Research Study Series
Number 64

Urban Sector Profile : Gujarat

P. # 70

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Asian Development Bank, Manila, Philippines
Urban Sector Profile Project
ADB TA No. 2098-IND

National Institute of Urban Affairs
New Delhi, India
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- Gujarat Industrial Development Corporation
- Directorate of Municipal Administration
- Directorate of Economics and Statistics
- Gujarat Infrastructure Development Board.
- Directorate of Census
- National Informatic Centre
- Gujarat Pollution Control Board
- Gujarat Housing Board
- Gujarat Water Supply and Sewerage Board.

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PREFACE

The Asian Development Bank (ADB) has provided a technical assistance (TA) Grant to the Ministry of Urban Affairs and Employment, Government of India, for preparation of an Urban Sector Profile. The primary objectives of the TA are to address the urgent sectoral issues and to guide ADB's future sectoral investment and technical assistance programming in India. The National Institute of Urban Affairs, New Delhi, has been entrusted with the responsibility of coordinating all the activities of the TA.

As a part of the Urban Sector Profile Project, State Urban Profiles have been prepared for five states, namely, Andhra Pradesh, Gujarat, Karnataka, Rajasthan and Tamil Nadu. Each State Profile also focuses on a city which either has significant potential for urban-economic development and/or has acute urban problems which need immediate attention.

The focus of the current urban reforms in India is on improving governance at the state and local levels. The state and city profiles would enable identification of specific needs for reforms as well as areas of strategic interventions. The state and city profiles cover analysis of urbanisation trends and patterns, the legislative and institutional framework for urban development, status of urban infrastructure and services, review of municipal finance and estimates of flow of finances for urban development in the state. These profiles also make an attempt to identify critical areas for urban sector reforms and potential sub-sectors/areas which require further investment and development as well as major strategies for urban development.

The state and city profiles have been prepared with the help of regional institutions and local resource persons. I very much appreciate the cooperation of the regional institutions and contribution made by the resource persons. At the Institute, Dr. Pushpa Pathak, Associate Professor, has coordinated the research work that was undertaken by the regional institutions and local resource persons as well as the preparation of these reports for publication by the Institute staff.

I am grateful to the Ministry of Urban Affairs and Employment, Government of India and the Asian Development Bank, Manila for their support. I hope that these studies will provide useful insights for formulating their state-level interventions for urban development.

Vinod K. Tewari
Director

April 1998

ABBREVIATIONS

ACGR	Annual Compound Growth Rate
ADB	Asian Development Bank
AMC	Ahmedabad Municipal Corporation
AMC	Ahmedabad Municipal Corporation
AMTS	Ahmedabad Municipal Transport Service
ARV	Annual Rateable Value
ASAG	Ahmedabad Study Action Group
AUDA	Ahmedabad Urban Development Authority
BOD	Biochemical Oxygen Demand
BOT	Build-Operate-Transfer
BPMC	Bombay Provincial Municipal Corporation (Act)
BT	Bituminous Top
CBO	Community-based Organisation
CEPT	Centre for Environment, Planning and Technology
CGR	Compound Growth Rate
CIDCO	City and Industrial Development Corporation
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CRISIL	Credit Rating Information Services of India Limited
DMA	Directorate of Municipal Administration
DO	Dissovled Oxygen
DP	Development Plan
EIUS	Environmental Improvement of Urban Slums
EP	Environment Protection
EPA	Environment Protection Act
EPC	Environmental Planning Collaborative
EWS	Economically Weaker Section
FDI	Foreign Direct Investment
FIRE-D	Financial Institution, Reform and Expansion - Debt (Project)
FSI	Floor Space Index
GHB	Gujarat Housing Board
GIC	General Insurance Corporation
GIDB	Gujarat Infrastructure Development Board
GIDC	Gujarat Industrial Development Corporation
GIS	Geographic Information System
GMFB	Gujarat Municipal Finance Board
GOI	Government of India
GPCB	Gujarat Pollution Control Board
GSCB	Gujarat Slum Clearance Board
GSRTC	Gujarat State Road Transport Corporation
GWSSB	Gujarat Water Supply and Sewerage Board
HH	Households

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GWSSB	Gujarat Water Supply and Sewerage Board
HH	Households

HIG	High Income Group
HU	Housing Units
HUDCO	Housing and Urban Development Corporation
HW	Hazardous Waste
HWGU	Hazardous Waste Generating Units
ICDS	Integrated Child Development Scheme
ICMA	International City Managers Association
IDSMT	Integrated Development of Small and Medium Towns
IEM	Industrial Entrepreneurs Memorandum
LA	Land Acquisition (Act)
LCS	Low Cost Sanitation
LIC	Life Insurance Corporation
LIG	Low Income Group
LPCD	Litres Per Capita Daily
LPCD	Litres Per Capita Daily
LPG	Liquidified Petroleum Gas
LRT	Light Rail Transit
M.Corp.	Municipal Corporation
MIG	Middle Income Group
MLD	Million Litres Per Day
NAAQM	National Ambient Air quality Monitoring (Programme)
NGO	Non-government Organisation
NH	National Highway
NIC	National Industrial Classification (workers)
NIUA	National Institute of Urban Affairs
NO_2	Nitrogen Dioxide
NO_x	Dioxides of Nitrogen
NRV	Net Rateable Value
NRY	Nehru Rozgar Yojana
NSDP	Net State Domestic Product
ODA	Overseas Development Administration
PAH_s	Polycyclic Aromatic Hydrocarbons
PMIUPEP	Prime Minister's Integrated Urban Poverty Eradication Programme
PTS	Public Transport System
RTO	Regional Transport Office
SC/ST	Scheduled Caste/Scheduled Tribe
SDP	State Domestic Product
SEBI	Securities and Exchange Board of India
SEWA	Self-Employed Women's Association
SI	Senior Inspector
SIHS	Subsidised Industrial Housing Schemes
SMC	Surat Municipal Corporation
SNP	Supplementary Nutrition Programme
SO_2	Sulpher Dioxide
SPM	Suspended Particulate Matter

SPS	Sewage Pumping Station
SSI	Senior Sub-Inspector
SSI	Small Scale Industry
SSU	Small Scale Undertaking
SUDA	Surat Urban Development Authority
SWM	Solid Waste Management
TCE	Tata Consulting Engineers
TCPO	Town and Country Planning Organisation
TDR	Transfer of Development Rights
TDR	Transfer of Development Rights
TP&VD	Town Planning and Valuation Department
TPD	Tonnes Per Day
TPS	Town Planning Scheme
UA	Urban Agglomeration
UAPP	Urban Assistance Plan for Poor
UBSP	Urban Basic Services for the Poor
UCD	Urban Community Development (Project)
UGD	Underground Drainage
UGD	Underground Drainage
UHC	Urban Health Centre
UK	United Kingdom
ULB	Urban Local Body
ULC	Urban Land Ceiling (Act)
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Education Fund
USAID	United States Agency for International Development
WBM	Water Bound Maccadum
WHO	World Health Organisation

SECTION - I

GUJARAT STATE PROFILE

I. TRENDS AND PATTERNS OF URBANISATION

INTRODUCTION

With a little over 34 per cent of its population living in urban areas, Gujarat is ranked second on the scale of urbanised states (1991), that is, if we ignore smaller states like Delhi (90.43%), Mizoram (42.86%) and Goa (41.67%). Gujarat's population grew from 20.6 million in 1961, when the state was formed, to 41.3 million in 1991, accounting for 4.93 per cent of the India's population. The state which is the seventh largest in the country, has emerged as one of the most industrialised and consequently urbanised states over the past three decades.

The decadal growth rate of population in Gujarat shows a declining trend. From 29.39 per cent for the 1961-71 period, it has declined to 21.20 per cent by 1981-91. This decline has been particularly sharp during the last decade.

The moderate decline in population growth observed during the eighties is a result of the slow economic growth as well as a decline in the natural growth rate of the population. During this decade, the agricultural sector remained virtually stagnant. The industrial as well as tertiary sectors also experienced a relatively low rate of growth.

URBAN GROWTH PATTERN

Gujarat has a network of 225 urban areas, with an urban population of 14.24 million (1991). The state has always been high on the urbanisation scale. Its urban population has almost increased three folds from 5.31 million in 1961 to 14.24 million in 1991. An important aspect is the gradual process of urbanisation. The level of urbanisation went up from 25.74 per cent in 1961 to 34.47 per cent in 1991 (Table 1.1).

Table 1.1: Urbanisation Levels and Growth Trends

Year	Gujarat			India		
	Urban Pop. (in Million)	% Urban Population	Decadal Growth Rates (%)	Urban Pop. (in Million)	% Urban Population	Decadal Growth Rates (%)
1961	5.31	25.74	-	78.9	18.0	-
1971	7.49	28.06	41.05	109.1	19.91	38.22
1981	10.60	31.10	41.52	159.5	23.70	46.23
1991	14.24	34.47	34.34	217.2	25.71	36.09

Source : Census of India and study estimates.

In line with the population growth trends at the all India level, the growth rate of urban population has also declined. However, the decline has not been as sharp as that observed at the all India level.

Components of Growth

Contribution to urban growth may be viewed in terms of three components, that is, addition due to natural growth, migration effect and reclassification effect.

Gujarat's urban population grew at a moderate rate of 40 per cent during the first two decades. Subsequently, the growth rate declined during the eighties. However, it should be noted that a proportion of this growth is artificial and has arisen out of a certain way of defining urban areas. The effective or real growth rates are, in reality, slightly lower.

Table 1.2: Components of Urban Growth

Year	Components (%)		
	Natural	Migration	Reclassification
1971-81	70.73*	21.55	7.72
1981-91	71.71**	18.86	9.42

Source : Study estimates based on census reports.

Note : * Natural growth rate is 24.3% p.a.
** Natural growth rate is an average of 21.13% p.a.

During the last two decades a marginal shift in the growth composition has been observed. Contribution of the natural growth component has increased marginally. Significant decrease in the share of migration has also been observed, reflecting positively on the employment generating capabilities of other states in India. Reclassification accounts for 9.42 per cent of the total addition in urban population during 1981-91 (Table 1.2).

Urban Concentration

New Towns

With an existing network of 225 urban agglomerations (1991), Gujarat state is endowed with a reasonably stable settlement structure. The phenomenon of new towns (settlements that are reclassified as urban from rural by the Census of India) in the case of Gujarat is significant with an addition of 17 towns. There has been an increase in the number of towns in Gujarat from 155 towns in 1961 to 225 towns in 1991. A progressively decreasing number of towns were added to the state total, from 39 in 1961-71 to only 17 in 1981-91 (Table 1.3). During 1981-91 two settlements were declassified as rural. Thus in effect 15 settlements were added in the tally. However, with the anticipated industrial development during the next decade and completion of Narmada irrigation project, many new towns are likely to emerge.

The towns which were reclassified and then included in existing Urban Agglomerations (UA) have not been accounted in the addition of new towns. There were also 18 mergers with UA's (Surat and Ahmedabad urban areas) in 1991. These merged settlements were earlier classified as gram panchayats (exclusively a part of the urban agglomerations).

Table 1.3 : Increase in Number of Urban Areas

Year	Urban Towns	Declassified Towns	Reclassified Towns	Included in UA	Mergers
1971	194	0	39	2	0
1981	210	7	23	25	0
1991	225	2	17	13	18

Source : Based on census reports.

Index of Primacy

Unlike several other states, domination of the capital city is not so evident in Gujarat. In fact, Gandhinagar is low on the urbanisation scale, being only a class I town. Ahmedabad is actually, the primate city in Gujarat, accounting for 23.15 per cent of the total urban population. Cities of Surat, Vadodara and Rajkot are the other large and rapidly growing urban areas, accounting for 10.65, 7.83 and 4.57 per cent respectively (Table 1.4). However, it is to be noted that, these six corporation cities dominating the scene in Gujarat, accommodate over half of the states' urban population. Ahmedabad is ranked seventh on the scale of total population residing within the cities' limits at the all India level, while Greater Bombay has the highest rank.

Table 1.4: Index of Primacy

City	Percentage to State Urban Population	Population (1991)
Ahmedabad	23.15	3,297,655
Surat	10.65	1,517,076
Vadodara	7.83	1,115,265
Rajkot	4.57	651,007
Bhavnagar	2.83	403,521
Jamnagar	2.57	365,464
Total of six towns	51.6	7,349,988
Gujarat State	100	14,246,061
Bombay	41.22	12,571,720
Madras	28.17	5,361,468
Calcutta	58.62	10,916,272

Source : Study estimates based on census reports.

Size-Class Distribution

The pyramid of primacy has a wide base in Gujarat. There are 172 small towns with a population of less than 50,000. Ahmedabad is at the apex of the peak, followed by two other million plus cities. There are 28 Class I cities and 25 Class II towns (Table 1.5).

In Gujarat the maximum concentration of the towns is in class IV category followed by class III category. This trend has continued throughout the past three decades.

Table 1.5: Number of Towns According to Size Class, 1971 to 1991

Size Class	1971		1981		1991	
	No.	Population	No.	Population	No.	Population
> 100,000	8	36,96,370	13	63,13,051	28	94,79,401
50001-100000	17	11,82,727	23	14,72,404	25	18,09,641
20001-50000	37	11,80,413	46	14,16,265	51	14,72,521
10001-20000	66	9,44,133	76	10,39,205	75	11,10,659
5001-10000	66	4,75,815	52	3,44,191	46	3,44,187
Total	194	74,79,458	210	1,05,85,116	225	1,42,16,409

The effect of size class of towns on growth is not very significant Class I towns are growing at a slightly higher rate (35%). Class II and Class V towns have also demonstrated better growth.. The phenomenon of size-class jumping is very significant as may be seen from the differences in growth rates (Table 1.6).

Table 1.6: Population Growth Rates in Cities and Towns of Different Size Classes (in percent)

Size Class	1961-71		1971-81		1981-91	
	Simple	Common	Simple	Common	Simple	Common
>100,000	55.36	46.72	67.57	50.83	50.16	34.58
50,001-100,000	52.72	29.29	32.85	30.68	22.90	23.62
20,001-50,000	8.21	27.69	19.75	32.23	3.97	31.27
10,001-20,000	50.84	27.87	12.76	26.42	6.88	20.91
5,001-10,000	16.85	24.03	-22.12	26.89	-0.66	20.15

Core-Periphery Differentials

In Gujarat, urban growth is slowly shifting from the urban proper (urban local authority areas) to peripheral areas. Share of the population living in peripheral areas, specially in the corporations as well as other Class I and II towns has become noticeable during the past decade. Similarly, due to industrialisation, certain smaller settlements are experiencing a considerable pressure of growth (Table 1.7).

These peripheral areas do not have effective urban management institutions to take care of planning and management of the area, as well as provision of basic services. The quality of development in these areas is observed to be poor.

Table 1.7: Population Growth Rates in Urban Proper and Peripheral Areas

Town Class	Population Growth Rates (%)	
	1971-81	1981-91
Corporations		
U. A.	48.31	36.19
Corporation	45.85	31.79
Periphery	79.01	81.02
Class I		
U.A.	42.36	31.87
Municipalities	35.31	27.28
Periphery	97.02	56.30
Class II		
U. A.	31.17	24.27
Municipalities	32.55	20.71
Periphery	3.47	115.48
Others	**26.50**	**21.62**

Source : study estimates based on Census reports.

Regional Variations

There is a disparity in the regional distribution of towns (Table 1.8). The pattern observed indicate a high concentration of towns in the Saurashtra region followed by the southern region. The district of Kutchchh has the least number of towns.

Table 1.8: Regional Variation in the Number of Towns

(Nos)

S.No.	Regions	1971	1981	1991
1	South	47	61	65
2	Central	28	28	35
3	North	28	27	29
4	Saurashtra	81	85	87
5	Kutchchh	10	9	9
	Total	**194**	**210**	**225**

Source : Study estimates based on census reports.

The growth is not spread uniformly throughout the state. On the scale of urbanisation, the north, north-west and the south-west regions are lower compared to the Central and Southern regions. The phenomenon of large city domination continues over space. All the six regions with a corporation within their limits are urbanising at a rapid rate. This list is topped by Ahmedabad followed by Surat. Bhavnagar is the only exception to the rule and has experienced medium paced growth. Gandhinagar is also urbanising at a rapid pace. Its status as the capital of Gujarat and proximity to Ahmedabad, are reasons for its growth. The districts of Sabarkantha, Banaskantha and Panchmahals are the lowest on the ladder.

The spatial pattern is equally influenced by the major transportation routes and links, leading to a concentration of settlements along the major corridor of Ahmedabad-Vadodara-Surat-Vapi-

Bombay, as well as on the minor corridor stretching from Rajkot to Porbunder on one side and Rajkot to Kandla-Bhuj on the other side. Barring these two corridors, population in other parts of the state is relatively thin. The growth rate in the north, Saurashtra, and Kutchchh regions is lower owing to inherent constraints like water and accessibility, etc. (Table 1.9).

INDUSTRIAL GROWTH AND URBAN DEVELOPMENT LINKAGE

Due to three and a half decades of concentrated efforts by successive state governments, Gujarat has emerged as a leading industrial state in the country. The economy of Gujarat grew at a moderate rate of 4.91 per cent during 1980-95. Between 1990-91 and 1994-95, however, the economy marked a growth rate of 7.4 per cent. In the previous year, that is, 1993-94 to 1994-95, the growth rate recorded has been phenomenal at 13.2 per cent.

Significant differentials in the rates of growth for different sectors have been observed, indicating a structural shift towards secondary and tertiary sectors. The share of primary sector has gone down from 40.81per cent of the NSDP in 1980-81 to 25.96 per cent in 1994-95 (at 1980-81 prices). Consequently, the shares of secondary and tertiary sector have gone up substantially (Table 1.10). These shifts are clear indicators for the gradual transformation of Gujarat into a semi-urban society.

