Gujarat - A Profile

CHAPTER—2

GUJARAT — A PROFILE

This chapter covers general informations about geography, geology, climate , soils, forests, agriculture and irrigation of Gujarat State with a special reference to Banaskantha, Kheda, Vadodara, Rajkot and Junagadh districts where the agrometeorological sites are located.

2.1 GENERAL

Gujarat state located on the North-West of India covers total geographical area of 1,95,984 sq.kms which is @ 6% of the total geographical area of India. The state is 540 km from North to South and its width from East to West is 500 km, with this Gujarat is seventh in India with respect to geographical area. The state is lying between N 20°-01' to N 24°-7' and E 68°-04' to E 74°-04'. Figure 2.1 shows the location of the state in the Indian union. Thus major part of Gujarat is in torrid zone and part of it is in temperate zone. Tropic of

cancer passes from North part of the state which affects its climate. Nearly half the border of the state is facing towards the Gulf of Kachchha, Arabian sea and Gulf of Khambhat. State is endowed with number of small and large rivers. The majority of the places are located at altitude of 25 - 75 meter (Fig 2.2)

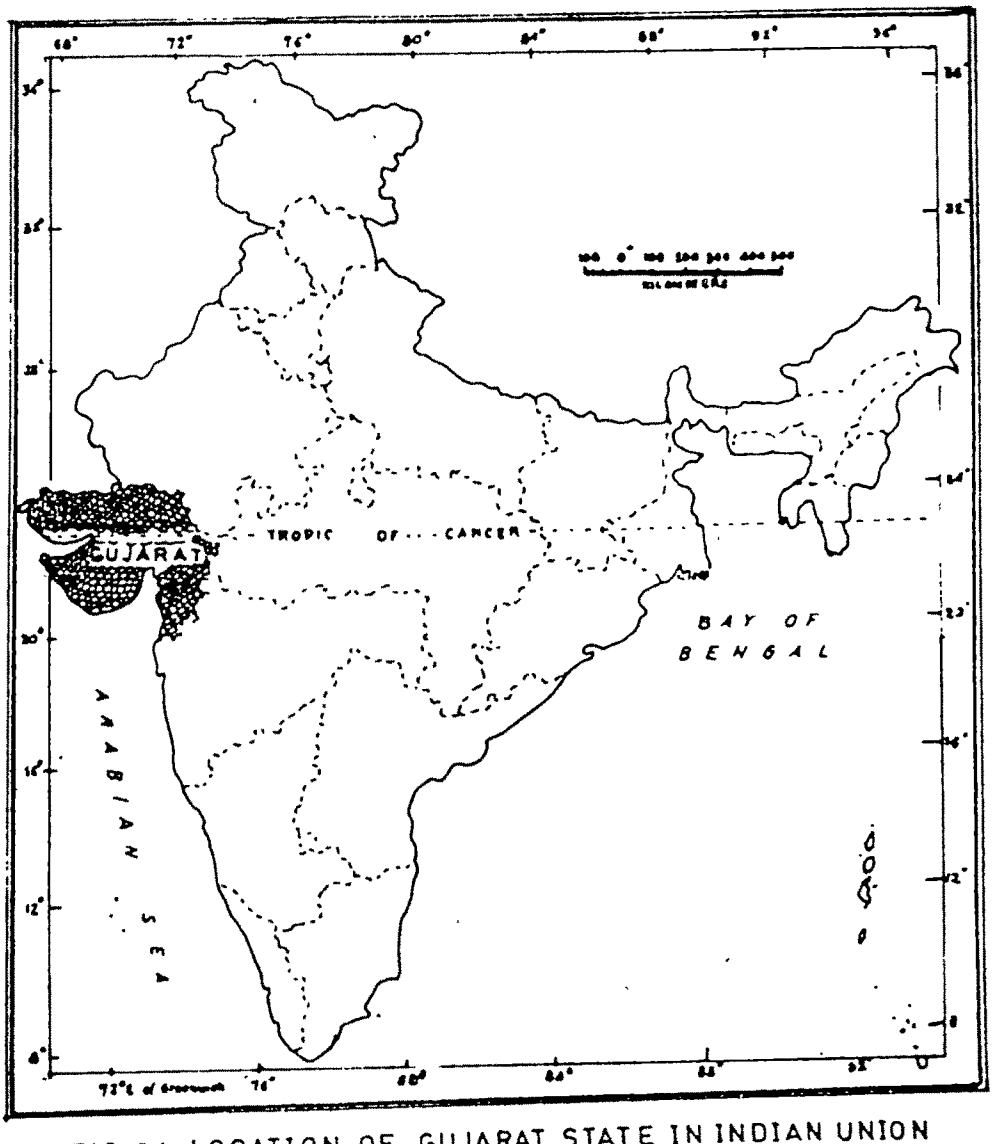

FIG: 2.1-LOCATION OF GUJARAT STATE IN INDIAN UNION

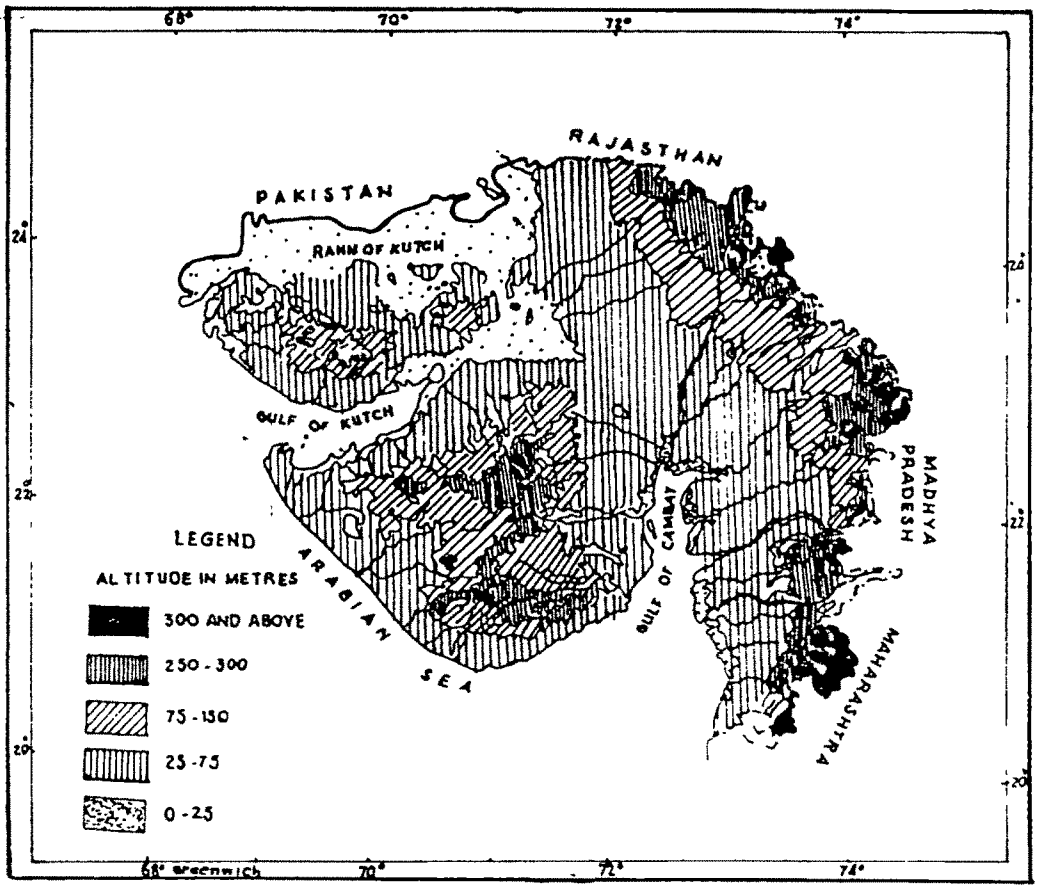

FIG: 2.2 - MAP OF GUJARAT SHOWING ALTITUDES

2.2 REGIONAL GEOGRAPHY

Geographical area of Gujarat is distributed mainly in three parts; Gujarat, Saurashtra and Kachchh. Rajkot and Junagadh districts are lying in Saurashtra. Banaskantha district is located in North Gujarat while Kheda and Vadodara districts are situated in Central Gujarat as shown in fig 2.3. Saurashtra region was island. Due to movement of earth, and raising of this land, the rivers viz Luni, Banas, Saraswati, Rupen and Sabarmati deposited sediments in the low lying area between Saurashtra and Gujarat. Thus Saurashtra was joined with Gujarat. The rivers in Saurashtra (Fig.2.4) are flowing

radially towards sea from the Central plateau. Due to erosion of central plateau in past, about 150 to 300 m high basaltic plateau of Saurashtra is formed.

