Chapter: III

3 Physical and Socio-economic Characterization of Study Area

The study in this chapter illustrates about the physical and socio-economic properties of the study area. Physical and socio-economic dataset have been compiled from variety of sources to present the detailed information about the study area. Chapter-3 presents all possible details about geographical conditions; land use and land cover status, geomorphology, soil, drainage networks, transportation network, climatic conditions and demographic status of the study area.

3.1 Study Area: Nakhatrana and Lakhpat Taluka (Kachchh District), Gujarat

Kachchh is a district of Gujarat state in western India.. True and official spelling of Kachchh is Kachchh. This spelling is also correct to its pronunciation. Spelling Kutch was in use during british rule. Now official spelling is Kachchh. A large part of this district is covered with shallow wetland known as Rann of Kachchh. The Kachchh is popular for seasonal marshy wetlands encompassed by the Gulf of Kachchh and the Arabian Sea in south and west, while northern and eastern part are encircled by the incredible and little Rann (seasonal wetland) of Kachchh. Kachchh, is the largest district of Gujarat, the complete zone of the region is 45,652 sq. km, which is over 23% of the all out territory of the state. The district is bounded on the north and northwest by the Sindh Province of Pakistan and on the northeast by Rajasthan state. There are several small ports all along the coast, which are mainly used as fishing ports. Kandla and Mundra are the two-important port in the district and support the industrial and commercial activities in the state. Figure 3.1 illustrates the complete geographical location of study area.

3.1.1 Administrative Divisions

Gujarat State is subdivided in 33 districts that contain 247 taluks (Tahshil). Total 18584 villages and around 60383628 total population of Gujarat State. Total population is 15, 83,225 with literacy rate of Kachchh district is around 59.79 % (kutchdp.gujarat.gov.in). Table 3.1 shows complete Taluka's list of Kachchh along with number of Gram Panchayat, Number of Villages and Population.

Administratively the Kachchh district is divided into ten Talukas, Bhuj is the districts headquarter. Nakhatrana and Lakhpat Taluka of Kuchchh district is selected for drought assessment and analysis based on various reports and literature review (Roy and Hirway, 2007). Nakhatrana having a geographical extent 23.09 to 23.62 N, 68.93 to 69.62 E and population is around 14, 6367 spreads over an area of 19,8161 hectares (2011, Census). Nakhatrana is situated in the middle of Kachchh the tropic of cancer passing from Dhinodher hills, 20 km away from Nakhatrana town. Nakhatana is a town and a municipality in Kachchh district in the Indian state of Gujarat. Nakhatrana is the headquarters of this taluka. Nakhatrana taluka is more populated by Jadeja Bapu.

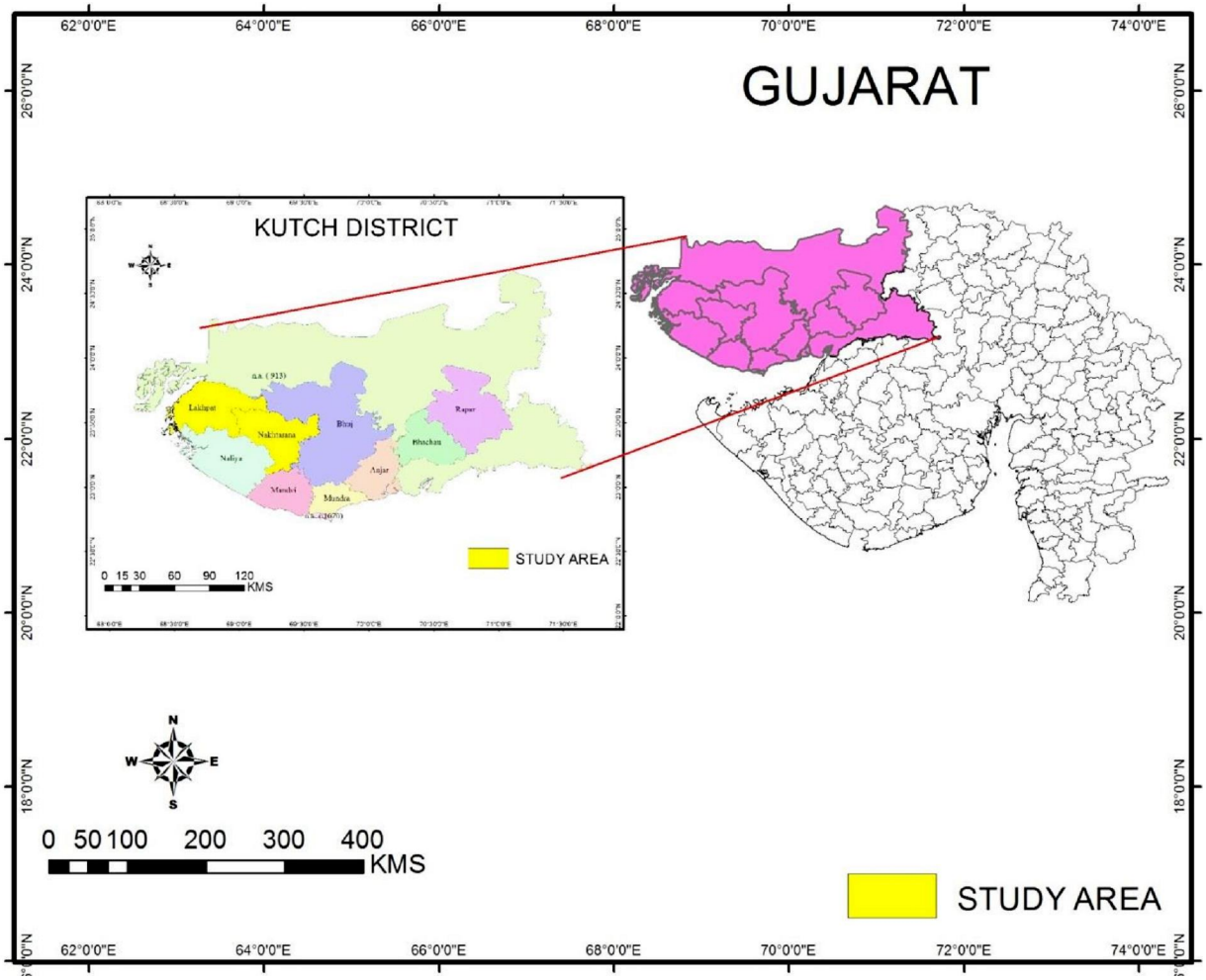

Figure 3.1 Administrative Subdivisions of Kachchh

As shown in figure 3.1, Lakhpat taluka having a geographical extent 23°.38'N to 23°.82'N, 68°.4'E to 69°.23'E, and population is around 62,552 and Area of Lakhpat taluka is around

2,18,864 hectares (2011, Census). Lakhpat is a city and a municipality in Kachchh district in the Indian state of Gujarat. Lakhpat is the headquarter of this taluka. There are 100 villages in Lakhpat taluk. The average literacy of Taluka is 49.76%. The main rivers of Taluka include Iron (Pitcher), Kharani (Punhro), Vaniyasar (Virani), Daman (Nog). Major Kharif crops are mung, millet, guava, sorghum, groundnut, and castor. Village boundaries of Lakhpat and Nakhatrana taluks are described in figure 3.2.