Table 1.9: Levels of Urbanisation and Urban Growth Rates by Regions

S. No.	District	Level of urbanisation (%)			Growth rates (%)	
		1971	1981	1991	1971-81	1981-91
	South	**22.58**	**27.51**	**31.83**	**55.95**	**45.85**
1	Bharuch	17.39	18.63	21.27	25.13	36.16
2	Panchmahals	11.21	11.09	10.61	24.32	21.74
3	Surat	33.73	42.76	50.56	76.89	61.17
4	The Dangs	0.00	0.00	11.04	-	-
5	Vadodara	30.46	37.16	42.98	57.58	39.72
6	Valsad	17.95	21.92	24.47	51.65	36.77
	Central	**44.21**	**48.05**	**52.46**	**40.30**	**31.56**
7	Ahmedabad	66.86	71.76	74.69	42.93	28.97
8	Gandhinagar	11.99	21.60	40.89	159.58	167.79
9	Kheda	19.95	20.11	22.80	23.99	29.40
	North	**13.47**	**14.06**	**15.33**	**31.33**	**30.79**
10	Banaskanta	9.45	8.64	12.51	20.55	52.80
11	Mehsana	18.58	20.07	22.01	31.51	26.41
12	Sabarkantha	8.75	9.90	8.56	43.04	24.52
	Saurashtra	**31.35**	**33.08**	**35.91**	**34.93**	**27.23**
13	Amreli	19.88	20.42	21.53	30.57	22.39
14	Bhavnagar.	31.99	33.29	35.11	39.14	28.66
15	Jamnagar	35.31	37.44	40.35	32.92	20.95
16	Junagadh	29.33	30.46	32.54	31.66	21.82
17	Rajkot	38.37	41.29	47.09	38.68	36.98
18	Surendranagar	27.01	28.72	30.01	30.08	22.13
	Kutchchh	**25.24**	**26.13**	**30.72**	**27.94**	**41.36**
19	Kutchchh	25.24	26.13	30.72	27.94	41.36
	Total	**28.06**	**31.10**	**34.47**	**41.52**	**34.34**

Source: Study estimates.

Table 1.10: Sector-wise Contribution of State Domestic Product

Year	Income (Nos.)				Growth Rates (%)			
	Tertiary	Primary	Secondary	Total	Tertiary	Primary	Secondary	Total
1981	2,01,998 (31.28)	2,67,178 (40.81)	1,78,366 (27.24)	6,54,742 (100.00)	-	-	-	-
1985	2,77,055 (32.80)	3,31,623 (39.26)	2,35,948 (27.94)	8,44,626 (100.00)	8.22	5.55	7.24	6.57
1990	4,15,460 (38.90)	3,17,637 (29.74)	3,35,014 (31.37)	10,68,111 (100.00)	8.44	-0.85	7.26	4.80
1995	5,49,706 (38.80)	3,67,810 (25.96)	4,99,221 (35.24)	14,16,737 (100.00)	5.75	2.97	8.30	5.81

Source: Socio-Economic review of Gujarat, Gujarat State, 1996-97.

Note: Figures in parentheses are percentages.

Industrial Growth

A five-fold increase in the number of working factories and a two and a half time increase in the number of workers in factories has occurred during the past three and a half decades (Table 1.12). A moderate to high growth rate during sixties, seventies and early eighties, a slight decline in the late eighties and quick revival showing high rate of growth during nineties has been observed. The small scale industries grew at a rapid rate, throughout the three decades (Table 1.11 and 1.13). The total number of registered small scale industrial (SSI) units had crossed the figure of 191,000 by the end of November 1996. Various projects like diamond park, national park, national handloom complex, growth centres, tool room complex, leather complex, etc. are being implemented by the government to encourage various industries in the state.

Table 1.11: Growth of Factories in Gujarat

Year	Factories			SSU	Growth Rates (%)		
	Number	Workers	Worker/ factory		Number of factories	Workers	SSU
1960	3649	346462	94.95	2168	-	-	-
1970	5544	437554	78.92	15949	4.27	2.38	22.08
1980	10674	635684	59.46	43712	6.77	3.80	10.60
1985	13067	663614	50.78	72479	4.13	0.86	10.60
1990	14513	747569	51.51	115384	7.65	7.54	9.74
1995	18532	822200	44.37	170208	10.20	1.15	9.19

Source : Annual Survey of Industries.

Spatial Patterns of Growth

The spatial patterns of growth observed during the period 1960 to 1995, suggests a different form of imbalance setting into the regional system. Large scale development has taken place on the Ahmedabad - Bombay corridor. The share of this (central and south Gujarat) region, accommodating eight districts, has been significant and increasing over the years. On the other hand, Saurashtra's share both in terms of factories and employment has reduced significantly.

Similar trends are observed with respect to growth of SSI units. In the year 1970, five districts, Ahmedabad, Surat, Rajkot, Kheda and Jamnagar were the leading districts accounting for two-thirds of the total SSI units in the state. By 1980, Vadodara district entered the list of five top major districts. In the early eighties industrialists from Bombay and Surat started realising the potential of Valsad. As a result, by 1985, Valsad entered the list of five top industrial districts in terms of SSI units occupying fifth position and pushing Jamnagar out. By 1990, Valsad district had improved its position to fourth place, pushing Vadodara to fifth place. In the late eighties and early nineties due to the establishment of industrial estates, and state incentives, Bharuch has emerged as another leading industrial district.

However, the positive aspects of growth during the past three decades is that, from the initial concentration around Ahmedabad, Surat and Vadodara, development has spread to other districts along the corridor. The urbanisation pattern has more or less followed the same pattern as the industrialisation trend which substantiates the close connection between industrial and urban development.

Future Patterns

The trend of rapid development continues. During 1996-97, 10 large/medium projects have commenced commercial production in the state. The total investment in these projects works out to Rs.31.64 billion by the end of December, 1996. Gujarat ranks sixth in respect of Foreign Direct Investment (FDI) approved between August, 1991 and November, 1996 following Delhi, Maharashtra, Tamil Nadu, West Bengal and Karnataka. The foreign direct investment approved in Delhi during this period was Rs.171.41 billion, Rs.118.63 billion in Maharashtra, Rs. 50.31 billion in Karnataka and Rs. 34.34 billion in Gujarat. The Foreign Direct Investment approved in the country during this period was Rs. 924.59 billion.

Since August, 1991, Industrial Entrepreneurs Memorandum(IEMs) for 4,207 units with an investment of Rs. 1090.77 billion and with an employment potential of 723,000 persons have been filed in Gujarat State, 28,048 IEMs were filed with an investment of Rs 5409.87 billion crore and providing employment to nearly 5 million persons in the country by the end of November, 1996. The share of Gujarat in India in respect of IEMs filed, investment and employment works out to be 15 per cent, 20.16 per cent and 14.46 per cent respectively.

Gujarat Industrial Development Corporation is developing 9,000 hectares of industrial land including 6,000 hectares in Dahej and Vilayat in Bharuch district, 1,000 hectares in Vagra, Ankleshwar and 1,700 hectares in Jhagadia in Bharuch. Gujarat Industrial Development Corporation is concentrating on the creation of a big industrial park with state of the art facilities including effluent treatment plants, ports and air linkages in collaboration with the private sector.

Given these developments, Gujarat is poised to leap forward in terms of industrial development. Therefore, the implication of these on urbanisation levels and pattern, infrastructure requirements and environmental impacts become critical issues to be addressed.

Table 1.12: District -wise Distribution of Working Factories and Employment

(figures in percent)

District	1960		1970		1980		1985		1990		1991		1992		1993	
	Facto	Empl	Facto	Empl	Facto	Empl	Facto	Empl	Facto	Empl	Facto	Empl	Facto	Empl	Facto	Empl
Ahmedabad	24.94	48.21	27.20	42.58	29.18	38.81	32.23	34.95	32.16	34.21	29.85	33.59	27.52	29.56	26.98	29.09
Vadodara	6.88	8.49	8.32	11.99	12.20	13.76	9.21	12.22	9.61	10.57	10.96	10.50	10.91	12.25	11.62	12.20
Bharuch	1.86	2.31	1.59	2.41	2.09	2.35	3.27	3.37	4.58	4.80	4.57	4.64	4.95	5.41	5.43	5.51
Dangs	0.03	0.00	0.04	0.01	0.02	0.02	0.02	0.03	0.00	0.00	5.54	0.01	0.03	0.01	0.03	0.03
Kheda	8.19	5.41	9.51	6.41	5.48	5.35	5.07	5.61	5.36	5.21	0.03	4.97	5.06	4.64	5.45	4.54
Panchmahals	1.64	1.56	1.50	1.28	1.63	1.33	1.95	1.83	2.74	2.45	2.89	2.74	2.84	2.80	3.23	3.21
Surat	19.07	6.84	15.01	7.21	9.57	8.30	10.68	9.40	8.03	9.30	8.44	10.11	11.06	13.10	8.41	11.74
Valsad	4.88	4.44	6.08	5.02	7.82	6.02	9.08	6.80	10.68	8.35	10.01	8.26	10.55	7.66	10.78	8.42
SUB-TOTAL I	67.50	77.25	69.23	76.91	68.00	75.93	71.49	74.19	73.16	74.99	72.28	74.82	72.91	75.44	71.93	74.73
	(2463)	(267659)	(3838)	(336506)	(7258)	(482667)	(9342)	(492359)	(10617)	(560602)	(10597)	(569299)	(11264)	(594142)	(10833)	(594504)
Banaskantha	0.55	0.15	0.34	0.11	0.30	0.20	0.34	0.22	0.28	2.43	0.32	0.28	0.26	0.22	0.25	0.25
Gandhinagar	0.11	0.09	0.14	0.27	0.31	0.51	0.66	0.78	1.01	1.32	1.02	1.35	0.94	1.26	1.08	1.57
Mehasana	2.80	3.69	2.22	3.50	2.40	3.25	3.55	3.80	4.78	4.84	4.94	4.85	4.52	4.08	5.11	4.86
Sabarkantha	1.45	1.21	1.01	1.15	0.80	1.22	0.86	1.58	0.90	1.32	0.86	1.19	0.82	0.90	0.90	1.24
SUB-TOTAL II	4.91	5.14	3.72	5.04	3.80	5.18	5.41	6.38	6.97	9.91	7.13	7.66	6.54	6.46	7.34	7.92
	(179)	(17806)	(206)	(22043)	(406)	(32911)	(707)	(42364)	(1011)	(74084)	(1046)	(58286)	(1010)	(50909)	(1106)	(63008)
Amreli	1.59	0.63	0.99	0.51	0.82	0.71	0.31	0.49	0.28	0.41	0.29	0.40	0.27	0.43	0.19	0.41
Bhavnagar	6.36	3.89	5.95	3.20	4.67	2.64	3.59	2.74	3.17	3.11	2.76	2.98	2.71	3.34	2.50	2.66
Jamnagar	3.75	3.07	4.02	3.06	4.83	2.87	3.42	2.87	2.56	2.63	2.78	2.74	2.56	2.57	2.55	2.72
Junagarh	3.78	2.24	3.66	3.34	3.42	3.52	2.25	2.76	2.07	3.01	2.24	3.02	2.21	2.57	2.39	3.21
Rajkot	8.08	3.27	8.95	4.11	9.90	5.49	9.41	6.11	7.58	4.10	8.40	4.42	8.54	4.66	8.63	4.48
Surendranagar	2.96	3.43	2.33	2.69	3.48	2.58	2.82	2.74	2.83	2.27	2.91	2.41	3.03	2.45	3.15	2.39
SUB-TOTAL III	26.53	16.52	25.90	16.91	27.13	17.81	21.80	17.70	18.49	13.42	19.39	15.98	19.32	8.79	19.42	10.48
	(968)	(57246)	(1436)	(73973)	(2896)	(113235)	(2848)	(117476)	(2683)	(100323)	(2843)	(121575)	(2985)	(131441)	(4200)	(126224
Kutchch	1.07	1.08	1.15	1.15	1.07	1.08	1.30	1.72	1.29	1.68	5.54	1.54	5.06	1.41	5.45	1.49
SUB-TOTAL IV	(39)	(3751)	(64)	(5032)	(114)	(6871)	(170)	(11415)	(187)	(12559)	(812)	(11748)	(782)	(11107)	(821)	(11816)
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	(3649)	**(346462)**	**(5544)**	**(437554)**	**(10674)**	**(635684)**	**(13067)**	**(663614)**	**(14513)**	**(747569)**	**(15298)**	**(760908)**	**(15031**	**(787599)**	**(15854)**	**(795552)**

Source : Office of Commissioner of Industries, Gujarat State, Gandhinagar.

Note : (i) Figures in parenthesis are actual figures.
(ii) Employ – Employees.
(iii) Facto - Factory

Table 1.13: District -wise Distribution of Small Scale Industrial Units

District	1970		1980		1985		1987		1989		1991		1995	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Ahmedabad	3,940	(24.70)	10,919	(24.98)	18,929	(26.12)	22,769	(25.78)	27,185	(25.72)	32,399	(25.53)	41,509	(24.39)
Vadodara	1,041	(6.53)	3,020	(6.91)	4,754	(6.56)	5,520	(6.25)	6,239	(5.90)	7,282	(5.74)	9,646	(5.67)
Bharuch	162	(1.02)	846	(1.94)	1,974	(2.72)	2,700	(3.06)	3,353	(3.17)	4,345	(3.42)	6,538	(3.84)
Dangs	3	(0.02)	7	(0.02)	10	(0.01)	10	(0.01)	10	(0.01)	11	(0.01)	21	(0.01)
Kheda	1,245	(7.81)	2,528	(5.78)	3,807	(5.25)	4,554	(5.16)	5,213	(4.93)	6,161	(4.86)	8,125	(4.77)
Panchmahals	277	(1.74)	761	(1.74)	1,285	(1.77)	1,555	(1.76)	1,860	(1.76)	2,342	(1.85)	3,544	(2.08)
Surat	2,349	(14.73)	5,486	(12.55)	9,174	(12.66)	11,525	(13.05)	15,347	(14.52)	18,495	(14.57)	24,704	(14.51)
Valsad	712	(4.46)	2,298	(5.26)	4,325	(5.97)	5,253	(5.95)	6,237	(5.90)	7,383	(5.82)	9,974	(5.86)
SUB-TOTAL I	9,729	(61.00)	25,865	(59.17)	44,258	(61.06)	53,886	(61.06)	65,444	(61.92)	78,418	(61.80)	104,061	(61.14)
Banaskantha	169	(1.06)	543	(1.24)	942	(1.30)	1,240	(1.40)	1,542	(1.46)	1,986	(1.57)	2,993	(1.76)
Gandhinagar	4	(0.03)	40	(0.09)	357	(0.49)	593	(0.67)	765	(0.72)	997	(0.79)	1,803	(1.06)
Mehasana	803	(5.03)	2,312	(5.29)	3,598	(4.96)	4,227	(4.79)	4,913	(4.65)	5,820	(4.59)	8,288	(4.87)
Sabarkantha	168	(1.05)	800	(1.83)	1,347	(1.86)	1,720	(1.95)	2,137	(2.02)	2,676	(2.11)	4,031	(2.37)
SUB-TOTAL II	1,144	(7.17)	3,695	(8.45)	6,244	(8.61)	7,780	(8.81)	9,357	(8.85)	11,479	(9.05)	17,115	(10.06)
Amreli	111	(0.70)	392	(0.90)	909	(1.25)	1,113	(1.26)	1,313	(1.24)	1,581	(1.25)	2,389	(1.400
Bhavnagar	957	(6.00)	2,465	(5.64)	3,616	(4.99)	4,209	(4.77)	4,767	(4.51)	5,639	(4.44)	7,528	(4.42)
Jamnagar	1,098	(6.88)	2,894	(6.62)	3,843	(5.30)	4,417	(5.00)	5,018	(4.75)	5,856	(4.61)	7,477	(4.390
Junagarh	370	(2.32)	1,184	(2.71)	1,889	(2.61)	2,112	(2.39)	2,480	(2.35)	2,991	(2.36)	4,061	(2.39)
Rajkot	2,014	(12.63)	5,088	(11.64)	8,348	(11.52)	10,899	(12.34)	12,918	(12.22)	15,636	(12.32)	20,175	(11.85)
Surendranagar	374	(2.34)	1,480	(3.39)	2,190	(3.02)	2,483	(2.81)	2,756	(2.61)	3,308	(2.61)	4,524	(2.66)
SUB-TOTAL III	4,924	(30.87)	13,503	(30.89)	20,795	(28.69)	25,233	(28.57)	29,252	(27.68)	35,011	(25.59)	46,154	(27.12)
Kutchch	152	(0.95)	649	(1.48)	1,182	(1.63)	1,426	(1.61)	1,632	(1.54)	1,990	(1.57)	2,878	(1.69)
TOTAL	15,949	(100.00)	43,712	(100.00)	72,479	(100.00)	8,325	(100.00)	105,685	(100.00)	126,898	(100.00)	70,208	(100.00)

Source : Office of Commissioner of Industries, Gujarat State, Gandhinagar.

Note : Figures in parentheses are percentages.

POPULATION FORECASTS

Basis for Projections

Trends in the vital rates and economic development provide clues to the future population size. Four extremely important specific observations are:

1. Natural growth rate of population declined significantly during the eighties. Though, a further decline is anticipated, the pace would be much slower.

2. Significant improvements in the growth of the industrial sector were observed. These trends are likely to be strengthened further in the coming years.

3. The stagnant agricultural sector is showing signs of growth. During the 2001-11 decade, growth is anticipated to be significant because of realisation of the Narmada irrigation project.

4. Share of urban population has been increasing. A positive contribution by migration is expected to continue.

With the situation described above, decline in the rate of population growth should not be as sharp as has been observed in the past. Growth rate and population increase, are expected to taper off over the next few decades. On the basis of the above, growth rates and population have been estimated in this study.

Table 1.14: Population Forecast

Year	Total pop. (million)	Urban pop. (million)	Compound Growth Rates		Percentage Urban
			Total (%)	Urban (%)	
1991	4.13	1.42	1.94	3.00	34.49
2001	4.96	1.84	1.84	2.84	38.00
2011	5.89	2.45	1.74	2.68	41.68
2021	6.94	3.15	1.65	2.53	45.44

Share of Urban Population

If the present trend continues in Gujarat, 45 per cent of its population is likely to live in urban areas by the year 2021 A.D. The six largest cities of the state are likely to continue as the dominant centres and will accommodate over 50 per cent of the states' urban population. The present share of Class I towns is likely to remain the same.

Table 1.15 : Urban Population Distribution by Size-Class

(in per cent)

Town class (Present)	Nos.	Urban population distribution			
		Area	1991	2001	2011
Corporations	**6**				
U. A.		22.19	52.01	53.16	52.41
Corp.		9.61	45.84	45.52	43.80
Periphery		12.58	6.18	7.64	8.60
Class I	**15**				
U. A.		11.95	15.67	16.19	17.28
Municipalities		5.55	12.73	12.85	13.71
Periphery		6.40	2.94	3.34	3.56
Class II	**27**				
U. A.		7.72	10.95	10.33	9.50
L A area		6.94	10.24	9.28	8.17
Periphery		0.78	0.71	1.05	1.32
Others	177	58.14	21.37	20.32	20.82
Grand total –U	**225**	**100.00**	**100.00**	**100.00**	**100.00**
Urban to state population			**35.44**	**38.61**	**42.79**

Source : Study Estimates.

SUMMARY

On the whole, given the scenario of major spurt in industries, the urbanisation trends in the state are likely to be strengthened further. The trends observed in the spatial pattern are likely to continue.