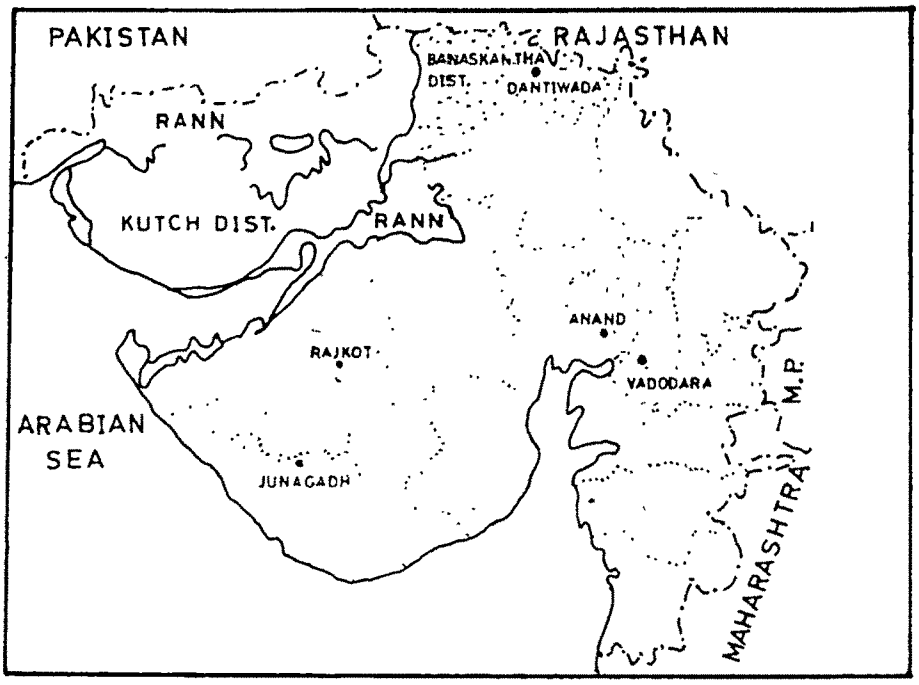

FIG: 2.3 - GEOGRAPHICAL MAP OF THE STATE

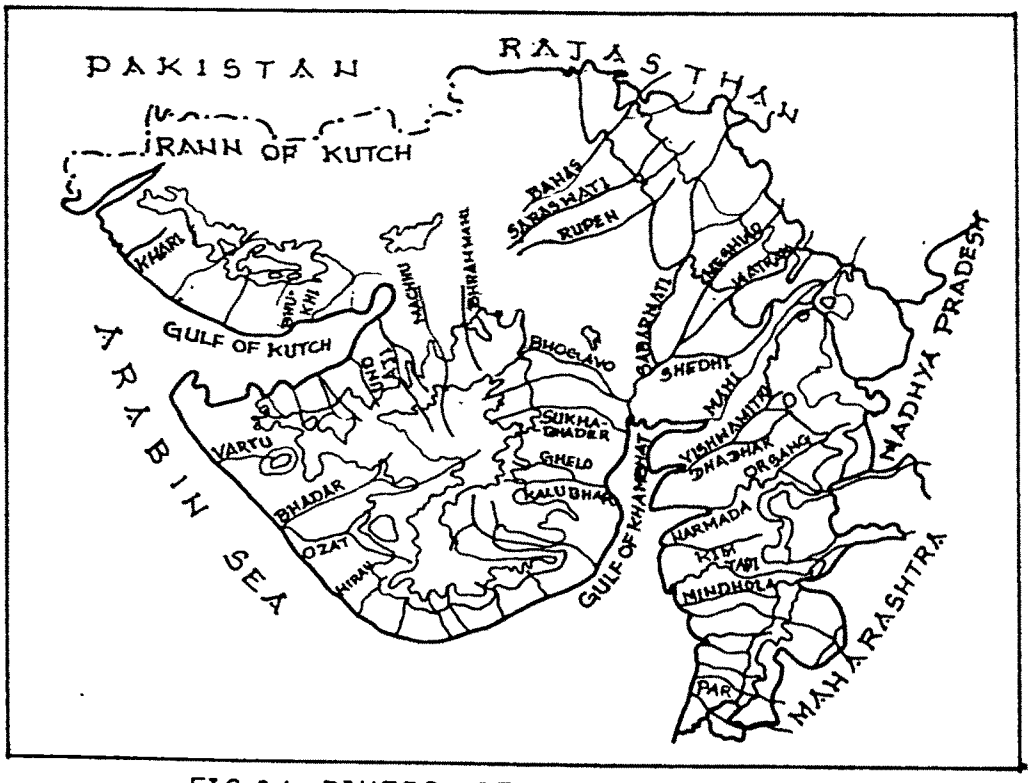

FIG: 2.4 - RIVERS OF GUJARAT

In Saurashtra small plane areas like Shetrunji basin, Bhadar basin, Ghogha basin and Morbi basin are formed due to sedimentaries of wastages of trap rocks. Such areas are fertile black plane lands. Banaskantha, Sabarkantha and major part of Mehsana districts are covered under the planes of North Gujarat. This plane is formed due to sediment depositions of rivers Banas and Sabarmati. Western land of Banaskantha and Mehsana districts is sandy, whereas sabarkantha is a black soil region. In North Gujarat planes, at some places higher spots are seen known as Godh in local terms. In this region soil is somewhat saline and less useful for agriculture. The plane of central Gujarat is spreaded from Amdavad district to North of River Narmada in Bhruch district. This plane is formed due to deposits of rivers Orsang, Dhadhar, Vishwamitri, Mahi, Sabarmati and their tributaries. In this plane alluvial soils and black soils are seen from North to south. East portion of the Central Gujarat plane is higher than the west portion on coastline.