Table 3.1 Taluks of Kachchh District

S.No.	Taluk Name	No. of Gram Panchayats	No. Of Villages	Population
1.	Bhuj	106	106	208584
2.	Anjar	53	67	160292
3.	Gandhidham	7	9	201569
4.	Lakhpat	33	100	50120
5.	Nakhatrana	77	132	129249
6.	Rapar	79	97	198000
7.	Abdasa	85	166	97508
8.	Bhachau	59	69	147981
9.	Mandvi	74	89	170573
10.	Mundra	42	60	83010

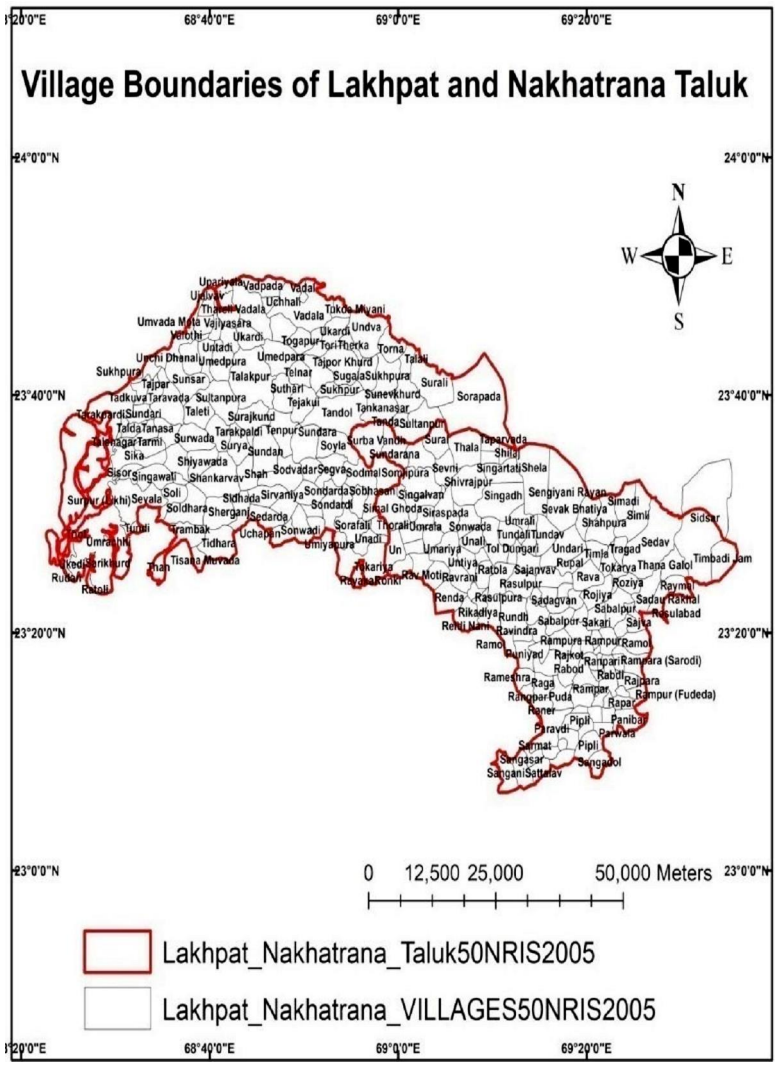

Figure 3.2 Village boundaries of Lakhpat and Nakhatrana Taluk

3.2 Physical Characteristics of Kachchh

The landscape of Kachchh is unique in its evolution as a result of several phases of tectonic movements since the Late Jurassic (Biswas, 1987). A major part of the area is occupied with Pre-Quaternary rocks. The major structural trend of Kutch is marked by an E-W direction that in turn, is reflected in the geological set up of the area.

Physiographical, the Kachchh region can be divided into five major units. All the five units show considerable diversity within each of them in terms of rock type, mode of occurrence and structural style.

3.2.1 Geomorphology of Kachchh

Figure 3.3 illustrates the geomorphology of the Kutch (Kachchh) is categorized into four major E-W trending zones. (i) Coastal Zone - demarcating the southern fringe, (ii) Kachchh Mainland - divided into the central portion comprising rocky upland, northern hill ranges and coastal plains, (iii) Banni Plains (less than 5m Mean Sea Level (MSL))-marked by raised fluviomarine sediments, mud flats and salt pans and (iv) Rann, Great Rann (~ 2m MSL) in the north and Little Rann in the east comprising vast saline wasteland. The boundaries of these main geomorphic zones are bounded by the major E-W trending faults. The mainland Kachchh is a rocky terrain with two sub-parallel east west trending hill ranges. The two hill ranges are Northern hill range and Katrol hill range bounded in their north by a fault forming a steep slope towards its north. The southern slope that follows the dip of the strata is gentler. The northern hill range is bounded in the north by Kachchh mainland fault and the Katrol hill range with Katrol hill fault. The Northern hill range comprises of a chain of domes of Jurassic and Cretaceous rocks. On the Kachchh mainland there are several peaks, the Nandu nagar has the maximum altitude of 430 meter (Merh, 1995). The central rocky plain occupies the intervening area between the northern hill range and the Katrol hill range. The plain is characterized by a gentle slope towards north. The Rann is the most remarkable and unique feature of the Kachchh region. It is a flat geomorphic terrain having an aerial extent of 22,000 Square Kilometer and hardly rising 3 to 4 meter above mean sea level. The Rann can be divided into two main regions, the Great Rann comprising the northern portion of the Kachchh mainland and the Little Rann comprising the eastern portion of the Mainland. The Great Rann of Kachchh has been the site of the earthquake which produced surface rupture known as "Allah Bund" resulting in the upliftment of the northern part of the Rann (Macmurdo, 1823). The Rann is geomorphologically divisible into five units – (i) Bet Zone, (ii) Linear Trench Zone, (iii) Banni Plain, (iv) Great Barren Zone, and (v) the Little Rann of Kachchh (Roy and Merh, 1981; Merh and Patel, 1988). This vast wasteland is about 4 meter above the present high-water line. The Rann area mostly remains dry except in the rainy season, when it submerged in the saline water. During summer and winter, the whole area is covered with a hard salt encrustation. Figure 3.4 illustrates about the geomorphology of the study area (Lakhpat and Nakhatrana taluk).