II. STATE URBAN DEVELOPMENT POLICY AND STRATEGY

Impressive performance in industrial growth and the consequent rapid urbanisation, widening infrastructure gaps, inadequacies in the planning and management system of urban development and increasing threat to the environment are the highlights of the urban sector scenario in Gujarat. Responding to such an emerging scenario, the state and the local governments have taken initiatives on various aspects of urban development and its management. An attempt is made here to summarise these initiatives.

URBAN GOVERNANCE

Democratic Decentralisation

The Constitution 74th Amendment (1992) has given a statutory status to the existence of the urban local bodies. Unlike many other states in the country, Gujarat, baring a few instances, has always had democratic functioning at the local level. The Act only strengthened its position further. As per the Act, elections to local bodies, including the provision for reservation for women and weaker sections (SC/ST) of the society, have been completed.

Establishment of Metropolitan/District Planning and Ward Committees

Under the Constitution 74th Amendment, in order to bridge the institutional gap, metropolitan/ district planning and ward committees are being established. The establishment of these committees would facilitate implementation of the enlarged functions at the local level.

Strengthening Administration

Transitional areas and nagar panchayats, which were hitherto governed under the District Panchayat's Act, have been brought under the Municipalities Act of 1993. Measures to strengthen the administration in these areas are under way.

At present, the local authorities have no planning units, which is the reason for a lack of effective planning control at the local level. There is a lack of skill for making and implementing schemes and other infrastructure projects at local level. It is, therefore, proposed that towns having a population of more than 50,000 need to be strengthened by way of assistance in creating a planning team consisting of a qualified planner and one technical personnel at the initial stage. The state government has proposed to give grant-in-aid at the rate of 50 per cent of the actual expenditure, under this scheme as assistance.

Devolution of Functions

The 12th Schedule of the Constitution Amendment proposed devolution of certain functions such as local level economic planning, environmental protection, slum improvement and poverty alleviation to local bodies. Though, clarity with regard to the mechanism is still lacking, attempts to undertake these are under way

Finance Commission

One of the major provisions in the Amendment pertains to the constitution of a finance commission in order to review the financial position of the municipalities/ urban local bodies and make recommendations every five years. The state has set up a finance commission and recommendations are awaited. The thrust of the commission will be on strengthening the capacities of the urban local bodies through corrective measures related to manpower, taxation powers, and redefining the state's role regarding these bodies.

DEVELOPMENT PLANNING

Development planning mechanisms in the state consist of preparation of the `Development Plans' for larger area and longer time periods and `Town Planning Schemes' for local area. The existing mechanisms are beset with a multitude of problems. The problems and initiatives in order to ameliorate these problems are enlisted below:

Coverage

Of the 225 urban areas in Gujarat, only 120 large urban areas have sanctioned development plans. Limited trained technical manpower with the Town Planning and Valuation Department as well as with the smaller urban areas are major constraints. Attempts to fill the vacant positions are being made. Training programmes for small and medium town officials, under ODA assistance, through Town and Country Planning Organisation, New Delhi, School of Planning, CEPT, Ahmedabad and University of Birmingham are being organised. Three batches (40 officials) have been covered so far. Through GMFB, under World Bank assistance, a series of training programme were organised. Given the requirements, the coverage is limited.

New Town Initiatives

In lieu of the inefficiencies associated with planning and management of Mega Cities, the Government of India has initiated a scheme for new township development, as part of the Ninth Five Year Plan (1997-2002).

The Government of Gujarat, seizing the opportunity, has initiated identification and planning of 20 new towns in the state. These towns which are being identified around large cities, in emerging industrial areas, and around major ports will provide ample opportunities for large scale public and private partnerships. By the end of October 1997, identification as well as preliminary plan of action is expected to be complete.

Regional Planning Initiatives

Gujarat's urban growth being intricately linked to industrial development, is taking place along the major corridors. This limits the efficacy of the local level planning. The Government of Gujarat has identified two critical regions for the preparation of regional plans. Evolving an appropriate institutional structure is also being considered.

Revitalisation of Urban Core

Historical core of cities are marked by a multitude of problems like severe traffic problems, inadequate infrastructure, neglected monuments, poor environmental conditions, etc., which have resulted in poor living conditions and a decline in the residential population. Ahmedabad, taking the lead, through collaborative efforts of the Municipal Corporation (AMC), Environmental Planning Collaborative (EPC), a non-profit company, Technical Support System of USAID's FIRE-D Project, have prepared a `Walled City Revitalisation Plan' as a strategy for comprehensive development. This strategic plan adopts a participatory approach aimed at revitalising the walled city through infrastructure upgradation and commercial development. Several demonstration, public-private partnership development projects (worth over Rs. 2 billion) have been identified for implementation.

Surat Municipal Corporation (SMC) has recently approved a proposal for the preparation of a strategic plan for revitalisation of its historic core.

Centre for Development of Urban Land Readjustment Technique

The government proposes to set up one centre at Gandhinagar for the development of urban land readjustment techniques in the state. This centre will examine critical proposals as well as suggest drastic changes in terms of planning, administration, time frame, organisational structure and more effective public participation. The centre will also impart training to planning professionals.

Seed Capital to Urban /Area Development Authorities

Urban/Area Development Authorities are expected to prepare the development plan and Town Planning schemes, based on the problems of their areas and then implement these proposed plans and schemes. They are also expected to undertake various development programs which can be implemented with loans taken from HUDCO, LIC, banks as well as utilise the assistance available under the integrated development programs for urban areas. Since the urban development authorities do not have their own adequate source of revenue, the government provides financial assistance as seed capital.

Information Systems

Keeping in line with the present day requirements and the technological progress, computerisation and use of GIS is being adopted by the corporations and municipalities with the help of the government. Many local bodies, on their own have taken measures to acquire these systems. Computerisation of development plans and Town Planning schemes is also under way. TP&VD has acquired satellite images and GIS facilities under the World Bank project. However, the initiation is limited in scope and coverage.

PLANNING MECHANISMS

Planning mechanism involving development plans (DP), Town Planning schemes (TPS) and the associated regulations, are aimed at converting raw agricultural land to urban uses, service the land, and regulate its use.

Legal Framework

The Bombay Town Planning Act, 1915, provided for the preparation of Town Planning schemes. Unlike present day comprehensive development planning process, the TPS mechanism appeared to be conducted like isolated site planning projects, without an overall perspective of the city development. The Bombay Town Planning Act, 1954 mitigated this lacuna by making it mandatory for the local authorities to prepare a master plan for the city. Provisions regarding the Town Planning schemes, however, remained the same. After formation of Gujarat state in 1960, this Act came into force throughout the state.

In seventies, the cities of Gujarat had begun to grow rapidly, over spilling the municipal boundaries but the local authorities had no mechanism to control development beyond its jurisdiction. The Gujarat Town Planning and Urban Development Act, 1976 vested powers in the state government to declare any area as a development area and constitute an Area/ Urban Development Authority for it. These Area/ Urban Development Authorities are supposed to prepare development plans as well as Town Planning schemes and implement them in the aforesaid areas.

Development Plans

Under the Gujarat Town Planning and Urban Development Act of 1976, Development Authorities or the local bodies prepare a landuse development plan for the area under its jurisdiction. So far, in Gujarat, of the 225 urban areas, development plans have been prepared and sanctioned for 79 urban areas only. As per the Act, the plans are for a period of 20 years and have to be revised after 10 years. Many of the plans are under revision. The mechanism, though supposed to be comprehensive, has over the years shown many limitations:

- Time delay in state approval.
- Rigid zoning system, which is difficult to implement and therefore often violated.
- Too much emphasis on the procedures and not on the content of the plan. Proposed plans are invariably mere extensions of the trends.
- Do not explicitly identify resources for implementation of proposals and therefore most of the developmental works remain unimplemented.
- As part of DP, proposals for roads and other physical and social infrastructure is made. Except roads and open spaces, other infrastructure remains on paper for a long time.
- Public participation in the planning process is limited only to parties directly getting affected.
- Due to rigid controls, development has started occurring outside planning areas.

- Despite DP zoning parcels for urban use, the process of non-agricultural permission is still to be taken.
- Along with land-use zoning, built form regulations is attempted through building bye-laws. Studies have indicated that the bye-laws are not conducive for evolving an appropriate built structure. Further, bye-laws have too many loop- holes because of which most of the development is illegal.
- DP mechanism is also a tool for making land available for housing and public purposes. The process is through reservations. Respective agencies have to acquire this land under Land Acquisition Act. Due to financial and legal constraints, for years such land is not acquired but often, is encroached upon.
- Cumbersome development permission procedures, involving multiple clearances, is also a major constraint.
- In the case of the six development authority areas, there is an additional problem of resources which are not in compliance with the functions that these authorities have been given. There is always a conflict with the corporation areas. Ultimately the so called comprehensive plan ends up as a two part plan : one for the corporation area prepared by the corporations, and the other for outer areas prepared by the Development Authorities.
- On the other side, in smaller towns, due to lack of trained manpower, preparation and implementation of plans becomes difficult. Though, the state Town Planning Department provides assistance by actually preparing the plans, these remain as desk plans only.
- No opportunities for public-private partnership projects exist.
- Industrial development related decisions are made by GIDC without any consideration for plans. The estates are proposed outside the jurisdiction limits of the development authority or local authority. This, in addition to putting pressure on the settlement, distorts the urban structure.
- With the liberalisation policy, many large scale investment projects have started coming up in undeveloped regions in small settlements. The impact area is spread over many regions. But no mechanism to plan and monitor the development at regional level exists.

Town Planning Schemes

Land readjustment through the Town Planning scheme mechanism has been a major mode of land development in Gujarat. The Bombay Town Planning Act, 1915, provided the first legal framework to undertake orderly development of outlying areas and extend infrastructure as well as services to these areas. Modelled on the British Housing and Town Planning Act of 1909 and the German practices for Town Planning prevalent then, the local authorities were given powers to convert the irregular revenue plots into appropriate shapes, lay down roads and provide the public ownership of privately held land for community facilities and open spaces. Such land was acquired without paying actual compensation, as the cost of acquisition of land was adjusted with the betterment of land and enhancements made in the value of land, due to public efforts.

The Process and Content of Town Planning Scheme

The Town Planning Scheme mechanism has been increasingly favored by the local authorities in Gujarat primarily because :

i. There is a collaborative effort of public authorities and private land owners for sharing land, thus reducing conflicts.
ii. Most of the land required for public purposes is made available without lengthy land acquisition process, as per the Land Acquisition Act, 1894.
iii. The entire scheme of land development and servicing can be self-financing.
iv. Provisions now exist for earmarking land for housing of the economically weaker sections of society thus bringing about equitable distribution.

The Town Planning Scheme process followed in Gujarat is essentially divided in five stages as described below:

Amendments in the Town Planning Act

As regards the preparation of town planning schemes, an attempt was made to expedite the finalisation of the scheme, by dividing the final scheme into two stages of preliminary and final scheme. The preliminary scheme consisted of a layout of roads, marking of reconstituted/redistributed plots and reserved plots. Upon its approval, the land acquired by the authority vests with it and work of implementation could be started while finance and valuation part of the final scheme is still in progress.

In 1986, the Government of Gujarat made a few important changes in the Gujarat Town Planning Act, 1976 to provide greater scope for making the scheme a self financing one.

Amendment of Section 40 (2) (ii), provided that upto 10 per cent of the land could be allotted under residential, commercial or industrial use to the local authority for raising the necessary revenue. The authority can take possession of the plots after the preliminary scheme is sanctioned.

Under Section 77(1) (g), 20 per cent of the costs of infrastructure could be added as incidental charges to the total cost of the scheme to provide facilities to the adjacent area surrounding the scheme.

Appraisal of Town Planning Schemes

Reservation of Land For Public Purposes: The enactment of Gujarat Town Planning and Urban Development Act, 1976, made a change in the Act which made it possible that apart from plots reserved for public purposes, plots could also be reserved by for the local body under various purposes, like commercial, residential, etc., to be sold later on. Though ostensibly 10 per cent of the area were to be earmarked for economically weaker section housing, in Ahmedabad on an average only 3 to 4 per cent have been earmarked.

Use and Intensity of Use Violations: The urban planning standards adopted in the preparation of town planning schemes do not seem to be realistic and contextual. It is found that in Ahmedabad

large scale variations exist in proposed and actual development. Further, the study[1] found that generally the existing buildable (residential) area has been much higher than the proposed.

Time Delay: One of the major problem with the town planning scheme mechanism is the large time gap between the dates of initiation of the scheme and the implementation. Prior to 1976, the town planning schemes were divided into two stages - namely; draft scheme and final scheme. The analysis of schemes undertaken by AMC showed that time taken for these stages was 4 years and 10 years. Such delays can play havoc, as the costs escalate every year and most of the area gets developed well before the scheme is implemented. However, since 1976, a clause was incorporated in order to reduce time, by ensuring that at least the demarcation of roads and plots for public amenities together with the provision of infrastructure could be started, from the preliminary stage onwards.

An analysis of town planning schemes suggests that on an average, the time taken from draft to preliminary sanction is about 5 years, about half the previous average. Incidentally, the recent schemes show a dramatic reduction in the time, in the preparation of the draft scheme to anywhere between 2 days to 37 months. This suggests the possibility of expediting the process if the finances are available, as has been the case of the latter schemes where the finances from the World Bank were available.

The time delays have been mainly due to administrative bottlenecks and poor land records. First, the administrative bottlenecks on the average account for 50 per cent of the total time taken from the declaration of intention to the sanctioning of the final scheme. This happens when the schemes are sent to the state government for sanction at these different stages. In U.K., on which most of the early Indian Town Planning Legislation are based, the need for approval/sanction by the higher governmental authority was removed for local level detailed plans as early as 1968. This could perhaps be followed here too, reducing the time delay to a considerable extent.

The second reason for time delays is the poor state of the land records. Most of these land records on the periphery of Ahmedabad have not been updated for over forty years. In fact, the land record is field checked only at the time of preparing the preliminary scheme

Financial Aspects of Town Planning Scheme Mechanism.: The most important feature of the town planning scheme mechanism is that it is a self-financing mechanism. The owners of the schemes are supposed to pay a share of the estimated incremental value of the serviced plots to meet the costs of the town planning schemes. If the costs equals or exceeds the 50 per cent of the total increments, the owners are supposed to part with 50 percent of the incremental value. Otherwise the share is fixed proportionately so as to cover the total costs of town planning schemes. The Town Planning Officer decides a time limit for the implementation of the physical infrastructure and the costs are calculated as on this date.

Though the schemes are apparently self-financing, most of the services provided are from the resources of the general fund. The cost recovery rate is only to the tune of 55 to 60 per cent making the notion of TPS as self financing mechanism a myth.

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[1] Mehta and Mehta, (1988) " Land Management Techniques in Ahmedabad, School of Planning, CEPT, Ahmedabad.

Urban Land (Ceiling and Regulation)Act

The ULC Act enacted in 1976 is intended to achieve the following :

- Prevent the concentration of urban property in the hands of a few persons and speculations and profiteering therein;
- To bring about socialisation of urban land in urban agglomeration to subserve the common good by ensuring the equitable distribution;
- To discourage construction of luxury houses leading to conspicuous consumption of scarce building material and to ensure equitable utilisation of such materials, and
- To secure orderly urbanisation.

However, the act has failed to achieve its laudable objectives as is evident from its poor performance. The extent of the vacant land, which could be taken physical possession of, is only seven per cent of the total estimated vacant land. Procedural bottlenecks, particularly in preparation of draft statement of excess vacant land, final statement and issuing of notification for acquiring the excess vacant land under this Act, led to delays and litigation. This further slowed down the process of making urban land available to the government. This resulted in choking of land supply in urban areas, besides affecting development activities adversely. Definition of some crucial terms in the Act like "urban land", "vacant land", "land appurtenant", "agriculture", " master plan", etc., are worded in a way which is prone to misinterpretation. Many landlords have taken advantages of such inherent weaknesses, in the Act. The Act, has therefore been under strong and persistent criticism.

LAND AND HOUSING

Availability of serviced land and housing in urban areas continue to be a critical issue in Gujarat's urban areas. An estimated 22 per cent of the state's urban population live in slums. Public agencies which function as `providers of housing' have not been able to deliver the goods in the required quantity because of institutional and financial constraints. During the eighth plan (1992-97) the contribution of the Gujarat Housing Board was only 13,973 units, while the Gujarat Slum Clearance Board added another 2,632 units, bringing the total public sector contribution to 16,600 units. Faced with these facts, the state has initiated reforms in the legal and institutional framework.

Urban Land Ceiling

The state set up an inter-ministerial committee which suggested amendments in Urban Land Ceiling Act. The intended objectives of the proposed amendments include aspects such as change in definitions of certain crucial terms, restriction of the act to certain rapidly growing urban agglomeration, removing procedural bottlenecks, shift of emphasis from takeover of vacant land to guided development, enhancement of payable amounts, constitution of land bank for urban poor, etc. All the above objectives are aimed at making the Act more workable by plugging the existing loopholes and eliminating unintended concessions. A public interest litigation filed in the high court has delayed the implementation of the amendments. The state is hopeful of a positive settlement soon.

Land Acquisition Act

Acquisition of land for public purposes through the LA Act is beset with a series of court cases. The delay in notification, acquisition and the fixation of compensation are matters of dispute. In view of this, use of Transfer of Development Rights (TDR) is being contemplated.

Public-Private Partnerships for Land Development

In view of time delays associated with the Town Planning scheme mechanism, which limit the supply of serviced land in urban areas, proposals to involve the private sector in land development are being seriously considered. Model mechanisms on the lines of CIDCO, Integrated Town Development Scheme, Haryana, are being evolved.

Development Control Regulations

The existing land development control regulations are seen as out-dated and largely contribute to delays in development. Further, they also add to the inefficiencies in use of urban land. The state as well as local bodies have initiated modifications in these mechanisms. The Gujarat Infrastructure Development Board (GIDB) has recently commissioned CEPT to undertake a study for suggesting reforms in the development control mechanisms.

Role of Housing Agencies

The role of public agencies is largely confined to that of a builder rather than a facilitator or enabler. The performance of these agencies has also not been satisfactory. The functions of Gujarat Housing Board (GHB) and the Gujarat Slum Clearance Board (GSCB) are overlapping. Merging GSCB with GHB and restructuring the role of GHB are under way.

Rent Control Act

Low level of formal housing supply, high and increasing vacancy rate, decline in the proportion of rental housing are clear indications for constraining nature of the Bombay Rent Control Act, operative in Gujarat. The state has set up a high level committee in order to identify appropriate amendments to the Act. The report of the committee is expected by the end of October, 1997.

Slum Improvement

Environmental Improvement in Slum Areas

The Government of India introduced the scheme of environment improvement in slum areas. The scheme was transferred to the state in 1974-75 and implemented as the minimum needs program by municipal corporations, municipalities and urban/area development authorities. The scheme envisages a financial assistance of Rs. 800/- per capita for the provision of basic amenities like drainage, sanitation, water supply, community latrines, street lights, etc. in slums. Priority is given to the slum areas situated on government/municipal land and/areas predominantly inhabited by

scheduled castes and scheduled tribes. An outlay of Rs.60 million is provided for the year 1997-98 for this scheme, with a target for coverage of 100,000 population by the year end.

