CHAPTER-3

SPATIAL CHARACTERISTICS OF THE STUDY AREA

3.1 Introduction

Gujarat state lies between 20^0 1' and 24^0 7' north latitude and 68^0 4' and 74^0 4' east longitude in the western part of India. The State is bounded by Arabian Sea on the west, Pakistan and Rajasthan in the north and north-east respectively, Madhya Pradesh in the east and Maharashtra in the south. The State comprises three geographic regions: The Rann of Kachchh, the Saurashtra Peninsula and the plain mainland of Gujarat. The State extends from the Rann of Kachchh and Aravalli hills in the north to the Daman ganga River in the south.

The Rann of Kuchchh is a part of the Kuchchh Peninsula, situated on the northwest border of the State with almost desert like physiography. It is spread over a large tract of salt marsh, called Rann of Kuchchh in the north and Little Rann in the south. Between Saurastra and Khambhat, is Kathiawad. It is a region made up of Deccan lavas and cut across by lava dykes. The mainland Gujarat extends to northeast Gujarat. This region has small plains and low hills; southeast Gujarat is an extension of the Western Ghats and receives the highest amount of rainfall in the State.

Gujarat has a tropical climate with hot summers and cold winters. The summer months are from April to June, while winter is from November to January. Monsoon is experienced in June and continues till September.

The four major river systems of the country, such as the Sabarmati, Mahi, Narmada and Tapi cover different parts of the State's geographical area of 1,96,024 sq. kms.

Socially, Gujarat is marked with significant variations corresponding to its varied physical characteristics. The average population size of the districts in Gujarat is around two million. Ahmadabad is the most populous district having around six million (5,816,519) population. The density of population in the State is 308 persons per square km. with Kuchchh (35 persons) and Ahmadabad (719 persons) at the two extremes. The State has a significant proportion of SC (7.10%) and ST (14.80%) population in its total population. However, in reality the social composition of the State's population is much more complex. From region to region different social groups have developed varied ways of adaptation mechanisms with their respective ecological setups. While the Kuchchh peninsula is largely inhabited by pastoral

communities, the semi-arid Saurashtra Peninsula provides conditions suitable for cultivation of coarse variety crops under the dry farming system along with animal husbandry. The undulating terrain in the eastern districts of Gujarat has remained the traditional abode of the Bhil and other tribes. The predominantly tribal tracts of the State form a continuous stretch extending further south along the eastern margin of Madhya Pradesh. The tribal share in the total population gradually increases towards the south. Between the eastern tribal tract and the south Gujarat coast, lie the flood plains of four major rivers viz. Sabarmati, Mahi, Narmada and Tapi. The deep alluvial deposits in these river valleys have not only been used since time immemorial for intensive cultivation of fine food grains and commercial crops, but also for trade and industrial activities.

Vadodara district portraying equally varied physical and social characteristics has been selected as a representative sample district of the State for detailed investigation in this study.

3.2 Vadodara District

Vadodara district extends over the eastern part of Gujarat state and lies between 21°50’ and 22^{0}50’ north latitudes and 72°50’ and 74°10’ east longitudes. The district has an average elevation of 37.7 meters above mean sea level, with gradual increase in height from west to east. North-south length of the district is shorter (109.3 kms.) than its east-west length (148.1 kms.). It is the tenth largest district of the State with 7,546 sq. kms. of area which accounts for around four (3.85%) per cent of total geographical area of Gujarat. The average population density of 522 persons per sq. km. is significantly higher than the State average of 308 persons per sq. km. At the 2011 Census, the district with a total population of 4,16,5626, accounted for about 7 per cent (6.89%) of state total population of 60,439,692.

The district boundary coincides with the boundaries of Kheda and Anand districts in the north-west, Bharuch district in the south-west, Narmada district in the south, the states of Maharashtra and Madhya Pradesh in the east while the district of Dohad and Panch Mahals bound it from north and north-east.

Vadodara district was bifurcated into Vadodara and Chhota Udaipur districts on 26 January, 2013. The four predominantly hilly, forested *talukas* of Chhota Udaipur, Jetpur Pavi, Nasvadi and Kavant were separated out of the old Vadodara district to form a new district of Chhota Udaipur. The remaining eight *talukas* primarily characterized by plain topography and accommodating largely non-tribal populations remained as the new Vadodara district. However, for the purpose of the present research the old Vadodara district with all its 12 administrative divisions or *talukas* has been considered. This was purposefully done because secondary data for the district and the *talukas* are not available after the 2011 Census.

The name Vadodara is used for the district as well as the city. Both the district and the city of Vadodara are also spelt as Baroda district or Baroda city. The Vadodara city happens to be one of the four million cities of the State along with Ahmadabad, Surat and Rajkot cities and is the largest urban center of the Vadodara district. Sir Sayajirao Government Hospital (SSGH) and the Government Medical College are the two prominent Government health units of the district. Both the hospitals are well equipped with modern facilities and well trained doctors and staff. Besides, there are several small and large private nursing homes and hospitals including a few multispecialty private hospitals in the city providing highly efficient and most modern medical care to the people of the city and of its neighborhood.

3.2.1 Physiography

Vadodara district is a part of Gujarat plain. The terrain of the district is flat, level plain in the west, while the eastern part is a hilly tract comprising Chhota Udaipur, Kavant, Nasvadi and Jetpur Pavi *talukas,* where elevation varies between 300 and 520 meters above mean sea level (amsl). Southeastern portion of this hilly area is relatively higher in altitude and forms the part of Vindhyan Hills. North eastern part of the hilly area is comprised of plateaus, ridges and isolated relict hills. The hilly tract is also covered by thick forests at some places. It is mainly inhabited by the tribal communities. The highest elevation of 637 meters amsl is at Amba Dungar and Mandai Dungar lying in the southeastern side of the district. The rest of the district is flat and a part of Mahi and Narmada doab. Elevation in the rest of the area ranges between 10 to 100 meters amsl. The general slope of the district is from east to west.

The district can be subdivided into seven small regions such as, Khambhat Plain, Mahi Plain, Vadodara Plain, Vindhyan Hills, Orsang-Heran Plain, Narmada Gorge and Lower Narmada Valley. Khambhat Plain is located in the western part of Padra *taluka*. The Khambhat Plain descends from 22 meters amsl in the eastern part to 10 meters amsl in its western part. Mahi Plain is located in the northwestern part of the district and incorporates within its perimeter parts of Padra, Vadodara and Savli *talukas*. Mahi Plain also has an east to west slope, with a maximum elevation of 100 meters amsl in the north that reaches a minimum of 30 meters in the west. The Usterts-Ochrepts type soil is commonly found in the region. Vadodara Plain is located in the central part of the district and is spread over Padra, Vadodara, Savli, Vaghodia, Dabhoi, Karjan, Sinor, Sankheda *talukas*. Elevation of the Plain varies from 88 meters amsl in the west to 27 meters amsl in the east. Both Mahi plain and Vadodara plain are covered with alluvium and blown sands. It is a part of the Deccan trap. Vindhyan Hills are located in the eastern part of the district and covers Chhota Udaipur and Nasvadi *talukas* with an altitude of 300 meters contour in the northern part.