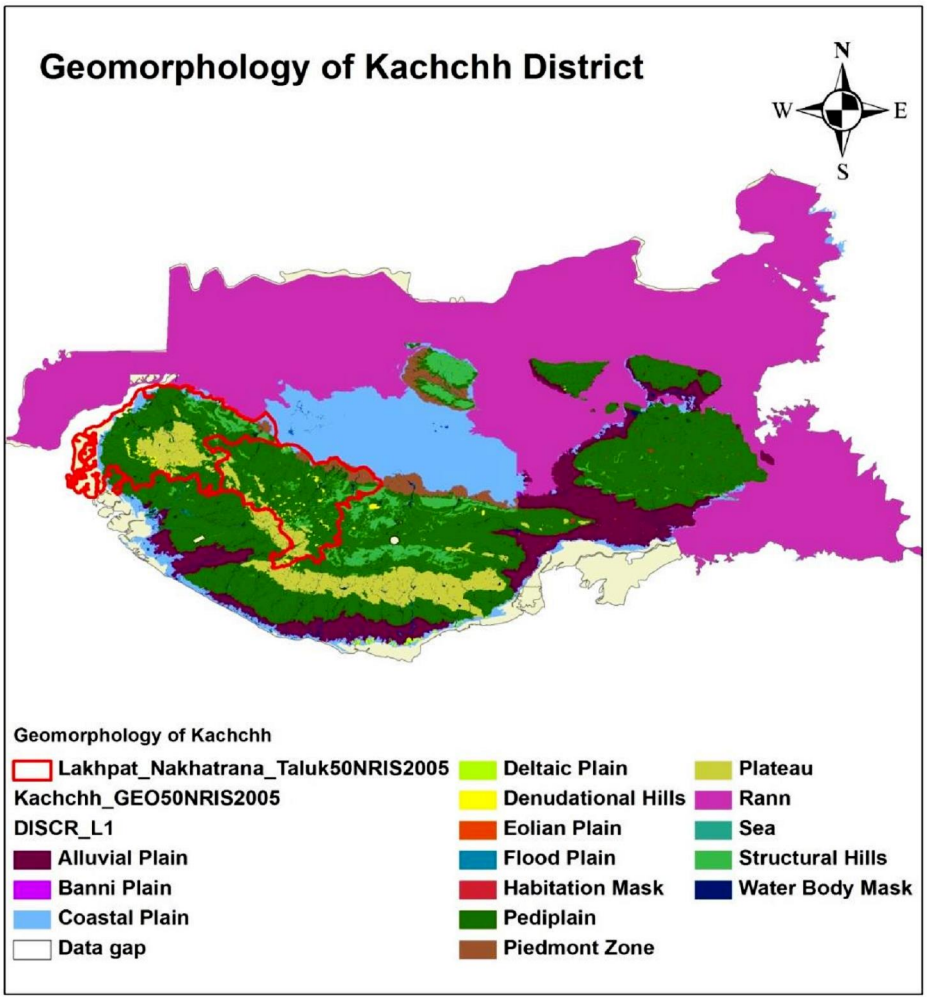

Figure 3.3 Geomorphology of Kachchh district

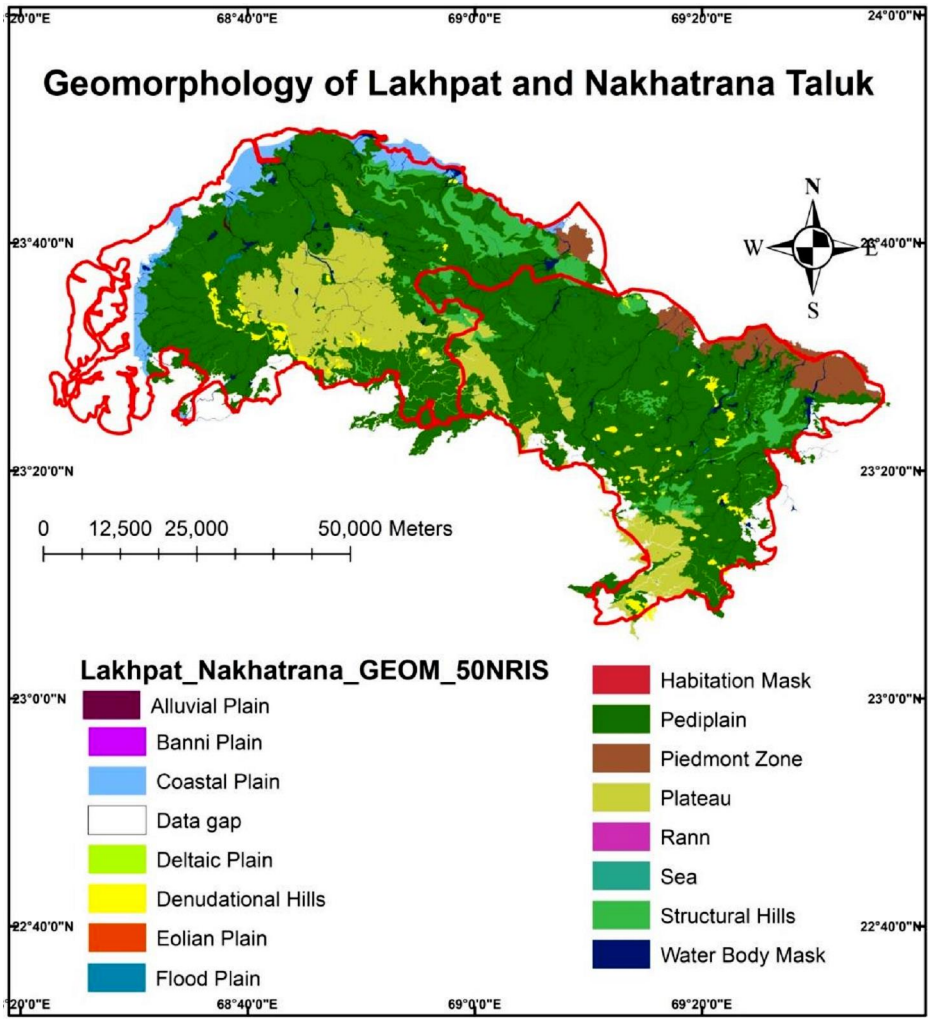

Figure 3.4 Geomorphology of Lakhpat and Nakhatrana (Source: http://www.nnrms.gov.in/, 2016)

3.2.2 Drainage Network

There are various little streams in the Kachchh region. Those streaming north vanish in the Rann. While the rest of the Join either the ocean or the Gulf of Kachchh. A portion of the primary streams are Khari, Kaila, Niruna, Nara, Matiiweriwali, Rukmavati, Kankavati, Bhukhi, and so on. There are dams crosswise over Khari, Kaila, Niruna and so on and alternate streams are likewise arranged to be saddled by having capacity plans to hold over shortage conditions influencing this district very frequently. (Merh, 1995). Major River is Luni crossing the Kachchh district from North-East to South-West direction as mentioned in figure 3.5.

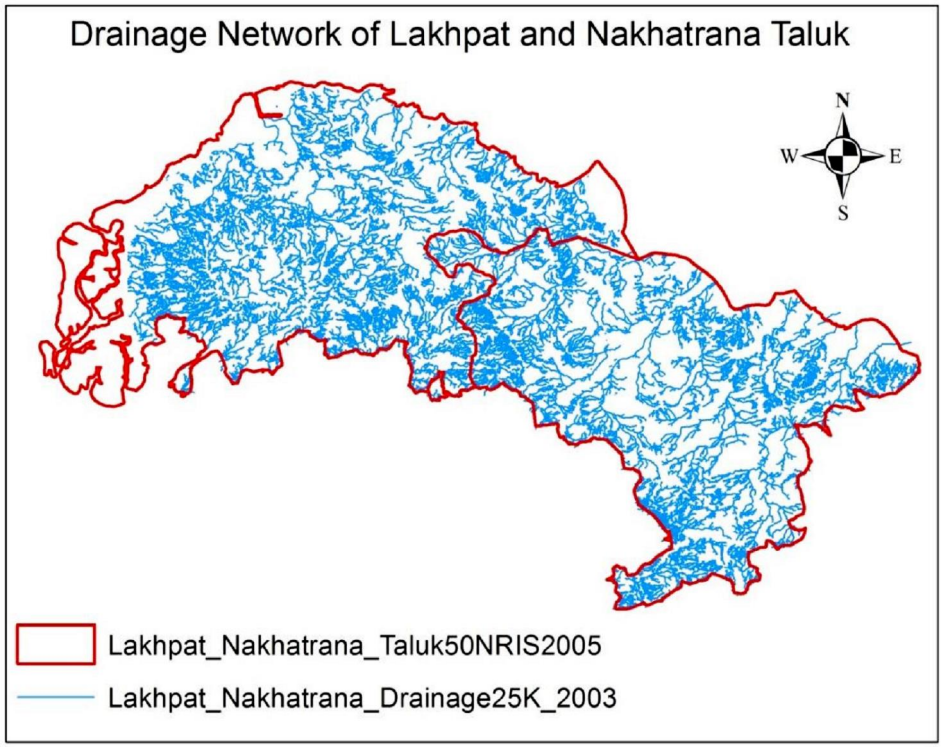

Figure 3.5 Drainage Networks of Lakhpat and Nakhatrana.

3.2.3 Geology

Sedimentary rocks running in age from Jurassic to Eocene age cover Kachchh area. These silts have a zone of Deccan trap volcanic sandwiched between Jurassic rocks of the northern part and Eocene sedimentaries in the south towards the drift. Limestones, shales and sandstones are the most well-known rocks (Krishnan, 1982). The Jurassic rocks have an expected thickness of 1950 m and harvest out in three anticlinal edges drifting E-W. Inferable from E-W blame the entire succession is rehashed. The northern range is around 160 km long and softened up to four islands (Pachham, Karir, Bela and Chorar) in the Rann of Kutch. The center edge is 190 km long inclining ESE from Lakhpat on the west. The southern edge, south of Bhuj, is 65 km long and frames the Charwar and Katrol slopes. The Jurassic rocks are rehashed in these two edges. The primary outcrop, of which they frame parts, is cut by E-W strike blame.

3.2.4 Soils

In the time of current and logical culturing, it is important to know the essential knowledge of soil. Soil is a normally happening permeable medium that backings the development of plant roots by holding air, warmth, water and supplements; and gives mechanical support to the

plant. Soil gives a repository of supplements required by crops, yet not really at ideal levels of prompt accessibility to plants. Development of plant is resolved through soil richness and soil ripeness is dictated by the accessibility of full scale and micronutrients. Figure 3.6 illustrates about soil depth in entire Kachchh district. Major Part of the Kachchh district is covered by great Rann and They are fairly deep, light gray in colour, sandy to sandy loam, with silty clay loam texture in some areas. The salt content in these soils is very high with NaCl as the dominant salt. Rann of Kachchh is treated as non-fertile saline mud. Where as in study area Lakhpat and Nakhatrana Taluks are deep soil dominated land and small patches of moderately deep soils are also visible in study area. Some small patches of shallow soil are available in eastern land part of Kachchh district.As per the NNRMS-2005 dataset; map represents Soil erosion of the Kachchh district in figure 3.6. Productivity of the Soil in Kachchh district is illustrated in figure 3.8. In Lakhpat and Nakhatrana Talukas profoundly beneficial soil accessible and some patches of non-gainful soil is likewise accessible in contemplate region. Kachchh district mainland part is covered by productive soil to moderately productive soil with small patches of Moderatelly low to low productive soil whereas the great Rann of Kachchh is covered by non-productive saline mud.