Urban Basic Services

The aim of this program is to improve and upgrade the quality of life of urban poor, especially the most vulnerable sections of the population (the women and children), who tend to get neglected in urban settings. The urban basic services programme is implemented through the concerned municipal corporation and municipalities in accordance with the financial pattern of the scheme. Since 1992-93, the scheme has been transferred to the state sector and 10 towns have been covered. An outlay of Rs.5 million is provided for the year 1996-97. The GOI introduced a 100 per cent centrally sponsored scheme viz., urban basic services for the poor, from November 1990, which was similar to the old urban basis program scheme. After 1992-93, the financial pattern of the scheme changed to 60:40 under which the states share of 40 per cent was to be taken from the provisions made under the plan allocation for the urban basic service programme. Rs.20 million is provided for the year 1997-98.

Urban Community Development Projects (UCD)

Urban community development projects lay special emphasis on self help, on the part of the local bodies, in order to enable the relatively disadvantaged sections of the community for obtaining maximum benefits from facilities provided under various government and municipal programmes. The activities undertaken cover physical improvement, civic amenities, health and sanitation, recreation and cultural activities, educational activities, economic programmes such as employment, referral services, small saving, etc. The urban community development project has an expenditure of Rs. 300,000 per annum, 40 per cent of this is given as a grant to municipal corporation and 60 per cent to municipalities. An outlay of Rs.2.5 million is provided for the year 1997-98.

Urban Assistance Plan for Poor (UAPP)

This scheme started with assistance from UNICEF. The UAPP provides financial and technical support for conducting the required training and orientation activities for the concerned officers, functionaries and community leaders (particularly women) of 27 municipalities and 4 municipal corporations implementing the UBSP Programme. As much as 50 per cent of the provision is made under the plan as state support, the rest being funds from UNICEF are provided under pon-plan support. An outlay of Rs. 1.5 million is provided for 1997-98.

Prime Minister's Integrated Urban Poverty Eradication Programme (PMIUPEP)

Considering the seriousness and complexity of the poverty scenario, PMIUPEP was formulated in order to redress the problem of urban poverty, with a multi-long-term strategy. The program is implemented in 27 towns with a population of 5,000 to 100,000. A central share of Rs. 58.3 million has already been received during 1995-96 from the Government of India. An outlay of Rs. 25 million for the year 1997-98 has been sanctioned, assuming the scheme will be continued.

Slum Networking

The AMC has forged partnerships with slum communities, NGOs and private agencies with the aim of transforming the quality of life in slums, which can be achieved primarily by improving the physical and social infrastructure within slums. Other components include health, education, skill upgradation and access to finance for house improvement and income generation.

A pilot project of the slum improvement partnership has been successfully implemented at Sanjaynagar in Potalia ward, Ahmedabad in partnership of four agencies namely, Patani Community, the Arvind Mills Ltd., SAATH (an NGO) and the AMC, while financial support was extended by SEWA Bank and HUDCO. Arvind Mills promoted a trust - SHARDA (Strategic Help Alliance for Relief to Distressed Areas) for implementing this project. All the partners in the project had played independent roles, but exercised joint control, with Arvind Mills as the executing agency.

A programme, "Parivartan" meaning complete transformation has been initiated through the joint venture of the industry, UNDP, public authorities, NGO's and the people covering over 300,000 slum households in Ahmedabad. Similar programmes are under execution in Surat and Vadodara.

INITIATIVES IN INFRASTRUCTURE DEVELOPMENT

Gujarat with its thrust on industrial development identifies both regional as well as urban infrastructure as key elements in the growth process.

The tasks for the provision of urban infrastructure are huge, with investment requirements crossing the limit of Rs.50 billion. Conventional sources for such infrastructure investments are the state government and financial institutions such as World Bank, ADB, HUDCO, LIC, etc. But reliance on conventional loan financing mechanisms alone may not be sufficient to meet with the above task. This has prompted the state and local governments to evolve innovative mechanisms and create supporting institutions for financing infrastructure.

Gujarat Infrastructure Development Board

The state government has constituted the Gujarat Infrastructure Development Board to play a promotive role in the development of infrastructure particularly in the areas of power, transport and communication, integrated area development, water supply and effluent treatment. The Board has identified projects and provided advisory services in these areas, for which feasibility studies are now being conducted.

Gujarat Toll Company

Gujarat, recently, established a toll company with the view of carrying out road projects on a BOT basis. Presently, at a cost of Rs. 3 billion, Ahmedabad, Mehsana and Vadodara-Halol roads are

being tendered out for private participation. Development of 1,000 kms. of state highway network has also been proposed, through World Bank assistance. Final studies for these projects are under way.

Urban Networking

Networks to share experiences, technologies, etc., at a global level is a way to solve many of the problems presently faced in urban areas. "Gujarat City Managers Association" which is affiliated to ICMA, USA, was formed in May 1997, for this purpose.

ADB Assistance

A reform programme valued US $ 250 has been envisaged through ADB assistance. It attempts at strengthening the finances of states and its prudent management. The ADB intends to launch a public sector restructuring programme for privatising, divesting or restructuring the state owned enterprises with the objective of maximising efficiency and reducing the governments' role in commercial activities. It also aims at evolving an enabling environment for private sector involvement in the infrastructure sector.

World Bank Project

Gujarat urban development project initiated in 1987 has been completed. The project included land development and readjustment, provision of infrastructure, water supply and storm sewerage treatment, slum upgradation, solid waste management, etc. in six corporation areas and Anand town. The project also included components on institutional strengthening of TPVD, GMFB, AMC and AUDA. Under the project, total expenses are estimated to the tune of 1.12 billion by 1995.

Gujarat Water Resource Development Corporation Ltd.

The main functions of the corporation are investigation, exploration, development and management of ground water resources, through public tubewells and lift irrigation in the state. As per the agreement between the Narmada and Water Resource Department and M/s Tahal Consulting Engineers of ISRAIL, for studying the planning of water resources in the state of Gujarat, the corporation is closely associated with the study for ground water resource management and planning for the state.

The corporation plans to implement a major water supply distribution system in the drought prone districts of Gujarat. The urban and rural settlements, for both domestic and industrial use are being included in the proposed project.

Local Initiatives

Industry-SMC Water Source Development Project

As early as 1983, SMC initiated public-private partnership projects in water supply source development schemes. A weir at the cost of Rs.130 billion was built and industrialists bore the full

cost of the weir. The arrangement is that a portion of the water stored will be shared by these industrialists as well.

Street Improvement Partnerships

The AMC initiated public-private partnerships aimed at improving the streets of Ahmedabad and for making them efficient and safe. Under this project, streets are designed and constructed for the smooth flow of traffic, at the same time ensuring pedestrian safety, reducing pollution and beautifying the cityscape. The C.G. road, a prime business and commercial artery of Ahmedabad, has been redeveloped as a pilot project by AMC in partnership with Arvind Mills Ltd. (AML). AML has put in Rs. 35 million which it will recover from advertising and parking revenues. The design was prepared by M/s. Hasmukh C. Patel (HCP), a private architectural and planning firm, and Dalal Consultants, a private consulting firm, were the project managers. The project was coordinated by a committee, headed by the Municipal Commissioner and representatives from AML, HCP and Dalal. Similar partnership projects are now being proposed on Drive-in road, Satellite road and other major roads within Ahmedabad.

Solid Waste Management

Surat: After plague, SMC has made concentrated efforts for improving its solid waste management. Presently, Surat is rated as the cleanest city in Gujarat and the second cleanest in the country.

For efficiency in solid waste management, the city has been divided into 6 zones. A total of 1,000 M.T. per day of garbage is collected in 1,000 dust bins distributed throughout the city. Moreover, to increase the efficiency of the same, private contractors are also employed and the city has been divided into 4 zones. The private contractors either hire or use their own vehicles and staff, and charge Rs. 70-90/ton, for transportation of waste. In 1994-95 more than 200,000 tons of waste was transported by these private contractors.

Ahmedabad: The AMC has teamed up with NGOs and private companies in order to improve the hygiene and sanitary conditions of the city by reorganising the solid waste collection and disposal systems. This project has two components - neighbourhood level collection and disposal.

A pilot project implementing the first component has been implemented in Ambawadi area, in partnership with SEWA - a well known NGO, Clean Green Abhiyan - an initiative supported by the Prarthana Group of Industries and the Centre for Environmental Education (CEE). CEE conducted awareness programmes for residents of the area in order to promote household level segregation of garbage. SEWA organised women ragpickers (a disadvantaged group) for collecting the segregated garbage. These women earn by selling the recyclable dry waste and the whole process is supported by Abhiyan.

In the second component, disposal of garbage through landfill is being replaced by recycling into fertilizer. The AMC in collaboration with a private company has set up a plant in the outskirts of the city and this will eventually save the AMC 2,500 cu.m./day of landfill space.

LRT for Ahmedabad

The felt need for better public transport facilities in metropolitan cities led to a feasibility study on LRT system in Ahmedabad in 1987. Recently, through the initiatives of Government of Gujarat, AMC and AUDA, Gujarat Industrial Investment Corporation(GIIC) has signed a memorandum of understanding with Mukund Industries for carrying out a detailed feasibility study. Attempts to fix the alignment and reservation of land for this purpose are being made as part of ongoing revision in the development plan.

LOCAL BODY RESOURCE MANAGEMENT

The urban local body performance, with respect to resource management in Gujarat is rated better in comparison with other states. Performance of the corporation cities in general has been exemplary. However, the situation in small and medium towns leaves enough scope for improvement. The recommendations of the State Finance Commission would form the basis for initiatives at the state level. The recent initiatives by the state and local authorities are presented below :

Property Tax Reforms

The state initiated a study covering six municipal corporation areas for addressing the problem of the property tax system. Recommendations of CEPT study include a total restructuring of the system in the form of delinking property value assessment to taxation. Alternatively, the study suggested a sq.ft. rate of tax, which will vary depending on the property characteristics. The formulae suggested has been discussed at various levels and procedures to obtain approvals from the elected bodies of the local authorities are being initiated.

Rationalisation of the Octroi System

Various industrial associations have been lobbying for abolition of octroi on the grounds that the cost of delay caused to vehicles is enormous. However, the state is of the view that octroi is the only elastic source of revenue for local bodies and therefore need to be continued. Therefore, reforms to smoothen the process have been initiated, based on the working groups recommendations.

Non-Tax Revenues

Local authorities in Gujarat are excessively dependent on octroi and property taxes for their resources. Through concentrated efforts in the recent past, some of the authorities have managed to raise their levels of collections significantly. But the growing resource requirements have led these authorities to look for alternative sources of revenue generation. The AMC is currently working on a proposal to raise the share of non-tax revenue in the form of infrastructure development charges/impact fees, property development, etc.

Credit Rating and Municipal Bonds

Ahmedabad became the first urban local body to obtain credit rating from CRISIL for its bond issue. The initial rating of the issue by CRISIL was `A+', which, based on the structuring of the bond, has been upgraded to `AA'. To part finance water, sewerage and other related urban infrastructure projects, AMC has planned to issue bonds with a face value of Rs. 1,000 million. The proposed bond issue is a general obligation bond backed by a structured Escrow mechanism and was approved by the state government in April 1997. The approval of SEBI is awaited. This first municipal bond in the country is expected to be issued in October 1997. The success of this issue will prompt other municipal corporations in the state as well as the country to follow the suit.

CONCLUSIONS

Gujarat, the land of opportunities, continues to attract major investments in industrial sector. The state and local bodies are making earnest efforts by creating/amending appropriately, the institutional structures to manage the anticipated urban growth and to provide for infrastructure requirements. The presentation outlined above is a clear indication that the state and the local bodies are increasingly assuming the role of facilitator, leaving the role of provider to the private sector. This is aimed at twin objectives of bringing in large scale investments in the infrastructure sector and to raise efficiency of the operations.

However, many of the state initiatives are still at the preliminary stage waiting to be operationalised. The local level initiatives are restricted to a few Municipal Corporations. These needs to be taken to small and medium towns as well. The capacities of these local bodies are limited and needs concentrated efforts towards enhancement. The mechanisms to manage all aspects urban development in an integrated manner are still not in place.

With a favourable socio-political, administrative and entrepreneurial climate existing, the state hopes to sustain these initiatives which will enable it not only to meet the gaps in urban infrastructure and other investment requirements but also pave way for rapid economic growth and better quality of life.

III. STATUS OF URBAN INFRASTRUCTURE AND SERVICES

CIVIC SERVICES

An urban area for its normal functioning requires certain basic services. The productivity and sustenance of the town depends largely upon the efficiency and promptness with which these services are provided. This section presents the existing level of services in relation to the suggested norms and estimates the deficiencies and resource requirements for the period 1997 to 2001 and from 2001 to 2011.

The exercise of estimating gaps and resource requirement in infrastructure services is largely based on the information collected by the Working Group set up by the Government of Gujarat for preparing the ninth plan strategies. The sample size used for analysis comprises of 144 cities distributed across the state. The zone wise distribution of the urban areas considered for analysis by size class is presented below in Table 3.1.

Table 3.1: Size-class Distribution of Sample Towns

Region	Size-Class of Towns					Total
	Corporations	Above 100000	50000-100000	20000-50000	5000-20000	
South	2	2	5	8	9	26
Central	1	2	4	13	9	29
North	-	4	6	2	11	22
Saurashtra	3	6	8	16	27	61
Kutchchh	-	1	2	2	1	8
Total Sample	6	15	25	41	57	144
Total Towns	6	22	25	51	121	225

Water Supply

The quantity and quality of water supplied is a matter of grave concern. Wide disparities in the population coverage and levels of supply between and amongst the different size class towns have been observed. To a large extent the cities in Kutchchh and many cities in Saurashtra remain poorly served.

In most corporations, water supply schemes are designed and executed by GWSSB and subsequently transferred to local the authorities for operations and maintenance. Within the corporation areas, local bodies themselves undertake the finance, planning, design, operation and maintenance of the system.

Sources of Water

The corporations in Gujarat are mainly dependent on surface water sources (rivers/dams or lakes). Ahmedabad, Surat and Vadodara, to some extent draw water from tube wells. In case of other towns, dependency on ground water is very high with 70 per cent of the towns

relying on the same (Table 3.2). It should to be noted that about 13 per cent of the towns depend on hand pumps or pressure pumps which are not reliable both in qualitative and quantitative terms.

Table 3.2 : Distribution of Urban Areas (non corporations) by Source of Water

Source	Town class (%)				
	A	B	C	D	Total
Surface water	44.44	33.33	25.00	27.59	28.87
• Dams	33.33	22.22	14.58	8.62	14.79
• Other. Schemes	11.11	11.11	10.42	18.97	14.08
Ground water	55.56	66.67	75.00	72.41	71.13
• Tube wells	33.33	59.26	37.50	44.83	44.37
• Wells	11.11	14.81	18.75	31.03	22.54
• Others	11.11	3.70	18.75	13.79	13.38
Total	100 .00	100.00	100.00	100.00	100.00

Coverage and Levels

Details of population covered by water supply and the levels of supply by cities and by size-class of towns are presented in Table 3.3 and 3.4. The rate of supply within the corporation limits is reasonable, at an average of 140 lpcd. The per capita supply in Jamnagar municipal corporation is lowest at 105 lpcd while Bhavnagar has the highest supply level at 180 lpcd. However, the situation in peripheral areas of corporations is very poor. Information on the six metropolitan peripheral settlements was available. The average supply levels in these areas is as low as 47 lpcd.

Coverage of population with potable water is also found to be reasonably high, except in Surat. In most corporation areas about 8 to 10 per cent of the total population depends upon public stand posts where as 12 per cent have to fend for themselves.

Table 3.3: Population Served with Water Supply

City	LPCD	Population (%)		
		Covered by Water	Covered by Post	Not Served
1. Ahmedabad	135	76	16	8
2. Surat	166	67	NA	33 (tankers sent in some areas)
3. Vadodara	141	98	NA	2
4. Rajkot	135	85	NA	15
5. Jamnagar	105	99	NA	1
6. Bhavnagar	180	90	NA	10

Note: NA - not available.

Table 3.4: Distribution of Urban Areas (excluding corporations) by Level of Supply

LPCD	Town Class (%)				
	A	B	C	D	Total
<50	0.00	15.00	29.63	50.00	30.95
75	0.00	10.00	25.93	16.67	16.67
100	28.57	35.00	22.22	16.67	23.81
125	14.29	20.00	7.41	6.67	10.71
150	42.86	10.00	11.11	3.33	10.71
>150	14.29	10.00	3.70	6.67	7.14
Total	100.00	100.00	100.00	100.00	100.00
Total Samples	(7)	(20)	(27)	(30)	(84)
Average	98	80	64	56	71
Minimum	79	19	22	17	19
Maximum	130	187	152	179	179

Sewerage

In case of urban areas other than corporations the functioning of sewerage schemes is similar to that of water supply schemes. The schemes are designed and constructed by the GWSSB and transferred to the local bodies for maintenance. Funding is through the state government as well as GMFB. The corporations themselves design, construct, operate and maintain the systems within municipal limits. Borrowings are from HUDCO and other international agencies.

Network

Except Jamnagar, which has a surface drainage network, all other cities have reasonable levels of UGD networks. In Ahmedabad, Vadodara and Surat, about 40 per cent of the population depends on septic tanks, cess pools or does not have any facility at all. The proportion of such population in Jamnagar and Bhavnagar is comparatively lower at 10 and 12 per cent respectively. Amongst the non-corporation cities only 28 per cent towns have UGD facilities, the dependency is largely on the surface drainage system (Table 3.5). The population coverage in most cities is limited, there is some level of coverage only in 42 settlements, while in others there is only a nominal coverage.

Sewage Disposal Systems

All the corporations have treatment plants (Table 3.6). Though their operational status is doubtful. Only 11 other remaining towns have oxidation ponds, whereas the remaining towns dump waste into rivers, streams/sea or on open ground. In a few cases the waste is used for irrigation.

Table 3.5: Distribution of Urban Areas by Type of Drainage System (other than corporations)

Drainage System by Type	Town Class (%)				
	A	B	C	D	Total
U.G.D	33.33	50.00	29.73	11.63	27.83
Surface drainage	44.44	38.46	54.05	60.47	52.17
Septic tank	22.22	11.54	16.22	27.91	20.00
Total	100.00	100.00	100.00	100.00	100.00

Table 3.6: Sewage Disposal System by Size-class of Towns

Town Class	Treatment Plant	Oxidation Pond	Dump Into River/Sea	Other Areas
M.Crop.	6	-	-	-
A Class	-	-	-	3
B Class	-	3	2	17
C Class	1	6	5	19
D Class	-	2	5	25

Solid Waste Management

Solid waste management became a matter of serious concern after Surat's "plague". Since then, all corporations have been giving special importance to this sector. Detailed information on only three corporation cities is available. For the other cities only manpower and vehicle details are available. Based on these details, the existing situation has been presented in the following sections.

