CHAPTER 3

DIMENSION OF DEVELOPMENT AND ENVIRONMENTAL DEGRADATION

INTRODUCTION

The post independence period has ushered in significant economic developments in Kutch. On the one hand, industrialization has been taken up as a planned endeavor leading to developed pockets in certain locations leading to serious shortages in infrastructure. On the other hand, agricultural boom induced by large irrigation projects and application of modern techniques (HYV, application of chemical fertilizer, tractorisation etc.) has created a great deal of marketable surplus. However, the existing industrial growth has been haphazard and without conformity to the overall development of certain regions, and the situation in the rural areas is equally bad because of improper landuse. Due to the complexities of economic necessity and resentment over increasing disparities with the developed regions, the underdeveloped regions clamour for more resources and favourable government policy.

Thus, there is a strong reason to ensure a focus on planning. In this context, Gujarat Government has taken adequate steps for making Kutch 'a gateway to North' and keen to provide required industrial environment by harnessing the locally available skills and crafts, by channelising institutional and financial support and finally technology upgradation by extending infrastructure network and marketing support.

This chapter focuses on Development and its nature in general and the Kutch region in particular.

DEVELOPMENT

Development involves a progressive transformation of economy and society. It does not take place in a vacuum, nor is it built upon abstract foundations. Development takes place within a specific societal context and in response to specific societal conditions. It affects all

aspects of society and at times, distracts from development itself. Existing social conditions are the starting point for development efforts. To a large extent, these determine its priorities and broad direction it takes as people being a country's principal assets, their well being affects development. Their energy and initiaves drive development and their characteristics determine the nature and direction of development.

Development is a process rather than an event, which grows and must be sustained over time. An individual state is no longer the sole actor in development, though each state has to bear responsibility for its own development. It requires competent government leadership, coherent national policies and strong popular commitment, international cooperation in which other actors assist the state in its efforts. In terms of the range of ideas, funds, projects, and groups engaged, development has emerged as a truly global endeavor. The actors in development; public and private, national and international are growing in number and diversity.

GROWTH AND DEVELOPMENT

These terms are often used interchangeably, though both have different connotation. Growth can be negative or positive, but development will always indicate improvement or positive results. Economic growth or growth is the engine of development as a whole. Without economic growth, sustained increase in household or government consumption, private or public capital formation, health, welfare and on security levels is not possible. Accelerating the rate of economic growth is a precondition for expanding the resource base and hence for economic, technological and social transformation.

However, economic growth by itself does not ensure that benefits will be equitably distributed or that the physical environment will be protected without the material resource for tackling the environment degradation. The advantage of economic growth is that it increases the range of human choice. It is not sufficient however to persue economic growth for its own sake. It is important that growth be equitable and sustainable. Growth should promote full employment and poverty reduction and should seek improved patterns of income distribution through greater equality of opportunity.

There is no single formula for generating economic growth but certain basic conditions are recognized as essential. Foremost among these is the need to take strategic decisions for

development. The state must have a political will to act. The experience of countries, states, areas which have achieved rapid development in the past few years can be seen as the outcome of a conscious choice by the state to give strategic priority to growth. Even in Kutch, this development is result of conscious effort by state government and hard work of local Kutchi people.

DEVELOPMENT AND ENVIRONMENT

Development and environment are not separate concepts and cannot be successfully addressed without reference to the other. The environment is a resource for development. Its condition is an important measure and its preservation a constant concern of development. Successful and sustainable development requires policies that incorporate environmental considerations. This link was accepted at the United Nations Conference on Environment and Development (UNCED) in 1992.

Preserving the availability and rationalizing the use of the earth's natural resources are among the most compelling issues that individuals, societies and the state must face. A country's natural resources are often its most easily accessible and exploitable assets and the way these are managed and protected has a significant impact on development and on a society's potential for progress.

In the context of development, each society must confront the different challenges associated with protecting the long term potential of its natural resources and its compelling needs and strive to create a balance between the two. The present social and economic needs must be satisfied in ways that do not undermine long term resource availability or the viability of the ecosystem on which the present and future generations are going to depend.

Environmental degradation reduces both the quality and the quantity of many resources used directly by people. The consequences of failing to pay adequate attention to destruction of natural resources can be catastrophic.
Environmentally unsound practices in the extraction of natural resources have left large region barren and contaminated. Most alarming is the fact that in many cases, degradation is irreversible. The link between the environment and development involves much more than exploitation of natural resources only. Preserving and protecting the ecological

equilibrium of our environment is a vital component not only of human development, but also of human survival.

NATURE OF DEVELOPMENT IN KUTCH

The recent phase of the development in Kutch has involved not only the small scale industries but also big industrial houses. The region is also developing into a diversified industrial one, in line with the trend across the State, which is also forging ahead on the industrial front. From its traditional textile base, Gujarat has diversified into fields like chemicals, petrochemicals, engineering, pharmaceutical, dye and dye intermediates, food processing, agro-based industries, dairy, edible oil and a host of other sectors. Similarly, Kutch which till few years back was known for its local artisans and their work is now on the map of developing industrial houses like Adani group, Sanghi group etc. The process of economic reforms has provided a boost to the efforts of its people for rapid industrialization and large sums of investments are in the pipeline. The district is poised to be considered among the booming industrial areas of the state on several counts including the proportion of workforce in industry and per capita industrial output. It is also important to note that the central and south Gujarat areas are already saturated with industrial development – a factor that could divert large sums of new investment to this region in future. Apart from industrial development, a number of ports and jetties have been developed for export oriented industries, and their number will double in near future.

Let us look at how Gujarat state has become industrialized after Maharastra and how it is now attracting entrepreneurs from all over the country as well as the abroad.

DEVELOPMENT IN GUJARAT

Gujarat has prospered during long phases of colonial and pre-colonial history. The mainstay of economy in those days was handicrafts and maritime trade. Among the handicrafts, the production of textiles supported by local cotton crop was prominent. And based on input of capital and local entrepreneurship, a large cotton textile industry emerged after the mid 19th century. Most of the big cotton mills were concentrated in Ahmedabad, where a range of ancillary units – mostly in the engineering sector - catering to the textile industry also came into existence.

After independence, the industrial growth of Gujarat became more dynamic, structurally more diversified and increasingly earmarked by the exceptional rise in the number of small and medium scale enterprises. Besides an expanding engineering industry, it was particularly the chemical and petrochemical industry, which made enormous progress. This was largely due to major oil and gas findings in central and southern Gujarat and construction of refineries, one of the largest in India being built near Baroda. This refinery in turn led to setting up of further ancillary industries of various sizes, especially in southern Gujarat. Among these industries, the production of fertilizer and plastics is of particular significant. Regarding textiles, the national policy has resulted in severe crises among the big mills and led to a flourishing powerloom sector manufacturing cloth from man made fibers in Surat.

In Surat, as also in other parts of the state wage-intensive cutting and polishing of imported diamonds for exports experienced a tremendous growth.

Today, the proportion of the industrial production is about twice as the Indian average. Besides the rise of income, the change of the overall economic structure has been one of the most important positive effects of Industrialization. It has led to a reduction of the dependency on agriculture which is affected by high variability of rainfall, repeated long drought period and occasional floods.

A differentiated analysis of the impressive industrialization shows that besides local availability of various raw materials, the extraordinarily favourable conditions of investment are mainly responsible for the successful development that made Gujarat one of the most prosperous states of the union, next only to neighbouring Maharashtra. Among the growth promoting features, the pragmatic, business like attitude of the government must be mentioned, which particularly contributed to the mushrooming of small and medium scale units. The power supply situation compared to other parts of India is fairly good. Another factor that provides Gujarat an edge over other industrially more advanced states like Maharastra or West Bengal is the good Labour relations. Other circumstances favouring development especially in southern Gujarat are the vicinity to Mumbai where many wealthy Gujarat entrepreneurs settled during colonial times, good infrastructural facilities and abundant water supply. Besides all these factors, the entrepreneurial ability of the Gujaratis who did not only stimulate the industrial growth in their own state but in the competitive economy of Mumbai is equally important.

As far as the spatial pattern of industrial development is concerned, distinct changes have occurred. Until founding of the state of Gujarat in the early sixties, Ahmedabad was the only major hub of industrial activity. Since then, the city has seen many ups and downs and has lost its dominance due to structural difficulties (decline in textile mills) and emergence of other rapidly growing urban centers. Most of these centers are located in southern Gujarat along the National highway no. 8. Today the spatial distribution of industries is characterized by a linear string of industrial centers between Ahmedabad and the southern border of the state and some island-like industrial towns outside this belt of activity.

However, this pattern is not the outcome of well-defined plan but the spatial result of structural changes in the state's industrial economy and of numerous locational decisions of individual entrepreneurs. Consequently, not all regions of Gujarat participated in modern industrial development, with large parts of the north and east remaining underdeveloped. A closer look at southern Gujarat reveals that even marked dis-homogeneities remain there as well.

While there is rapid development on both sides along the national highway, the most important transportation line, the economy of the eastern part of the region is more or less stagnant. Regarding the locational factors that led to the present spatial structure it is observed that the availability of raw materials, except for oil and gas was of minor importance for the entrepreneural decions to choose a place to locate the respective unit. However, abundant water supply and the possibility of discharge of industrial effluents influenced the locational decisions for many establishments of the chemical industry. For most of the other units, the infrastructural facilities in particular transportation infrastructure are of far greater importance. This means a location very close to the national highway which enables easy access to the capital of Maharastra. Mumbai is not the only the place of origin of many entrepreneurs but also the economic focus of western India. Much of the factory equipment and many inputs are available here, as also easy access to national and international markets and market channel. Besides, Mumbai is the 'Commercial capital' of the country, which translates into centre for transactions and business contacts.

On the other hand, the concentration of industrial and commercial activities in the urban areas leads to a number of negative effects: congestion of population, development and spreading of slums and squatter settlements, environmental pollution, overburden of infrastructure - to name just a few. At the same time, economic stagnation and impoverishment of the population occurs in peripheral areas.

The problem of unbalanced regional growth is not only restricted to this state but is typical for vast parts of the Indian union. It occurs at almost every regional level; striking disparities may be found between neighbouring taluka's, districts or states. Within Gujarat also, Kutch remained largely underdeveloped due to various economic, social, cultural, historical and natural factors in the past. But the initiatives of State government and local entrepreneurs are turning this district into a lucrative place for industrial development.

GUJARAT VISION 2010: A PROMISE OF TRANSFORMATION

With rapid industrialization, the state government is quite conscious about the need to provide infrastructure facilities on a large scale for achieving balanced development and improvement of the quality of life of the people. In order to assess the demand-supply gap in infrastructure capacity over next 10 years, the Government has developed a document Gujarat Infrastructure Agenda: Vision 2010 in consultation with developers, experts, Government department etc., which covers detailed planning with inter-sectoral linkages, etc.

Kutch: A Development Scenario (From Past to Present)

One of the major objectives of India's economic policy is the achievement of a regionally balanced industrial growth linked with the relief of congested urban agglomerates and the modern development of backward regions. Due to the fact that Gujarat, like other states based their regional strategies largely on the Union's policy, it seems to be expedient to examine the measures and their impact, especially with respect to the development process initiated in backward Kutch.

Among the first efforts to achieve a more even spread of larger factories were the spatially selective granting of industrial licenses and a ban on new or expansion of existing units in metropolitan areas. Those 'negative'approaches were successful in preventing the establishment of further big factories in large cities like Mumbai. But they failed to compensate the disadvantages of backward areas and could not initiate any substantial growth in these regions.

The location of large public sector units was another early step undertaken to induce industrial growth in certain backward regions endowed with rich natural resources. In relation to the huge investments, the projects failed to create any investments or significant 'push' towards modern industrial development in their vicinity. They tended to become just industrial enclaves in otherwise backward tracts.

A scheme for the promotion of ancillaries catering to large units on the basis of state contracts was also evolved.

Committees of the central government undertook later identification of backward region.

Gujarat is among those states which successfully granted incentives to attract entrepreneurs from other states and implemented regional policy aimed at the development of backward areas. Incentives for industrial development are granted across different areas of the state. The incentives offered by the state government are among others, subsidies of share capital and promotion of skilled as well as unskilled workers.

Thus, Government policies helped the development in backward areas like Kutch to reduce the intra-state disparities.

Before partition, the city of Karachi was the main trading center for India in the west, besides Bombay. After independence, Kandla port near Gandhidham has been developed into a major port, which is the gateway for the vast granaries of Punjab and Haryana and the rich industrial belt of west and North India. A Free Trade Zone at Kandla has also become a special attraction for trade.

Whenever there is talk on economy of Kutch, one can normally think of conventional types of trades which flourished in the past based on livestock, agriculture, and craftsmanship and of course the age old maritime and fishing trade. The mineral based economy was earlier never thought of but now the economists and geologists think of mineral based economy as most promising for the economic upliftment of Kutch. The value of the hidden treasure is now slowly improving the economy of this so called 'Barren land'. Even the vast Rann is not perceived as a 'wasteland' as it has immense resources waiting to be exploited.