The area of Kheda district between river Watrak and Mahi, is known as "Charotar". Which is formed due to deposits of rivers Mahi, Watrak and Shedhi. This plane is formed due to Loesses type soil which is fertile and best for agriculture.

2.3 CLIMATE

Gujarat is in the region of seasonal climate. Its climate is between the Southern indian Konkan climate of heavy rain and dry climate of Rajasthan. South Gujarat is blessed with 200 cms rain whereas only 30 to 40 cm rain falls in Banaskantha district in north Gujarat (Fig 2.5).

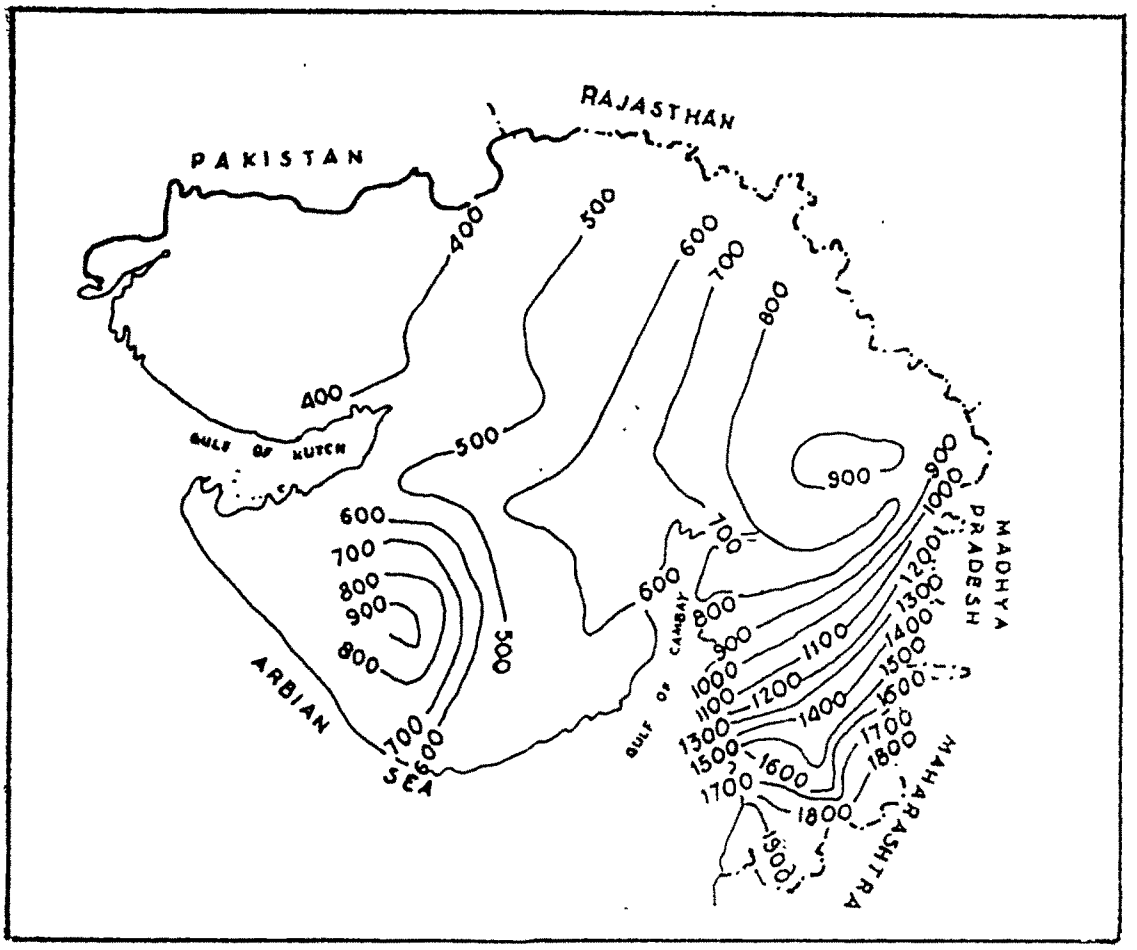

FIG: 2.5 - RAINFALL (ANNUAL) OF GUJARAT

On western side Kachchh district climate is hot and dry, and on south eastern region . Dang district and part of Valsad District is a dense forest. Thus Gujarat is experiencing inequality of temperatures and rain during the year. The climate of Gujarat can be divided into three seasons :

(1) Hot and dry season from May to June

(2) Warm and rainy season from July to September , and

(3) Cool and dry post - rainy season from October to April.