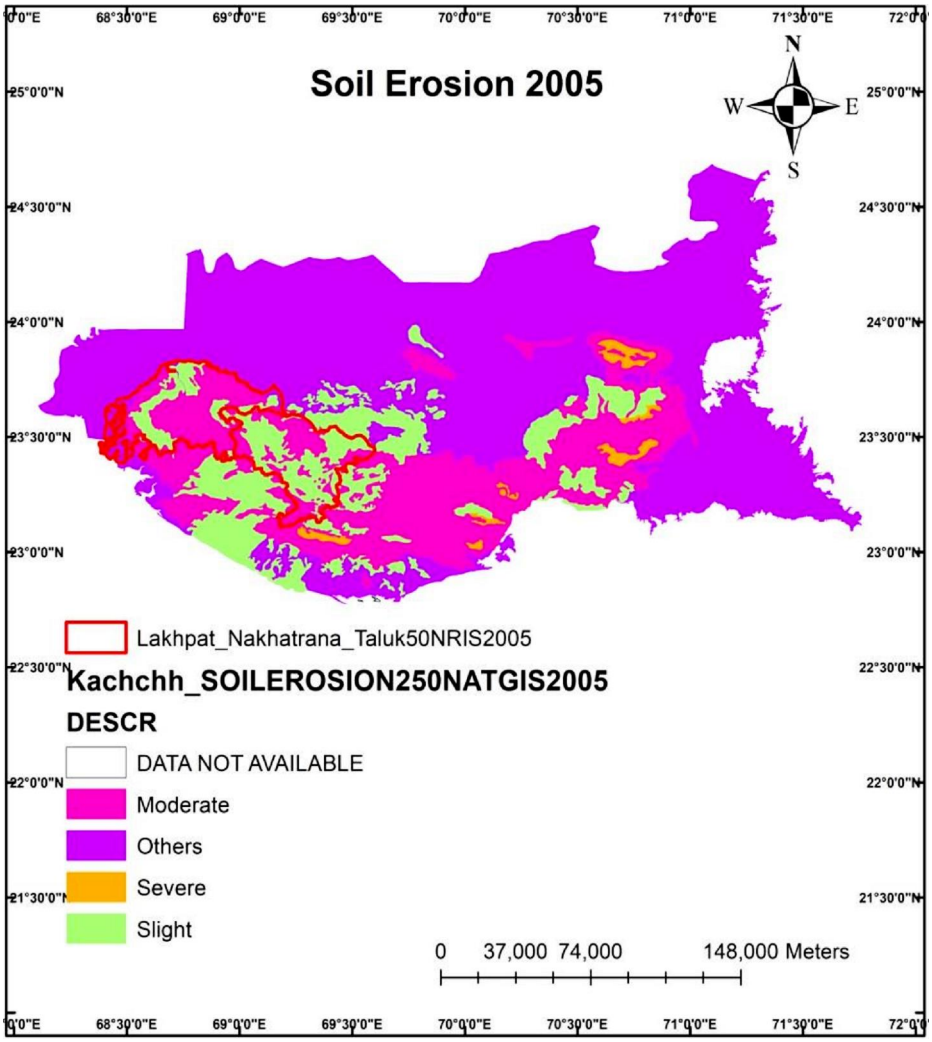

Figure 3.6 Map of Soil Erosion

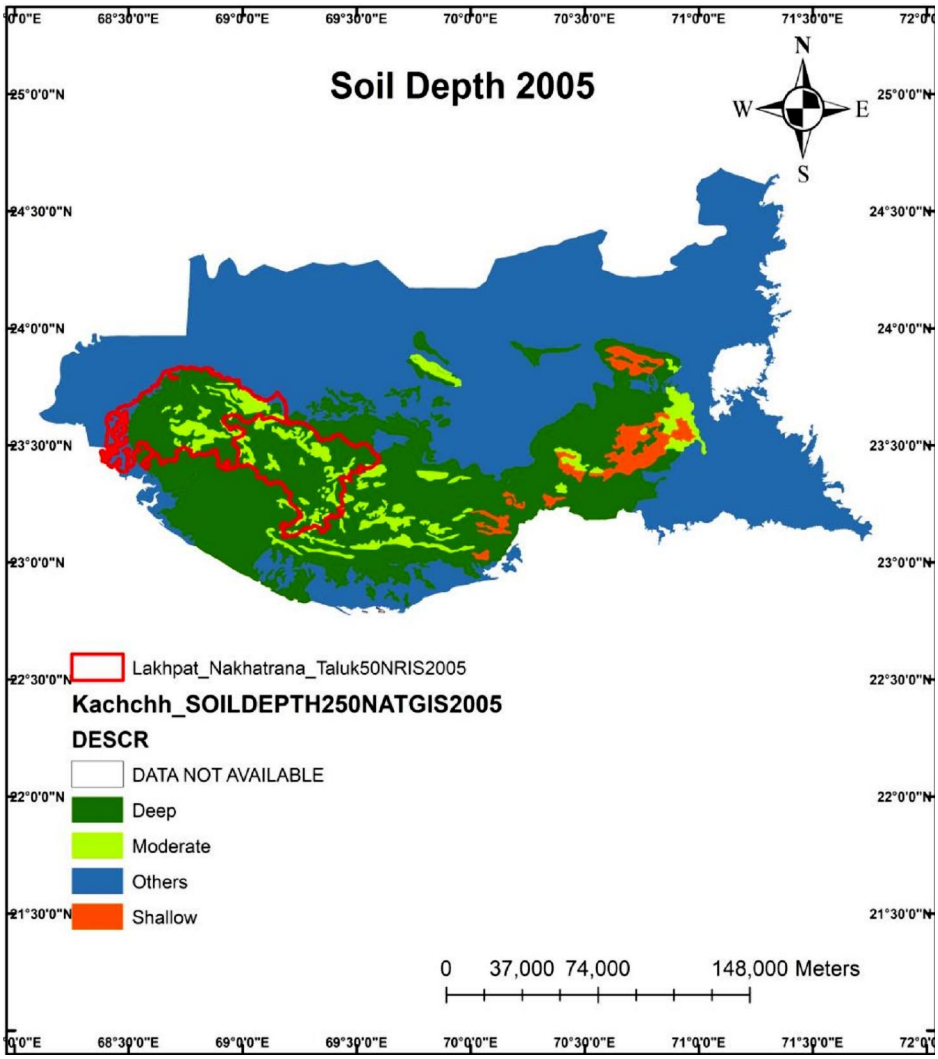

Figure 3.7 Map of Soil Depth

As we discussed, Kutch district is mainly covered by the great ran of Kutch, where as mainland covered by deep soil and at some part moderate soil depth. Thickness of the soil is deep to moderate in study area which is illustrated in figure 3.7.