As presented in Table 3.7, the daily collection performance varies between 67 per cent to 93 per cent in the cities of Gujarat. The performance of Surat stands out amongst all the cities.

Table 3.7: Solid Waste Generation and Collection in Corporation Cities – 1995

Town	Population (milliion)	Generation (Tonnes/day)	Collection (Tonnes/day)	Percentage Collection	Per Capita Collection (Grams)
Ahmedabad	3.29	1718	1275	74.21	409
Vadodara	1.11	469	315	67.16	259
Surat	1.51	1073	895	93.16	491

Source: Parikh (1997), Solid Waste Management of Corporation Indian Cities, PG Dissertation, SP, Ahmedabad and study estimates.

Role of NGO'S/CBO'S

In the large cities of Gujarat, organisations such as Self Employed Womens' Association, Vadodara Citizen Council, are taking part in solid waste management by contributing in collection and separation of solid waste. However, the assistance from these agencies is limited to 2 - 3 per cent.

System of Waste Collection

Ahmedabad and Surat have a mechanised system of loading and unloading while other cities essentially carry out the tasks of loading manually.

Private Participation

Solid waste collection being manpower intensive, the public bodies were found to be inefficient because of "Ghost Labourers". Corporations in Gujarat have successfully involved the private sector in collection and transportation of waste. In Surat, transportation of waste is done through private contracts in four zones. The cost ranges from Rs. 70 to 90 per ton. With this arrangement 58 per cent of the transportation cost accrues to the corporation as savings due to privatisation. In Rajkot also, solid waste collection in some zones is done via private contractors.

Disposal

The corporations as well as other cities in Gujarat dispose waste in landfill sites. Sanitary landfilling is not practised. Ahmedabad has made the first attempt of producing fertilizer only recently.

Hospital Waste

Hospital waste collection and its incineration is a critical problem. Ahmedabad is in the process of devising an appropriate system for managing hospital waste. But its disposal in other corporation cities as well as non corporation cities is still a matter of concern.

Industrial Waste

The problem of disposal of hazardous industrial waste is assuming serious proportion. Though this is expected to be outside the purview of local authorities, the recent High Court judgement has made local authorities responsible for facilitating safe disposal of industrial waste. Subsequently, Gujarat Pollution Control Board (GPCB) has issued guidelines for the disposal of industrial wastes.

Information on collection of solid waste is not available for other cities. As per the NIUA (1991) survey, Class A, B and C cities collected only about two-thirds of the waste generated, which is very poor.

Population per safai kamdar is an important parameter concerning solid waste management in cities. Although clear cut norms are not available for this parameter, comparison of cities in terms of average, minimum and maximum, sufficiency and efficiency may be evaluated. As expected the number of persons per safai kamdar increases with a decrease in the city size. However, marked variations exist within the size class, as depicted below in Table 3.8. The range of population served per safai kamdar varies from 213 to 2,337.

Table 3.8: Manpower for Solid Waste Management

Source	Population Served Per Safai Kamdar				
	Town Class				
	Corportion	A	B	C	D
Average	435	450	599	766	656
Minimum	402	241	213	306	273
Maximum	487	981	2018	2337	1614

Roads

Road Density

In terms of averages, in the Class I cities including corporation areas, the road availability measured through road density appears to be fairly adequate. Marked differentials exist however, between urban areas. Amongst the corporation areas, Ahmedabad, Surat and Bhavnagar appear deficient with a low road density of 6.5, 6.2 and 2.6 Kms./per sq.km. respectively. Other corporation cities as well as other Class A towns have a fairly high level of road density (Table 3.9).

Table 3.9: Road Densities and Surface Quality

Source	Town class				
	Corporation	A	B	C	D
	Density (km./sq.km.)				
Average	10.4	14.2	6.7	5.1	1.7
Minimum	2.6	9.1	1.1	0.2	0.1
Maximum	17.5	20.4	12.0	45.0	10.0
% Pucca road					
Average	84.16	58.20	70.02	63.57	60.19
Minimum	73.86	31.29	35.73	27.70	5.53
Maximum	92.93	83.45	100.00	100.00	97.42

The Class B and C towns with an average density of 6.7 and 5.1 kms./per sq.km. respectively, are fairly well placed, expect for few towns having road densities as low as 0.2 and 1.1. In Class D towns, though the situation is poor given the size, the question of roads may not be of critical importance.

Surface Quality

In terms of surface quality, corporations and Class B towns have a reasonably high proportion of "pucca roads". But the situation in Class A towns is quite poor (Table 3.10).

Table 3.10: Surface Quality of Roads

(in kms.)

Town Class	No.	Total Surfaced	Total Unsurfaced
M. Corporation	6	4126 (72.87)	1536(27.13)
A Class	4	526(57.17)	394(42.83)
B Class	22	1055(68.68)	481(31.32)
C Class	31	602(59.13)	416(40.87)
D Class	32	452(55.87)	357(44.13)

Note: Figures in parentheses are percentages to total road length.

Street Lights And Poles

Street lights form an important element of infrastructure which is associated with roads. The service levels of street lights depend upon the spacing between the lamps. Table 3.11 below gives the existing situation of street lights for different categories of towns.

Table 3.11: Street Light Spacing on Roads

Town Class	No.	≤25 mts.	25-50 mts.	50-75 mts.	75-100 mts.	≥100 mts.
M.Corporation	6	16.6	50.0	33.4	-	-
A Class	6	-	75.0	25.0	-	-
B Class	22	19.0	42.9	19.0	9.5	9.5
C Class	27	25.9	33.3	22.2	7.4	11.1
D Class	24	25.0	33.3	29.2	4.2	8.3

The number of tube lights in an area have a direct relation to the road length. In an area, their sufficiency depends upon the road width, traffic volume and land use. For a normal two lane road the spacing should be around 25 mts. in large cities. The average spacing of street lights on the present roads in most towns ranges between 25 -50 mts. and 50 to 75 mts. Only 20 per cent of towns have street lights in sufficient quantity.

Public Transport

The proportion of trips serviced by the public transport system and fleet availability per 100,000 population are two critical indicators of the supply levels of public transport. Table 3.12 below clearly indicates a very low level of public transport supply in the cities of Gujarat.

Table 3.12: Public Transport Supply Levels

Town	% Trips Serviced by PTS		Fleet Availability (Buses per 100,000 Population)
	High Estimates	Low Estimates	
Ahmedabad	16.8	13.9	19
Surat	8.8	7.6	9
Vadodara	11.1	9.5	13
Rajkot	6.4	3.5	9

The main reason for the poor state of affairs in public transport is the acute resource constraints faced by the agencies which have limited resources for fleet replacement, augmentation, and supportive infrastructure development.

GAPS AND RESOURCES REQUIRED

Estimation of resource requirements for urban infrastructure at Gujarat level is beset with problems pertaining to information availability, varying costs, physical standards, etc. However, at the policy level, even indicative estimates are useful. Details of standards/norms and the implied gaps and resource requirements are presented below.

Water Supply

Water Supply Norms

The requirements for water supply are based on the assumption that the total population should be covered with adequate quantity of potable water. The water requirements are dependent upon, apart from other factors, the type of land use, climatological conditions and economic conditions of the cities. Most areas in Gujarat have extreme climatic conditions, and the state is also economically well off, thus the supply requirements have thus been kept as presented below in Table 3.13.

Table 3.13: Water Supply Standards

Local Bodies	LPCD
A Class Town	140
B Class Town	130
C Class Town	110
D Class Town	100
Municipal Corporation	160

Mode of Water Supply

It is recommended that the entire population residing within the area under control of local bodies should be covered by house service connections (HSC). Presently, as indicated in

earlier sections, the population coverage by potable water supply is poor, especially in the non corporation areas.

Unit Cost of Provision of Water

The cost of supplying water has been based on HUDCO study on 'Cost Analysis of Urban Infrastructure Projects' (Table 3.14). HUDCO has estimated the cost of provision as well as distribution of the water supply schemes based on cost estimates of various schemes financed by it.

Table 3.14: Cost of Provision of Water

(Rs. in 100,000/MLD)

Source	Tube Wells			River/Reservoirs			Canal
Distance (Km.)	0-5	5-10	10-15	0-5	5-10	10-15	0-5
Average Cost	35.75	71.0	79.10	55.92	79.22	91.14	44.88
Distribution System		Rs 150-200/Capita					

Source: HUDCO.

Gaps and Resource Requirements

The gaps have been estimated in terms of additional requirements during the time period 1997 to 2001 (which is inclusive of existing gaps), and 2001 to 2011 (Table 3.15).

Table 3.15: Water Supply Requirements

(at 1996 prices)

Town Class	No. of Towns	Population 1996*	Avg. qty of wate supplie (mld	Additional requirement upto 2001 (mld)	Additional requirement 2001-2011 (mld)	Per capita cost of distribution (in Rs.)	Add. Fund required upto 2001 (Rs. in million)	Add. Fund required 2001-2011 (Rs. in million)
A	20	2,988,755	127.6	160	85	150	993.5	579.9
B	26	1,744,986	57.8	181	41	150	575.3	290.6
C	62	1,826,035	22.4	201	36	100	359.5	249.0
D	111	1,315,453	9.6	133	13	100	257.5	151.1
M	6	8,541,867	1591.9	356	240	150	2856.8	2303.5
						Total	**5042.6**	**3574.1**

Note : (I) A=A Class Town, B= B Class Town, C= C Class Town, D= D Class Town, M= Municipal Corporations
(ii) Average cost per MLD in corporation cities is Rs.7.9 million and in other towns, it is assumed as Rs.7.1 million.
(iii) * Figures of population for the year 1996 are estimated.

Sewerage

All corporations have reasonable levels of UGD network, but the area coverage still remains inadequate. Within the non corporation areas, prime dependence is on the surface drainage system.

Norms

The norms for sewerage and sanitation have been fixed on the basis of population to be covered under different safe disposal systems. Unit costs have been based on the proposed project in Tamil Nadu, Karnataka and Gujarat. The unit cost per capita is assumed to be at Rs. 2,500 for under ground drainage system and Rs. 800 for low cost sanitation systems. It is assumed that municipal corporations and A Class towns will have a under ground drainage system for the entire city, whereas the other towns would have a combination of both systems.

Gaps and Resource Requirements

The gaps in the sewerage system have been estimated considering the total population to be covered by various systems for the target periods (Table 3.16).

Table 3.16: Resource Requirement for Sewerage

(at 1996 prices)

Town Class	No.	Population to be covered (in million)			Per Capita Cost (Rs./capita)	Total Capital Investment (in million Rs.)	
		1996	2001	2011		Upto 2001	2001-2011
A Class	20	0.39	0.99	1.66	2000	1969.4	1160.0
B Class	26	0.26	0.66	1.00	2000	1717.9	502.8
C Class	62	0.20	0.50	0.85	1500	1280.8	345.8
D Class	111	0.18	0.36	0.57	1500	906.9	209.9
M.Corporation	6	0.68	2.48	4.48	2500	8634.0	5003.3
Total						**14509.0**	**7221.8**

Solid Waste Management

Manpower Requirement

Street cleaning is a primary activity in solid waste management. The efficiency of street cleaning depends to a great extent on the number of conservancy staff employed, or on the road length to be cleaned by one person. The public health department prescribes the norm of 400 to 600 mts. road length/sweeper depending upon the population density (Table 3.17).

Table 3.17: Average Distance per Conservancy Staff

Category	Average (Mts.)	Minimum (Mts.)	Maximum (Mts.)
A Class	423	369	533
B Class	11445	1322	34550
C and D Class	22231	14887	29576
M. Corporation	280	145	364

The requirements for manpower have been staggered over the time period for which the SWM estimates have been calculated (Table 3.18).

Table 3.18: Manpower Requirement

Town Class	No.	No. of cleaners presently employed	Additional cleaners required upto 2001	Additional cleaners required 2001-2011
A Class	20	6655	1700	1200
B Class	26	3829	2350	1600
C Class	62	3858	4600	3100
D Class	111	3878	23200	15500
M. Corporation	6	17720	18300	12200
Total			**50150**	**33600**

Roads

Investment in the road sector is needed for upgrading the existing roads and laying of new roads, wherever inadequate. The provision of roads is fairly adequate in Class I cities. However in corporations of Surat, Ahmedabad and Bhavnagar the provision of roads is deficient. Similarly, in smaller towns provision of the same is grossly inadequate.

Norms

The total requirement has been based on the fact that the roads presently unsurfaced will be surfaced and that all the roads shall be converted into BT. The average width of the newly laid/upgraded roads has been estimated at 7 mts.

Unit Cost

The costs likely to be incurred for upgrading/laying of new roads at 1996 prices have been shown in Table 3.19.

Table 3.19: Cost of Laying /Upgrading of Roads

(1996 Prices)

Category	Cost (in million Rs.)	
	Upgradation	New laying
A Class Towns	0.40	1.2
B Class Towns	0.39	1.2
C Class Towns	0.39	0.8
D Class Towns	0.30	0.8
Municipal Corporation	0.40	1.5

Gaps and Resource Requirements

Gaps in roads are estimated based on the existing situation and the target to be achieved as per the norms (Table 3.20).

Table 3.20: Resource Requirement for Roads

Town Class	No.	Total Surfaced roads (in kms.)	Additional road length required (in kms.)				Resource requirement (in million Rs.)	
			New laying upto 2001		Upgradation			
			upto 2001	2001-2011	upto 2001	2001-2011	upto 2001	2001-2011
A Class	20	2630	86	129	1379	590	587.7	362.0
B Class	26	1246	680	1020	398	170	1117.4	1500.7
C Class	62	1204	950	1420	583	250	906.5	1191.9
D Class	111	1567	5712	8570	866	371	4758.1	6895.3
M. Corporation	6	4126	458	686	573	245	769.0	975.8
Total			**7886**	**11825**	**3799**	**1626**	**8338.7**	**10925.7**

Street Lights

The number of street lights per kms. road length is an indication of adequacy of street lighting. Generally, for a two lane road the street lights are placed 25 mts. apart. The provision of tube lights as indicated in Table 3.22 is marginally below the standards in municipal corporation where as in non corporations it is grossly inadequate.

Norms

A minimum spacing is required between successive lamp posts and this is dependent on road width, traffic, volume and land use. In a normal two lane the preferred spacing is 25 mts. but this could vary with the nature of different locations (Table 3.21).

Table 3.21: Average Street Light Spacing

Category	Average (mts.)
Corporation	25
A Class	40
B Class	55
C Class	60
D Class	60

Unit Cost

In corporations, the distribution of sodium vapour lamps is 60 per cent for 70 watts, 30 per cent for 150 watts and 10 per cent 250 watts. In case of municipalities, it is 70, 20 and 10 per cent respectively, and for smaller towns tube lights are proposed. Based on the market rates the units costs have been adopted (Table 3.22).

Table 3.22: Capital Cost Required (1996 prices)

Town Class	Unit Cost Of Lights	
	Sodium Vapour	Tube Lights
M. Corporation	7430	4100
A Class	7430	4100
B Class	7075	4100
C Class	5800	3500
D Class	5800	3000

Gaps and Resource Requirements

The gaps have been worked out on the basis of the above (Table 3.23). The emphasis has been on providing adequate quantity of street lights on all roads.

Table 3.23: Street Light Requirement

Town Class	No.	Additional street lights required Upto 2001	Additional street lights required 2001-2011	Resource requirement (in million Rs.) Upto 2001	Resource requirement (in million Rs.) 2001-2011
A Class	4	79665	53110	591.9	394.6
B Class	22	32327	21552	286.6	194.5
C Class	31	65068	43378	460.3	306.9
D Class	32	529565	353044	307.1	204.8
M. Corporation	6	20395	13596	151.5	101.0
Total				**1797.4**	**1201.8**

Public Transport

Fleet and Infrastructure Augmentation Requirements

Various committees have recommended a very high level of fleet availability ratio at 45 to 50 buses per 100,000 population. However, in the immediate future achieving such levels, given the present low level is an impossible task. Therefore, reasonable city-wise targets at 30, 25, 20 and 15 buses per 100,000 population for Ahmedabad, Surat, Vadodara and Rajkot respectively have been set. These targets are to be achieved by the end of the plan period

through a gradual increase in fleet strength. The fleet procurement plan and fleet strength are also presented below in Table 3.24.

Table 3.24: Additional Fleet Requirements

City	1997	1998	1999	2000	2001
Ahmedabad					
Total new buses	207	219	232	248	265
Total fleet	852	960	1,081	1,218	1,372
New depots	2	2	2	1	2
Surat					
Total new buses	67	76	88	102	120
Total fleet	216	266	328	404	498
New depots	1	1	1	1	1
Vadodara					
Total new buses	52	56	61	66	73
Total fleet	200	231	267	308	356
New depots	0	1	1	0	0
Rajkot					
Total new buses	24	25	28	30	33
Totalfleet	87	100	116	134	155
New depots	0	1	0	0	0

RESOURCE REQUIREMENT FOR BASIC SERVICES

The analysis of existing infrastructure facilities in terms of adequacy and requirement reveals that the present provision of services is highly inadequate. The total resource requirement to meet with basic infrastructural needs upto 2001 is to the tune of Rs. 30 billion. The additional requirement during the period 2001 and 2011 is estimated at Rs. 23 billion as shown in Table 3.25.

The loan assistance received by the urban sector is limited. HUDCO lending has been in the order of Rs. 200 to 250 million per annum. In addition, during 1987-1995, through World Bank assistance, Rs. 1170 million worth projects were completed. Efforts to enhance external funding and generation of resources through public private partnerships are the means towards bridging these gaps. Prioritising and phasing of investment programme by sectors, and by urban area revisions in standards are also equally important tasks to be undertaken.

URBAN HOUSING

Access to decent and adequate housing including basic services and amenities is a principal determinant of quality of life in urban areas. The attempt in this section is to present an overview of housing conditions in urban Gujarat and forecast the requirements upto the year 2011 A.D.

Table 3.25: Resource requirement for Infrastructure Services

(in million Rs.)