Main parameter affecting the climate of Gujarat is its geographical location. Tropic of cancer passes from North where desert and semidesert regions are located whereas major

part is in torrid zone where summer temperature remains high and winter is not much cold. Gujarat is having a special shape. Due to narrow width of south Gujarat below Narmada, the effect of sea is experienced deep inside the region, resulting in temperate climate. North of Narmada the region is wider and experiencing unequal climate. Also sea effect is negligible in the inside region of Kachchh and saurashtra except coastal belt. Also on North, East and South border due to more hill ranges of Aravalli, Vindhya and Satpuda, forests are formed due to rain.

Over and above such local parameters general parameters are also affecting the climate. Gujarat is experiencing hot summer and mild winter climate like other countries in upper torrid zone. Sometimes winter temperature goes down suddenly due to cold wave from Himalayan ranges generated from snow fall. Some parts of the state experience an occassional frost for a day or two during winter season. As Gujarat is in seasonal climatic region, effect of seasonal winds can be seen on its climate. Uniform and regular changes are not seen in the yearly and seasonal temperature and rain of Gujarat. Rain and Temperature of Gujarat is uncertain. Therefore Gujarat has experienced heavy famine and floods also.

Banaskantha is a dry and torrid climate region. Daily variation in temperature is more. Humidity remains low. Average annual rainfall is less than 40 cms, Due to high temperature resulting in high evaporation, water is scarce, and land is dry sandy. In Rajkot district of central saurashtra the

climate is same as Banskanttha. However here rainfall is 40 to 80 cms and rainy days are also more. The central Gujarat region between Sabarmati and Narmada river is getting 80 to 100 cms rainfall. Summer is hot. Coastalands are humid, whereas inland area is experiencing unequal climate. The rainfall in Gujarat state is seasonal. South - West monsoons are active during last week of June to second week of September. However, the distribution of rainfall is uneven and irregular which leads to a partial or complete failure of crops in some years. The North West monsoon do not occur in the Gujarat state. The monsoon weakens as it progresses from the southern to northern parts of the state. The rainfall distribution during rainy season is erratic, long breaks and an occassional high-volume high-intensity shower occur commonly. Due to non-uniform distribution of rainfall there are some areasin Gujarat especially in Kachchha, the Saurashtra region, Banaskantha, Sabarkantha and part of Amadavad, Panchmahal and Kheda districts where the climate is arid. Average yearly rainfall of the state is shown in figure 2.5.

2.4 AGRO CLIMATIC ZONES

Nearly 59 percent of the total area is under the arid and semi arid climate. The details of district-wise area under arid and semi arid are shown in Table 2.1 and Fig 2.6. The state is further sub-divided into eight agroclimatic zones mainly based on amount of rainfall and soil types as shown in Fig 2.7. General information about eight zones is as per annex 2.1.

Table 2.1

District wise Arid and Semi-arid Zones of Gujarat

Distrct	Total area km^2	Total area under the zone km^2	% of District	% of state
ARID ZONE				
Jamnagar	14125	7814.3	55.32	
Kachchha	45612	41076.5	90.49	
Total	59737	48890.8		24.84
SEMI-ARID ZONE				
Rajkot	11203	8242.0	73.56	
Surendranagar	10488	3556.1	33.90	
Bhavnagar	11155	9788.3	87.94	
Amreli	6760	6711.5	99.27	
Junagadh	10607	7051.9	66.48	
Banaskantha	12702	6124.2	48.21	
Sabarkantha	7390	3520.7	47.63	
Mehsana	9027	5608.3	62.12	
Gandhinagar	649	649.0	100.00	
Bharuch	9045	2844.6	31.44	
Panchmahals	8866	3104.2	35.01	
Amadabad	8707	8565.9	98.38	
Total		65766.7		33.56

2.5 SOILS

Soil is an important factor for the agriculture of any region. Gujarat soil is mainly classified as under based on its origin, colour, fertility etc. (1) Alluvial Soil, (2) Black Soil, (3) Desert Soil, (4) Laterite Soil and (5) Mixed red and black soils (6) Residual sandy soils (7) Saline/Alkaline soils (8) Hillysoils (9) Forest soils. Figure 2.8 shows soil map of Gujarat. Rajkot and Junagadh district are having medium black soil, Banaskantha district soil is sandy loam. Kheda district is in zone of silty loam soil and deep black soil is seen in Vadodara district.