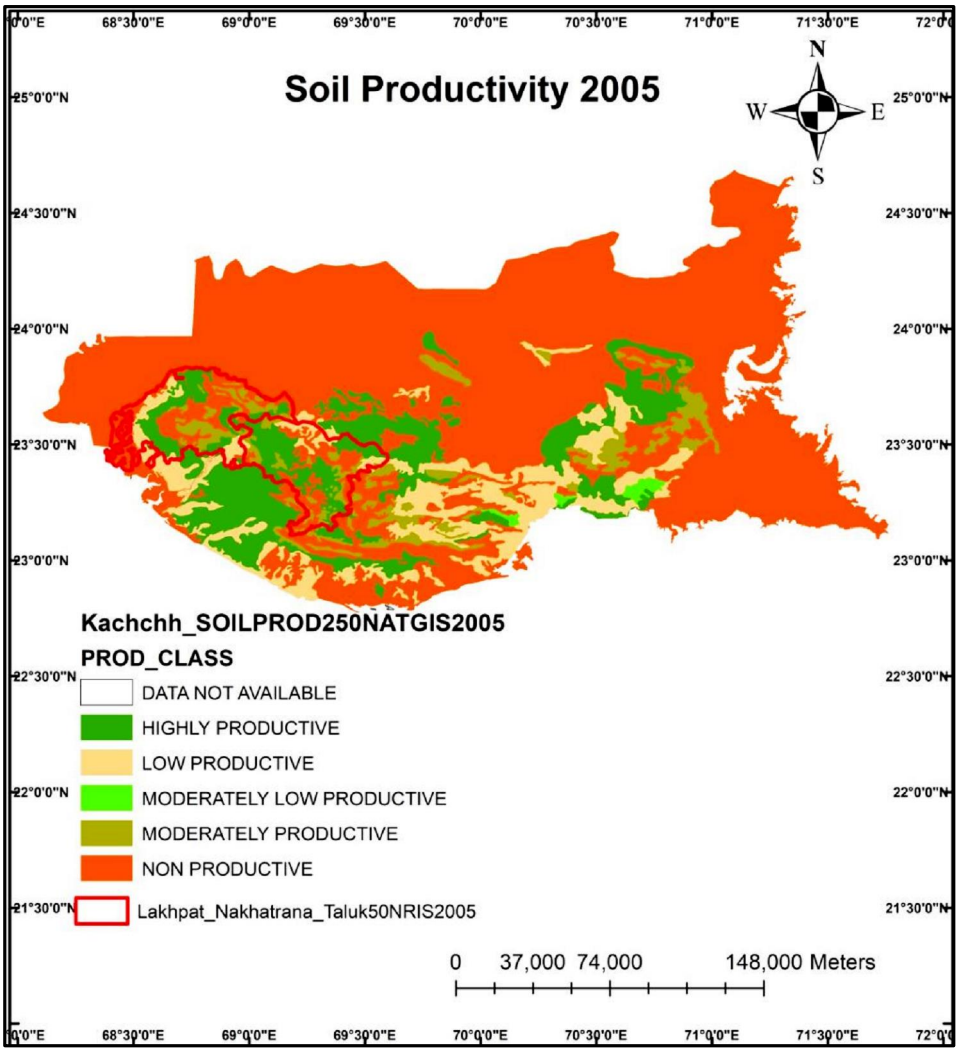

Figure 3.8 Soil Productivity Map of Kutch District

3.2.5 Land Use / Land Cover:

Landuse and Landcover data acquired from NNRMS web portal. It can be interpreted from the figure XX, there is Majority of land is covered by Rann in North and North-East Part that is also considered as wasteland, whereas, Major mainland part is covered as shrub land. Agricultural area is comparatively very less in entire Kachchh district. Agriculture area is approximately20% of the total area. LULC of Nakhatrana and Lakhpat Taluks are described in Figure 3.9; Where Nakhatrana taluk contains more agricultural land as compaired to Lakhpat taluk.

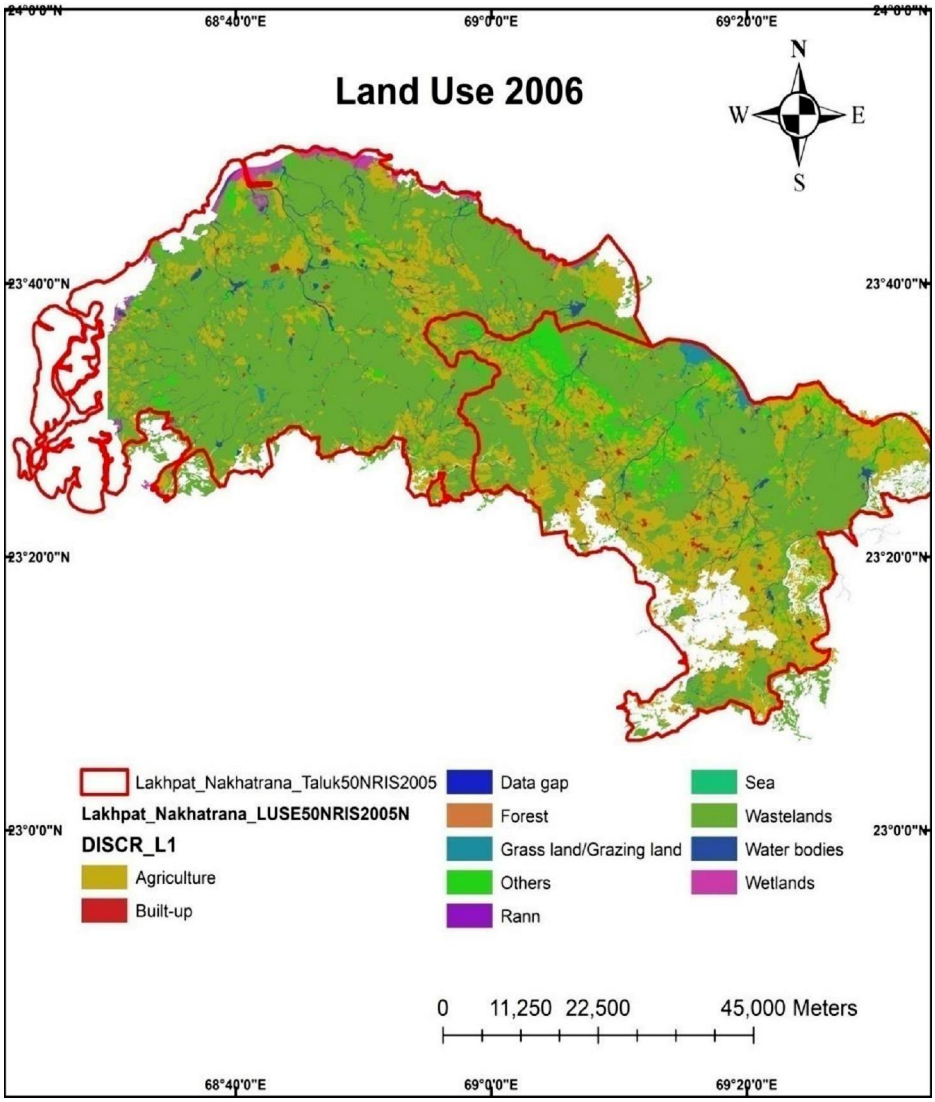

Figure 3.9 Landuse of Lakhpat and Nakhatrana

3.2.6 Seismicity

The earliest earthquake recorded in Kutch dates back to 16th June 1819. Since then, over 90 earthquakes of varying intensity have struck the region, but none as severe as the most recent one.The Kachchh region falls in zone V, an 80-100 km stretch of land bordering Kachchh covering northern parts of Saurashtra and some part of Gujarat mainland comes under zone IV, with the rest of Saurashtra and mainland falling under zone III. A very small area in the eastern part comes under zone II. The Gujarat region has witnessed many destructive earthquakes in the past. Most of these earthquakes occurred in the Kachchh region.

3.2.7 Minerals

Kutch is rich in non – metallic minerals. As a mineral rich district of Gujarat, It has largest reserves of limestone, lignite, bauxite, china clay and silica sand in the country. The district has the highest production of Lignite and China clay in Gujarat. Panandhro city has the largest lignite reserve in Gujarat. Because of its high calorific value and low moisture content, Kutch's lignite is favorable for power generation. Yearly production of salt is 2.5 lakh tonnes and is exported to countries like Taiwan, Bangladesh and Korea.

3.2.8 Flora

Kachchh has practically no forest and have very few trees. The Kachchh flora is mostly characterized by thorny and non-thorny shrubs and trees. The wild tree growth is almost entirely confined to thorny like Baval, Kher etc. The coastline exhibit swamps vegetated with mangrove forest and grasses covering dunes and sand flats. The main varieties of flora found in the study area-Avicennia officinalis (Tavar Tarvariyan), Leptadenia spartium (Khip), Casuarina Equisetifolia (Saru), Halopyrum inucronatum (Dariyai Kansdo, Dariyai Kans), Melia azadirachta (Limbdo), Acacia Arabica (baval), Cassia auriculata (Aval), Sporobolus indicus (Velari charchar), Sueda maritime (Lano, Luno), Euphorbia tirucalli (Thor Kharsani Thor, Dandalio Thor), Leucoena glauca (Laso baval, Vilayati baval) etc.