Orsang-Heran Plain is located in the mid-eastern part of the district and covers Dabhoi, Sankheda, Chhota Udaipur, Nasvadi, Jetpur Pavi and Tilakwada *talukas*. Narmada Gorge is located in the southeastern part of the district and extends over some parts of Chhota Udaipur and Nasvadi *talukas*. The relief of the region is hilly with altitude varying from 300 meters to 520 meters amsl. Lower Narmada Valley is located in the southern part of the district spread over parts of Dabhoi, Karjan, and Sinor *talukas*. Altitude of this region varies from 45 meters amsl in the eastern part and 20 meters amsl in the western part. Geologically Narmada Gorge and Lower Narmada Valley belong to the Deccan Trap, Intra-Trappean, Bagh and Lamenta Beds.

Hills of Vadodara district are relatively small. The 1.6 kms long Bhairpur rise lies in Sankheda *taluka*. North east of it occurs a narrow ridge of quartzite known as Gugalpur hills, which is 4 kms long with an elevation of 113.08 meters amsl. Other high lying features of Sankheda *taluka* are Achali Ridge with a maximum elevation of 270.66 meters amsl, Kanaha Hill (46 metres), Lachharas Hills and Lonadra Hills. However, the eastern margin of the district is marked with peaks of higher elevation, with Satpuda Hills and Rajpipla Hills in the southeast and Vindhyan Hills in the north east. The latter forms the boundary between Gujarat and Madhya Pradesh states.

3.2.2 Drainage

The district is divided into three river basins, viz. the Narmada Basin, the Mahi Basin and the Dhadhar Basin. Narmada and Mahi are the principal rivers which form the southern and northwestern boundaries of the district respectively and ultimately merge with Arabian Sea at the Gulf of Khambhat outside the district. Originating near Gomanpur village of Madhya Pradesh from the Vindhyan Hills, the Mahi River runs for about 115 kms. Within the district. It flows from north to southwest and passes through Savli, Vadodara and Padra *talukas*. It has 5 tributaries and some sub-tributaries in the district. The major tributaries of Mahi River are Mesari, Goma and Karad, which flow from the northwest side of the district. The Jambuva, the Surya and the Vishwamitri Rivers flow in the northeastern part and the Dhadhar River flows in the central part of the district.

The Narmada River originates from Amarkantak in Madhya Pradesh. It flows in Vadodara district through Karjan *taluka* before meeting the Arabian Sea at the Gulf of Khambhat. It has 15 tributaries and sub-tributaries in the district. The major tributaries of Narmada are Orsang, Heran, and Men, which flow through the district in a southwestern direction.

Apart from these rivers there are many lakes and tanks in Vadodara district, such as Aajwa (Vaghodia *taluka*), Wadhwana and Pratapura lakes.

3.2.3 Climate

Vadodara district is located south of the Tropic of Cancer and is in the transition zone of arid areas of Saurashtra Peninsula and heavy rainfall areas of South Gujarat experiencing sub-tropical climate. The climate of the district is by and large hot and dry in summers and cold in winters, and therefore experiences three seasons; monsoon, summer and winter.

3.2.4 Temperature

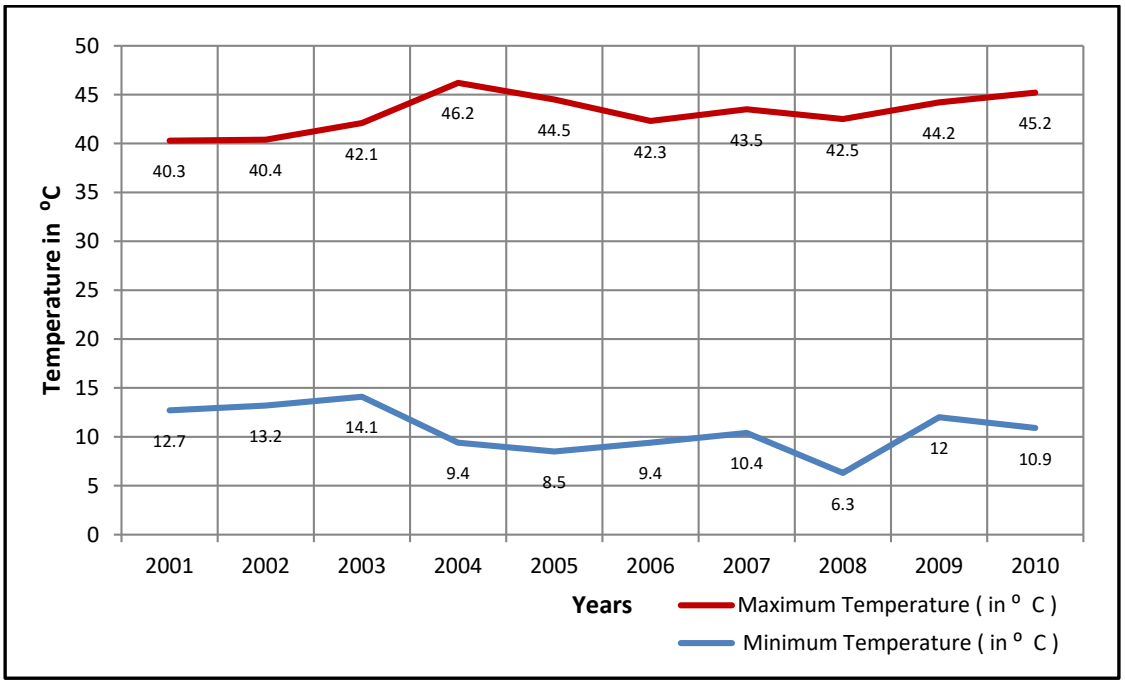
Temperature starts rising from the month of March and reaches a maximum of about 46^0 Celsius in May. January is the coldest month of the year when the minimum temperature does not go below 12^0 Celsius because diurnal range of temperature is lower. However, the district experiences wide annual and daily variations in the temperature conditions. It had experienced the maximum temperature of 46.2^0 Celsius in 2004 and the minimum of 6.3^0 Celsius in 2008 (Table 3.1).

Table - 3.1 : Year-Wise Maximum and Minimum Temperature- Vadodara District

Sr.No.	Year	Temperature (in Celsius)	
		Maximum	Minimum
1	2001	40.3	12.7
2	2002	40.4	13.2
3	2003	42.1	14.1
4	2004	46.2	9.4
5	2005	44.5	8.5
6	2006	42.3	9.4
7	2007	43.5	10.4
8	2008	42.5	6.3
9	2009	44.2	12.0
10	2010	45.2	10.9

Source: Census of India (2011): District Census Handbook: Vadodara.

Figure-3.1 : Year-Wise Maximum and Minimum Temperature- Vadodara district (2001-2010)



Source: Census of India (2011): District Census Handbook: Vadodara.
Socio-Economic Review, Gujarat State, 2012-13.

