajputana and cuts through deep gorges. After flowing for some distance, it passes into Gujarat. Its estuary is so wide that it is called Mahisagar. The bed of the river lies so much below the land on the either side of the banks that its waters cannot be readily used for irrigation.80

**THE NARMADA**

The Narmada river, the Namados of Ptolemy and Namnadios of the periplus, rise at Amarkantak in Satpura range. Winding through the rugged hills of nandla it rushes through the 'marble rocks' near Jabalpur and enters a fertile basin forming the Narmada valley between the Vindhyan and the Satpura ranges. It enters Gujarat, and before joining the sea near Broach, it renders fertile the plains over a distance of 170 miles.81

**THE TAPTI**

The Tapti raises in the Satpura hills and after flowing for some distance in the Vidarba region, it enters Khandesh and finally empties itself into Arabian Sea near Surat. It is tidal for last 30 miles of its course.82

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80 ibid, Vol. 1, pp. 172-173
82 ibid, p. 685.