Kutch: Industrial Development

Kutch is home to many handicrafts since several generations. After independence, various schemes for the industrial and economic development of the district were introduced as were plans for the development of Kandla port with a well developed and constantly upgraded road network linking the to National Highway and Railway network.

In 1965, the country's first Free Trade Zone was set up about 9.6 km from Kandla and about 6 km from Gandhidham on the Kandla–Ahmedabad National Highway. The zone was declared open for allotment of plots and commencement of construction of factories on 7th March1965. The main objective of the free trade zone is to make merchandise competitive by eliminating local taxes, reduce overhead costs, stimulate reprocessing industries for exports and overcome inadequacies involved in the system of bonded warehouse.

Table 3.1 Liquid Cargo Facilities around Kandla Complex

Private

Sr. No.	Name of Party	Existing Capacity (in KLs)	Under Construction (in KLs)
1	IMC	24,249	10
2	N. P Patel	35,000	
3	J K Synthetics	23,304	17,500
4	Bayer ABS Ltd	13,310	
5	C.R.L	2,28,500	
6	F.O.C.T	38,700	
7	Friends Salt Works	97,840	
8	Indo Nippon Chem Co Ltd	17,200	
9	J.R Enterprises	27,232	
10	Kesar Enterprise	88,000	
11	USTTL	34,975	1,10.000
12	Agencies & Cargo Care	32,900	4,000
	Total	**6,61,210**	**1,41,500**

Government

1	IFFCO	1,74,667	16,667
2	NDDB	45,100	13,200
3	BPC	1,76,690	
4	HPC	1,73,064	
5	IOC Khaiirohar	61,054	
6	IOC FST	54,724	
7	IOC LPG	50,500	
8	IOC NFST	3,21,307	
	Total	**10,57,106**	**29,867**
	Overall	**17,18,316**	**1,71,367**

Working Factories

In 1960, there were 39 working factories in the district and on an average 3751 workers were employed daily. In 1993, the number of working factories increased to 197 with a daily average of 11816 workers. The number of working factories in Kutch in 1993 is only 1.31 percent of the total working factories in the state.

On the basis of the latest results of the annual survey of industries 1992-93 (factory sector), there were 145 reporting factories. The value of production from these factories has been estimated at about Rs.988.4 crores during this tenure, up from Rs.12.3 lakh during the year 1980-81.

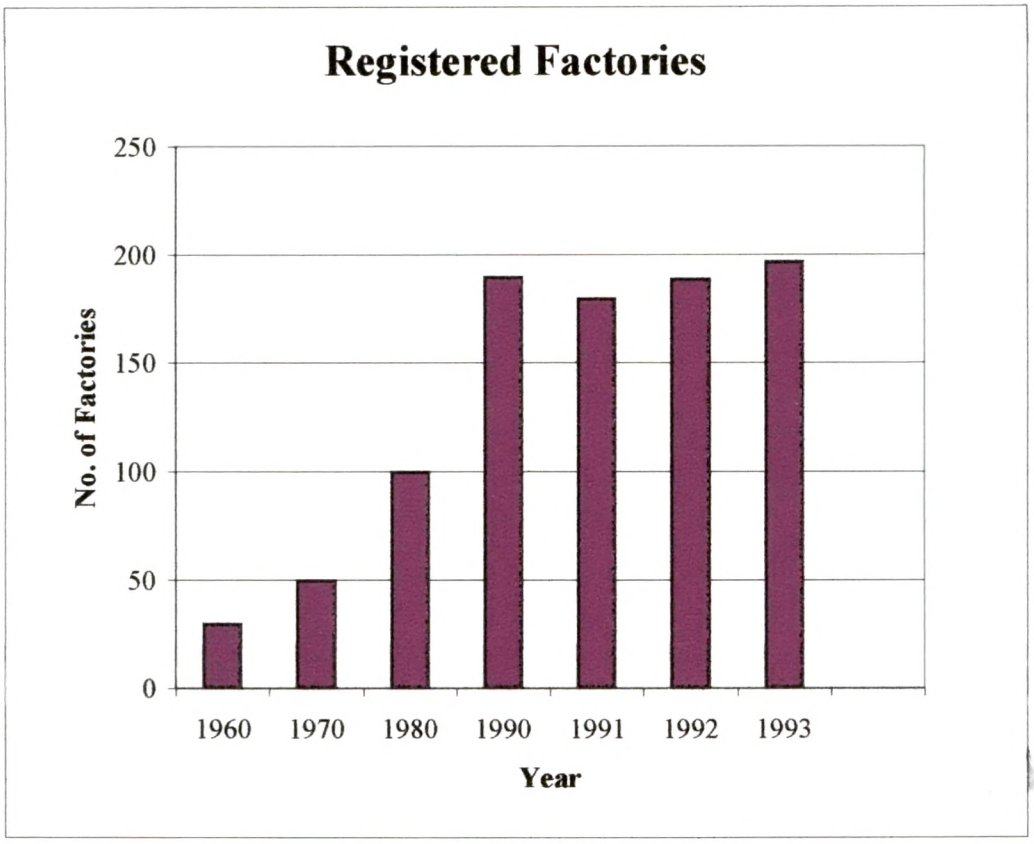
According to chief inspector of factories, the total number of registered factories and average number of daily workers employed in Kutch were 39 and 3751 respectively at the end of 1960, which has increased to 197 and 11816 respectively in 1993, indicating an annual growth of about 12 percent in the number of factories and about 7 percent increase of workers employed in the factories.

Among registered establishments, the three most important in terms of the number of establishments are manufacture of Food products, Textile products (including wearing apparel) other than footwear and Rubber, Plastic, Petroleum and coal products.

Similarly, the three most important in terms of the employees are, manufacture of

Textile Product (including wearing apparel) other than footwear
Food products
Rubber, Plastic, Petroleum, and Coal products.

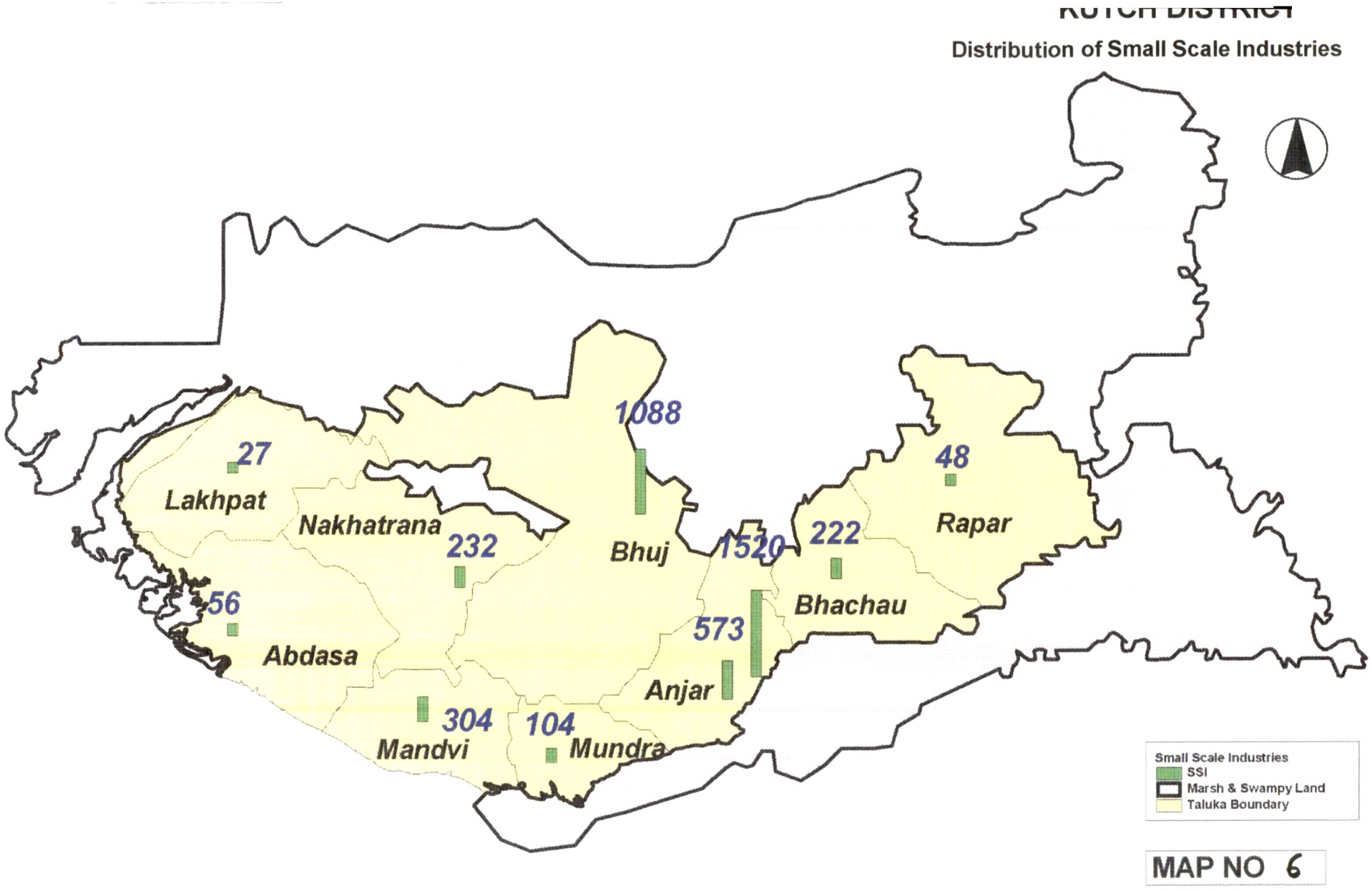
Table :3.2	
Year	Number of Factories
1960	30
1970	50
1980	100
1990	190
1991	180
1992	189
1993	197



SMALL SCALE INDUSTRIAL UNITS

Small-scale industrial units (SSI) play an important role in the industrial economy of the state. In 2001, 4774 small scale units with an aggregate investment of Rs.121,140 million were operational in the district of Kutch.Their number is continuously increasing, from 135 in 1981, they increased to 2878 in 1994-95 registering an average annual increase of 145 percent, and to 3823 units in 1997-98. Among the total SSI units in 1994-95, the highest number of units 442 (15.4 percent) were in textile group, followed by units producing chemical products (15.3 percent), Earthenware and cement products (9.1 percent), Metal Products (8.9 percent) etc. The rest of the units reported a share of less than 5 percent of the total number of SSI units in the district as shown in the figure 3.1.

At present, there are about 4000 small scale industries in Kutch,in which highest is in Gandhidham with 1520 units and lowest is in Lakhpat in 27 units given in Map No 6 manufacturing motor parts, drugs textile, renewable plastic industry, injection molded plastic goods and HDPE bags, oil and Road Tankers, ceramics, leather and rubber goods, PVC pipes, household and consumer item, gum, food processing unit, Saw mill, Wood Powder, Mineral, Packing Material etc.


KUTCH DISTRICT
Distribution of Small Scale Industries
27
Lakhpat
Nakhatrana
232
1088
Bhuj
1520
222
48
Rapar
Bhachau
56
Abdasa
573
Anjar
304
Mandvi
104
Mundra
Small Scale Industries
SSI
Marsh & Swampy Land
Taluka Boundary
MAP NO 6
10 0 10 20 30 40 50 Kilometers

Map : Distribution of Small Scale Industries			
Sr. No	TALUKA NAME	SSI	
1	Bhuj	1088	
2	Anjar	573	
3	Gandhidham	1520	
4	Mandvi	304	
5	Mundra	104	
6	Bhachau	222	
7	Abdasa	56	
8	Lakhpat	27	
9	Nakhatrana	232	
10	Rapar	48	

SSI = Small Scale Industries

Table 3.3-No. of Registered Units in Kutch

Sr. No	Industry Group	1981	1990-91	1994-95
1	Food Products	5	4	135
2	Tobacco	NA	NA	8
3	Textiles	NA	7	442
4	Wood Products	3	18	197
5	Paper &Paper Products	NA	5	86
6	Leather Products	NA	5	14
7	Rubber &Rubber Products	NA	5	57
8	Chemical Products	42	22	439
9	Earthenware &Cement Products	9	9	263
10	Non Metallic Mineral Products	NA	15	57
11	Metal Products	5	9	256
12	Machinery (except Electrical & Transport equipment)	1	1	40
13	Electrical machinery equipment	NA	1	28
14	Transport machinery equipment	NA	NA	21
15	Others	70	48	835
	Total	**135**	**149**	**835**

Economic Census

According to economic census, 1990 conducted in the state, the total number of enterprises in Kutch in Rural and Urban areas of the district as 44,443 of which 3864 were agricultural enterprises and 40,579 were non-agricultural enterprises. The total number of workers employed in the above enterprises was 118,069 of which 110,027 i.e. about 93 percent were engaged in non-agricultural activities and the rest were engaged in agricultural activities. Out of the 44,443 enterprises in the district almost 32000, i.e. 72 percent were Own account enterprise and the remaining 28 percent were establishments.