3.2.9 Transportation

Roads: National Highway 8A connects Kutch with Ahmedabad (91 Kilometers), Vadodara (465 km), Rajkot (218 km) and Surat (632 km) Bhuj is connected with Kandla (45 km from Bhuj) by a State Highway via Anjar Connectivity with major industrial districts: Jamnagar (261 km), Surat (632 km), Bhavnagar (396 km), Valsad (699 km), Ankleshwar (359) and Mehsana (311 km).

Rail: Mumbai is connected with Bhuj by 5 broad gauge stations Mundra and Kandla ports are linked by broad gauge rail to the Delhi-Mumbai Industrial Corridor Bhuj-Gandhidham-Kandla-Ahmedabad broad guage line provide direct connectivity from Kutch to other parts of country. Figure

Air: Bhuj has the only operational airport in Kutch. Kandla, Mandvi Mundra air strips are under development.

Port: Mundra Port has a total length of 17.5 meters. Other ports in the district include Kandla and Mandvi Mundra Port Project has just established the longest non- government railway line, put up at a cost of INR 160 crore (USD 38 Million), between Adipur and Mundra, totaling a distance of 57 km. Mundra port is connected to Gandhidham by National Highway and a broad-gauge railway line Other ports are at Kandla and Mandvi Port.

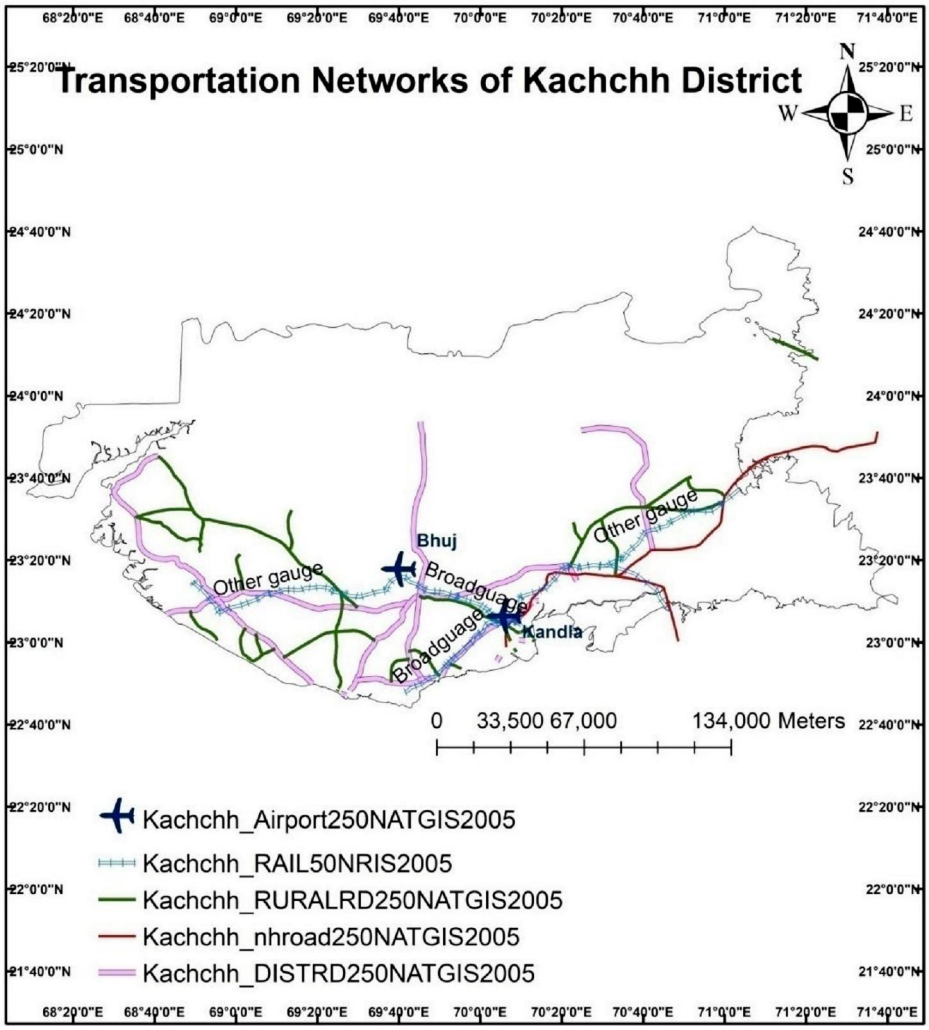

Figure 3.10 Transportation network of Kachchh District

3.3 Climate of Kutch District

The Kachchh region in general falls within the arid to hyper arid belt of western India. Average rainfall in the district is lies around 300 to 400 millimeters per year. On an average there are very less, approximately 15 rainy days during the entire year that has increased to ~25 days in recent years. The day temperatures particularly in summers are generally low in the coastal region than the interior. In summers the day temperatures go above 46°C. January

is the coldest month of the year when the mean daily maximum temperature is 26°C and the mean daily minimum temperature is 11°C. However, during the cold wave conditions due to the NW disturbances, temperature goes down below the minimum level. Humidity remains high throughout the year along the coast, generally exceeding 60% on an average. Table 3.2 illustrates monthly climatic conditions of Kachchh district.

Table 3.2 Rainfall & Temperature of Kachchh district

Month	Max Temp (Deg. C)	Min Temp (Deg. C)	Humidity (%)	Wind Spd. Kmpd	Solar Rad. (MJ/m2/d)	Eto (mm/d)	Rainfall (mm)
January	26.7	9	47	138.2	8.9	3.6	2
February	29.8	12	45.5	149	9.5	4.5	1.1
March	34.9	17.6	43.5	177.7	10.1	6.2	2.9
April	38.7	22.1	44.5	217.2	10.8	7.9	0.7
May	39.5	25.2	53.5	330.3	11.4	9.2	1.7
June	37.1	27	65	375.2	8.7	7.7	33.9
July	33.6	26.2	75	346.5	5.3	5.4	136.3
August	32.5	25.2	77	307	5.4	4.9	120.7
September	33.7	23.8	70.5	229.8	7.9	5.4	54.2
October	35.9	20.6	52.5	141.8	9.6	5.3	15.4
November	32.4	15.5	48	123.9	9.3	4.1	7.7
December	28.1	10.5	49	131	8.9	3.4	1.6
Total	-	-	-	-	-	-	378.2
Average	33.6	19.6	55.9	222.3	8.8	5.6	-

Source: IMD

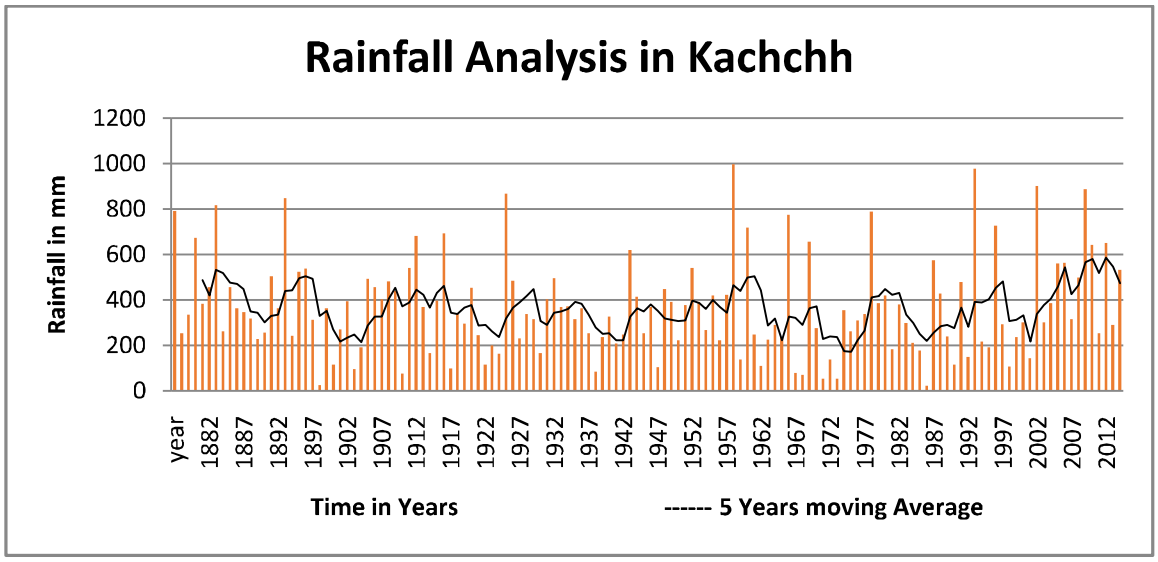

Figure 3.11 Rainfall Analysis of Kachchh District

3.4 Demography:

The changes in the population were analyzed from the census book of 1961, 1971, 1981, 1991, 2001 and 2011. Later on, this data was compared with the data collected through the questionnaire regarding the prevailing issues of ground water in those areas. Population Increase according to Census. Total population of Kachchh District according to 2011 census is 2,090,313 compared to 1,583,225 of 2001.Population Growth for Kachchh District recorded in 2011 for the decade has remained 32.03 percent. Same figure for 1991-2001 decade was 25.40 percent.