Service	M.Corp.	A Class	B Class	C Class	D Class	Total
Water Supply						
· upto 2001	28,56.8	9,93.5	5,75.3	3,59.5	2,57.5	50,42.6
· 2001-2011	23,03.5	5,79.9	2,90.6	2,49.0	1,51.1	35,74.1
Sewerage						
· upto 2001	86,34.0	1969.4	17,17.9	12,80.8	9,06.9	145,09.0
· 2001-2011	50,03.3	1160.0	5,02.8	3,45.8	2,09.9	72,21.8
Solid Waste (Man power Required)						
· upto 2001	18,30.0	1,70.0	2,35.0	4,60.0	23,20.0	50,15.0
· 2001-2011	12,20.0	1,20.0	1,60.0	3,10.0	15,50.0	33,60.0
Roads						
· upto 2001	769.0	587.7	1117.4	906.5	4758.1	83,38.7
· 2001-2011	975.8	362.0	1500.7	1191.9	6895.3	109,25.7
Street Lights						
· upto 2001	1,51.5	5,91.9	2,86.6	4,60.3	3,07.1	17,97.4
· 2001-2011	1,01.0	3,94.6	1,94.5	3,06.9	2,04.8	12,01.8
Total of Basic Services						
· upto 2001	124,11.3	41,42.5	36,97.2	30,071	62,29.6	296,87.7
· 2001-2011	83,83.6	24,96.5	24,88.6	20,936	74,61.1	229,23.4

Housing Formation and Housing Supply Levels

A key variable determining housing requirements is the rate of household formation. In Gujarat, the average size of family has declined from 5.76 in 1971 to 5.33 in 1991, implying enhanced rate of household formation (Table 3.26). During 1981-91, a total of 780,000 households were added . If the trend continues, 1.3 and 1.5 million households are likely to be added during the time periods 1991-2001 and 2001-11 respectively.

Table 3.26: Overall Housing Trends

Year	Population	House-Holds	Occupied Housing Units	Average Family Size	Occupancy Rate
1971	7496500	1301205	1266335	5.76	5.91
1981	10601653	1895057	1876432	5.59	5.65
1991	14246061	2673960	2531280	5.33	5.63

Source : Census of India, 1971, 1981, H -Series V, Gujarat, VIII A & B (i);
Census of India 1991, H. Series Tables.

Vacancy Rate

To enable residential mobility, moderate levels of vacancy rates are essential. However, in urban Gujarat, vacancy rates in 1991 are very high at 15 per cent, which has risen from 11

per cent in 1981 (Table 3.27). There are many reasons for houses to remain vacant. In large urban areas high vacancy rates are likely to be related to rent control.

Table 3.27: Vacancy Rates

	1971	1981	1991
Total Urban H.U.	1866875	2702285	3749105
Vacant H.U.	208660	310045	580275
Vacancy Rates (%)	11.17	11.47	15.47

Source : Census of India, 1971, 1981, H -Series V, Gujarat VIII A & B (i); Census of India 1991, H. Series Tables.

Tenure Status

Significant shifts in the tenure status has been observed during 1981-91. The proportion of households living in own houses has increased from 50 per cent to 66 per cent (Table 3.28). This phenomenon by itself looks positive. However, the situation needs to be considered with respect to other attributes in order to arrive at a firm conclusion.

In terms of tenure and household size relationship, as expected, the proportion of owner occupied households increase with an increase in the family size.

Table 3.28: Share of Urban HH's by Size and Tenure Status in Gujarat

Tenure/ HH size	1-2		3-5		6+		All	
	1981	1991	1981	1991	1981	1991	1981	1991
Owner Occupied	106,705 (41.03)	186,920 (55.62)	360,385 (45.85)	817,555 (63.52)	499,475 (59.02)	770,020 (73.87)	955,250 (51.48)	1,777,185 (66.46)
Rented	153,375 (58.97)	133,385 (39.68)	425,475 (54.14)	427,910 (33.26)	346,730 (40.98)	245,580 (23.56)	925,580 (49.51)	808,765 (30.24)
Others	-	15,735 (4.7)	-	41,490 (3.22)	-	26,780 (2.56)	-	84,005 (3.29)
Total	260,080 (100.00)	336,040 (100.00)	785,860 (100.00)	1,286,955 (100.00)	846,205 (100.00)	1042380 (100.00)	1,892,145 (100.00)	2,673,960 (100.00)

Source : Census of India 1981, H - Series V, Gujarat, VIII A & B (i); Census of India 1991, H. Series Tables.

Note : Figures in parentheses indicate percentage to 'All'.

Crowding

Improvement in the situation with respect to the level of crowding has been observed. The proportion of households living in one room house has come down to 39 per cent in 1991 from 46 per cent in 1981 (Table 3.29). However, of these households, about 35 per cent have a family size of more than 6 members and another 49 per cent have a family size between 3 and 5 members. This shows that still a large number of households live under crowded housing conditions.

Table 3.29: Distribution of Urban Household by Size and Room Occupied

HH size	No. of Rooms					
	One		More than one		All	
	1981	1991	1981	1991	1981	1991
1-2	154,525 (18.12)	168,800 (16.52)	105,555 (10.59)	167,240 (10.23)	260,080 (14.06)	336,040 (12.65)
3-5	384,740 (45.11)	504,830 (49.42)	401,120 (40.23)	782,125 (47.87)	785,860 (42.48)	1,286,955 (48.46)
6+	313,705 (36.78)	353,970 (34.65)	532,500 (53.40)	702,985 (43.02)	846,205 (45.74)	1,056,955 (39.80)
Total	852,970 (46.10)	1,021,610 (38.45)	997,145 (53.90)	1,634,020 (61.55)	1,850,115 (100.00)	2,655,620 (100.00)

Source : Census of India 1981; Census of India 1991, H. Series Tables.
Note: Figures in parentheses indicate percentage to 'All'.

Quality of Housing

The urban housing condition with respect to the wall and roof material has been presented in Tables 3.30 and 3.31. It is clear that the over all housing condition in urban centres of the state has improved in terms of the quality of material used. With an increased percentage of houses having concrete roofs and burned brick wall, the number of pucca houses in the urban centres of the state has risen. However, one-fourth of the total housing stock is built with substandard building materials like grass, leaves, reeds, thatch, mud, etc., and requires upgradation.

Table 3.30: Housing Quality

Type of Material	Type of Roofing Material (% of Households)		Walling Material (% of Households)	
	1971	1991	1971	1991
Kuccha	35.3	23.60	51.00	7.94
Semi Pucca	31.3	28.22	3.70	7.88
Pucca	31.6	44.40	45.20	82.95
All other materials	1.8	2.40	0.10	0.54

Source : Census of India.

Table 3.31: Quality of Housing

Quality of Housing	Number Of Urban Households	Percentage To Total Urban Households
House holds in houses with roof material as grass, leaves, reeds, thatch, etc. and durable wall	606,440	16.17
Households in houses with roof materials as above and same wall material	267,710	7.14

Source : Census of India.

Basic Services

Water Supply: Despite decades of efforts, about a quarter of households still have to depend upon outside sources for water. Over 78 per cent of households have access to tap water, leaving 22 per cent to depend on handpumps and other sources (Table 3.32). The quality of water from hand pumps is not ensured.

Table 3.32: Urban Households by Source of Drinking Water in Gujarat

(Number of Connections)

(Number of connections/ %)\ **Place Of Availability Of Source**	**Taps**		**Hand Pumps**		**Others ***		**All**	
	1981	**1991**	**1981**	**1991**	**1981**	**1991**	**1981**	**1991**
Inside the house	1,048,120 (66.82)	1,589,700 (75.55)	31,150 (48.89)	120,130 (52.41)	65,180 (26.22)	170,120 (49.79)	1,144,450 (60.85)	1,879,950 (70.28)
Outside the house	520,395 (33.18)	514,505 (24.45)	32,560 (51.11)	109,075 (47.59)	183,415 (73.78)	171,555 (50.21)	736,370 (39.15)	795,135 (29.72)
All	1,568,515 (100.00)	2,104,205 (100.00)	63,710 (100.00)	229,205 (100.00)	248,595 (100.00)	341,675 (100.00)	1,880,820 (100.00)	2,675,085 (100.00)

Source : Census of India, 1981-Series V, Gujarat, VIII A & B (ii); Census of India, 1991, H. Series Tables.

Note : (i) * Others include well, river, canal, tank and so on.
(ii) Figures in parentheses are percentage to 'All'.

Sanitation: There has been an improvement in the availability of toilets over the past decade. Inspite of an increase in the provision of toilets, one-third of the populace (comprising mostly of slum dwellers) still has to makedo without this basic service (Table 3.33).

Table 3.33: Urban Households by Availability of Toilet Facilities in Gujarat, 1991

Toilet Facility			
Available (%)		**Not Available (%)**	
1981	**1991**	**1981**	**1991**
60.00	64.00	40.00	36.00

Source : Census of India, 1981 and 1991, H. Series Tables.

Slums

The slum population in the state has increased from 1.89 million to an estimated 2.44 million in 1990. In larger cities one person among every four persons is a slum dweller. These slums are located primarily on government land lying vacant and therefore freely accessible to the poor for encroachment. This trend is prevalent in most of the Corporation areas except Jamnagar where more private land has been encroached upon (Table 3.34 & 3.35).

Table 3.34: Households in Slum Areas (Corporations)

(percentage)

Urban Area	1973	1983	1990
Jamnagar	31.20	24.6	20.82
Rajkot	09.57	16.4	23.90
Bhavnagar	13.24	14.9	16.18
Ahmedabad	22.80	23.9	24.90
Vadodara	13.10	13.8	14.31
Surat	23.10	24.1	24.80

Source : Mehta, Meera and Mehta, Dinesh, Housing Strategies for the Eight Plan: A Perspective for Gujarat State - 1990.

Table 3.35: Distribution of HH's Living in the Slums Located on Public and Private Lands

(percentage)

City	Proportion of HH's living in the slums in 1990 on	
	Government Land	Private Land
Vadodara	95	5
Rajkot	81	19
Bhavnagar	79	21
Surat	62	38
Ahmedabad	55	45
Jamnagar	46	54

Source : Mehta, Meera and Mehta, Dinesh, Housing Strategies for the Eight Plan: A Perspective for Gujarat State - 1990.

Requirements for Land and Housing

Urban Land

The total annual requirement of urban land in the state is nearly 1,835 ha. for the time period 1991- 2001, and 2,287 ha. from 2001 to 2011 (Table 3.36). The level of land servicing by formal mechanism is only about 60-65 per cent. Mechanisms to expedite the process are needed.

Table 3.36: Annual Requirements of Land for Urban Gujarat by Use for Different Purposes

(in ha.)

Year	Total Requirement	Requirement for Housing	Requirement for Commercial Use	Requirement for Industrial Use
1991-2001	1,835	618	50	154
2001-2011	2,287	771	62	192

Urban Housing Requirements

The trends in occupancy rates, household sizes and the growth of urban population have been analysed in order to enable the estimation of the housing requirements. In urban Gujarat, there has been a decline in the average family size and the rate of household formation has increased substantially during 1981-91 period. This trend, implies an additional housing requirement of 1.29 and 1.52 million during 1991-2001 and 2001-2011 respectively (Table 3.37).

Table 3.37: Housing Requirements

Year	Urban Population	Total House-holds	Housing Needs	Additional Requirement
1991	14246061	2673960	2922869	-
2001	18835351	3671608	4166174	1287148
2011	24555141	4995960	5618955	1515274

Efforts from Public Agency

Gujarat Housing Board (GHB) and Gujarat Slum Clearance Board (GSCB) are responsible for the public supply of housing. But the construction activities of GSCB are in the process of being shifted to GHB. Once the transfer procedure is completed, GHB will have to cater to the entire lower income group and economically weaker section housing demand for Gujarat.

Gujarat Housing Board has constructed 1,52,284 houses till 31-03-97. The major thrust of the Board is on the construction of lower income group houses. On an yearly basis the GHB constructs between 3,000 to 7,000 houses and the per house expenditure incurred by GHB varies between Rs. 62,648 per house to Rs. 116,010 per house (refer chapter four for details).

Table 3.38 below shows achievements in house construction by GHB and GSCB during the eighth five year plan period (1992-97).

Table 3.38: Eighth Five Year Plan Achievement in Residential Housing, 1992-97

(no. of housing units)

Agencies	992-93	993-94	994-95	995-96	1996-97 (Likely)	Total (Likely)
Gujarat Housing Board	1422	1833	5197	4141	1380	13973
Gujarat Slum Clearance Board	312	2112	208	0	0	2632
Total	1734	3945	5405	4141	1380	16605
Cumulative Total	1734	5679	11084	15225	16605	0

Source : Respective Organisation

There is a great deal of imbalance in the scale of operations of GHB and GSCB on the basis of city-size and regional distribution. About 81 per cent of houses constructed by GHB and 95 per cent constructed by GSCB are confined to the six municipal corporation areas. Even among these, 70 per cent houses supplied by GSCB and 60 per cent supplied by GHB, are in Ahmedabad alone.

Table 3.39 below gives the type-wise distribution of housing units during the eighth five year plan period (1992-97).

Table 3.39: Eighth Five Year Plan Achievement by Type of Housing Unit, 1992-97

(no. of housing units)

Type of house	1992-93	1993-94	1994-95	1995-96	1996-97
Site and Services	-	-	-	-	-
E.W.S	361	1,403	3,202	2,138	800
L.I.G	1,373	2,542	2,203	2,003	580
Total	1,734	3,945	5,405	4,141	1,380
Cumulative Total	1,734	5,679	11,084	15,225	16,605

Regulatory Mechanisms

A series of regulations on land use and building control determine the use of urban land in Gujarat. These are Bombay Land Revenue Code 1879, Land Acquisition Act 1894, Gujarat Cooperative Societies Act 1961, Gujarat Municipalities Act 1965, Urban Land Ceiling and Regulation Act 1976 and Gujarat Town Planning and Urban Development Act 1976.

But these laws are not effective in promoting, guiding and regulating building control activities because of the fact that they are outdated and have not been suitably updated since their inception. The specifications given by these regulations show a great deal of variation not only between cities but also within cities.

The Rent Control Act and Property Tax are not favorable for an extension in size of the existing houses. For example, in Ahmedabad 90 per cent of the rent is charged as property tax for commercial use, including from houses put up for rent. This results in the under utilisation of land, restricting land owners to construct exclusively for personal use. According to a study conducted by ASAG, of the 80 housing societies surveyed in 1989, as against the permissible FSI of 1, only 47 per cent had been utilised[2].

The Urban Land Ceiling Act, though seen as a boom for providing land for housing to the weaker sections of society, has been a failure. As against the 44,000 hectares of identified surplus land, during the Act's existance of 20 years, only 2 per cent of this land was finally acquired. As regards the disposal of land under Section 23, only 0.24 per cent was disposed. This poor track record over the 20 year time period, is sufficient evidence to scrap the Act.

[2] Study by ASAG (Ahmedabad Study Action Group) on intensity of densification – 1989.

The other tool available for land acquisition is the Land Acquisition Act of 1894, used in order to acquire land reserved for public purposes including housing. But this tool also has certain limitations. Delay due to court litigation, in particular is a common problem.

Summary

The overall housing situation in the state has shown some improvement in the past decades. This is evident from an improvement in the quality of housing, reduced crowding and increase in supply levels. However, a huge back log in the housing sector still remains to be fulfilled. Supply levels of serviced land and formal housing are still inadequate.

The instruments responsible for the provision of housing and land need to be re-examined in terms of their impact on the overall housing scenario in the state. There is a need to explore the possibility of public-private partnerships in the provision of housing and serviced land The use of Transfer of Development Rights (TDR) as a tool to aquire land also needs serious consideration.

URBAN ENVIRONMENT

The accelerated pace of urban and industrial growth in Gujarat has brought to the forefront a host of problems. The most important of these are the lack of urban infrastructure and housing and deterioration of the urban environment and quality of life. This section presents the extent of environmental deterioration in urban Gujarat.

Air Pollution

Industries and vehicular emissions are posing a serious health hazard in the urban areas of Gujarat. This section deals with the sources and levels of air pollution.

Transport

The number of registered motor vehicles has increased more than three fold in the past decade, from 1.1 million in 1985-86 to 3.38 million at the end of 1995-96 (Table 3.40). More than 350,000 vehicles were registered during the year 1995-1996 of which 70 per cent were two wheelers. These vehicles are petrol driven, with two stroke technology, due to which the emission levels are higher. Based on the vehicular utilisation factors, it is estimated that about 200,000 tons of carbon monoxide was emitted in the air in 1981, which increased by six-folds by the year 1996.

Industries

Industries are yet another major cause of air pollution. Gujarat has registered a rapid growth in the number of factories in last two decades. The number of registered factories has grown from 10,674 in 1980 to 18,532 (provisional) at the end of the year 1995. In 1996 the working factories employed 820,000 workers (Table 3.41).

Table 3.40: Registered Motor Vehicles in Gujarat

Class of Vehicle	As on 31st March			
	1980	1985	1990	1995
Motor Cycle	241,165	566,813 (18.6)	1,257,826 (17.28)	2,109,897 (10.89)
Auto Rickshaw	31,053	52,861 (11.23)	98,917 (13.35)	137,335 (6.78)
Jeep	14,328	22,110 (9.06)	33,798 (8.86)	51,750 (8.89)
Motor Cars (Three and Four Wheelers)	52,817	82,836 (9.41)	141,584 (11.31)	222,049 (9.41)
Taxi Cabs	2,896	6,354 (17.0)	9,069 (7.37)	27,581 (24.91)
Buses	11,203	17,150 (8.89)	20,011 (3.13)	27,099 (6.25)
Trucks and Goods Vehicles	44,392	76,015 (11.35)	119,461 (9.46)	198,187 (10.65)
Tractors	32,492	61,400 (13.57)	85,386 (6.81)	134,479 (9.50)
Others	28,158	55,206 (14.41)	107,982 (14.35)	112,829 (0.87)
All Vehicles	458,504	940,745 (15.46)	1,874,034 (14.78)	3,021,186 (10.02)

Source : Socio Economic Review of Gujarat, Gujarat State, 1996-97.
Note : Figures in parentheses indicate average annual growth rates.

There has been a major shift in the composition of industries in Gujarat. In 1960 food beverages and tobacco industries accounted for one-third of the industries, Textile industries accounted for one-fourth of the total number of industries. In 1995, chemical industries and chemical products (except petroleum) emerged as a leading industrial sector accounting for 15 per cent of the total factories. This was followed by metallic and mineral products (10.60%), machinery and machine tools parts except electrical machinery (9.05 %). Textiles accounted for 14.90 per cent. In the small scale sector, very high growth rates were observed in the eighties. The number of small scale industries has grown from 15,849 in 1960 to 184,120 in 1996.

The spatial distribution of industries show that the largest concentration is in the Ahmedabad-Vadodara-Surat-Valsad corridor. Ahmedabad, Vadodara and Surat districts account for more than half of the total working factories in Gujarat. Rajkot, Bhavnagar and Jamnagar in Saurashtra region also account for a sizeable number of factories. Ahmedabad district has the largest number of small scale industries followed by Surat, Rajkot, Valsad and Vadodara.