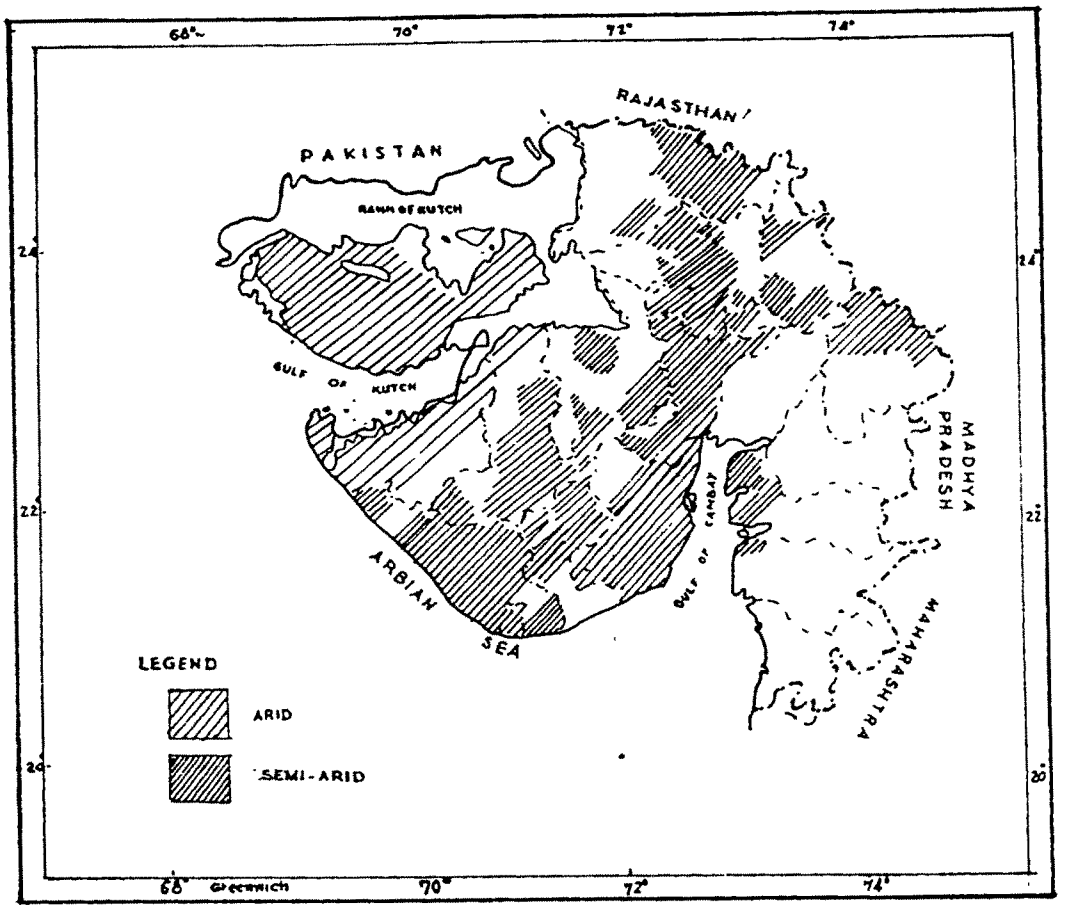

FIG: 2-6 - ARID AND SEMI ARID ZONES OF GUJARAT

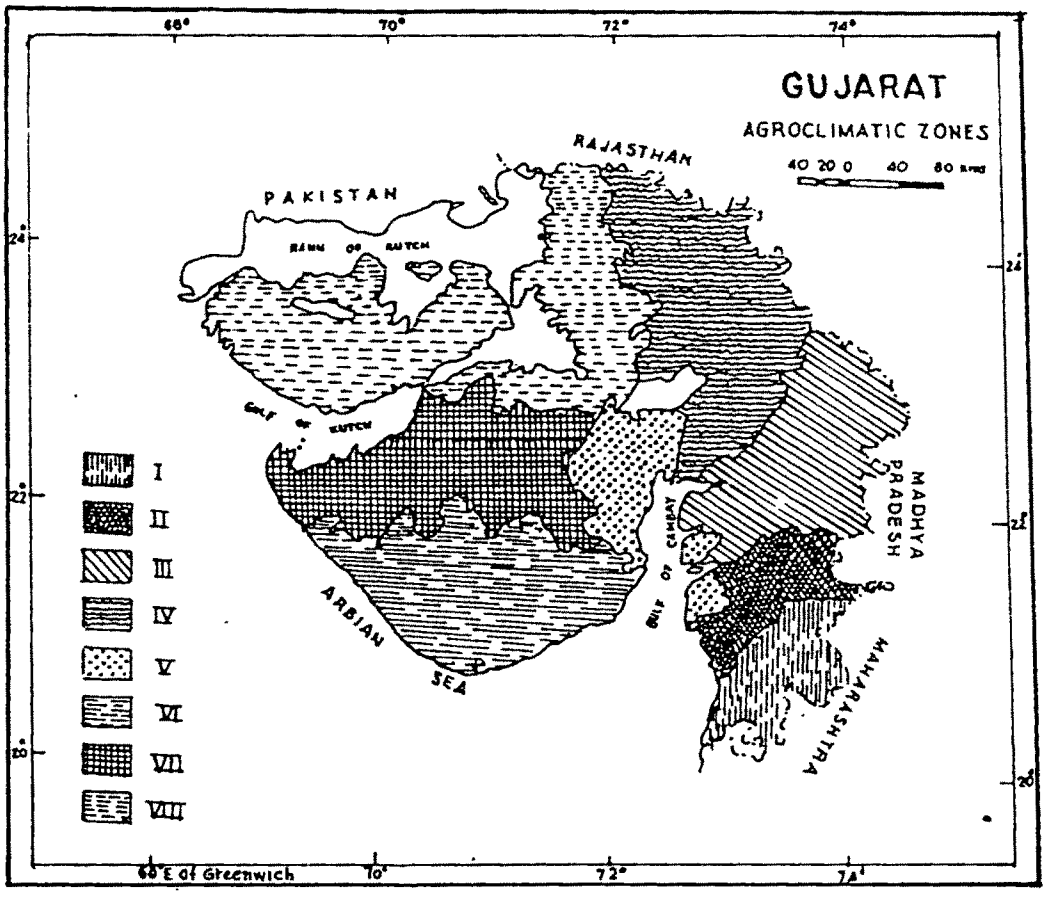

FIG: 2-7 - AGROCLIMATIC ZONES OF GUJARAT

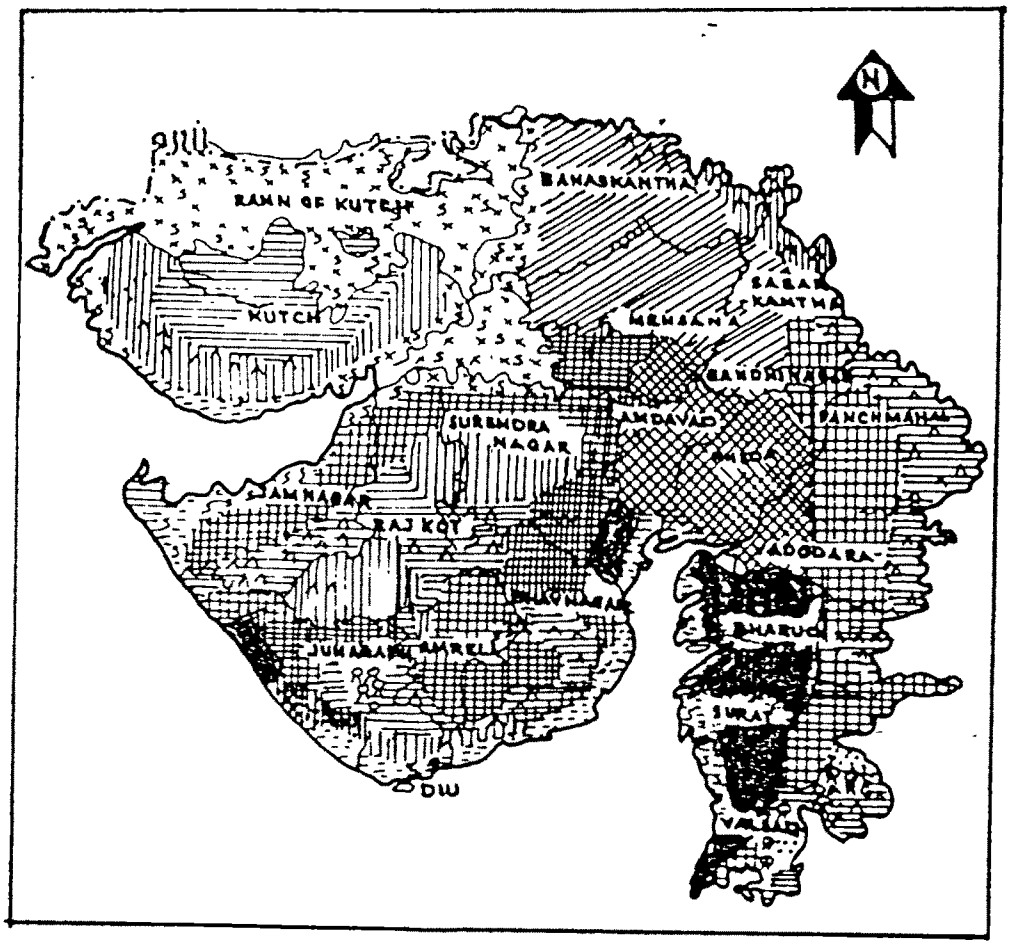

FIG-2.8 - SOIL MAP OF GUJARAT

- SHALLOW BLACK
- MEDIUM BLACK
- DEEP BLACK
- RESIDUAL SANDY
- ALLUVIAL SANDY
- ALLUVIAL SANDY LOAM
- MIXED RED AND BLACK
- LATERITIC
- COASTAL ALLUVIUM
- DESERT
- HILLY
- FOREST
- SALINE ALKALI

In the central area of Saurashtra plateau medium black soil is seen which is not so deep. In this soil mineral content is less and major part of it is residual. In low land area where it is transported and deposited, it is deep and black. This type of soil is less useful for agriculture. In more than 50% area of Gujarat, soil is loam having mixture of sand,clay and loam. Banaskantha soil is sandy loam. In this soil Nitrogen and lime is less whereas Phosphorous is medium and Potash is more. In Banaskantha soil silt-clay is less than 10% and fine sand is more than 80% . In western part of it saline soil is seen whereas near Aravalli in east, soil is sandy and having Kankar.