3.2.5 Rainfall

Consonance with the monsoon rhythm of South Asian region, the district receives around 95 per cent of its annual average rainfall during the monsoon months of June and September. The highest rainfall occurs in the month of July. Rainfall increases from west to east due to the hilly region in eastern part and decreases from

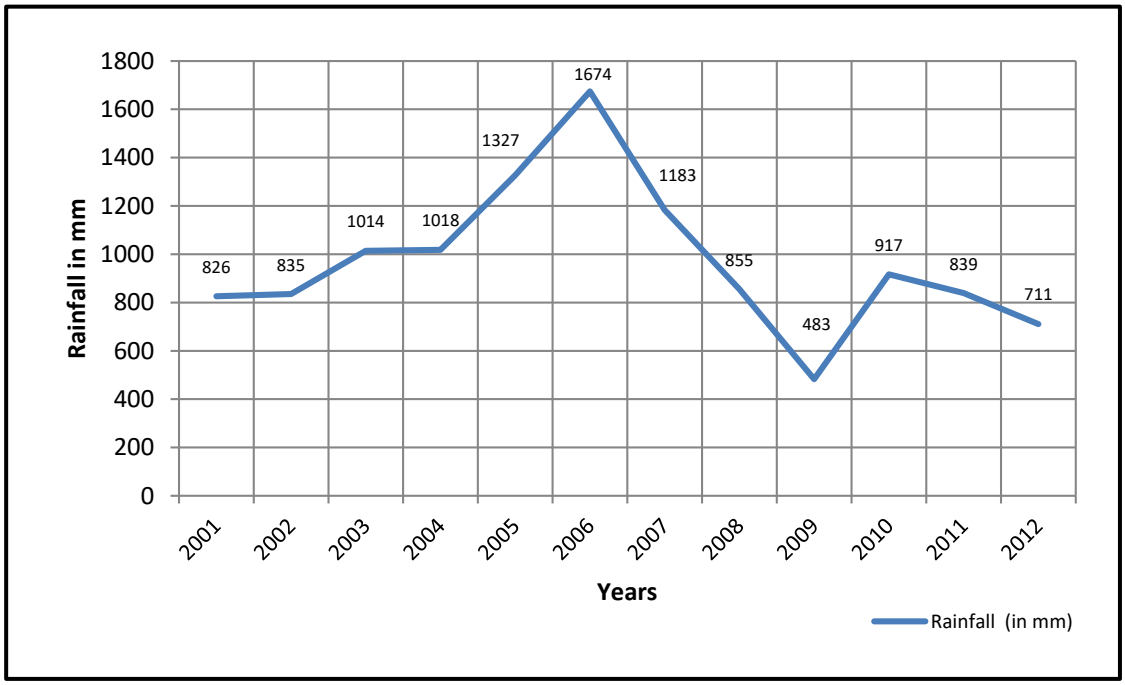
south to north of the district. The monsoon in this district is generally accompanied by gusty winds. Moderate and light winds are recorded in the summer months.

Table-3.2 : Annual Average Rainfall - Vadodara district

Sr.No	Year	Rainfall(in mm)
1	2001	826
2	2002	835
3	2003	1014
4	2004	1018
5	2005	1327
6	2006	1674
7	2007	1183
8	2008	855
9	2009	483
10	2010	917
11	2011	839
12	2012	711

Source: Census of India (2011): District Census Handbook: Vadodara
Socio–Economic Review, Gujarat State, 2012-13.

Figure-3.2 : Annual Average Rainfall - Vadodara District



Source: Census of India (2011): District Census Handbook: Vadodara.
Socio –Economic Review, Gujarat State, 2012-13.

The district has experienced wide variation of 1,000 mms. of rainfall during the reference period of 2001 to 2012. While around 1,700 (1674) mms. of rainfall was recorded during the year 2006, it was as low as 500 (483) mms. in the year 2009 (Table 3.2).

3.2.6 Wind

Wind in Vadodara district is generally light to moderate. Wind in summer season (monsoon) blows from south western direction and brings a humid climate from mid-June to mid-September. After the monsoon season, wind blows from the north and northeast. Velocity of wind varies between 4.0 km/hr. to 10 km/hr.

3.2.7 Soil

The soils of the district are of three types, namely black soil, alluvial soil and hilly soil. The black soils are formed from basalt, granite and gneisses. Black soils are found in central, southern and eastern part of the district and cover around 3,44,040 hectares, which accounts for about 45 percent of the district's geographical area. Black soils are mostly found in the *talukas* of Jetpur Pavi, Chhota Udaipur, Nasvadi, Sankheda, Dabhoi, Karjan and Sinor. Black soils are further subdivided into shallow, medium and deep black soils. The shallow and medium black soils are generally infertile. The deep black soil is called Regur. They have deep black colour and are generally of fertile type. Alluvial soils are of coarse sandy to clayey in nature. They are found in the north-western part of the district. They are well drained and reddish brown in colour and are relatively more fertile. They are further divided into two groups; The *Goradu* or *Gorat* soil (older alluvium) and the *Bhatta* soil (new alluvium). Hilly or forest soil are found in the hilly eastern part of the district. Hilly soils are infertile in nature and are shallow on the slopes of the hill. These soils are composed of rock fragments and *muram*.

3.2.8 Land and Land Use Pattern

A major portion of the Vadodara district lies in the plain region, with the two major rivers crossing through it. Perusal of the land use statistics pertaining to the rural areas of the district reveals that almost three-fourth (70.29%) of the area is under the plough. Less than 10 per cent (8.32%) of the district is covered with forests. The forested areas are mostly confined to the eastern hilly *talukas*, where majority of the population belongs to the ST communities. A significant proportion of area (6.94%) in the district is barren and not cultivable. Pasture and grazing land (4.41%) and land put to non-agricultural uses (4.35%) are the other significant land uses in the district. Other types of land uses cover smaller portion of the rural areas of the district.

Table - 3.3 : Land Classification of Rural Areas – Vadodara District

Sr. No	Land Use Category	Area (in hectares)	Area (in %)
1	Forests	59,332.15	8.32
2	Area under Non-Agriculture Uses	30,993.67	4.35
3	Barren and Un-cultivable Land	49,720.83	6.97
4	Permanent pastures and other Grazing Lands	31,448.83	4.41
5	Land Under Miscellaneous Tree Crops etc.	3,995.85	0.56
6	Cultivable Waste Land	13,893.17	1.95
7	Fallow Lands other than Current Fallows	13,180.55	1.85
8	Current Fallows	9,335.73	1.31
9	Net Area Sown	5,01,333.96	70.29
	Total	**7,13,234.74**	**100**

Source: Census of India (2011): District Census Handbook: Vadodara.

3.2.9 Economic Activities

Agriculture - Agriculture is the main occupation of the people of the district and both food and non-food crops are grown. The principal food crops are Maize, Jowar, Bajri, Rice, Wheat, Pulses (Tur and Gram), Groundnut and Sugarcane, and non-food crops include Cotton, Tobacco and Castor. It is also seen that the area under major crops has increased between 1993-94 to 1997-98. Production of crops like Wheat, Maize, Groundnut, Cumin and Chilly has been increasing since 2007-08. Since this agricultural year, the average yield per hectare of most of the crops has also been increasing. For example, the per hectare yield of food Grains from 1491 kg. to 1689 kg., cereals from 1703 kg. to 1970kg., Pulses from to1004 kg. - 1073 kg., Oil seeds from 1410 kg. to 1435 kg. Individual cereals like Wheat registered an increase of per hectare yield from 2,600 kg. to 2792 kg., Rice from 1236 kg. to 1377 kg., Bajra from 1727 kg. to 1981 kg., Maize from 1708 kg. to 2022 kg., Jowar from 1000 kg. to 1018 kg. Similarly, there was an increment in the per hectare yield of Gram (1000 kg. to 1380 kg.). From among the Oil seeds, while Mustard and Cotton registered an increase from 1000 kg. to 1568 kg. and from 477 kg. to 676 kg. respectively, Sesame failed to do so. The per hectare yield of Sesame decreased from 500 kg. to 407 kg. Similarly, there was a decrease in the per hectare yield of Rice (1377 kg. to 1236 kg.). It is worth to note that area and production of horticulture has been increasing in the district (District Census Handbook: Vadodara - 2011).