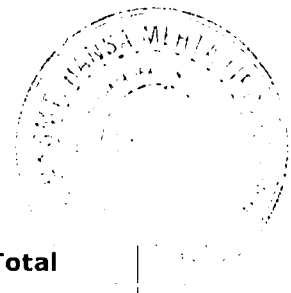


Table 3.4, Economic Census: Number of Workers in Kutch

Sr. No.	Type of Enterprises	Rural	Urban	Total
1	Agricultural Enterprises			
a)	Total Enterprises	3134	730	3864
b)	Own Account Enterprises	2616	531	3147
c)	Establishments	518	199	717
d)	Total Workers	6341	1701	8042
e)	Hired Workers	1448	868	2116
2	Non-Agriculture Activity			
a)	Total Enterprises	21503	19076	40579
b)	Own Account Enterprises	14952	13764	28716
c)	Establishments	6551	5312	11863
d)	Total Workers	50841	59186	110027
e)	Hired Workers	29156	35955	65111
3	All Activity			
a)	Total Enterprises	24637	19806	44443
b)	Own Account Enterprises	17568	14295	31863
c)	Establishments	7069	5511	12580
d)	Total Workers	57182	60887	118069
e)	Hired Workers	30604	30623	67227

Source: Economic Census 1990, Directorate of Economic and Statistics, Gandhinagar

Industrial Development: Reasons

Gujarat Government is doing in Kutch what it does best - seeking solution to all its problems through industrialization and wealth creation. And the vast area, which was considered 'Barren land', is now booming with industrial activity on a large scale. Kutch has a relatively good base of infrastructure. The district harbours six important ports of the state, including the major port of Kandla; the other being Mundra, Mandvi, Jakhau, Koteshwar and Tuna. The National highway 8A and 13 pass through the district. The major trading towns of Gandhidham and Bhuj are connected by broad gauge rail links. Apart from this, two functioning airstrips enhance the proximity of the district to the world.

There are 8 industrial estates in the district and one Special Economic Zones (SEZ) at Kandla. These industrial estates are equipped with all amenities like fully developed plots

and industrial sheds, uninterrupted power supply with well connected approach roads. Presently, land is available in the estates like Bhuj, Anjar, Mandvi, Mundra and Nakhatrana for non-polluting industries. In addition, Gujarat Growth Center Development Corporation Ltd. has also developed a growth center at Bhachau over a chunk of 130 hectares of land, which also offers a good location.

There are many reasons that make this district a happening area like:
Rich in Minerals
Modern Ports
Sales tax and excise holiday
Special Economic Zones
Other Infrastructure

Minerals

A range of minerals are found in the Kutch district, like Lignite, Silica, Sand, White clay, Bauxite, China Clay, Bentonite etc. The total mineral production in the district was 1322 tonnes in 1961, which has increased to about 31.60 lakh tonnes in 1995. Lignite dominated with a share of 95 percent i.e. about 30 lakh tonnes and the rest shared the balance 5 percent of production. Recently Bromine has been recovered from the Rann water which was going waste in the past. The production of Lignite and Bauxite is controlled by Gujarat Mineral Development Corporation (GMDC) whereas other minerals are controlled by the Department of mining.

Lignite: Lignite is also known as Brown coal or terrain coal, and is mainly found in the Lakhpat taluka at a place called Panandhro, which is the site for Kutch lignite project as well. In magnitude, the project is next only to the Neyveli Lignite project. Kutch has 200 million tonnes of lignite reserves spread over various parts, presently under control of GMDC. Preliminary mining was started in 1970 and actual exploration of lignite as fuel started in 1974. The Kutch thermal plant of 140 MW capacity at Panandhro is based on Lignite.

Bauxite: Bauxite is the main source for Aluminum. It contains 50 percent Aluminum Oxide. The State Government wants to set up a large Alumina plant in Kutch with foreign collaboration, hence only low grade Bauxite is permitted to be taken outside the country. Lease to private sector for high grade Bauxite mining has not been issued to any industry so

far. Bauxite is mainly found in Mandvi and Abdassa talukas.There are proven reserves of bauxite in Naredi.

Limestone: The cement industry has great potential in Kutch since the basic raw material limestone of cement grade is available in abundance.The cement grade limestone must have a minimum of 42 percent calcium oxide and maximum of 2 to 3 percent magnesium oxide. The other additives like laterite, bauxite, clays are also easily found. Gypsum which is used as a retarder during fine grinding of cement is usually brought from Rajasthan because the quality of gypsum available in Kutch is not suitable. However the infrastructure for optimum utilization of mineral resources is yet to be fully developed.

Laterite: Low grade bauxite containing more iron is called Laterite and is used for cement manufacture as an additive.

Bentonite: It is high selling clay mineral having several industrial applications. There are several theories about its formation; according to one, it is a 'Weathered Basalt', as per another it is derived from volcanic ash, modified over a period of millions of years. There are several varieties available like Lithomagic clay, white clay, Pizzotenic clay etc. Its applications include oil exploration and drilling (both onshore and offshore), in iron ore foundries because of its high grade swelling and binding properties. Processed bentonite is of two types - Sodium predominant and calcium predominant. The former is more easily available and in large quantities than the other. Processed bentonite is used in Petroleum refractory, insecticides, fungicides, ceramics, cosmetics, Pharmaceutical aids, refining of edible oil etc. is

Modern Ports

Kutch has a vast coastline about 322 km. one-fifth of the total State coastline of 1600 km, along the northern shore of Gulf of Kutch. A no. of ports are located along the coastline, some of which are presently operational while others have historical importance. Ports play an important role in the development of trade, commerce and industry and act as a catalyst for the development of coastal area and hinterland. Ports help generate considerable employment opportunities in their hinterland and are catalyst in the development of port based industries such as oil refineries, chemical fertilizer, power plants etc.

Due to these advantages, the ports in Kutch constitute an important infrastructural facility for the development of maritime economy of the district, state and country as a whole and also to stimulate growth in coastal areas.

The important ports, presently functional are Kandla, Mandvi, Mundra, Jhakau and recently developed satellite port at Tuna. The non- functional ports are those of Jhangi, Khari, Rohar, Lakhpat and Koteshwar.

Some captive jetties are being constructed by private sector companies near Mundra, Jhakau and Kharo creek.

Major, Minor and Intermediate Ports

Kandla is the only major port in the state. Out of 41 intermediate and minor ports in the state, four viz. Mundra, Mandvi, Jhakay and Koteshwar are located in Kutch.

The Kandla Port: Kandla port, located on the Kandla creek is a major port of national importance. The detailed survey of this creek was done by British Royal Indian Navy in 1922. The ruler of princely state Kutch, Maharaja Khengarji III patronised the idea of establishing a major port at Kandla in 1930.

Due to loss of Karachi port after independence, the onus of Northern trade was shifted to the port of Mumbai thus putting a strain on its facilities. Under the inspirational guidance of Sardar Vallabhbhai Patel, the Government of India on 17th February, 1948 constituted an Expert committee known as 'The West Coast Major Port Development Committee' to explore the possibilities of establishing a deep-sea Port to cater to the vast hinterland. The committee submitted its report on 30th April, 1948 recommending that the major port should be sited at Kandla.

It was declared as a Major Port on April 8,1955 by Late Shri Lal Bahadur Shastri, the then Minister of Transport and the Port trust was formed in 1964. Since then, the Kandla Port has come a long way in becoming the **'Port of the New Millennium'**.

It is one of the six major ports of India and caters to most of the north Indian market. It has an average dry cargo handling capacity of 24,000 metric tonnes per day (3000 million

ton per annum) through its 8 berths and has plans to add 2 more. Kandla port also has the biggest storage capacity of liquid cargo in the whole of Asia. Though the cyclone of June 1998 destroyed most of its infrastructure and paralysed the port, the port was made operational within 15 days.

The port is under Ministry of Commerce and is administered by a Port Trust with chairman as its head. The Kandla Port Trust (KPT) is run by a board of trustees. The Ministry of Commerce is represented by an Administrator appointed by the management of Kandla Free Trade Zone (KAFTZ). The other board members include Assistant Collector Customs, Divisional Superintendent Western Railway, CSO Navy, Administrator - Gandhidham Municipality, a representative of Gandhidham chapter of Gujarat Chamber of Commerce and Industries, Rajasthan Chamber of Commerce, Northern Chamber of Commerce etc. For safety reasons, the port has the latest Radar controlled VTMS.

Intermediate Ports

The administration of all other ports in Gujarat is under the Directorate of Ports, Gujarat Maritime Board, Ahmedabad. There are 8 groups headed by Deputy Engineers, Port officers and Assistant Port Officers. There is also a state Port advisory Board.

Traffic Handled at the Ports

The main items imported through the intermediate ports are Fertilizers, Sulphur, Iron Scrap and dets, wool and foodgrains. Items like Soybean oil, Sulphur, Timber logs, Maize, Cooking coal, Iron ores, Steel coils, Scrap are imported through Kandla whereas rice, Bentonite, castor oil, onion, salt are the main items that are exported.

The traffic passing through the ports of Gujarat has been increasing from the beginning of the first five year plan.The quantity of the total cargo handled by the Kandla port has increased on an average annually by about 55 percent during last 33 years as can be seen in the following table3.5.

Table 3.5,Import and Export at Kandla.

Year	Imports (in Lakh tonnes)	Exports (in Lakh tonnes)	Total (in lakh tones)
1961-62	11.14	2.78	13.92
1971-72	17.98	2.34	20.32
1981-82	88.07	7.23	95.3
1991-92	181.48	28.55	210.03
1992-93	205.02	24.07	229.09
1993-94	209.52	35.48	245
1994-95	224.96	38.51	265.02
Average Annual Increase	58%	40%	55%

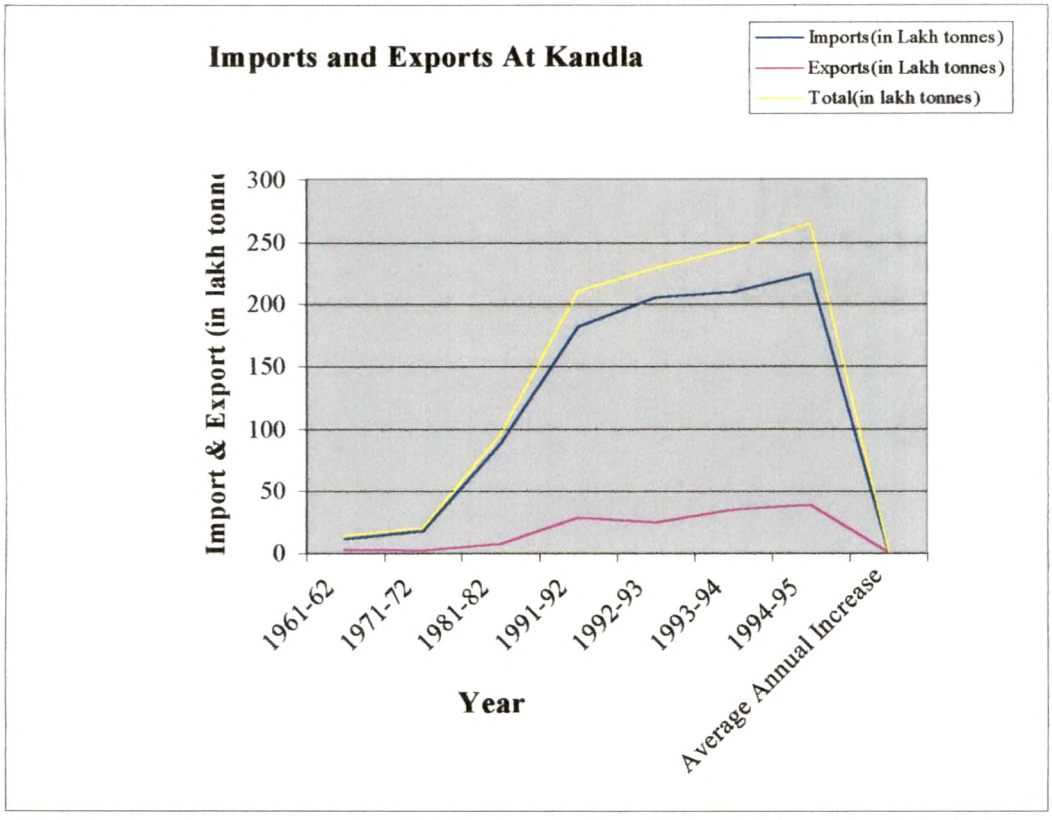
Source: Gujarat Maritime Board, Gujarat Kandla Port Trust (KPT)

A sharp rise in export and import has been observed since 1991-92. The total cargo handled has increased from 13.92 lakh tonnes in 1961-62 to 95.30 lakh tonnes in 1981-82 indicating an average annual growth of 29 percent during the period. The cargo thereafter increased significantly from 95.30 lakh tonnes in 1981-82 to 210.03 lakh tonnes in 1991-92 and reached to a level of 265.02 lakh tonnes in 1994-95 with an average annual increase of 13 percent during the period. It is also observed that having handled a record traffic of 245 lakh tonnes in 1993-94 and exceeding the target of 226.80 lakh tones, Kandla Port has leaped into league of three major ports of India viz; Mumbai, Chennai, Vishkapattnam, leaving Calcutta far behind. It is noteworthy that Mumbai and Chennai Ports have reached 25 million tonnes traffic in 100 years, Vishakapattnam in 60 years while Kandla has just taken 39 years.