3.4.1 Demographic Analysis:

Demography can be important indices of socio economic development. Development depends on availability of static and dynamic natural resources of any area. Here the demographic aspects of the study area have been dealt in terms of population, male female ratio, population density and workers on District Census Handbook along with taluk level male, female, worker, agricultural workers. The demographic status of Kachchh District is described in Table 3.3, along with Study Area Lakhpat and Nakhatrana Taluk. Table 3.3 shows number of House hold is 445672 and Total population is 2092371, which includes 1096737 male populations and 995634 female populations. Demographic information is further categorised into Rural and Urban categories. Table 3.3 describes male population is 52.42 percent and female population is 47.58 percent of Total population in Kachchh district. Scheduled Caste (SC) Population is 12.37 percent and Scheduled Tribe (ST) is around 1.15

percent of Total population in Kachchh district. Literate population of total population is around 59.85 percent and illiterate population is 40.15 percent in kachchh district.

Table 3.3 describes the number of Households in Lakhpat and Nakhatrana taluks are 12155 and 28608 respectively. Total population is 62552 and 146367 in Lakpat and Nakhatrana taluka respectively. Total SC population of Lakhpat is 6379 which is 10.19 percent of total population of taluk. ST population is relatively very less in entire taluk is around 508 which is 0.81 percent of total population in taluk. Literate population of taluk is 51.20 percent of total population in Lakhpat taluk. Nakhatrana is comparatively highly populated than Lakhpat with 146367 total populations. Total SC population is 25319 with 17.29 percent of total population and ST population is 1422 which is 0.97 percent of total population in Nakhatrana Taluk. Literate population is 88603 which are 60.53 percent of total population in Nakhatrana taluk.

Table 3.3 Population and categories in Kachchh District (Census of India 2011)

Parameters/ Area	**Kachchh District**			**Lakhpat**	**Nakhatrana**
	Rural	**Urban**	**Total**	**Total (Rural)**	**Total (Rural)**
No of House Holds	286001	159671	445672	12155	28608
Total Persons	1363836	728535	2092371	62552	146367
Total Male	713524	383213	1096737	32274	74380
Total Female	650312	345322	995634	30278	71987
Persons (0-6 Years)	222543	95869	318412	10966	21786
Males (0-6 Years)	115533	50206	165739	5654	11337
Females (0-6 Years)	107010	45663	152673	5312	10449
SC Persons	170304	88555	258859	6379	25319
SC Males	87247	45977	133224	3305	12887
SC Females	83057	42578	125635	3074	12432

ST Persons	14287	9941	24228	508	1422
ST Males	7629	5196	12825	260	751
ST Females	6658	4745	11403	248	671
Literate Persons	740922	511397	1252319	32029	88603
Literate Males	449185	290054	739239	19324	50129
Literate Females	291737	221343	513080	12705	38474
Illiterate Persons	622914	217138	840052	30523	57764
Illiterate Males	264339	93159	357498	12950	24251
Illiterate Females	358575	123979	482554	17573	33513

3.4.2 Socio-Economic Profile of study area:

Socio-economic indicators provide an understanding of the development scenario of any area. As the study on agricultural problem, this section on Socio-economic indicators provides data on gender, housing, growth, agriculture and other employment indicators. Table 3.4 illustrates about the total workers, male workers, female workers, cultivator workers, agricultural workers and household industry workers etc. Table XX describes details about Kachchh district in two categories mainly with rural and urban population, whereas Lakhpat and Nakhatrana taluka contains information about the rural population only because of the non-existance of urban population in duo taluks. Total workers in Kachchh district are 776228 with 37.09 percent of total population, where 624704 male workers and 151524 are female. Total worker of Lakhpat Taluka is 21436 (34.27 percent) and Total workers in Nakhatrana Taluka are 53738 which are 36.71 percent of total population. Classified worker in different categories are mentioned in Table 3.4. Main agriculture workers in kachchh are 6.71 percent of total population.Agricultural worker of total populationin Lakhpat taluk are 11.04 percent and in Nakhtrana 13.73 percent. Main household industry workers in kachchh district are around 0.39 percent and in Lakhpat and Nakhatrana Taluk are 0.16, 0.26 percent of total population respectively. People from the study area are also engaged with other short

duration works, Katchchh district's other worker's strength is 20.98 percent of total population whereas 13.94, 12.98 percent other workers of total population from Lakhpat and Nakhatrana Taluk respectively. Marginal Workers along with categories and time duration of works are described in Table 3.5.

Table 3.4 Total and Main Workers of Kachchh District (Census 2011)

Parameters	**Kachchh District**			**Lakhpat**	**Nakhatrana**
Name	**Rural**	**Urban**	**Total**	**Total**	**Total**
Total Worker - Persons	516868	259360	776228	21436	53738
Total Worker - Males	404980	219724	624704	17358	41753
Total Worker- Females	111888	39636	151524	4078	11985
Main Worker - Persons	448173	238764	686937	18957	47138
Main Worker - Males	382698	208671	591369	16219	39836
Main Worker Females	65475	30093	95568	2738	7302
NON_WORK_P	1316143	846968	469175	41116	92629
NON_WORK_M	472033	308544	163489	14916	32627
NON_WORK_F	844110	538424	305686	26200	60002
Main Cultivator Workers Population - Persons	94294	4947	99241	3228	7662
Main Cultivator Workers Population - Males	84686	3830	88516	3018	7179
Main Cultivator Workers Population - Females	9608	1117	10725	210	483
Main Agriculture Labour Workers Population - Persons	134475	5935	140410	6908	20098
Main Agriculture Labour Workers Population - Males	100098	4019	104117	5539	14931
Main Agriculture Labour Workers Population - Females	34377	1916	36293	1369	5167
Main Household Industry Workers Population - Persons	4723	3447	8170	102	390
Main Household Industry Workers Population - Males	3338	2287	5625	59	286
Main Household Industry Workers Population - Females	1385	1160	2545	43	104
Main Other Workers Population - Persons	214681	224435	439116	8719	18988

Main Other Workers Population - Males	194576	198535	393111	7603	17440
Main Other Workers Population - Females	20105	25900	46005	1116	1548

Table 3.5 Statistics of Marginal Workers of Kachchh District (Census 2011).

Parameters	**Kachchh District**			**Lakhpat**	**Nakhatrana**
	Rural	**Urban**	**Total**	**Total**	**Total**
Marginal Worker Persons	89291	68695	20596	2479	6600
Marginal Worker Male	33335	22282	11053	1139	1917
Marginal Worker Female	55956	46413	9543	1340	4683
Marginal Cultivator Workers Population - Persons	6635	6044	591	234	307
Marginal Cultivator Workers Population - Males	1852	1635	217	49	65
Marginal Cultivator Workers Population - Females	4783	4409	374	185	242
Marginal Agriculture Labour Workers Population - Persons	43561	41743	1818	1406	4632
Marginal Agriculture Labour Workers Population - Males	11765	11298	467	712	986
Marginal Agriculture Labour Workers Population - Females	31796	30445	1351	694	3646
Marginal Household Industry Workers Population - Persons	2632	1549	1083	54	126
Marginal Household Industry Workers Population - Males	431	256	175	2	22
Marginal Household Industry Workers Population - Females	2201	1293	908	52	104
Marginal Other Workers Population - Persons	36463	19359	17104	785	1535