Irrigation – Almost all types of irrigation sources are utilized by the farmers of the district. The Census of India (2011), recorded around 1,06,400 hectares (36.93

%) of agricultural land under canal irrigation, 1,66,900 hectares (57.93 %) under well irrigation, 9,600 hectares (3.33 %) under tank irrigation and 5,200 (1.80 %) hectares under other sources irrigation (District Census Handbook: Vadodara - 2011).

Industry - Vadodara is one of most industrially advanced districts of the State. The district has benefitted from its location on the Delhi-Mumbai industrial corridor which stretches from Ahmadabad to Vapi. The corridor is best known for its fertilizer, petro-chemical complexes in addition to the industrial estates. There are many large-scale industries such as, Gujarat State Fertilizers and Chemicals (GSFC), Indian Petrochemical Corporation Limited (IPCL) and Gujarat Alkalis and Chemicals Limited (GACL) in the district. Vadodara district has thirteen industrial estates namely Sankeda, Jetpur Pavi, Dabhoi, Ranoli, Limda, Por, Ramangamdi, Nadesari, Vaghodia, Makarpura, PCC (Power Control Centre Panel) Savli, Savli Biotech Park and Sehra industrial estates. The district has five Special Economic Zones (SEZs), namely, Suzlon Infrastructure Limited (Ajawa and Pipalia, Vaghodia *taluka*), Larsen & Toubro Limited (Ankhol, Vadodara *taluka*), Biotech Savli SEZ Gujarat Infrastructure Development Corporation (Savli), Nipiam Infotech Pvt. Ltd (Nimeta, Vaghodia *taluka*) and Strength Real Estate Pvt. Ltd. (Vemali, Vadodara *taluka*).Vadodara district also has 18,000 small scale industrial units in which repair and services (5,713), Textile (1,923), Metal Works (1,615), Chemicals (1,357), Equipments/Machinery (1,316), Rubber and its Products (1,145) and Food Product (1,047) Units are the most prominent. Miscellaneous small scale industries are also large in number (3,840). Other small scale industries include, Glass (885), Ceramic, Equipment Related to Electricity (829), Papers and its Products (753), Non-Ferrous Metals (601), Leather (543) and Tobacco (173) (Brief Industrial Profile of Vadodara District -2010-2011).

Vadodara district has good reserves of minerals including Fluoride, Black Trap, Quartz, Fluorspar (Kavant *taluka*), Agate, Granite, Gravel, Marble, Manganese Ore and Graphite. It has 7,200 lac tonnes of dolomite and 116 lac tonnes of fluorspar reserves. The district produces 98 per cent of the total dolomite production in Gujarat (Brief Industrial Profile of Vadodara District-2010-2011).

Forestry - Vadodara district has dry mixed deciduous type of forests. As a whole district has 9.82 per cent of its total geographical area under forests. Most of the forested areas of the district are confined to the eastern tribal *talukas* of Chhota Udaipur, Kavant, Nasvadi and Jetpur Pavi. According to the Government records for

the year 2010-2011, of the 741.48sq.kms.of forested area in the district, 697.24 sq. kms. (94.03%) are under reserved forests, 38.54 sq. kms. (5.19%) are under unclassified forests and 5.70 sq. kms. (0.76%) are under protected forests. Timber, Firewood, Timru Leaves, Gum, Rosha Grass, Mahuda Flowers, Fruits, Lac and Ashotri Leaves (Mountain Ebony-Kachnar) are the major forest products of the district.

Transport - Vadodara district is well connected with Delhi (1028 kms.) and Mumbai (448 kms.) by road (NH8 or new NH48), rail and air transport. Particularly the rail and road networks provide easy and convenient access to other districts of Gujarat and the neighbouring states. Cities of Ahmadabad, Rajkot, Ankleshwar and Surat in the Delhi Mumbai Industrial Corridor are well connected with the district in general and the city of Vadodara in particular with railroads and wide metalled National Highways and one National Expressway connecting Vadodara to Ahmadabad (93kms). Metalled roads connect all towns and 1,135 (73.51%) villages of the district with each other. The remaining 413 (26.67%) villages of the district have un-metalled road access. Vadodara is well connected with broad gauge railway lines with other states and district centers. Railways connect 65 villages and 11 towns within the district. Vadodara railway station acts as a major junction connecting the district with major urban centres of Delhi, Mumbai, Suarashtra, Kuchchh, Khandesh and Malwa regions. Vadodara has a well-developed international airport at Harni, connecting the city with Delhi, Mumbai, Chennai, Hyderabad, Indore and Bangalore (2011 Census).

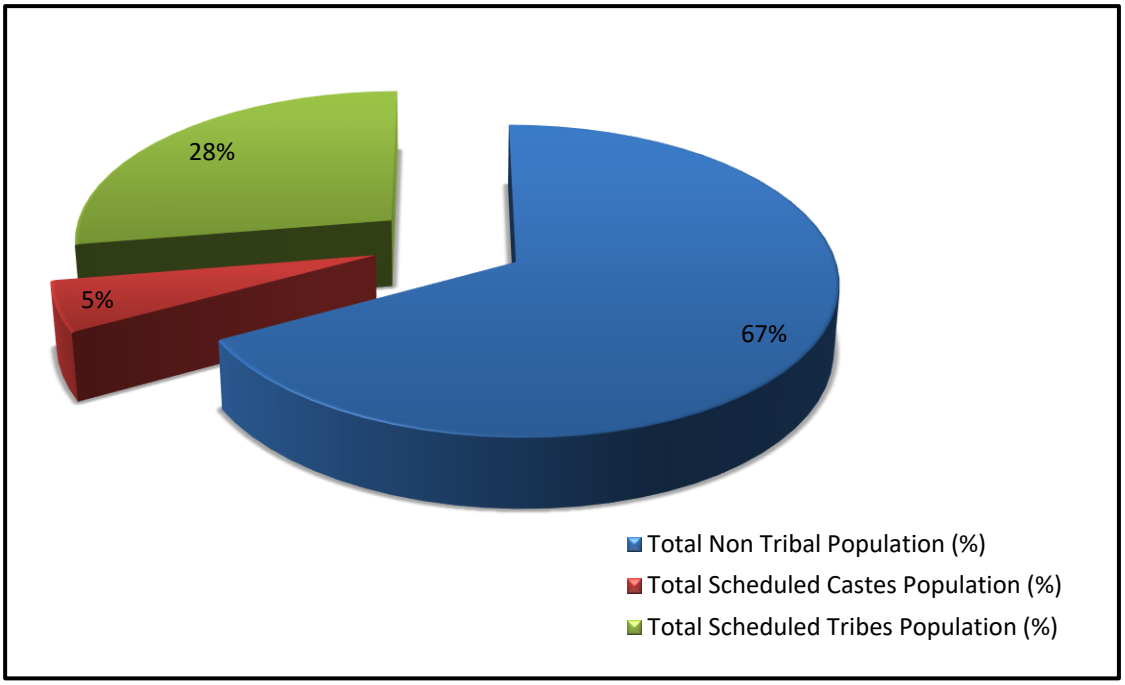
3.2.10 Basic Amenities

Out of the 1,533 inhabited villages in the district, 1,493 (97.39%)villages have educational facility, 1,533 (100%)villages have drinking water facility, 544 (35.49%) villages have medical facility, 1,525 (99.48%) villages have domestic power supply, 528 (34.44%) villages have post office facility, 1,525 (99.02%) villages have telephone facility (2011 Census).