Soil of Kheda district is silty loam,less fertile and permeable. Such soil are best for tobacco crop. Such soils can hold less moisture and mineral content is less. In deep black soil of Vadodara district, mineral content is less. In vadodara district soil, 40 to 60% is silt clay and 20% is sand. It can hold more moisture, and it is best for cotton. Part of Junagadh district is included in Dharland region. Such soils are fertile and useful for groundnut. Part of Kheda district is Kyari land which is having more silt clay percentage, and less lime. Due to irrigation it is more useful for Paddy.

2.6 FORESTS

In India forests are covering 24% of the total geographical area against which the forest area in Gujarat is 9.1% of states geographical area. This forest area of Gujarat also

includes barren land in between and it is not dense. The low percentage of forest is due to lack of fertile land and uncertainty of rain. Major portion of the forest is in South, South-east and Eastern portion of Gujarat, and Central Saurastra. More than70% forest of Gujarat is in South Gujarat which are moist deciduous and dry deciduous forests. In North Gujarat due to low rainfall dry scrub and Mangrove forests are seen.

2.7 IRRIGATION

Out of total geographical area of Gujarat @ 66% land is suitable for agriculture. Rainfall is not uniform and certain in Gujarat. As discussed earlier Gujarat experienced 29 famine after 1905. Therefore irrigation is required in Saurashtra,Kachchh and in Gujarat region north of river Mahi. In south Gujarat irrigation is required for hot weather crops due to dry spell of months from November to May. Paddy requires more water. Also for more production of crops like groundnut and cotton irrigation is required. About available water resources of Gujarat information is given in chapter 1. Table 2.2 shows the ultimate possible utilisation of ground water and surface water of Gujarat state.

2.8 AGRICULTURE

Agriculture and its development in Gujarat can be discussed with following special factors.

(i) Size of farms and its patterns is not same in whole Gujarat. In Kachchh, Saurastra and north Gujarat farms are larger than south and central Gujarat, where farms are gener-

ally about 8 hectors or less. About 43% farms are less than 2 ha, 30% from 2 to 5 ha, 56% from 5 to 20 ha and only 2% are more than 20 ha.

(ii) Except rich farmers, use of machinery is less for agricultural activity in the state.

(iii) In Gujarat, area under cash crop is more than area under foodgrain crops. Cotton, Groundnut Sugarcane and Tobacco covers more than 50 lakh ha area.

(iv) In Saurashtra groundnut is planted after cotton. In Gujarat soil, potash & phosphate are more and nitrogen is less. Therefore pulse is planted as a rotation of crop.

(v) In Gujarat agriculture and animal husbandry are associated with each other and therefore dairying is also developed considerably.

Crop pattern of Gujarat is having many varieties. wheat, paddy, Jowar, millet, ground nut , Cotton, and Tobacco are main crops. In Saurashtra groundnut and in central and south Gujarat cotton and Tobacco are generally planted. In North Gujarat cumin seed is main cash crop.

In Banaskantha district the area near Danta Taluka, near Aravalli hill is uneven and hilly. This area is generally under maize crop. Other subsidiary crops are millet, cotton and wheat. In western part of Vadodara and Kheda districts soil is deep sandy loam. Main crop of this area is tobacco. Main crop of major part of Banaskantha district is Millet and pulse. Cotton & Jowar are also planted in this area. Major part of Rajkot district and Junagadh district is under cotton and Groundnut plantation. Millet and cotton are subsidiary

crops.

Under foodgrain 51.6 lakh ha area is covered. Millet stands first in Gujarat with reference to area grown and production gained. Jowar stands second. Wheat and paddy are not the major crops of state. Cash crop covers 39 lakh ha area. Cotton stands first in Gujarat and second in India. In Groundnut Gujarat is first in the country. Gujarat is second in the country for Tobacco crop. This crop covers only 1 % of cropped area of Gujarat eventhough gain is higher.

Table 2.2

Ultimate Possible Utilization of Ground Water and Surface Water of Gujarat State

Sr. No.	Name of Region of the State	Ultimate Possible Utilization				Total	
		Surface Water		Ground Water			
		Mm^3	Maft	Mm^3	Maft	Mm^3	Maft
1	Gujarat	27000	21.90	12725	10.32	39725	32.22
2	Saurashtra	3910	3.17	5643	4.58	9553	7.75
3	Kachchha	570	0.46	801	0.65	1371	1.11
	Total	31480	25.53	19169	15.55	50649	41.08