Marginal Other Workers Population - Males	19287	9093	10194	376	844
Marginal Other Workers Population - Females	17176	10266	6910	409	691
Marginal Workers Population work during 3 to 6 Month - Persons	75376	57654	17722	2252	5586
Marginal Workers Population work during 3 to 6 Month - Males	27750	18417	9333	1052	1578
Marginal Workers Population work during 3 to 6 Month - Females	47626	39237	8389	1200	4008
Marginal Cultivator Workers work during 3 to 6 Month - Persons	5226	4721	505	211	272
Marginal Cultivator Workers work during 3 to 6 Month - Males	1549	1358	191	40	56
Marginal Cultivator Workers work during 3 to 6 Month - Females	3677	3363	314	171	216
Marginal Agriculture Labour Workers Population work during 3 to 6 Month - Persons	37335	35706	1629	1307	3996
Marginal Agriculture Labour Workers Population work during 3 to 6 Month - Males	10028	9618	410	683	810
Marginal Agriculture Labour Workers Population work during 3 to 6 Month - Females	27307	26088	1219	624	3186
Marginal Household Industry Workers Population work during 3 to 6 Month - Persons	2026	1213	813	47	85
Marginal Household Industry Workers Population work during 3 to 6 Month - Males	369	218	151	1	18
Marginal Household Industry Workers Population work during 3 to 6 Month - Females	1657	995	662	46	67
Marginal Other Workers Population work during 3 to 6 Month - Persons	30789	16014	14775	687	1233

Marginal Other Workers Population work during 3 to 6 Month - Males	15804	7223	8581	328	694
Marginal Other Workers Population work during 3 to 6 Month - Females	14985	8791	6194	359	539
Marginal Workers Population work during 0 to 3 Month - Persons	13915	11041	2874	227	1014
Marginal Workers Population work during 0 to 3 Month - Males	5585	3865	1720	87	339
Marginal Workers Population work during 0 to 3 Month - Females	8330	7176	1154	140	675
Marginal Cultivator Workers Population work during 0 to 3 Month - Persons	1409	1323	86	23	35
Marginal Cultivator Workers Population work during 0 to 3 Month - Males	303	277	26	9	9
Marginal Cultivator Workers Population work during 0 to 3 Month - Females	1106	1046	60	14	26
Marginal Agriculture Labour Workers Population work during 0 to 3 Month - Persons	6226	6037	189	99	636
Marginal Agriculture Labour Workers Population work during 0 to 3 Month - Males	1737	1680	57	29	176
Marginal Agriculture Labour Workers Population work during 0 to 3 Month - Females	4489	4357	132	70	460
Marginal Household Industry Workers Population work during 0 to 3 Month - Persons	606	336	270	7	41
Marginal Household Industry Workers Population work during 0 to 3 Month - Males	62	38	24	1	4
Marginal Household Industry Workers Population work during 0 to 3 Month - Females	544	298	246	6	37

Marginal Other Workers Population work during 0 to 3 Month - Persons	5674	3345	2329	98	302
Marginal Other Workers Population work during 0 to 3 Month - Males	3483	1870	1613	48	150
Marginal Other Workers Population work during 0 to 3 Month - Females	2191	1475	716	50	152

3.1.1.1. Economy Drivers:

Kutch has emerged as a hub for chemicals, minerals, textiles, engineering, oil & Gas and Port based industries. Kutch is an ideal gateway to Asian, African and American markets as Mundra Port offers shortest landroute from any port to the vast hinterland of western and northern India Presence of Mundra, Kandla and Mandavi ports has made the district a trade and logistics hub. Industries in the district such as minerals, port-based, engineering & auto, steel pipes, cement, salt, textiles, tourism and infrastructure projects are the drivers of economy

Rich mineral wealth of the district is an attraction for investors. Many foreign companies are expected to invest on lignite, limestone and bauxite reserves. Presence of a large number of Industrial estates and parks in several sectors such as power, port based, textile and engineering, may further augment the economic growth of the district. The tourism sector is experiencing a strong resurgence. The palaces, wildlife, fairs and festivals of the district are witnessing a large influx of national and international tourists

Tourism

Kutch boasts of a culturally rich heritage and vibrant population celebrating traditional fairs and festivals. The district accounts for 2.39 % of total tourist inflow in Gujarat during 2006-07 and has shown a growth of 219 % over the inflow of tourists during 2005-06.

Heritage: Aina Mahal (Old Palace), Prag Mahal (New Palace), Kutch Museum, Cenotoph Complex, Indus Valley Civilization site at Dholavira,

Pilgrimage Sites: Swaminarayan Temple, Lakhpat, Koteshwar, Bhadreshwar temple.

Beach/ Resorts: Mandvi Beach

Fairs & Festivals: The Kutch Desert Festival, Ravechi Fair, Navratri Fair, Nakhatrana Fair, Dhrarg Fair

Handicrafts: Block printing including the intricate 'Ajrakh' printing, terracota work, lacquered wood furniture, Bandhani, finest silver ornaments and intrinsic metallic work

Wild Life: Great Indian bustard, chinkara, blackbuck, fox, hayena, jackal, hare, wolf and panther constitute the wildlife of the district. The forests have rich reserves of date palms, chikoo, guava, mango, pomegranate, ber etc. The home of the last remaining population of khur (wild ass) in India. There is also a bird population, particularly of the large flamingos. Both are protected in 5,000 km Little Rann Sanctuary, near Dhangadhra; one has to get permission to enter from the sanctuary superintendent's office in Dhangadhra. Black Buck-Antelope Cervicapra (Linnaeus) (Kaliar) This variety of deer is to be seen occasionally on alluvial sands along the shores of the Gulf of Kutch, while the Common Red Antelope-Gazella henetui (Chinkara) is found in the same places in much larger numbers. Three varieties of fox found in Kutch are (i) common grey Indian fox; (ii) white with black belly and legs, and (iii) large English-like fox of a light brown colour with a white point to his brush. Known as lonkadi it is quite active. The striped hyaena though not much of a common wild animal of Kutch, one does come across it in the shrubby semi-desert areas. **Panther-Panthera Pardus (Linnaeus) (Dipdo) t**his species used to be fairly common but of late its numbers have dwindled considerably. Unlike the tiger which prefers heavy cover, the panther is able to live and thrive almost anywhere. In Kachchh they have good and plentiful cover among the rocky hills, and except after killing a cow or goat, are difficult to trace. Its natural prey includes deer, monkeys, porcupines, etc.

3.1.1.2. Agriculture:

Agriculture is very prominent in the study area. According to Agriculture census for the years 1995-96 to 2010-11, irrigation through Tube well has increased to significant levels compared to the earlier periods. While in 1995-96 contributed to only 3.36% of the total irrigated area while majority of the irrigation was done through wells which contributed to 78.24%. There has been significant change of practice in irrigation since then due to scanty of rainfall years and increase in depth of the water levels. During the period of 2000-01

irrigation through well reduced to 32 .34 % while there was a drastic increase in the irrigation practices through tube wells with an increase of 66.73 %. The tube well fed agriculture area covers major part of the irrigated area in the recent years i.e. 2010-11 (about 67.46 % of total agriculture land) while irrigation through well has been reduced to only 4.28%. Irrigation through canal is also been done which has increased to 6.54% from 0.18% in 2000 to 2011. This can be attributed to the recent development of SSNL canal planned through various parts of kachchh district. While alternate sources of water sources like tankers are also been used were no or negligible amount of water for irrigation is available (Agricultural Census 2011).

Major Crops being produced in Kutch district are: (Crops of Kutch) oilseed, bajra, jowar, cotton, pulses, date palms and brinjal (Lakhpat Nakhtrana) among various oilseeds groundnut, castor seeds, rape (Rapar Abdasa Bhuj) and mustard seeds are the most important crops (Bhachau Anjar Mandavi). Kutch is an important producer of psyllium (Isabgul), cumin and coriander Bajra in Gandhidham Mundra. Conventional pesticide-based farming is transforming Jowar into organic cultivation of crops Pulses Around 1,000 cotton producers in Rapar taluka of Kutch have been granted 'organic' certification by Agrocel (an agricultural service provider) (DoA, 2006-07).

3.5 Summary

Hence from the population and agriculture census analysis we can understand the impact of natural disaster like drought on the residents of the villages and its growth pattern. This chapter shows the physical and socio-economic profile of study area that is very helpful in drought analysis. Spatial and non-spatial data collected through various sources is very important to know physical conditions of study area and socioeconomic profile of the region.