3.3 Population Composition

According to 2011 census, Vadodara district has a total population of 41,65,626 with a sex ratio of 934 (21,53,736 males and 20,11,890 females). With a decadal growth rate of 14.38 per cent, there was an increase of 5,23,824 persons during the last decade. However, there was a big discrepancy between the rural (5.22%) and the urban (25.48%) population growth rates during the last decade. Currently, the rural (50.41%) and urban (49.59%) population share in the district is almost balanced. However, there is significant discrepancy between the rural (948) and the urban (920) sex ratio. The population density in the district (522 per sq. km.) is comparatively much higher than the State average (308 per sq.km.).

Figure-3.3 : Proportion of Population in Vadodara District-2011



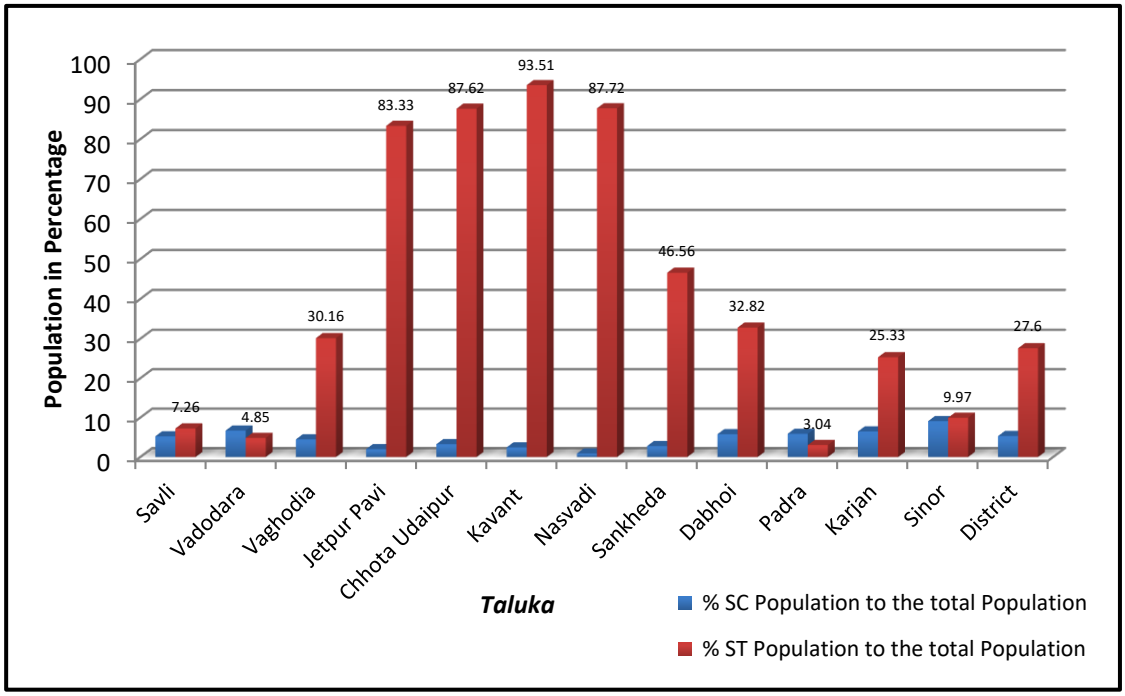
Source: Census of India (2011): District Census Handbook: Vadodara.

The district population is heading towards touching the half billion population mark. It accommodated more than four million (41,65,626) persons within its geographical extent during the 2011 Census count. Social composition-wise, the ST segment of the population (11,49,901) accounted for a very significant proportion (27.60 %) of the district total population. The SC segment (5.32%) of the district population (2,21,629) however, is much less in comparison to their ST counterparts (Fig.3.3). The ST population is mostly rural (90.50%) by residence, while around a

third (62.50%) of the SC population resides in the urban areas. The ST population of the district accounts for almost half (49.56%) of the total rural population of the district.

Across the district the distribution and concentration of the two segments are almost exclusive. While the SC population is confined to the western *talukas* with plain topography, the ST population is highly concentrated in the eastern hilly and forested *talukas*. For example, the share of the SC population in the total population of Vadodara (6.71%) and Karjan (6.49%) *talukas*, which lie in the western plain part of the district, is the highest. On the other hand, the eastern *talukas* of Kavant (93.51%), Nasvadi (87.72%), Chhota Udaipur (87.62%) and Jetpur Pavi (83.3%) are predominantly tribal *talukas*.

Figure-3.4 : *Taluka*-Wise Share of SC and ST Population in Vadodara District (2011)



Source: Census of India (2011): District Census Handbook: Vadodara

3.4 Occupational Structure

The district has about two-fifth (16,93,473 or 40.65%) of the population contributing to the economy by engaging in economically gainful activities. This share however, includes both the main and the marginal workers. While majority (12,33,312 or 72.83%) of the males are engaged in economically gainful activities,