Mundra Port

This modern port was dedicated to the nation on 23rd January, 2000. Industry sources and analysts in the Gandhidham-Kandla region are hopeful that the port will provide a major boost to import and export trade, especially from states like Gujarat, Rajasthan, Punjab, U.P, Delhi, Himachal Pradesh, Haryana and Madhya Pradesh.

Of late, Mundra port has been seeing increasing business volumes and establishing new records in terms of handling cargo.This is bound to give a major fillip to ancillary industries and create more employment opportunities in the region.Mundra port has a



single window clearance system, which is customer friendly and here customers receive personnel attention. Sources in the Adani Group, the main promoters of the Mundra claimed that proposed containers terminal, for which the foundation stone would be already laid, is going to be the deepest container port on India's west coast.

It would have a state of the art cargo handling facility, which will be much more efficient and contribute to reduced turnaround times. At present also, Mundra boasts of faster customs formalities and the better port efficiency is adversely affecting business of the Kandla port, to a substantial level.

Besides, sundry expenses needed to be paid by exporters and importers are far lower in comparison to Kandla. All these are bound to attract more importers and exporters to Mundra.

The liquid cargo storage facility established at Mundra port has enabled it to offer storage rates lower than that applicable at Kandla port and are likely to decline further in future. Large capacities in terms of pipe sizes & diameters plus bigger draft that allows large vessels to come in and turnaround faster improve the economy of scale and leads to cheaper overall costs. Importers of liquid cargo find Mundra Port more cost –effective in terms of per tonne cost.

Kandla Dock Labour Board member M.L Bellani admitted that 'the growth of Mundra port would be at the cost of Kandla port which is just 60 km away'. However, a customs clearing agent said that Kandla port was losing business to Mundra port mainly because of the anti-trade policies of the Kandla Port Trust and the customs authorities. It is felt that with rationalization of its policies and practices, Kandla Port Trust can minimize the damage.

Sales Tax & Excise Holiday

With the feeling running high in official circles that fresh investment in industry is the best way to rebuild Kutch after the earthquake (of 26th January, 2001), the Department of Mines & Industries, Government of Gujarat have announced sales tax incentives for new industrial units coming up in the district of Kutch vide Government Resolution No.INC-10200-9031-1 dated 9.11.2001 and as amended vide corrigendum dated 12.11.2001

It should be heartening for the government to find that 34 investors have already pledged an investment equal to that made in the past 50 years in the district. The INDEXb office in Bhuj informed recently that the registration of units has exceeded the targets, (The details are included in Annexue 1). And this could be just the beginning of rapid industrilization process in Kutch, riding high on sales tax and excise holiday declared by the state and central government. Sources say investment in the next few weeks and months could touch or even exceed Rs. 3,000 crore mark. Big names in the corporate world are trying to acquire land to take the advantage of the five year tax holiday.

Table 3.6 Exemption of Sales Tax

Investment Range	**Quantum of ST Exemption/ Deferment**	**Perio d**
Investment in eligible fixed assets upto RS. 10 crore	100% of eligible investment in fixed assets	5 years
Investment in eligible fixed assets exceeding Rs.10 crore upto Rs.50 crore	100% of eligible investment in fixed assets	7 years
Investment in eligible fixed assets exceeding Rs.50 crore	100%of eligible investment in fixed assets. Such units also entitled to avail of the benefit of composite scheme of exemption and deferment simultaneously	10 years

Benefit of Sales Tax Exemption/ Deferment offered to new industrial units set up in Kutch district between 31st July, 2001 and 31 st October 2004.

In case if the production could not be commenced on or before 31st October ,2004 the unit could be considered as a pipeline case for availing of the incentives, provided it has applied for appropriate registration for small,medium or large scale industry (as the case may be), acquired land or has received an offer letter from GIDC, deposited the application for term loan with financial institutions or banks and it will undertake to commence commercial production on or before 31st October 2005, by which time a minimum of 50% of the investment envisaged for the project should have been made.

Out of the 300 odd enquiries so far 13 have filed their memoranda, 10 have acquired land and 8 are in the process of acquiring land. 'Investment of Rs.2000 crores would be from known industrial houses like Reliance, L.G and Excel, while the rest would be on small and medium scale', officials inform.

An official of District Industrial Center in Kutch says groups like Samsung, Bhilwara, Century, Jindal and Sanghi are also planning to move shortly. A spokesperson for Reliance says, 'We have identified three suitable plots for our telephone project. We will narrow down to one shortly and commence production as soon as possible'. The proposed unit will manufacture hand-sets for the Reliance Telecom Project.

Status as on March 31, 2002

Medium & Large industry	145
Small Scale industry	5,000

This is comparable to the annual Industrial Target of 230 and the fact that 500 units were registered in the last two year.

Instituation to Support Growth

As an entrepreneur, you need a nucleus of support institutions with diverse skills, an efficient task force, so to speak, to put your plans into effective practice. Gujarat offers just that - specialized organizations and agencies, working within coherent areas, to help put your dreams on the fast track to a concrete reality.

GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION (GIDC)

Role

As a promotional agency, strives to provide the basic infrastructure facilities to the industries in Gujarat
Developing industrial estates all over the state
Offers basic amenities in major, developed industrial estates
Developing functional estates to fulfill specific needs of certain industries
Promoting pollution mitigation measures.

Services

Created in 1962, GIDC has been a customer-oriented corporation which has a single motto; accelerate the pace of industrialization in Gujarat. A corporation that helps the entrepreneur realize his dreams in this bountiful land endowed with some of the richest natural resources found on the subcontinent. For the ease of the customer/ client/ entrepreneur, GIDC has classified its estates. It also provides infrastructural requirements like plots, sheds, water, drainage, street light, housing, hospitals, educational facilities etc. and also supportive commercial facilities like Banking, Telecommunication, Shopping Complexes, Canteens etc.

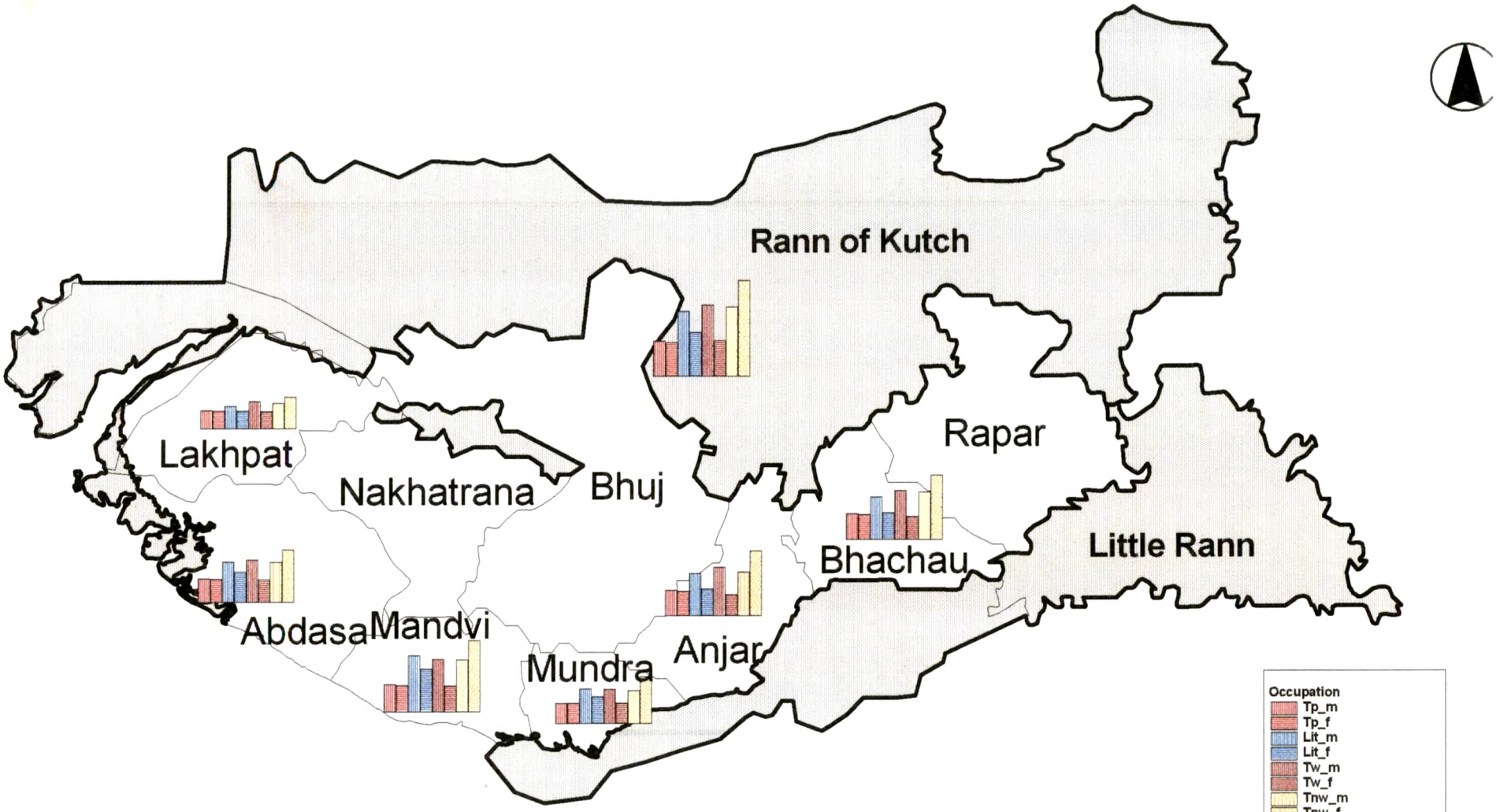
The functional aspect is to provide the customer with a comfortable ambience so that units take to production as soon as possible.

With central Government announcing Excise Tax holiday and the State Government announcing Sales Tax incentives for Kutch, it is one of the most promising emerging industrial zones. Also the proximity of Kutch to the sea has a varitable importance of increasing trade via the sea route. Internally Kutch is well connected by both rail and road.

Development Indicator

This study have taken indicator like male and female occupation ,Literate male and female,working male /female which shows that coastal talukas like Mandvi,Mundra and even Abdasa is showing promising result and they are competing with the Bhuj ,capital town of district as given in map no 7.GIDC industrial estates given below shows that in terms of area Mandvi estate have highest but proposed expansion shows that in future Anjar and Bhuj ii(Nagor) will expand fast and power supply is available in Anjar and Mandvi .

Development Indicator



MAP NO 7

10 0 10 20 30 40 50 Kilometers

Map : Development Indicator								
NAME	TP_M	TP_F	LIT_M	LIT_F	TW_M	TW_F	TNW_M	TNW_F
Mundra	4984	4837	14984	9725	14568	5122	13475	23008
Mandvi	10155	9484	29907	20724	27120	9131	26679	40149
Bhuj	15224	14457	35786	21217	39885	15569	38567	56615
Abdasa	7277	6930	18816	12120	20302	6582	18468	27262
Lakhpat	3795	3634	6924	3601	9992	3194	8743	12939
Anjar	8584	7914	20317	9605	24324	5672	21171	35478
Bhachau	8851	8192	20341	9455	24626	6890	23596	35160

TP_M = Total Male Population
TP_F = Total Female Population
LIT_M = Literate Male
LIT_F = Literate Female
TW_M = Total Male Workers
TW_F = Total Female Workers
TNW_M = Total Male Non Workers
TNW_F = Total Female Non Workers

Table 3.7,Upcoming Estates

1. Anjar (Expansion)

Parameter	**Status**
Area of Estate	12.73 ha
Proposed Expansion	144.27
Sheds K2 B.A.	75.39 16 (By May 02)
P. A.	170.66
B1 type B.A.	60.58 16 (By May 02)
P.A.	150.62
Roads	By April 02
Power Supply	Readily available
Water Supply	By Feb 02 (For industrial Use)

Total number of Plots	94
Upto 500 square meter	30
500-1000 square meter	38
1000-2000 square meter	20
Above 2000 square meter	06

Table 3.8 Mandvi (Expansion)

Parameter	**Status**
Area of Estate	19.94 ha
Proposed Expansion	25.0 ha
Sheds K2 B.A.	75.39 (By May 02)
P. A.	170.66
B1 type B.A.	60.58
P.A.	150.62
Roads	By April 02
Power Supply	Readily available

Bhachau - 135 ha(Additional Estates)

Mundra - 1770 ha(Additional Estates)

B.A.-Built up Area (in Square Meter)

P.A.-Plot Area (in Square Meter)

Table 3.9 GIDC Estates

Estate	**Area of Estate in Hectares**	**No. of Plots allotted**	**No. of Functioning units**	**No. of Sheds Allotted**	**No. of Sheds Functioning**
1. Gandhidham	10.61	101	93	52	46
2. Bhuj-I	19.00	109	88	45	36
3. Anjar	10.00	105	57	--	--
4. Mandvi	19.94	6	1	--	--
5. Mundra	1.34	13	9	7	6
6.Madhapar	2.12	15	10	4	2

Special Economic Zones

Kandla SEZ with an export of RS 800 crore from 140 units is an important center of industrial activity in the district. The Government also expects the proposal for a new Special Economic Zones (SEZ) mooted by the Adanis near Mundra port (fourth in the state) to be cleared by the Center soon, which is likely to provide further fillip to the industrial activity in Kutch. A spokesperson for the Adani Group says: Though the Group has not made any investment in the post-quake scenario as part of the SEZ project, it will develop an industrial park in the initial phase to facilitate industries desirous of availing themselves of the incentives.