The golden corridor (Ahmedabad-Vadodara-Surat-Valsad) belt and Bhavnagar-Jamnagar-Rajkot belt in Saurashtra with a high concentration of industrial activity, are experiencing high levels of industrial pollution.

Table 3.41: Industrial Mix (Factory Sector)

(in per cent)

Industry Group	1960		1970		1980		1985		1990		1992-93		1994		1995	
	Factory	Emp.	Factory	Emp.	Factory	Emp.	Factory	Emp.	Factory	Emp.	Factory	Emp.	Factory	Emp.	Factory	Emp.
20-21 Food products	14.85	6.13	12.72	7.49	10.03	8.77	7.94	10.13	7.4	8.53	10.85	9.21	7.96	8.89	7.73	8.97
22 Beverages	5.54	2.01	4.8	1.89	2.53	1.41	1.87	1.41	1.22	0.84	1.59	0.26	1.70	0.87	1.75	0.92
23 Textiles - Cotton	36.37	68.55	23.7	53.73	11.87	39.03	10.06	31.00	7.34	22.48	14.52	22.98	7.42	18.72	7.23	17.69
24 Wool, silk & synthetic fiber Tex.	-	-	-	-	4.82	5.61	5.63	6.34	5.33	7.68	13.94	10.77	8.22	10.27	8.13	10.44
26 Text products	0.33	0.10	0.25	0.16	1.69	0.99	1.71	1.86	1.46	1.74	2.75	1.80	1.71	2.04	1.80	2.16
27 Wood & wood products	2.63	1.14	2.54	1.04	5.85	1.08	6.12	1.23	5.66	1.16	0.33	0.03	4.95	1.29	4.81	2.04
28 Paper & paper products	4.52	1.64	3.97	2.24	3.52	2.45	3.73	2.76	3.54	3.79	3.92	2.29	3.94	2.99	3.89	3.12
30 Leather products	0.66	0.13	0.56	0.15	0.38	0.08	0.3	0.1	0.25	0.2	0.33	0.10	0.18	0.13	0.17	0.14
31 Rubber, plastic, petroleum & coal	2.9	1.63	4.02	1.72	4.09	2.63	4.61	3.28	5.79	4.06	2.00	1.79	5.89	5.57	5.98	5.73
32 Chemical & chemical products	2.3	3.22	3.59	5.55	10.38	9.21	11.07	10.16	11.27	12.87	12.19	17.55	14.52	15.14	15.30	15.40
33 Non-metallic mineral products	6.6	5.61	9.88	6.85	9.72	6.34	11.41	7.35	10.76	7.38	9.27	5.10	11.12	8.60	10.93	8.78
34 Basic metal & alloyed industry	2.9	0.71	4.51	2.07	5.20	2.9	6.49	3.98	6.59	4.35	5.76	2.57	6.79	5.20	6.95	5.35
35 Metal products & parts	3.64	0.77	5.39	2.01	8.64	4.11	8.38	4.36	7.97	4.26	2.59	1.89	8.21	4.77	8.15	4.90
36 Machinery & machine tools	9.92	3.51	12.28	7.53	10.30	7.05	9.99	6.43	14.28	6.64	5.68	4.93	9.44	6.33	9.33	6.49
37 Electrical machinery	0.33	0.08	1.70	1.77	2.90	2.19	3.09	2.97	3.07	3.12	3.84	3.14	3.20	3.90	3.17	4.01
38 Transport equipment and parts	3.45	3.56	3.73	3.69	0.99	1.39	0.95	1.46	1.28	2.16	6.68	3.23	1.36	2.11	1.33	2.23
40 Other manufacturing	0.74	0.18	4.65	1.17	3.10	0.99	3.63	1.41	2.91	1.42	1.50	0.95	2.71	1.86	2.67	0.28
Others	2.30	1.03	1.70	0.95	3.98	3.76	3.00	3.78	3.89	7.32	2.26	11.23	0.71	1.31	0.69	1.35
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	(3649)	(346462)	(5544)	(437554)	(10674)	(635684)	(13067)	(663614)	(14513)	(747569)	(11980)	(750601)	(16329)	(785498)	(17984)	(793535)

Source : Chief Inspector of factories, Gujarat State, Ahmedabad.

Note: (i) Figures in parentheses indicate absolute numbers.
(ii) Emp. - employees.

Air Pollution Levels

Common air pollutants are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), dioxides of nitrogen(NO_X) suspended particulate matter (SPM), carbon monoxide (CO) and lead. The standards prescribed by Gujarat Pollution Control Board (GPCB) and WHO are presented below in Table 3.42.

Table 3.42: Air Pollution Standards

(Concentration in micrograms per m^3)

Category		SPM	SO_2	CO	NOx
GPCB Standards					
Industrial and mixed use		500	120	5000	120
Residential and rural areas		200	80	2000	80
Sensitive areas (Hill stations tourist, resorts, sanctuaries, health resorts etc.)		100	30	1000	30
WHO Guidelines					
SO_2	Annual mean : 40-60 ug/m^3 98% of daily averages : 100-150 ug.m^3 10 minutes : 500 ug.m^3 1 Hour : 350 ug.m^3				
SPM	Annual mean : 60-90 ug/m^3 98% of daily averages : 150-230 ug.m^3				
NOx	1 Hour : 400 ug.m^3 24 hours : 150 ug/m^3				
CO	15 minutes : 100,000 ug.m^3 30 minutes : 60,000 ug.m^3 1 Hour : 30,000 ug.m^3 8 Hour : 10,000 ug.m^3				
Lead	Annual mean : 0.5-1.0 ug/m^3				

Source: NIUA, New Delhi.

Under the National Ambient Air Quality Monitoring Programme (NAAQM) the Gujarat Pollution Control Board monitors ambient air quality at Ahmedabad, Surat, Vadodara and Vapi. The test results for SO_2 , NO_x and SPM are presented in Table 3.43.

SPM levels in all the cities and at all the monitoring stations exceeds WHO's residential standards. In the industrial areas, though, the level is within prescribed standards. In many cases, the general levels are high. There are also cases, where even the standard fixed for SPM levels in industrial areas are exceeded. With regard to the other two parameters monitored (NOx and SO_2), the observed levels are within the permissible limits.

Table 3.43: Status of Ambient Air Quality In Metropolitan Cities Of Gujarat (Yearly average) (all values are in micrograms per cubic meter)

District	Name of the Station	SO_2					NOx					SPM				
		1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
Ahmedabad	Sarabhai Gen. Hosp., Saraspur	24	-	-	-	-	39	-	-	-	-	342	-	-	-	-
	GIDC, Naroda	22	17	15	27	27	38	43	32	20	22	263	231	148	223	273
	L.D. Coll.Of Eng. Navrangpura	8	7	15	17	60	39	40	21	18	26	254	214	139	210	208
	Cadila Distributor, Narol	66	39	43	85	60	52	44	28	18	19	388	345	214	438	411
	AEC, Sabarmati	23	-	-	-	-	25	-	-	-	-	325	-	-	-	-
Vadodara	G.P.C.B.Office	9	13	22	60	48	13	21	13	16	17	275	263	312	283	211
	I.P.C.L.	21	25	30	75	49	24	53	27	21	20	296	412	398	337	322
	Vadodara	14	-	-	-	-	24	-	-	-	-	426	-	-	-	-
	Makarpura	15	-	-	-	-	12	-	-	-	-	376	-	-	-	-
	Nyay Mandir	10	14	24	72	53	12	28	20	22	20	372	450	341	415	297
Surat	S.V.R.Engg. College	18	23	45	75	44	22	67	39	14	24	180	218	159	402	214
	Ashwanikumar Road	27	-	-	-	-	29	-	-	-	-	259	-	-	-	-
	Air India Building	78	31	50	101	46	26	51	43	45	33	378	286	185	565	363
	Vadodara Rayon	22	31	-	-	-	23	46	-	-	-	260	249	-	-	-
	B.R.C., Udhna	-	-	57	92	46	-	-	46	15	27	-	-	465	486	236
Vapi	Vapi High School, Vapi	46	-	-	-	-	36	-	-	-	-	236	-	-	-	-
	Phase II GIDC, Vapi	28	-	-	-	-	22	-	-	-	-	245	-	-	-	-
	Vapi Nagarpalika,Vapi	-	29	10	27	21	-	29	19	31	29	-	225	281	223	101
	GPC Board, Vapi	-	25	32	52	29	-	33	34	32	48	-	183	309	210	154
Bharuch	Ralies India Ltd., GIDC, Ankleshwar	-	-	30	96	86	-	-	20	44	30	-	-	137	315	318
	Durga Traders, Ankleshwar	-	-	33	89	64	-	-	20	22	20	-	-	137	409	341
Rajkot	St. Mary's School	-	-	15		18	-	-	6	10		-	-	471	483	-
	Sardar Industrial Corporation	-	-	38	19	26	-	-	9	8	11	-	-	556	587	855
	GPCB Office	-	-		12		--	-	-	-	7	-	-	-	-	303

Source: Annual Report, Gujarat Pollution Control Board, Gandhinagar, 1995-96.

Cooking Energy : A Source of Indoor Pollution

The usage of biomass is identified as the primary source of indoor air pollution. The major indoor air pollutants are suspended particulate matter (SPM), carbon monoxide (CO), polycyclic aromatic hydrocarbons (PAHs) etc. Levels of indoor pollutants are shown in Table 3.44 below. After electricity, LPG is the least polluting energy source, whereas cowdung is the most polluting cooking energy source.

Table 3.44: Levels of Indoor Pollutants during Cooking Hours in Houses using Different Types of Fuel

Types of Fuel	SPM (mg/m^3)	CO (mg/m^3)	HCHO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)
Cattle Dung	2.75	144	670	319	159
Wood	1.98	156	652	325	155
Coal	1.10	94	109	147	185
Kerosene	0.46	108	112	133	87
LPG	0.46	14	68	124	51

Source: P.R.Sukhla, Energy Strategies and Greenhouse Gas Mitigation.

Note: Estimated Cooking Time : Cattle dung 3.1 hours, Wood 3.5 hours, Coal 3.4 hours, Kerosene 3.0 hours, LPG 2.6 hours.

Table 3.45 below shows that over 60 per cent of the households depend on environmentally unsafe energy sources for cooking. Over one-third of the households live in one room houses, and are most likely users of environmentally unsafe energy for cooking, thus being exposed to high levels of indoor pollution.

Table: 3.45: House Hold by Type of Fuel Used

(in per cent)

Area	Electrictiy	Cooking Gas	Kerosene	Coal/ Coke	Charcoal	Wood	Biogas	Cow Dung	Others	Total
Households	0.1	37.7	30.7	0.5	3.6	20.9	1.0	4.6	0.6	100

Source: H-Series Tables, Census of India.

Water Pollution

Rivers, dams and lakes are major sources of drinking water. However, mixing of industrial waste water and domestic sewage with these sources leads to water pollution.

The water quality is being monitored by GPCB regularly at 48 river points, 24 dams and 23 lakes. The level has been compared with the disposal standards as specified under the Environment (Protection) Act (EPA), 1986.

In terms of COD, 7 out of 48 stations have COD levels in excess to the prescribed limit. In some cases, the limits are exceeded by 15 to 16 times. These are largely concentrated in and around industrial centres. With regards to BOD, in six monitoring stations the limits are exceeded. Again, in some cases these exceed the limit by 10 to 18 times. At three places the water is found to be acidic and not within permissible limits (Table 3.46 and 3.47).

It is not surprising that these critical points are located or pass through major industrial centres. It is an evidence to show that untreated industrial and domestic waste is being disposed into the streams and lakes.

Table 3.46: Status of Water Quality of Reservoirs in the State of Gujarat (yearly average)

S.No	Name of the Dam	Location	pH					TDS					DO					BOD				
			1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Hathmati Dam	Himmatnagar	8.07	8.46	8.3	8.3	7.8	236	193	112	180	266	8.06	9.0	8.5	10.4	7.1	3.56	2.30	3.9	1.5	3.7
2	Meshwo Dam	Shamlaji	3.83	7.95	7.8	8.4	7.9	295	205	117	183	206	7.13	7.9	6.0	7.3	8.1	1.33	0.60	1.5	0.6	3.7
3	Indrasi Dam	Bhiloda	8.07	7.50	8.0	8.4	7.8	241	203	231	175	316	8.53	8.3	9.3	9.5	8.5	4.66	1.90	0.9	0.8	4.7
4	Mazam Dam	Modasa	7.99	7.93	8.1	8.4		210	187	158	256	-	8.13	7.2	7.4	8.0		2.06	9.00	1.3	1.9	-
5	Vatrak Dam	Sabarkantha	8.05	8.08	8.1	8.2	7.79	244	172	139	202	182	10.65	8.3	8.8	7.4	7.1	0.95	2.00	1.6	1.2	1.6
6	Dharoi Dam	Kheralu	7.98	8.02	8.3	8.4	8.0	199	183	141	288	204	8.06	7.6	7.6	6.4	7.5	2.30	2.40	1.2	0.3	1.6
7	Vanakbori Dam	Vanakbori	8.4	8.20	8.3	8.1	8.3	299	218	180	372	324	9.00	7.9	8.0	8.5	8.3	2.70	1.65	2.0	2.1	4.3
8	Kadana Dam	Kadana	8.4	8.30	8.3	7.0		218	195	184	208		7.35	8.5	6.5	10.4		1.20	2.25	2.0	3.0	-
9	Aji Dam I	Rajkot	7.65	7.81	7.7	7.8	8.3	249	260	334	230	222	9.22	8.9	5.9	7.7	7.4	3.10	ND	0.2	0.4	0.3
10	Aji Dam II	Rajkot	7.52	7.98	8.3	7.9	8.1	639	727	800	990	692	8.65	893	10.6	6.9	7.6	2.80	6.40	11.3	23.6	2.6
11	Nyari Dam	Rajkot	-	-	7.8	8.4	8.4	-	-	314	318	263	-	-	6.7	7.1	6.4	-	-	3.6	1.0	0.5
12	Shetrunji Dam	Palitana	-	-	8.3	-	8.1	-	-	306	-	222	-	-	8.0		7.5	-	-	3.5	-	0.2
13	Machhu Dam	Morbi	-	--	7.8	8.2	-	-	-	858	258	-	-	-	10.6	7.3		-	-	11.3	1.0	-
14	Bhadar Dam	Gondal	8.10	8.26	8.1	8.5	7.7	325	180	242	212	132	6.60	7.0	5.9	7.9	7.1	3.65	2.35	1.5	2.0	0.4
15	Ashapura Dam	Gondal	-	-	8.3	8.7	9.8	-	-	624	248	208	-	-	8.4	9.9	9	-	-	1.6	0.7	0.2
16	Dholidhaja Dam	Surendranagar	7.75	8.44	8.5	8.3		172	259	240	204	-	8.90	8.6	9.3	8.5		2.20	1.95	2.6	0.7	-
17	Welington Dam	Junagadh	7.97	8.00	8.2	7.2	7.6	264	264	312	234	-	6.10	10.1	6.7	1.9	3.2	5.00	7.60	2.4	-	0.3
18	Madhuban Dam	Nr. Selvas	8.26	7.89	7.2	5.3		549	175	284	106	-	8.33	8.6	7.5	7.5	-	0.97	109	0.2	0.6	-
19	Ukai Dam	Ukai	8.16	7.87	7.8	-	-	160	368	140	-	-	7.85	5.7	6.9	-	-	1.5	2.25	2.7	-	-
20	Kankarpar dam	Kakarpar	8.24	7.93	7.9	-	-	155	166	108	-	-	6.35	6.8	8.0	-	-	1.9	2.41	2.6	-	-
21	Saputara Dam	Saputara	8.25	7.81	7.7	8.3	-	105	112	92	130	-	8.20	6.0	5.9	8.1	-	1.3	2.95	2.9	0.1	-
22	GIDC Vapi Reservoir	Valsad	-	-	8.0	8.1	-	-	-	294	124	-	-	-	7.5	8.1	-	-	-	0.2	0.3	-
23	Par Reservoir	Valsad	-	-	8.1	8.3	-	-	-	121	228	-	-	--	7.5	6.6	-	-	-	0.2	0.3	-
24	Dantiwada Dam	Banaskantha	-	-	-	8.1	-	-	-		257	-	-	-	-	6.6	-	-	-		1.3	-

Source : Annual Report, Gujarat Pollution Control Board, Gandhinagar, 1995-96.

Table 3.46: Status of Water Quality of Reservoirs in the State of Gujarat (yearly average)

S.No	Name of the Dam	Location	COD					NH_3-H					TKN					PHOSPHATE				
			1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Hathmati Dam	Himmatnagar	17.0	12.0	15	12	18	0.70	1.68	1.1	1.2	0.6	1.56	3.9	2.24	5.0	1.7	0.580	0.01	0.03	ND	0.47
2	Meshwo Dam	Shamlaji	10.0	10.0	8	25	22	0.84	1.12	0	1.1	0.2	2.52	9	3.36	3.9	1.7	nil	0.66	0.03	ND	0.17
3	Indrasi Dam	Bhiloda	20.6	15.0	50	23	13	0.70	1.68	3.9	1.1	0.4	2.89	7.3	3.9	5.0	2.2	0.036	0.04	0.02	ND	0.69
4	Mazam Dam	Modasa	12.0	16.0	9	39		0.93	1.12	3.3	1.1		2.05	5	1.68	3.4	-	0.080	0.03	0.09	ND	-
5	Vatrak Dam	Sabarkantha	15.5	13.0	26	14	14	1.68	0.56	2.2	1.9	1.2	3.64	2.8	1.12	5.0	1.7	0.250	nil	0.09	ND	0.24
6	Dharoi Dam	Kheralu	14.6	14.0	29	11	25	0.56	1.12	0.6	1.5	0.4	2.80	2.8	3.90	10.1	1.1	0.005	0.08	0.03	ND	0.24
7	Vanakbori Dam	Vanakbori	33.0	5.0	11	14	12	6.12	0.69	0.8	1.4	7.6	3.99	1.4	0.89	2.0	-	0.040	0.05	0.08	ND	-
8	Kadana Dam	Kadana	54.8	9.5	8	10		2.80	0.97	1.4	1.1		3.36	2	1.12	1.7	-	0.030	0.06	0.04	ND	-
9	Aji Dam I	Rajkot	20.0	25.3	12	10	10	1.05	1.48	1.7	1.1	1.4	3.37	2	2.33	1.7	-	0.440	0.19	0.1	ND	ND
10	Aji Dam II	Rajkot	65.0	24.0	43	235	30	2.42	1.58	2.2	95	3.9	4.20	3.1	2.30	11.5	-	0.790	0.60	0.32	ND	0.47
11	Nyari Dam	Rajkot	-	-	20	19	50	-	-	1.1	1.1	2.2	-	1.4	-	2.0	-	-	-	0.25	ND	ND
12	Shetrunji Dam	Palitana	-	-	20		10	-	-	0.6	-	1.4	-	0.8	-		-	-	-	0.07		ND
13	Machhu Dam	Morbi	-	-	43	10		-	-	2.2	0.6	-	-	3.1	-	0.8	-	-	-	0.32	ND	-
14	Bhadar Dam	Gondal	5.50	19.5	30	29	21	2.10	0.42	1.1	1.1	1.1	-	1.4	0.70	2.0	-	0.450	0.35	0.34	ND	0.24
15	Ashapura Dam	Gondal			50	39	10	-	-	1.1	1.4	2.5	-	1.3	-	2.5	-	-	-	0.2	ND	0.33
16	Dholidhaja Dam	Surendranagar	10.0	14.5	20	29		17.50	0.84	1.1	0.3	-	20.20	1.3	1.40	0.6	-	0.680	0.29	0.12	ND	-
17	Welington Dam	Junagadh	10.0	47.0	30	58	10	2.12	2.24	1.1	1.1	1.4	2.24	1.3	3.36	2.0	-	0.740	0.08	0.03	ND	0.06
18	Madhuban Dam	Nr. Selvas	17.6	5.2	2	20	-	0.36	0.715	0.8	1.0	-	-	1.2	3.15	1.5	-	0.130	0.01	0.01	ND	-
19	Ukai Dam	Ukai	11.0	10.0	10		-	0.45	0.28	0.2	-	-	0.67	0.5	0.50	-	-	0.070	0.34	0.4	-	-
20	Kankarpar dam	Kakarpar	11.0	10.0	10		-	0.67	0.475	0.3	-	-	0.55	0.5	0.73	-	-	0.120	0.25	0.3	-	-
21	Saputara Dam	Saputara	8.0	10.0	10	10	-	0.56	0.365	0.3	0.3	-	0.89	0.3	0.61	2.1	-	0.012	0.45	0.3	ND	-
22	GIDC Vapi Reservoir	Valsad	-	-	10	10	-	-	-	-	0.3	-	-	4.1	-	1.1	-	-	-	0.1	ND	-
23	Par Reservoir	Valsad	-	-	10	10	-	-	-	0.4	2.2	-	-	0.9	-	2.8	-	-	-	0.01	ND	-
24	Dantiwada Dam	Banaskantha	-	-		23	-	-	-	-	1.2	-	-	-	-	3.4	-	-	-		ND	-

Source : Annual Report, Gujarat Pollution Control Board, Gandhinagar, 1995-96.