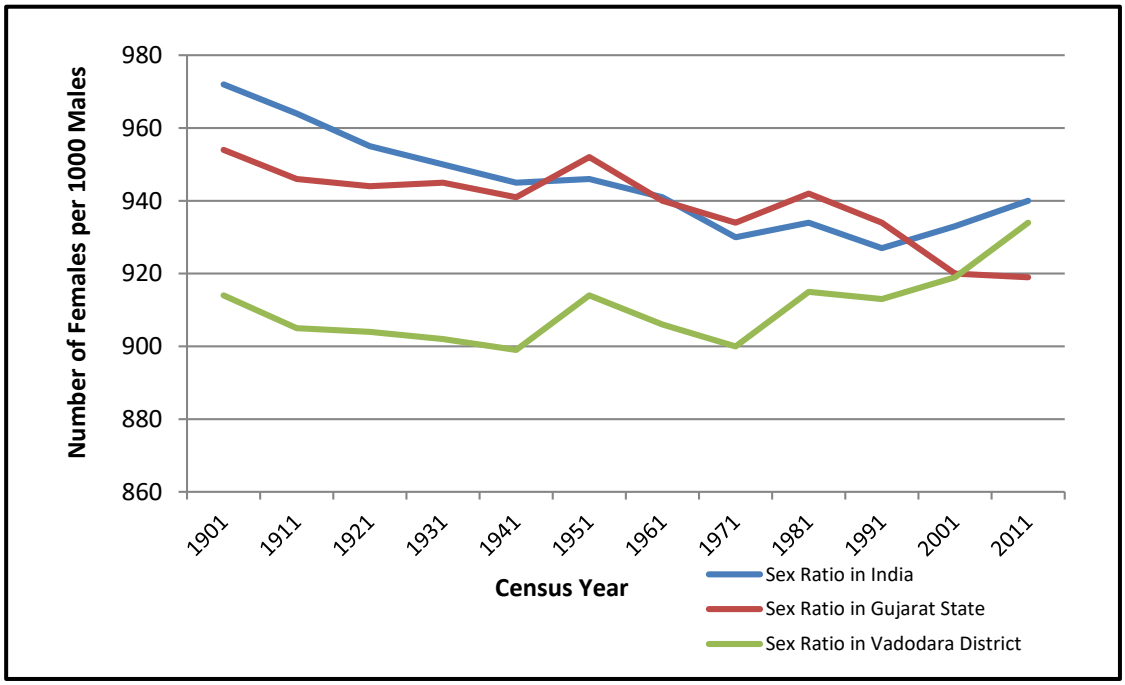
their female counterparts (4,60,161 or 27.17%) are mostly unemployed. From among the four industrial categories of main workers, 'other workers' accommodate the maximum number (7,93,306), accounting for about half the workers (46.84%). Majority of the male (6,64,817 or 53.91%) and female (1,28,489 or 27.92%) workers have preferred to participate in this sector. Higher participation in activities categorized under 'other workers' may be ascribed to the opportunities available in the urban-industrial sector of the city of Vadodara in particular and the district as a whole. Household industries seem to be the least lucrative in the district as only 17,680 or 1.04 per cent of the workers have joined this sector for gainful employment. The share of both males and females in this sector remain by and large similar with 1.00 and 1.15 percentage of workers respectively. Although the agricultural sector accommodates the maximum proportion (8,82,487 or 52.11%) of workers, the share of agricultural wage earners (5,70,361 or 33.68%) out numbers that of the cultivators (3,12,126 or 18.43%). This is a clear indication of greater landlessness or higher share of marginal and small farmers in the district who to a great extent depend on agricultural wage earning for their sustenance. By and large, a similar proportion of the male workers in the agricultural sector returned themselves as cultivators (2,62,841 or 21.31%) and agricultural workers (2,93,262 or 23.78%) at the 2011 Census. The situation in case of the females is however quite reversing. While only a few (49,285 or 10.71%) of the females returned themselves as cultivators, a large number (2,77,099 or 60.22%) did so as agricultural wage earners. On the whole, the scenario emerging from the occupational structure of the district indicates a higher dependency level with only around 40 per cent of the population engaged in economically gainful work. Besides, the relatively higher proportion of agricultural wage earners is an indication of higher level of impoverishment in the district.

3.5 Sex Ratio:

Sex Ratio can be defined as number of females per thousand males. A perusal of Figure - 3.5 makes it clear that sex ratio of the country has been decreasing since the beginning of the last century. The ratio of 972 at the 1901 census has reached as low as 940 females per thousand males. Performance of the state of Gujarat in this context has rather been still worse. It compares very poorly with the Nation as a whole with 954 and 919 females per thousand males respectively for the said census years. The case of Vadodara district was extremely precarious in comparison to the

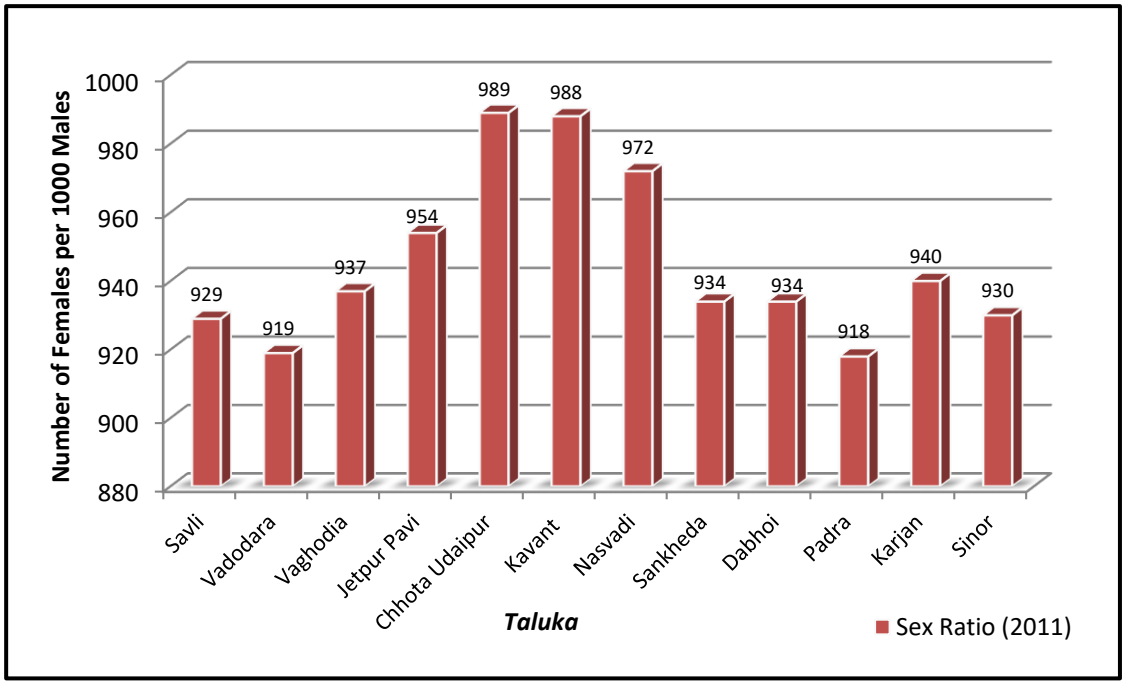
State as well as the Nation. However, it is heartening to note that the situation has improved during the last decade when sex ratio in the district took a leap from 914 at the beginning of the last century to 934 at the 2011 census count, crossing even the State average.

Figure - 3.5 : Sex Ratio: India, Gujarat and Vadodara District(1901-2011)



Source: Census of India (2011).