The financial closure for another SEZ to be developed at Poshitra in private sector on a 5,000 hectares of land at the cost of RS 5,600 crores, has taken place. Work on its development would begin soon. Yet another exists at Sachin, near Surat, where the Diamond Development Corporation operated a Free Trade Zone was converted into a SEZ a year ago.

Industrial Projects

Several industrial projects are being taken up in the district in the recent years which are expected to give push to the process of industrial development in Kutch. Following table provides information on industrial projects under implementation in Kutch and the state as a whole:

Table 3.10 Industrial Projects under implementation, 1996-97

Status as on 30th June'96

Investment	**No. of Projects (Kutch)**	**Investment**	**Employment**	**No of Projects (Gujarat)**	**Investment**	**Employment**
Upto Rs. 5 crore	3 (0.24)	11 (0.45)	166 (0.14)	1251	2444	117049
Upto Rs. 5-10 crore	12 (1.16)	2.35 (1.19)	4313 (1.85)	1038	19777	233239
Upto Rs. 100 crores	11 (0.07)	6958 (6.64)	5705 (5.35)	165	107660	104951
Average Per Project	N.A	277	392	N.A	53	455249

Source: Industrial Commissioner, Gujarat State and Gandhinagar.

Note:

1) Based on Industrial Entrepreneurs Memorandum, Letter of intent & Letter of permission for 100% EOU

2) Figures in ( ) indicate percentage vis-à-vis State Total

Out of the total 2454 industrial projects under implementation in the state, 26 projects i.e. 1.06 percent are located in Kutch district. These projects involve a total investment of Rs.7204 crore (5.55 percent of the tota investment of the state) and would provide employment to about 10184 persons. The average investment and employment per project in the district is particularly noteworthy in the above table. The average investment per project in Kutch works out to be Rs.277 crores as against state average employment per project in the district is 39.2 which is also significantly higher than an average of 186 for the state as a whole. Thus Kutch is reflecting a very encouraging scenario in respect of industrial development in recent years.

Same way, Gulf region consists of several industries like salt work unit along the coast (40% of Indian salt production comes from Kutch). Others like Digvijay Cement Factory at Sikka, Tata Chemicals and Associated Cement Company at Mithapur, Unit of Gujarat State Fertilizer Corporation at Sikka, Crude oil terminal of Indian Oil Corporation at Vadinar, Salaya-Mathura oil pipeline, Reliance Petroleum and Essar Oil Refineries at Moti Khavdi and the 'proposed Vadinar-Bina pipeline of Bharat Petroleum on the Saurashtra coast, the proposed Kandla-Karnal oil pipeline, the Vadinar-Kandla under sea pipeline and Sanghi Cement company of the Kutch coast.

The Gulf area is being aggressively developed as an oil importing base because of its proximity to the exporting countries of the Middle East. To facilitate unloading of oil from Very Large Crude Carrier (VLCC), Seven Single Mooring (SBM) have been planned to be ancored along the southern shore of the Vadinar and one off Sikka and one more is being planned for. All these activities are either close to or inside the 411 square kilometer area of the Marine National Park, which has the fragile ecosystem, particularly the coral reefs of Gulf of Kutch.

Important Industrial Units in Kutch

Public Sector Units/ Government Controlled
Kutch Lignite
IFFCO (Fertilizer & Bi Products)
Kandla Port (Kandla Port Trust)
Kandla Free Trade Zone (KAFTZ)
Kutch Alumina Plant (Proposal Stage)

Private Sector Units (Old Units)
Sindhu Ressetlement Corporation Ltd, Adipur, 1948
Cutch Oil & Allied Industry, 1949
Kutch Salt and Allied Industries, Jhakau, 1957
Atul Drug House Ltd, Kandla, 1962
Mandvi Ginning & Pressing Factory
Kutch Salt Works 1934 (Later United Salt Works and Industrial Ltd, 1939)
Ashapura Group Of Industries-Bentonite etc.
Kutch Minerals Ltd-China Clay

New Industrial Units (cleared by State Government)

Sanghi Cement - 2.6 million ton Capacity
Adani Ports (Cargo handling - Mundra)
Adani Agro Ltd
Ballarpur Industries (Marine Chemical Unit)
Agro Cel (Excel group)
Gujarat Alkali and Chemicals Ltd
Siftel Machines Pvt. Ltd
PSL International Ltd
Gujarat Alumina & Bauxite Ltd

Other Cement Plants in the pipeline are the AGE, DLF, Anjan, J K Corporation etc

Future Prospects & Measures for Industrial Development

For industrial development of the state, Government of Gujarat has established apart from Gujarat Industrial Development Corporation (GIDC), District Industries Centers (DIC) in each district of the state. There were in all 2878 registered small-scale Industrial units in the Kutch district at the end of the year 1994-95. Of these, 442 were engaged in the manufacture of cotton textiles, 439 in the manufacture of Chemicals, 256 in the manufacture of metal products, 263 in the manufacture of earthenware and cement projects, 197 in the manufacture of wood products, 135 in the manufacture of food products, 86 in the manufacture of paper and paper products and remaining 1060 were other industrial units.

An industrial estate aims at helping the small entrepreneurs in establishment of an industry by providing key infrastructural facilities like land, shed, power, mates, drainage, transport, storage etc. at one place. In Kutch, GIDC has established 7 industrial estates in the Bhuj, Mundra, Anjar and Mandvi talukas of the district.

The state cabinet cleared the Sanghi cement project at the famous Narayan Sarovar Sanctuary housing the rare Chinkaras in the border district of Kutch. The project has an installed capacity of 2.5 million tonnes of cement per annum at an investment of Rs. 7000 Crore.

The state Government has decided to setup more cement projects in Kutch and Saurashtra region and utilitise fly ash generated by the six major thermal power plants of the state as an ingredient for cement manufacture and thereby reduce the pollution problems. The Directorate of Geology and Mining of the State Government has discovered huge deposits of limestone and Lignite in Kutch which can be used with fly ash for the new cement projects. The other significant reason for inviting more cement projects in the inner parts of Saurashtra and Kutch is the availability of transport facilities from the Cement plant to the ports dotting the two regions.

Anjan Cement Ltd (ACL) is setting up a one million tonne cement plant in Kutch with an estimated investment of RS 300 crore. The plant would use lignite as fuel.
The Bhoomipujan for the GIDC's Industrial Complex at Mandvi in Kutch district was done on Aug 30,1995. A high-level committee will prepare a blue print for the development of Mandvi town.

Investors who have already filed their industry entrepreneurial memorandum (IEM) include Excel Groups with three projects worth Rs.155 crore, Aquagel Chemicals, also with three projects of Rs.155 crore, Jindal Photo Films project of Rs 110 crore, Hindustan Seal with an investment of Rs.50 crore, Khurana Chemicals with an investment of Rs.88 crore, and Sanghi Group's three projects worth Rs.110 crore.

In fact, one project has already been commissioned that of PSL Holdings. The project is an expansion of the existing piped manufacturing Gandhidham Unit at Anjar. Officials are hoping that the Resurgent Gujarat Business partnership meet being held in Ahmedabad will boost the process of industrialization in Kutch. The industrial development of the quake-hit district will be a prime focus of Resurgent Gujarat says L Mansingh, Principal secretary, Industries and mines Department. Quite a few industries have opted to find land on their own as the land procurement through GIDC is taking long, he says.

Principal industrial adviser to the Gujarat Government R J Shah who is co-ordinating investment in Kutch, says 'We have put clearances in Kutch on the fast track'.

Of the 34 projects that have been confirmed, engineering units top the list, followed by mineral processing and mineral processing and plastics. He says the process would get a

boost once the Gujarat Industrial Development Corporation's three estates of Anjar, Nafar (near Bhuj) and Mandvi are ready.

POPULATION

The living species of the planet earth are exposed to great danger from dual forces, the rapid growth of human population and accelerating deterioration of the environment. With the augmentation in industrialization and increasing population, the resources are getting scarce day by day.

According to population census 1991, the district had a population of 12,62,507 persons, 3.1 percent of the total State population which stood at 41.3 millions. This ranks 15th among the 19 districts of the state.

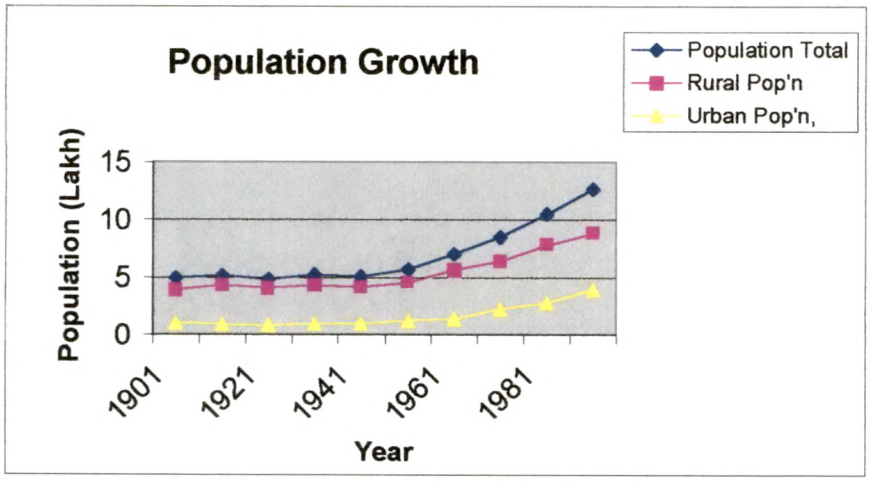
The population explosion of Kutch since 1901 is presented below in Table 3.11. It reveals that population of the district has increased almost three times during a period of 90 years i.e. between 1901 & 1991. On an average, every year around 2100 people are added to the population of the district creating a demand for additional resources for clothing, housing, food, education, health, schooling etc. The rural population of the district has increased from 3.89 lakh to 8.75 lakh i.e. little above two times, whereas the urban population has undergone a higher growth by registering an increase from 99 thousand in 1901 to 3.88 lakh in 1991, an increase of about four times.

Table 3.11 Population Growth in Kutch Period: 1901-1991

Year	Population (In Lakh)			Population Increase		
	Total	Rural	Urban	Total	Rural	Urban
1901	4.88	3.89	0.99	-	-	-
1911	5.13	4.26	0.87	5.1	9.5	-12.1
1921	4.85	4.05	0.80	-5.5	-4.9	-8.0
1931	5.20	4.28	0.92	7.2	5.7	15.0
1941	5.08	4.13	0.95	-2.3	-3.5	3.3
1951	5.68	4.54	1.14	11.8	9.9	20.0
1961	6.96	5.61	1.35	22.5	23.8	18.4
1971	8.50	6.35	2.15	22.1	13.2	59.3
1981	10.50	7.76	2.71	23.5	22.2	27.4
1991	12.63	8.75	3.88	20.3	12.8	41.6

Note: Census 2001 figures were not collected in Kutch

Figure 3.3 Population Growth



The figure above shows that growth trend was not uniform till 1941. Since 1951, however the trend of growth has been spectacular. The population had increased at a decadal growth rate of 11.8 percent during 1941-51 and it kept on going almost at a rate of more than 20 percent. It reached a level of 23.3 percent during the decade 1981-91. Similarly the rural population which had increased at the rate of 9.9 percent during 1941-51 and thereafter increased with uniform growth trend in the following decade registered ultimately a growth rate of percent during 1981-91. The growth of Urban population in the last 50 yr. has presented a very remarkable progress in the district by registering a growth rate of 41.6 percent during 1981-91, which is more than double the rate of 20 percent observed during 1941-51. An examination of the trend in the degree of urbanization in the district supports the phenomenon of excellent urban growth in Kutch specifically after the formation of Gujarat State. In 1941, the proportion of urban population in the district was 18.8 percent which rose to 19.4 percent in 1961, 25.2 percent in 1971 and 26.1 percent in1981 and reached a level of 30.7 percent in 1991.