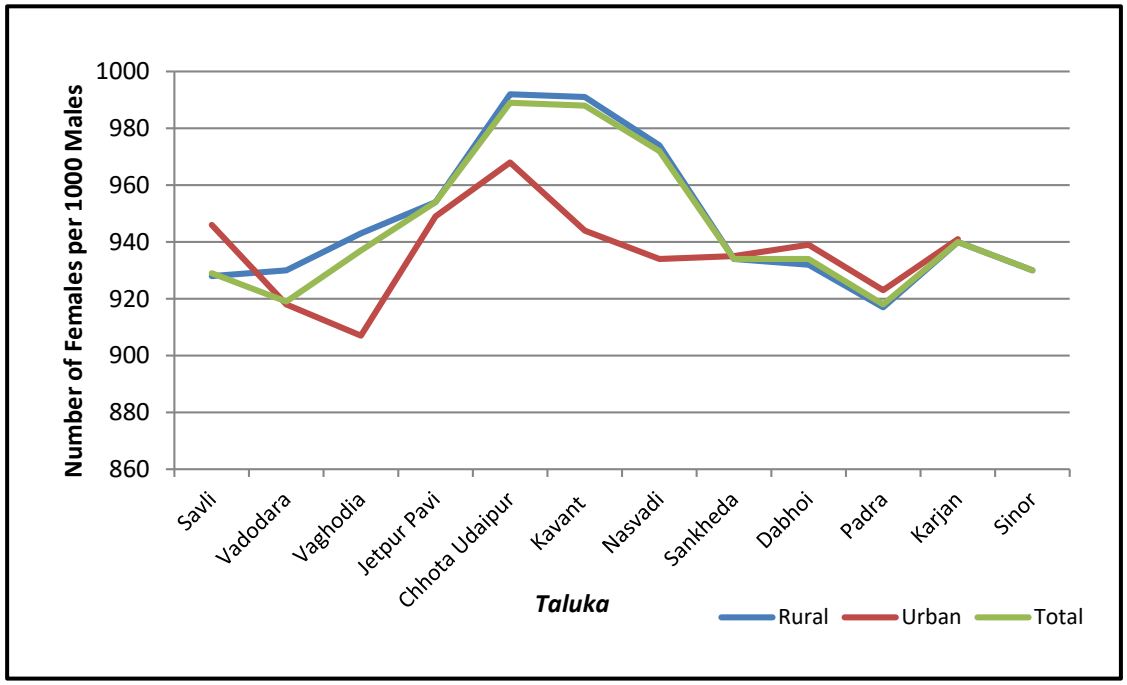
Figure - 3.6 : *Taluka*-Wise Sex Ratio of Vadodara District (2011)



Source: Census of India (2011): District Census Handbook: Vadodara

Although the district has been experiencing increment in sex ratio in the recent decades and has achieved a position higher than that of the State as a whole, it displays a large difference between its rural (948) and urban (920) sex ratios. At the *taluka* level, the predominantly rural and tribal *talukas* surpass the other *talukas* with higher sex ratios. For example, the *talukas* of Chhota Udaipur (989), Kavant (988) and Nasvadi (972) have relatively balanced sex ratio. The situation in the non-tribal *talukas* is rather a matter of concern. The most urbanized and predominantly non-tribal *taluka* of Vadodara (919) and its adjoining Padra (918) *taluka* have recorded the lowest sex ratio (Fig. 3.6). Sex ratio in the rural population of the district too displays the same pattern across the *talukas* with Chhota Udaipur at the top and Padra at the bottom. The pattern of sex ratio by and large remains unaltered in the context of urban population in the *talukas*, excepting that the bottom most position is occupied by Vaghodia (907) *taluka* replacing Padra *taluka* (Fig.-3.7).

Figure - 3.7 : *Taluka*-Wise Rural and Urban Sex Ratio of Vadodara District (2011)



Source: Census of India (2011): District Census Handbook: Vadodara.

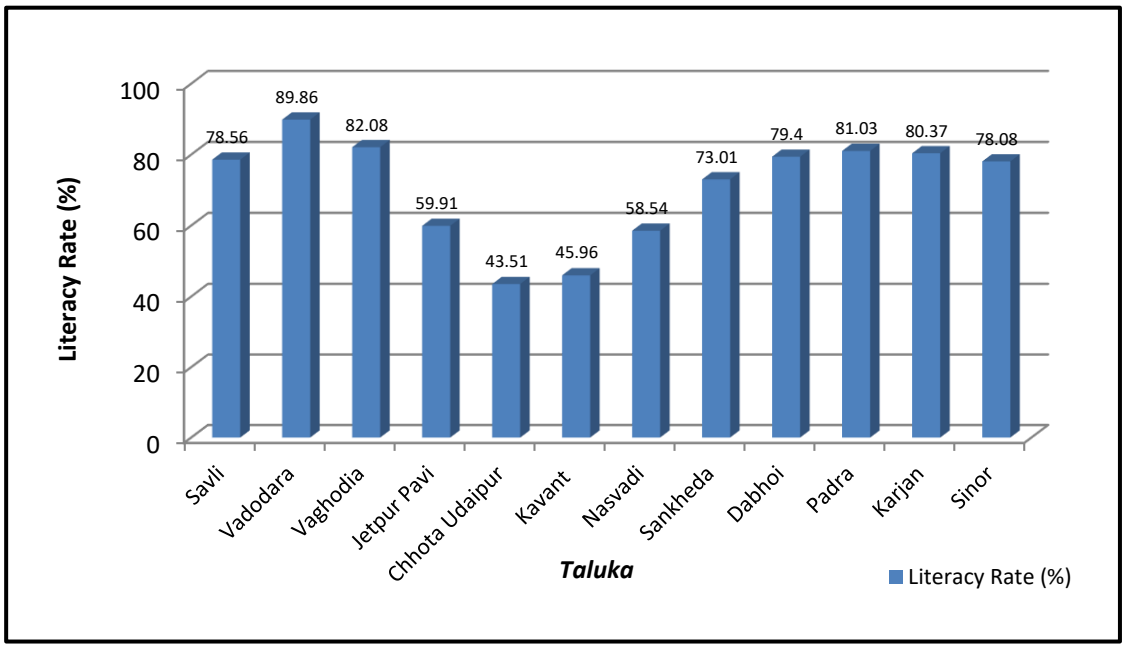
It is disheartening to note that the child (age group of 0-6) sex ratio in the district is precariously low (897,926 and 858 respectively in all, rural and urban areas). Here again, the predominantly tribal *talukas* display a healthier picture, with Kavant *taluka* in the lead with highest child sex ratio in all the three contexts. The

highly urban-industrial Vadodara *taluka* has the lowest sex ratio among its total (855), rural (874) and urban (852) child populations (District Census Handbook: Vadodara, 2011).

3.6 Literacy Rate

According to 2011 census, average literacy rate of Vadodara district is 78.92 per cent, which increased from 70.76 per cent in 2001. However, there is a big gap between the male (85.39%) and female literacy rates (72.03%) in the district, despite significant growth during the decade (from 80.04% and 60.73% respectively for male and female). Proportion of literates is much higher in the population of the non-tribal *talukas* like, Vadodara (89.86%), Vaghodia (82.08%) and Padra (81.03%). The literacy rate recorded in the tribal *talukas* compare very poorly with the literacy rates in these non-tribal *talukas*, particularly of Chhota Udaipur (43.51%), Kavant (45.96%) *talukas*.

Figure - 3.8 : *Taluka*-Wise Literacy Rate of Vadodara District-2011



Source: Census of India (2011): District Census Handbook: Vadodara.

3.7 Religious Composition

Religion and religious practices play an important role in the context of several aspects of human life including health of the population. According to 2011 census, the district population is composed of all the major six religions practiced in the country. As is clear from Table 3.3, the proportion of population recorded under

different religions in Vadodara district is more or less in correspondence with the Gujarat state averages of the respective religions. Proportion of population following Hindu religion (89.16%) in the district is significantly prominent touching the 90 per cent mark. The Muslims account for about one-tenth (9.23%) of the district population while the share of other religious groups is in traces (Table 3.4 & Fig. 3.9).

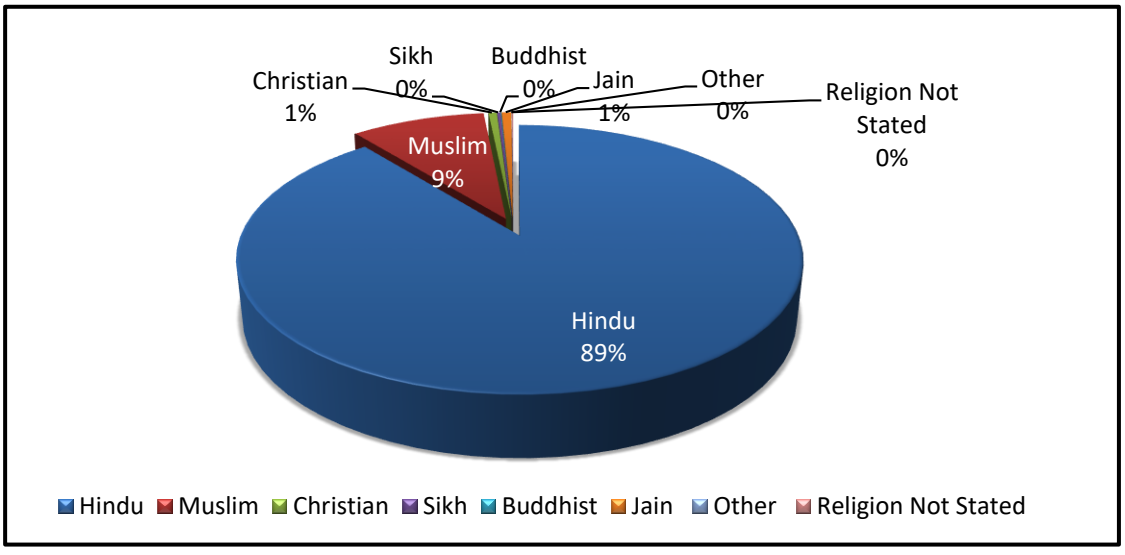
Prominence of the Hindu population becomes relatively higher (93.94%) in the rural areas and lower (84.29%) in the urban areas of the district. Population adhering to other religions is relatively higher in the urban areas, indicating their predominantly urban character. Their presence in the rural areas of the district seems to be highly insignificant (Table 3.4).

Table - 3.4 : Percentage of Population by Major Religions in Vadodara District-2011

Sr. No	Religion	Gujarat State	Vadodara District		
		Total	Total	Rural	Urban
1	Hindu	88.57	89.16	93.94	84.29
2	Muslim	9.67	9.23	5.82	12.70
3	Christian	0.52	0.57	0.06	1.09
4	Sikh	0.10	0.22	0.03	0.43
5	Buddhist	0.05	0.05	0.01	0.09
6	Jain	0.96	0.66	0.09	1.25
7	Others	0.03	0.03	0.00	0.05
8	Religion Not Stated	0.10	0.07	0.04	0.11
	Total	**100**	**100**	**100**	**100**

Source: Census of India (2011): District Census Handbook: Vadodara

Figure - 3.9 : Percentage of Population by Major Religion in Vadodara District-2011



Source: Census of India (2011): District Census Handbook: Vadodara

3.8 Conclusion

Vadodara district extends over the eastern part of Gujarat state and lies between 21°50’ and 22^{0}50’ north latitudes and 72°50’ and 74°10’ east longitudes. Vadodara district is a part of the Gujarat Plains. The terrain of the district is flat level plain in the west, while the eastern part is a hilly tract and elevation varies between 300 meters and 520 meters amsl. The hilly area in the east comprises of plateaus, ridges and isolated relict hills. These hilly tracts are also covered with thick forests at some places and have been the traditional abode of the tribes. Narmada and Mahi are the principal rivers draining through the district. The climate of the district is by and large hot and dry in summers and cold in winters. May is the hottest and January is the coldest month of the year. The district receives maximum of its annual rainfall during the months of July and August.Three types of soils are found in the district, namely black soil, alluvial soil and hilly soil. Black soils are found in the central, southern and eastern parts of the district. Alluvial soils are confined to the north-western part, while hilly soils are characteristics of the hilly eastern part of the district.

Land use characteristics indicate that maximum proportion (70.29%) of area in the district is under the plough. Despite the fact that the entire eastern stretch of the district is part of the Vindhyan escarpment and made up of hills, ridges and plateaus, it has very less (8.32%) proportion of area under forest cover. Rather, a significant segment (6.97%) of the district is classified under barren and uncultivable land. The district has around five (4.41%) per cent of its area under permanent pastures and other grazing lands. While a similar proportion (4.35%) of the district area is under non-agricultural use, the remaining categories of land use account for small proportions of the district area.

Agriculture is the main occupation of the people of the District. Farmers of the district grow both food and non-food crops. The principal food crops include Maize, Jowar, Bajri, Rice, Wheat, Pulses (Tur and Gram), Groundnut and Sugarcane. The principal non-food crops include cotton, tobacco and castor.

Vadodara district has good reserves of minerals of Fluoride, Black Trap, Quartz, Fluorspar, Agate, Granite, Gravel, Marble, Manganese Ore and Graphite. Vadodara district is well connected with Delhi (1028 km.) and Mumbai (448 km.) by the Delhi Mumbai Industrial Corridor. The National Highway No. 8 (NH8 or new NH48) which connects Vadodara with major industrial centres of Gujarat such as

Ahmadabad, Rajkot, Ankleshwar and Surat passes through the district. According to 2011 census, total population of the district has crossed the four million mark with 41,65,626 populations. The ST segment of the population accounts for a significant proportion (27.60 %) of the total district population and is mostly confined to the rural areas of the eastern hilly *talukas*. The SC population is relatively less in proportion (5.32 %) and majority of it is urban by residence. Although sex ratio in the district remained lower than the State and National averages for almost hundred years, there has been improvement in it during the last decade, placing the district average above the State average. The tribal *talukas* of the district (Chhota Udaipur – 992, Kavant – 991 and Nasvadi - 972) display a more or less balanced sex ratio in both of their rural and urban populations, and reverse is the case in the most urbanized and industrialized *talukas* like Vadodara (919) and Padra (918). On an average, around 80 per cent (78.92 %) of the district population is able to read and write. While majority of the population of the western non-tribal and highly urbanized and industrialized *talukas* of the district like Vadodara (89.86%), Padra (81.03%) and Vaghodia (82.08%) have attained the aptitude of literacy, their counterparts in the predominantly tribal and hill area eastern *talukas* are still lagging behind (Chhota Udaipur - 43.51%, Kavant-45.96% and Nasvadi - 58.54%). Religious composition-wise, the district is dominated by the Hindus, particularly so in the rural areas of the district. Overall, population belonging to religions other than Hinduism account for very insignificant proportions, excepting for Islam which accommodates around a tenth (9.23%) of the total district population. Share of the populations belonging to other religions is seen to be relatively higher in the urban areas in comparison to the rural areas of the district. This is true even in the case of the Muslims. Their presence in the rural areas of the district is however much less.

It is clearly evident from the discussion that there is great spatial variation within the district of Vadodara with respect to its physical and social characteristics. The *talukas* in the western part of the district display characteristics of a typically alluvial plain area having ample agricultural and urban-industrial prospects, better connectivity and dominance of the non-tribal population which has higher level of awareness and exposure. On the other hand, the eastern part is predominantly hilly and thus agriculturally less suitable and is the traditional habitat of the ST population which is mostly rural by residence and relatively less literate.