Coastal Population

The coastal regions of Gujarat sustain over a million human beings spread over 2000 coastal villages. Moreover, port, industries and urban centers are developing at a rapid pace in these regions. The rapidly increasing population coupled with sophisticated technology and industrial development has had significant effects on the ecology of the coastal and marine environment. The coastal talukas in Kutch have higher population as compared to other interior taluka's, with Kandla town topping the population density chart in the district.

During the last decade, the growth rate of population in the district wais 20.22. Among the talukas, coastal Anjar taluka has recorded the highest growth rate of 38.58 whereas Mundra taluka recorded lowest rate of 8.59 as shown in the Map no 4and 5. However, Mundra is moving ahead with the recent industrialization and setting up of Adani port, and this is reflected in the population growth of the taluka.

The decadal growth rate of Lakhpat and Anjar (coastal Talukas) and Bhuj is greater than the district's growth rate. Three talukas Bhuj, Mandvi and Anjar (coastal) contributed about 86 percent urban population to the total population of the district during 1991 census.

Table 3.12 Salient Characteristics of Kutch (Coastal Areas)

Length of coastline (kms)	406
Percentage Ratio to the total coastline of state	24.75
Coastal talukas	6
Coastal towns	7
Coastal villages	562
Coastal population	717831
Percentage of total coastal population of state	7.6
Total no. of talukas in District	9
Percentage of coastal talukas in District	66.7
District population	1262507
Coastal population as % of total District population	56.9

Source: District Census Handbook 1981-91 (Glory of Gujarat)

Table 3.13 Decadal Changes in Distribution of population

	1981			1991			% Decadal Variation (1981-91)			% of Urban Popu	
Taluka	Total	**Rural**	Urban	Total	**Rural**	Urban	Total	**Rural**	Urban	1981	1991
Mundra	63,224	53,075	10,149	68,652	57000	11,652	8.59	7.40	14.81	16.03	16.97
Mandvi	1,30,146	98,032	32.114	1,46,034	1,09,398	36,636	12.21	11.59	14.08	24.68	25.09
Abdara	78,982	71,862	7120	86,402	78,297	8,105	9.39	8.95	13.83	9.01	9.38
Lakhpat	28,902	28902	-	36759	36759	-	27.18	27.18	-	-	-
Bhachau	1,00,252	86,329	13,923	1,14,759	96,351	18,408	14.47	14.47	32.21	13.89	16.04
Anjar	1,91,388	72,298	1,19,090	2,65,225	89,644	1,75,581	38.58	38.58	47.44	62.22	66.20
District	10,50,161	7,75,789	2,74372	12,62,507	8,74650	3,87,857	20.22	20.22	41.36	26.13	30.72

Source: District Census Handbook, 1991.

The rapidly increasing population coupled with sophisticated technology and industrial development has had significant effect on the land use pattern.

These areas were traditionally considered an inexhaustible source of food and raw materials, with an infinite capacity to absorb wastes. However, manpower has been degraded at an annual rate of 10% between 1975 and 1985 on Gujarat coast. Although direct extraction of corals is banned for several years now, the recent development of ports and other coastal infrastructure have led to severe sedimentation on many reefs. Effluent discharge from industries and coastal habitations has also increased the stress on these ecosystems.

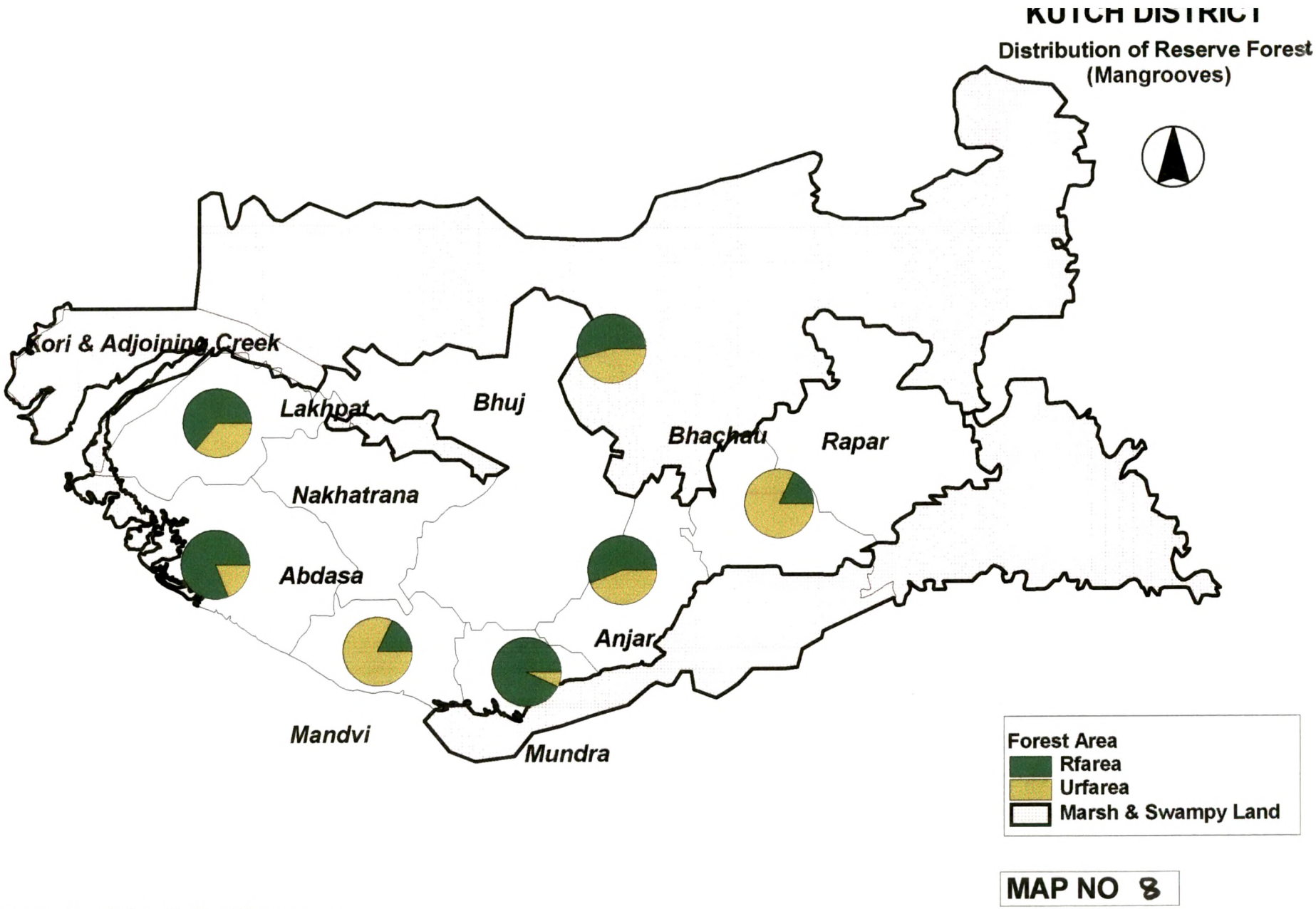
The coral reef area itself has decreased by 9400 Ha (about 43%) during 1975-86. In 1975, it was 116 sq.km., 83 sq.km. in 1982 and further reduced to 53 sq.km. in 1986.

The corals are important as they can contribute towards human development with their symbiotic flora and fauna, if conserved appropriately. They are known to increase shore stability and offer protection from natural disasters, e.g. cyclones, storms etc. The corals are one of the most fragile ecosystems. In the Gulf of Kutch, all species of coral are presently under threat. While Acropra sp. is probably extinct, paracyanthus indices and many soft corals are endangered.

Mangrove: They mangrove represents the most serious of ecosystem damage in the district as well as in whole state. Its cover reduced by 72.5% in the Gulf of Kutch during 1975-1982. Mangrove areas and mud flats are lost to salt pans and other industrial activities.

An equally serious issue is the loss of mangrove system diversity over the years, with only one variety, Avicennia marina found growing naturally and being regenerated. Mangroves cover in Gujarat state showed reduction in areas from 38.5 sq.km. in 1997 to 33.4 sq.km. in 1985. This decline is mainly due to conversion of coastal forest area for industrial unit/ establishments and salt units.

The Mundra taluka has an area of 53.305 sq.km. as reserved forest and Abdasa, Lakhpat talukas have area of 529.50 sq.km as shown in the map of Reserve forest Map No 8.


KUTCH DISTRICT
Distribution of Reserve Forest
(Mangrooves)
Kori & Adjoining Creek
Lakhpat
Bhuj
Nakhatrana
Bhachau
Rapar
Abdasa
Anjar
Mandvi
Mundra
Forest Area
Rfarea
Urfarea
Marsh & Swampy Land
MAP NO 8
10 0 10 20 30 40 50 Kilometers

General features of Gulf of Kutch

Gulf of Kutch (Area)	7350 sq.km.
Area of Marine National Park	295 sq.km.
Area of Mudflats	208.19 sq.km.
Area of Marine Sanctuary	163 sq.km.
Area of Coral Reef (Okha to Jodiya) 1975	116 sq.km.
Area of Coral Reef (Okha to Jodiya) 1985	53 sq.km.
Salt Pan Area	330 sq.km.
Total no. of Islands	42
No. of Islands having coral reefs	34

Industrial discharge into the Gulf of Kutch (Moti Khavdi, Sikka) with high degree of salinity, total dissolved solids and temperature are reported to be injurious, toxic to fish and detrimental to primary production of coral reefs. Each tonne of salt manufactured from sea water with salinity of 35 ppt is reported to produce bitten with 250 ppt of salinity. With 40% of country's salt producing industry based in Kutch, millions of liters of billion is discharged into the environment, and discharge from desalination plants is expected to add to the problems.

Pipe line discharges, dumping from ships, riverine inputs, non point runoff, industrial and municipal waste, sewage sludge and dredged material containing heavy metals, toxic non-metals, Chlorinated hydrocarbons and petroleum hydrocarbons damage the estuarine environment. The assumption that these pollutants would be dispersed without accumulation and transfer into the food web and other commercial resource is not substantiated. Due to salination of mud a major portion of the southeastern side of Piroton reef has mud deposition (Field visit: NEERI) (picture plate).

The deposition rate has increased steeply from 1982 to 1985 (Bahugana et.al. 1989).

Narara reef has gradually degraded, may be due to lifting of sand and corals by Digvijay Cement Company for the manufacture of cement. This has been stopped, subsequent to declaration of the area under national park and sanctuary, but not before reef had been destroyed to a great extent. According to Chhaya and Patel (1982) loose mud particles from the southern border are swept away along with the current during high tides and receding

tides. These silt particles get deposited on the coral reef. The deposition also results in the death of living corals.

A sizeable quantity of silt particles originate due to activities like dredging filling and mining, land clearance on the seacoast and also weapons testing by the armed forces in the Gulf area. Besides, there are leakages in and around oil terminals at Kandla and Vadinar. There are incidences like oil spills from tankers in the area. In general, the anthropogenic factors responsible for degradation of corals in the Gulf can be summarized as follows:
over exploitation due to its commercial importance
Mangroves deforestation leading to sedimentation in the coral reef areas.
Fishing in corals areas.
Reef milking by various research groups for sample and museum collection.
oil spillage (burnt engine oil/crude oil/ballast/vessel to vessel transport) leads to considerable amount of coral reef degradation and associated marine biodiversity.

Over exploitation of marine fisheries: The year 1998-99 witnessed a drastic fall in the landings to 5.61 lakh tonnes from the annual figure of 7.02 lakh tonnes. The relative share of commercially important varieties like white and black pomfrets, umboprawn, lobters and hilsa in marine landing has come down drastically in the last two decades and could have serious repercussion.

Deforestation: Gujarat actual forest area of 12568 sq.km. (1997) constitutes 6.4% of its geographical area. This figure is well below the national average of 19.27%. The per capita forest cover has reduced from 0.06 hectare in 1980 to 0.04 hectare in 1996. Between 1951 and 1975 about 2.5 million hectares of forest were denotified to make land available for agriculture. In later years 51913.3 hectares were again denotified to make room for developmental projects. Unauthorized cultivation in forest area has also been on the increase. The Kandla port trust, Vadinar has unauthorized occupation of forest area of 18.32 hactares, since 1978.

Table 3.14 Vulnerable Areas and Causes of problems

Vulnerable Areas	Pressure/Causes of Problems
Coral reefs	Eutrophication, sedimentation, overfishing, destructive fishing, reefs mining, the aquarium and curso trade, disease.
Wet lands	Reclamation and development includes landfill.
Sea grass bed	Siltation, coastal development atrophication, physical disturbance.
Coastal lagoons	Reclamation and pollution
Mangroves	Excessive exploitation, cleaning development and aquaculture.
Shorelines	Development, modification of habits, erosion.
Water sheds	Soil erosion, pollution.
Small islands	Changes in sea level, waste management, pollution.
Coastal shelves	Pollution, fishier, dredging and navigation.

Reduction in wetland area: Many of the wetlands in Gujarat are of international significance as they provide wintering sites as well as resting-places for migratory waterfowl from Russia and Central Asia. In Kutch Peninsula, Little Rann and the southern Gulf of Kutch are significant.

The wetlands, coastal and inland, are treasure houses of biodiversity. In recent times however, urbanization, agricultural development industrialization, mining activity, increased salinity and other biotic interference has had adverse effects. The decrease in wetland area in Kutch is a cause for concern as the area shrunk from 1.56 millions hectares in 1971 to app. 1.01 million hectares in 1992. The shrinkage of wetland area has affected not only bird populations but also flow of many rivers in the whole state.

Decrease in Pasture lands: While the livestock population recorded an increase 981792 - more than four-fold in a period of about 60 years ending 1996, the area under permanent pastures and grasslands showed a decline. According to livestock census 1992, the livestock population (excluding dogs) in the district was 1418954, which is 7.63 percent of the total population of the state. The grassland area reduced from 3.3 million in 1975 to 2.9 million hectares in 1995 across the state.

Land degradation due to Mining: Site data on land use pattern of pre and past mining scenario is crucial to assess the types and magnitude impact of mining activity. The land use pattern of mining area usually deals with total lease areas sanctioned, area mind (?) are used for overburdens and other infrastructure and extent of areas under natural resources (forest, water bodies etc). While on one hand, the mineral resources and mining have a major role in industrial and economic development, on the other hand, indiscriminate mining of the non renewable resources not only depletes the natural sources, but also leads to disturbances to the ecological setup of the region through one-time concentrated activity.

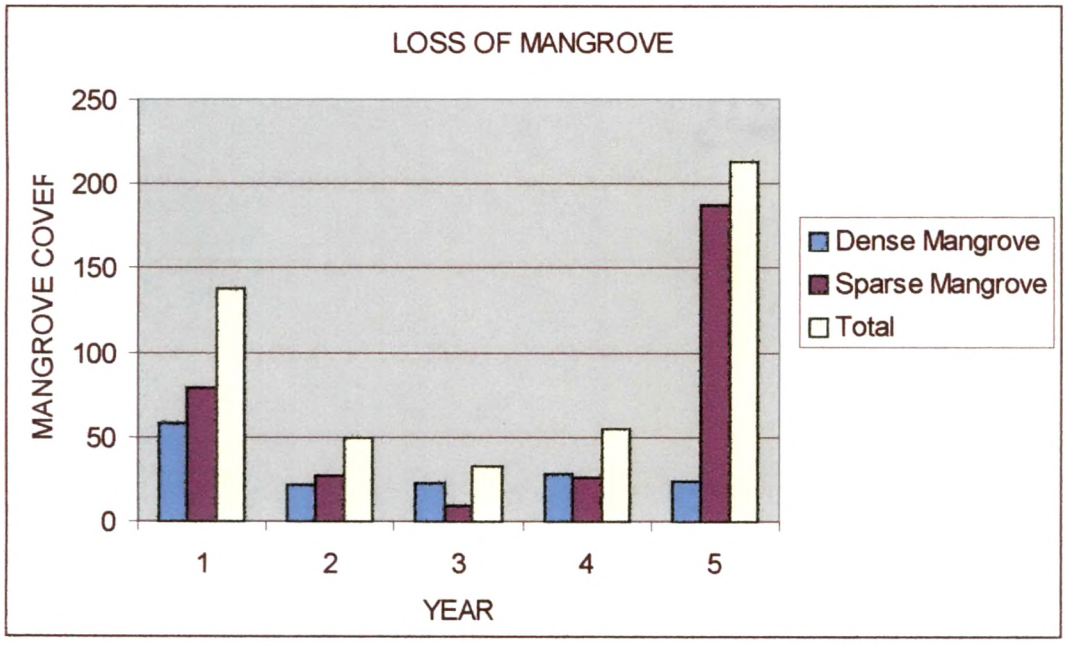
One of the major impacts of mining is loss of productive land as the area acquired for mine is lost forever. The Panadhro lignite mine in Kutch, an open cast mine has a mine area of 1800 ha, amounting to loss of 1800 ha of open Sadar Sarovar forest. As the mine is located close to the Narayan Sarovar sanctuary, its indirect impact like cutting and lopping of vegetation, Vehicle pressures etc. severely impact the habitat and threaten species like the Chinkara, wolf and caracal in and around the project area. Release of fly ash in the environment results in considerable change to tree and shrub species diversity of the surrounding areas.

Table 3.15 Changes in the area coverage (in sq. km.) of mangroves in Gujarat State

Mangroves cover	**1975**	**1982**	**1985**	**1988**	**1992**
Dense Mangroves	58.4	21.8	23.4	28.6	24.8
Sparse Mangroves	80.1	28.2	10.0	27.1	188.3
Total	138.5	50.0	33.4	55.7	213.1

Source: Gujarat Ecology Commission (1996), Biological Diversity of Gujarat Ecology Commission, Vadoadara and Bahuguna et.al 1997

Figure 3.4 Loss of Mangroves



The mangroves in Gulf of Kutch are under stress due to anthropogenic pressure, ecotoxicological impact of pollutants present in the discharge of industries, salt works, marine transport and proposed expansion of ports, traffic, oil transport facilities that is why over the years Dence cover show the down ward trend clear from the above figure no 3.4 The list of pollutants and their probable impacts on mangroves are described in following table 3.16 these are the different pollutant creating the havoc on ecosystem.

Table 3.16 Major pollutants and their probable effects in the Gulf of Kutch

Pollutant	Location	Effect
Petroleum hydrocarbons	Local oil spills	Mortality of mangroves, corals, sea birds, insects & micro/macro terrestrial animals.
Plastics	Beaches, floating debris	Aesthetically distributing entanglement of animal ingestion by animals, chocking of pneumatophones of mangroves
Heavy Metals	Industrial out falls	Mostly sub lethal effects causing growth abnormalities
Sewerage	Local out falls	Eutrophication, altered community structure, introduction of pathogens, wreed growth, algae growth choke, pneumatophones of mangroves.

Source: Sengupta, R, Getanjali Deshmukh, Thiva Karan, G A Ramamoorthy, Richa Chandra, Serebiati. S, and Bandopadhayay, S (1999)

A total of 29 mangroves species have been reported in Gujarat, of which around nine coastal mangroves species require immediate conservation measures. Presently, the mangroves biodiversity is very low in the coastal areas of Gujarat (Singh 1999), though there is consistent recovery of mangrove cover in Gujarat state; from 397 sq.km. in 1991 to 991 sq.km. in 1997 as shown in the below table 3.17. There is a further increase of 45 sq.km. in 1999, mainly as a result of the implementation of Cher plantation program. Although a total area of 1324.4 sqkm has been declared as forest in the state under different notifications, not all of them have a mangrove cover.

Table 3.17 District wise Mangrove Cover in the state (Area in sq. km)

District	FSI 1991	FSI 1993	FSI 1995	FSI 1997	GEER 1998
Kutch	239	242	536	836	724.4
Junagarh	-	-	-	-	1.0
Jamnagar	118	118	118	118	140.6
Bhavnagar	16	16	19	20	15.2
Bharuch	7	35	12	13	14.7
Surat	14	8	4	4	74.2
Valsad	3	-	-	-	10.3
Total	397	419	689	991	923.4

Source: 1) Singh, H.S; Mangrove in Gujarat: Current Status and Strategy for Development, Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar (based on IRS ILSS III Data on Scale 1:50,000).

2) Space Application Center, State of Forest Report Published by FSI, Dehradun (scales 1:2,50,000).

Figure 3.5 Mangrove Cover

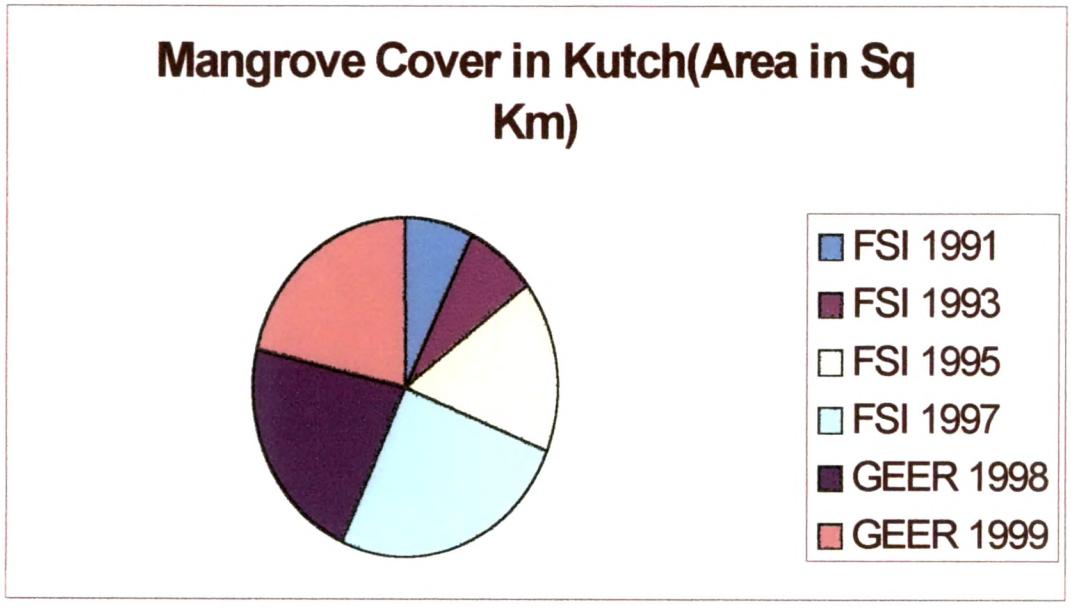
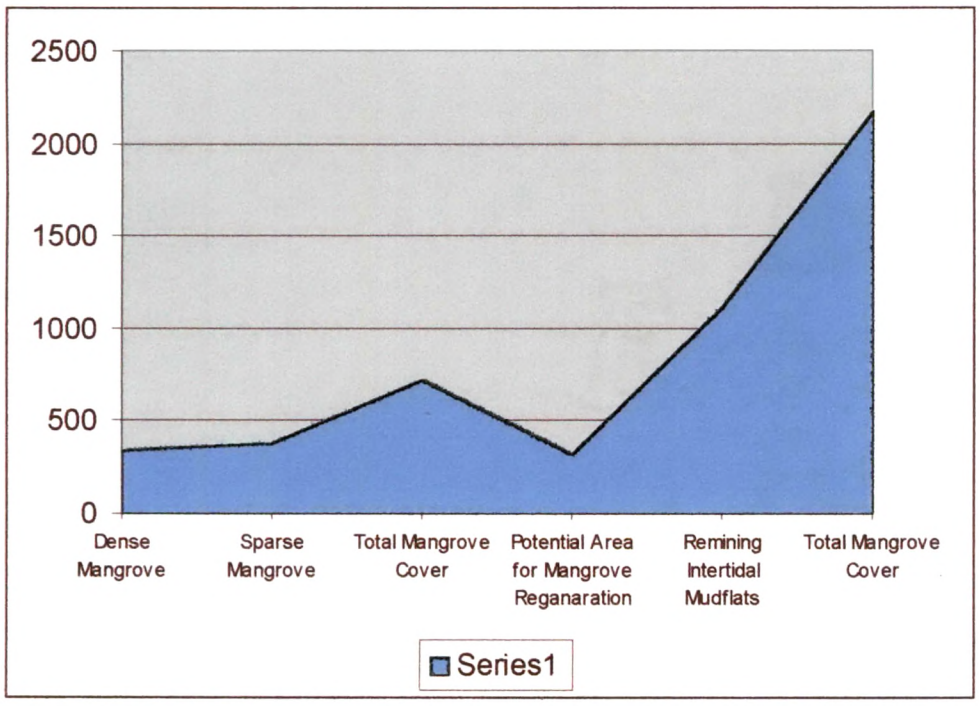


Table 3.18 Kutch Mangrove and Mudflats in Nov 1998 (Area in Sq. km)

Dense Mangrove	344.2
Sparse Mangrove	383.2
Total Mangrove Cover	727.4
Potential Areas for Mangrove Regeneration	327.3
Remaining inter tidal Mud flats	112.6
Total	2177.3

Source: Singh,H.S.; Mangrove in Gujarat: Current Status and Strategy for Development, Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar.

Figure 3.6 Kutch Mangrove and Mudflats



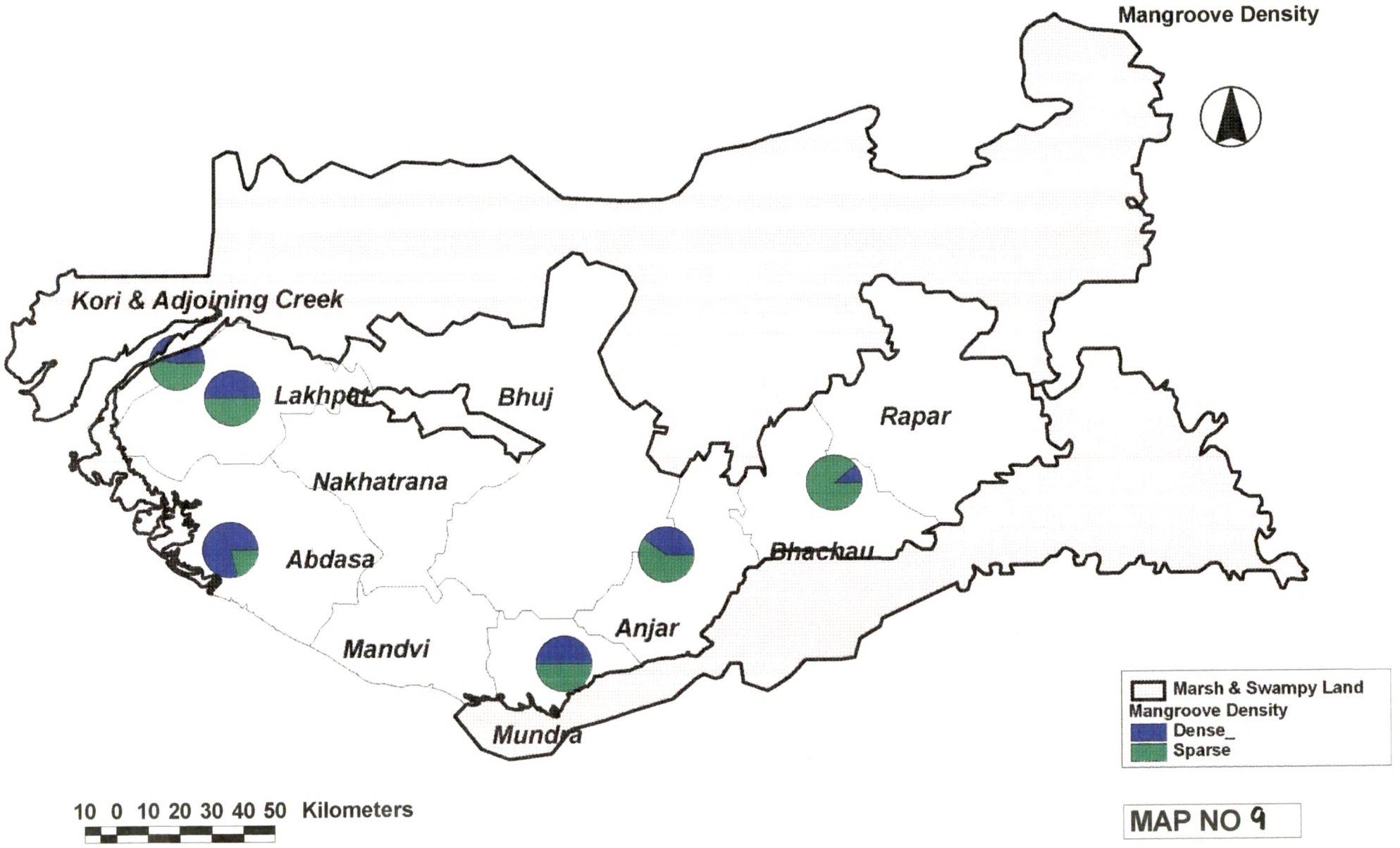
Mangrove cover (in sq. km.) in Kutch

Location	Dense Mangrove	Sparse Mangrove	Total Mangrove Cover	Potential Areas for Mangrove Regeneration
Kori & adjoining creek	306.2	337.1	643.3	196.9
Lakhpat taluka	2.3	2.1	4.4	2.7
Naliya/abdase	15.3	3.6	18.9	14.1
Mandavi	0.2	0.1	0.3	2.5
Mundra	9.5	9.6	19.1	14.9
Anjar	7.5	11.9	19.4	17.8
Bachau	2.0	17.4	19.4	35.7
Total	343.0	381.8	724.8	284.6

Source: Singh,H.S.; Mangrove in Gujarat: Current Status and Strategy for Development, Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar.

Western Kutch mangrove is best in Gujarat; however it is influenced to a great extent by anthropogenic pressures along the main road at Mundra and Jhakhari. Other mangrove areas in Kutch are under pressure due to lack of adequate protection as they have not yet been declared as legal forest. Due to development of the port site and related infrastructure at near by Mundra, Kandla port and the KAFTZ have experienced a massive growth of population in Anjar Taluka; 4% annually during 1981-1991, as against states urban growth rate of 3% during the same period.The highest density is in Abdasa taluka of Dence forest as development is low as compare to other coastal area shown in the Map 9.

There is a significant shift in the employment pattern in Lakhpat taluka towards mining and quarring, which may attract population from other areas to this region (Mehta et al, 1999). Present and proposed mining and thermal power plants are also affecting the mangrove distribution e.g. Lignite, Bauxite and Limestone in Abdasa taluka and mining in Panadhro. In Lakhpat, 5 million tonnes of lignite is mined, which is expected to increase in near future, for several lignite based thermal power plants; one of 140 MW capacity at Panandhro as also for export based industries that are in the pipeline. Moreover, an area of 3000 ha is denotified from Narayan Sarovar Sanctuary for limestone mining to feed Mega cement projects by 5 groups. There is also a lack of adequate population in the mangrove area in some notified area e.g. near Kandla Port (Anjar and Bhachau) Jangi to Surajbari (Bhachau taluka) near Mundra port (Mundra taluka) and area in Lakhpat taluka.


Mangroove Density
Kori & Adjoining Creek
Lakhpat
Bhuj
Nakhatrana
Rapar
Abdasa
Bhachau
Anjar
Mandvi
Mundra
Marsh & Swampy Land
Mangroove Density
Dense_
Sparse
10 0 10 20 30 40 50 Kilometers
MAP NO 9

Map : Mangrove Density				
NAME	DENSE	SPARSE	TOTAL	POTENTIAL
Mundra	10	10	19	15
Mandvi	0	0	0	3
Abdasa	15	4	19	14
Lakhpat	2	2	4	3
Anjar	8	12	19	18
Bhachau	2	17	19	36
Kori & Adjoining Creek	306	337	643	197

The maximum percentage of cut and lopped (4.1%) in fringe area were recorded in Mundra and Jakhau by settlers near Mundra port and fisherman. The Adani port at the Mundra and nearby number of proposed projects e.g. an industrial park, port facilities, Salt work and Power Plants are also affecting the local environment a lot.

Even natural disaster like cyclones of June 1998 and May 1999 could have affected the coastal area negatively.

Coastal Pollution and Marine Water Quality: On perusal of the data related to coastal pollution from industries, township etc., it is evident that the adequate data and information related to marine data quality is not available.

There is increased salinity and other forms of pollution on surface water, which could be due to ground water abstraction for irrigation. The contribution of surface and ground water for irrigation in coastal districts is to extent of 20% and 72% respectively as seen in the following table.

In addition, the abstraction of ground water for drinking purposes accentuates the water quality and quantity preplans of coastal towns.

Table 3.20 Area irrigated by various sources in coastal district of Kutch (Area in Hectares)

Coastal District Total	**81-90**	**90-91**	**91-92**	**92-93**	**93-94**
Canal	104	93	4	121	68
Tank	623	428	579	693	822
Wells & Tubewell	623	428	579	693	822
others	-	-	-	-	-

Source: Irrigation in Gujarat, Directorate of Economics & Statistics, Government of Gujarat, Gandhinagar 1997.

Industrial pollution along the coastal area: There is an increase in accumulation of heavy metals and organic chemicals in rivers and ground water due to industrial wastewater discharge in the coastal talukas of Kutch. The presence of many important ports in the district has its advantages as well as disadvantages. The oil spills from base terminal as also

leakages and discharge of spent fuel oil from the engines of ships constantly deteriote the quality of coastal water, thus damaging the mangroves and marine life. Disposal of flyash from the GEB thermal power plant, also affects the mangrove ecosystem adversely.

The pollutants enter the coastal waters through variety of sources such as direct release through wastewater via river discharge and through atmospheric fallout. The industries of Anjar GIDC, the cement and thermal power plants discharge their wastewater which contains a variety of pollutants in and around the coast, which accumulates in the inter-tidal zone and adversely impacts the water quality. (Reference ISRO workshop 1997) The liquid waste devoid of Sardar Sarovar enters the Gulf of Kutch through irregular tidal channels.

Interior Gulf of Kutch has better water quality with little stress possibly due to only a limited number of industries around. The creek areas contribute significantly to the particulate matter and nutrient budget in the outer, though. Surface salinity of seawater varies between 32 to 44.5 ppt and suspended solids vary from 15 to 698 mg/it. The seepage of high saline water from salt pans and exposed intertidal areas coupled with high rate of evaporation results in higher salinity often exceeding 40 ppt off Navlakhi, Kandla and at the head of Gulf of Kutch.
Source: Proceeding of the workshop on integrated coastal zone management, April 2-4, 1997 organized by ISRO, Ahmedabad and DOE, Government of Gujarat.

Table 3.21 Some Possible Major Pollutants and their probable effects in Gulf of Kutch

Pollutant	**location**	**Effect**
Petroleum hydrocarbons	Local oil spills	Mortality of mangroves, corals, sea birds, insects & micro/macro terrestrial animals.
Plastics	Beaches, floating debris	Aesthetically distributing entanglement of animal ingestion by animals, chocking of pneumatophones of mangroves
Heavy Metals	Industrial out falls	Mostly sub lethal effects causing growth abnormalities
Sewerage	Local out falls	Eutrophication, altered community structure, introduction of pathogens, wreed growth, algae growth choke, pneumatophones of mangroves.

Coastal erosion/ degradation: Apart from the forces of nature, erosion is aggravated by developments along the coastline for commercial purposes. The main factors causing erosion of a coastline are enumerated below:

Man made interference: The construction of breakwaters, jetties and groyness (solid structure projecting towards the sea to prevent erosion) for development of ports and harbours results in significant changes in the shoreline. On the Kutch coastline as well, remarkable changes have appeared due to large- scale development of jetties. Although the construction of seawall along the coast does not actually obstruct any along shore movement of the sediment, it would prevent the erosion of the protected coastline, thereby depriving the littoral currents of adequate supply of sand/sediment. The frequent cyclones generate high and steep waves which cause severe erosion of the coast. Similarly the water level changes by tides and the storm surges increases the sediment transportation and changes the beach morphology.

Shoreline changes are observed near Gandhidham, Maliya and Bhachau. At most of the places the high waterline has moved inward indicating erosion. East of Mandvi, the high waterline as well as low waterline has prograted toward indicating deposition.

The coastal alluvial plains of Kutch district have poor drainage, which leads to drainage impedance and the coastal water get inundated for long periods. This results in increased salinity/ alkalinity in Mandavi, Mundra, Abdasa, Anjar and Bhachau talukas of Kutch district. Salinity ingress leads to loss of agricultural production, alluvial salines and land degradation.

CONCLUSION

Though, the pressure and effects of anthropogenic activities are felt nearer to land, the greater harm is caused to the sea, its life and resources. The effects are more severe where the waters are shallowest. It is here that pollution is at its worst, habitats are most readily destroyed and much of depletion of fisheries takes place.
The pressure is particularly exacerbated along the coasts, where rapid growth in the numbers of people combined with persistent poverty leaves a very limited scope for management of the situation. Across the world, increasing population pressure and pressure on space and resources, combined with poor economic performance and impoverishment of large parts of the populations are among the root causes undermining the efforts for sustainable use of oceans and coastal areas, including renewable resources.

In Kutch, poorly planned coastal, urban and industrial development, including indiscriminate exploitation of coastal resources (e.g. mangroves) and development of recreational, harbour and aquaculture facilities has resulted in a change of the natural coastline and reduced the area previously covered by wetlands, marshes and mangroves. Chemical compounds released into the marine environment may also significantly affect individual members of ecosystem, thus destabilizing the integrity of natural ecosystem, and in extreme cases, leading to the destruction of the whole ecosystem.

And high proportion of world's population pressure and increasing demand for space and resources, combined with poor economic performance and improverishment of large part of the global populations are among at the root causes undermining the efforts for sustainable use of oceans and coastal areas, including their renewable resources.
In Kutch, poorly planed coastal urban and industrial development, including indiscriminate exploitation of coastal resources (e.g. mangroves) and development of recreational, harbour and aquaculture facilities, considerably changed the natural coastline and reduced the area previously covered by wetlands, marshes and mangroves.

Even chemical compounds released into the marine environment may significantly affect individual members of ecosystem, thus destabilizing the integrity of natural ecosystem which in extreme cases, leads to the destruction of the whole ecosystem.

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