Table 3.47: Status of Water Quality of Lake, Gujarat (yearly average)

Sl.No	Name of the Dam	Location	PH					TDS					DO					BOD				
			1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Thol Tank	Kadi	7.37	4.42	7	8.5	8.7	582	1168	1176	247	482	9.6	10.6	14.6	7.5	10.9	14.66	3	37	2	13
2	Nal Sarovar	Sanand	8.14	-	9.9	9.5		2271		1476	489		8.9		12.2	9.7		4.5	Found	2	3	
3	Moonsar Lake	Viramgam	8.93	-	9.7	9.5	9.1	3148		2670	2872	3042	9.46		13.5	7	6.3	23.33	Found	52	7	62
4	Bidu Sarovar	Sidhpur	7.55	-	-	8.2	7.8	685			1288	990	7.1			9.2	5.9	25	Found	Found	7	32
5	Kankaria Lake	Ahmedabad	8.29	8.4	8.6	8.6	8.2	763	807	718	485	622	5.66	5.75	7.6	4.8	5.8	6.66	7.55	7	9	11
6	Chandolia Lake	Ahmedabad	8.52	7.8	-	8.8		564	310		373		8	4.65		8.1	-	5	7.8	Found	8	
7	Verai talav	Anand	-	-	9.4	8	8.6			354	388	328			10.8	2.5	-	-	-	10	9	16
8	Malav Talav	Dholka	8.82	8.16	8.8	9.2	9.1	984	1145	1238	741	1413	11	4.6	10.3	4.1	13.4	27	49	14	4	23
9	Sayaji Sarovar	Vadodara	8.25	8	7.9		7.6	155	190	170		184	8.3	8	8.3		8.1	5.4	11	1		2
10	Sursagar Lake	Vadodara	8.05	8.14	8.1	8.3	7.4	1680	1896	2196	1978	2262	8.05	5.2	2.7	8.1	nil	9.9	16	17	8	23
11	Sayaji Sarovar	Vadodara	-	-	-	8.3	-	-	-	-	154	-	-	-	-	8.3	-	-	-	-	0	-
12	Gomti Talav	Dakor	8.2	6.5	7.8	7.9	8.6	176	266	178	198	620	4.8	9	6.2	6.2	9.7	6	3	2	2	13
13	Dabhoi Lake	Dabhoi	9.6	9.7	7.7	9.1		932	560	512	642		7.9	13	2.9	13		15	38	24	38	
14	Yamuna Talav	Halol	-	-	7.9	8.4	7.5			178	208	550	-	-	3.8	8.1	1.6	-	-	4	4	45
15	Chhals Talav	Dahod	-	-	7.1	8.2	8.7			356	374	646	-	-	3.9	9.1	8.3	-	-	21	21	12
16	Ranapratap Sarovar	Nr. Halol	8.1	8.2	8.5	8.3		423	252	200	374		11.25	8	8.2	7.9		9.15	22	2	4	
17	Ramsagar Talav	Godhra	8.25	9.2	7.9	7.8	8	390	485	388	394	510	6.7	9.8	5.7	7.3	nil	7.7	18.5	5	19	48
18	Lalpari lake	Rajkot	7.65	7.48	7.7		8.5	290	268	5		261	10.7	7.6	5.8		7.9	3.2	ND	6		3
19	Ranmal Lake & Lakhota Talav	Jamnagar	7.5	7.63	8.2	7.5		572	467	4	668	-	15.5	5.45	8.9	13	-	-	4.05	9	29	
20	Narayan Sarovar	Kutch	8.7	8.1	-	-	8.5	786	1168	-	-	241	7	20.1	-	-	6.9	6.2	19.4	-	-	1
21	Bore Talav	Bhavnagar	7.92	-	-	-	-	206	-	-	-	-	8.15	-	-	-	-	2	Found	-	-	
22	Hamirsar Lake	Bhuj	7.9	7.81	7.9		7.4	411	2.36	298		241	8.4	76	7.4		6.9	2.05	2.1	7		1
23	Natural Pond	Gandevi	-	-	-	7.6	-	-	-	-	280	-	-	-	-	4.2	-	-	-	-	1	-

Source : Annual Report, Gujarat Pollution Control Board, Gandhinagar, 1995-96.

Table 3.47 (Contt.):

Sl.No	Name of the Dam	Location	COD					NH_3-H					TKN					PHOSPHATE				
			1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Thol Tank	Kadi	102	46	340	59	81	1.8	3.9	1.49	1.68	3.9	3.54	6.18	29.1	6.2	6.7	0.078	0.26	0.11	ND	0.63
2	Nal Sarovar	Sanand	40	Dry	7	21	-	0.6	-	0.84	-	4.5	2.14	-	7.3	4.5		0.033		0.55	ND	
3	Moonsar Lake	Viramgam	216	Dry	331	167	212	1.7	2.8	1.01	-	2.8	6.53	-	5.6	4.5	5.1	1.702		0.49	0.9	1.52
4	Bidu Sarovar	Sidhpur	109	Dry	Dry	57	92	2.3	3.4	0.42	-	-	4.62	-	-	6.2	4.5	0.593			ND	23
5	Kankaria Lake	Ahmedabad	51	54	42	32	42	0.9	-	1.4	1.12	1.7	4.01	3.92	3.9	3.4	3.4	0.23	0.279	0.13	0.3	0.26
6	Chandolia Lake	Ahmedabad	165	48	Dry	26	-	0.9	-	0.84	-	-	8.4	8.5	-	3.9		0.262	0.55		0.2	
7	Verai talav	Anand	-	-	71	21	70	1.1	-	-	-	1.1	-	-	4.5	1.7	1.4			0.2	0.5	0.3
8	Malav Talav	Dholka	157	147	111	92	196	0.7	1.1	1.4	4.48	2.2	4.57	12.3	6.2	3.9	10.7	0.133	0.186	0.34	0.3	0.54
9	Sayaji Sarovar	Vadodara	19	39	5		6		3.4	1.12	1.68	2.2	1.75	2.1	4.5		6.4	0.084	0.02	0.08		0.1
10	Sursagar Lake	Vadodara	77	83	107	12	101	1.7	3.1		3.92	3.4	2.73	4.62	3.9	2.2	5.3	0.16	0.08	0.18	0.2	0.15
11	Sayaji Sarovar	Vadodara	-	-	-	10	-	1.9	-	-	-	-	-	--	-	2.5	-	-	-	-	ND	-
12	Gomti Talav	Dakor	22	17	36	36	52	1.1	3.1	4.76	1.68	1.1	2.87	2.24	1.7	1.7	3.9	0.037	0.08	0.09	0.09	0.19
13	Dabhoi Lake	Dabhoi	146	95	103	66	-	1.4		3.92	0.84	1.4	4.2	1.4	9.8	2.2		0.12	0.01	5	2.5	
14	Yamuna Talav	Halol	-	-	23	10	144	1.7	2	-	-	1.7	-	-	2.8	2.5	2.5	-	-	0.1	ND	0.15
15	Chhals Talav	Dahod	-	-	107	37	130	1.7	1.1	-	-	1.7	-	-	2.8	2.2	1.7	-	-	41	0.3	0.19
16	Ranapratap Sarovar	Nr. Halol	68	49	12	12		1.4		1.96	1.3	3.4	1.82	0.37	5.1	1.7		0.189	0.14	3.45	ND	
17	Ramsagar Talav	Godhra	101	139	84	47	142	1.1	1.4	3.36	2.48	1.1	5.39	2.48	3.1	1.7	2.2	0.224	0.07	0.49	0.2	0.19
18	Lalpari lake	Rajkot	70	20	30		30		2.5	4.48	0.56	1.4	6.62	0.7	1.7			0.65	1.1	2		ND
19	Ranmal Lake & Lakhota Talav	Jamnagar	10	54	31	154		2.5		0.84	1.12	1.4	2.2	1.82	1.7	5.3		0.67	0.09	0.15	0.4	
20	Narayan Sarovar	Kutch	30	88	-	-	60	-	3.1	0.56	2.24	-	-	3.36	-	-	-	0.48	0.52	-	-	ND
21	Bore Talav	Bhavnagar	10	Dry	-	-	-	-	-	1.05	-	-	2.24	-	-	-	-	0.65	--	-	-	-
22	Hamirsar Lake	Bhuj	35	10	10		60		3.1	1.05	0.84	0.8	2.8	0.98	1.1			0.15	0.18	0.11		ND
23	Natural Pond	Gandevi	-	-	-	10	-	1.7	-	-	-	-	-	-	--	2.2	-	-	-	-	ND	-

Source : Annual Report, Gujarat Pollution Control Board, Gandhinagar, 1995-96.

Hazardous Waste

Due to visibility and immediation of impact, the problems pertaining to effluent and air are more often noticed and solutions sought. The problems arising out of hazardous waste have been addressed only recently. As part of Environment (Protection) Act, 1986, the E.P. rules were framed in 1989 to manage hazardous waste. The most common practice for management and handling of hazardous waste is to simply dump these wastes in the low lying areas, which results in groundwater contamination. It is also a threat to humans who come in direct contact with the waste. The attempt in this section is to briefly present the existing scenario in Ahmedabad.

Hazardous Waste Generation in Ahmedabad

Most of the hazardous waste industries are located in the three GIDC industrial estates. The details of the industries are given below in Table 3.48.

Table 3.48: Industrial Estates in Ahmedabad

Industrial Estate	Total Number of Units	No. of HWGU	Area $(Km)^2$
Odhav	1166	139	1.00
Naroda	650	106	2.50
Vatva	1280	189	5.00
Total	3096	434	-

Source: Bansal Neeru(1997), Hazardous Waste Management, School of Planning, CEPT, Ahmedabad.

The sector-wise distribution of hazardous waste generating units in these industrial estates are given below in Table 3.49.

Table 3.49: Sector-wise Distribution of Hazardous Waste Generating Units

No	Industrial Sector	No. of Units		
		Odhav	Naroda	Vatva
1.	Textile Processing	10	28	22
2.	Drugs and Pharmaceuticals	11	14	14
3.	Rolling Mills	55	6	6
4.	Dye and Dye Intermediate	47	37	114
5.	Pigments(Org. & Inorg.)	2	-	1
6.	Pesticides(Bulk and Formulation)	5	15	10
7.	Organic Chemicals	5	5	14
8.	Inorganic Chemicals	3	1	8
9.	Metallurgical	1	-	-
	Total	139	106	189

Source: Bansal Neeru (1997), Hazardous Waste Management, School of Planning, CEPT, Ahmedabad.

The estate-wise break up of the waste generated is given below in Table 3.50.

Table 3.50: Hazardous Waste Generated in Industrial Estates of Ahmedabad

Industrial Estates	HW Generated in TPA		
	Existing	Expected	Total
Odhav	13160	10055	23215
Naroda	9119	5023	14142
Vatva	40273	17440	57713

In response to a court order, GPCB has initiated a series of steps to manage hazardous waste. However, given the magnitude of the task, effectiveness of these strategies is doubtful.

Hospital Waste

In addition to industrial waste, hospital waste is also becoming a serious threat. In Ahmedabad alone, the number of hospitals and nursing homes have increased from a total of 97 in 1971 to 813 in 1997[3] (Table 3.51). The estimated waste generated from these hospitals is 5,124 kg./day This coupled with "disposable kits", has intensified the problem of hospital waste management.

Table 3.51: Hospital Waste Generated and Number of Medical Institutions in Ahmedabad City

S.No.	Ownership	1971	1981	1991	1997
1.	Govt. and Municipal Hospital (No.)	6	6	6	6
2.	Muni. Maternity Homes (No.)	20	22	18	21
3.	Private Nursing Homes (No.)	71	129	337	786
	Total (No.)	97	157	361	813
	Estimated Waste Generated (kg./day)				5,124

Source : Singh, Arvind (1997), Hospital Waste Management, School of Planning, Ahmedabad.

[3] AMC Health Department.

Health Impact

The ultimate effect of poor environment and living conditions is on health of the inhabitants. Poor environmental factors such as NO_2 ,SO_2, poor housing, dust, smoke, etc. act as environmental stress factors and human beings are the recipients. Similarly, the deteriorating environmental conditions in Gujarat has increased the health risks for the people (Table 3.52).

Table 3.52: No. of Cases and Deaths Occurred due to Communicable Diseases in Gujarat, 1989 to 1995

Disease	1989	1990	1991	1992	1993	1994	1995
Cholera							
Cases	274	144	107	246	265	572	65
Deaths	6	3	2	10	1	11	1
Gastroenteritis							
Cases	23096	23413	25071	32389	33600	42035	28301
Deaths	413	349	455	415	254	701	127
Ineffective Hepatitis							
Cases	11939	8095	6816	4407	8825	7701	4867
Deaths	516	305	195	135	176	168	89
Enteric fever							
Cases	3566	3307	8401	5836	4773	2745	2750
Deaths	31	24	42	36	16	11	7
Meningocal Meningitis							
Cases	244	118	24	16	18	12	4
Deaths	65	43	5	5	2	5	1
Other than Meningitis							
Cases	2085	1293	826	609	593	551	448
Deaths	459	315	225	173	170	172	98

Although the number of deaths due to communicable diseases (water and air borne) in the major cities and the state as a whole have reduced in the past six years, the morbidity level still remains high. The cases of gastroenteritis, enteric fever and cholera are consistently high, which indicates an increase in health hazards related with water.

Table 3.53: No. of Cases and Deaths Occurred due to various Communicable Diseases in Corporations, 1995

Corporation	Cholera		Gastro-enteritis		Infective Hepatitis		Enteric Fever		Meningocal Hepatitis		Other than Meningocal Meningitis	
	C	D	C	D	C	D	C	D	C	D	C	D
Jamnagar	0	0	429	3	193	0	367	2	0	0	37	9
Rajkot	0	0	2186	20	211	11	149	1	0	0	36	12
Bhavnagar	2	0	938	5	177	7	32	0	0	0	36	7
Ahmedabad	20	0	4003	29	577	20	133	2	0	0	70	17
Vadodara	7	0	86	1	1132	2	0	0	0	0	0	0
Surat	0	0	1678	10	504	13	276	0	0	0	76	13
Total	27	0	9320	68	2794	53	957	5	0	0	255	58
Gujarat	65	1	28301	127	4867	89	2750	7	4	1	448	98

C=Cases, D=Deaths.

The six corporations accounting for 18 per cent of the states' population register very high mortality and morbidity rates. In terms of cases of gastroenteritis, infective hepatitis, and enteric fever, these corporations account for 33, 57, 34.8 per cent of disease cases respectively. Similarly the proportion of deaths attributable to these diseases are high at 54, 60 and 71 per cent respectively (Table 3.53).

SUMMARY

In brief, it could be stated that in Gujarat the environmental problems are beginning to assume serious proportions. The sources of these are industrialisation and the associated urbanisation activity .

The Gujarat Pollution Control Board, set up in mid seventies has been taking steps to control pollution levels in the state. Subsequent to the high court judgement, closure of about 2000 units, measures to create common effluent treatment plants and hazardous waste management systems are being put to practice at many places.

IV. INSTITUTIONAL ARRANGEMENTS FOR URBAN INFRASTRUCTURE

INSTITUTIONS

A multitude of organisations, under the umbrella of Department of Housing and Urban Development of the state government, operate in Gujarat to achieve an efficient and effective management of urban development. These are the Town Planning and Valuation Department, Gujarat Municipal Finance Board, Directorate of Municipal Administration, Gujarat Housing Board, Gujarat Slum Clearance Board, Municipal Corporations, Municipalities, Nagar Panchayats. A host of other agencies such as Gujarat Water Supply and Sewerage Board, Department of Transport, Gujarat Industrial Development Corporation, etc., also have their functional arena in urban areas. A brief account of their functions and performance has been presented in this section.

Town Planning and Valuation Department (TP&VD)

Headed by a chief town planner, the organisation has a network of regional and sub-regional offices all over the state. The Town Planning and Valuation Department is the technical wing of the state government in all matters related to urban planning. Its main functions include scrutinising plans and schemes on state's behalf, advising on matters related to developmental and legal matters. It deals with land valuation and provides technical support to local authorities in preparation of development plans and town planning schemes. It is also called upon to prepare development plans and town planning schemes for municipalities which do not have required expertise to do so. The department is also responsible for keeping urban and regional information. The department has recently established a photo interpretation cell and a GIS cell. However, lack of technical manpower is posing a serious constraint in operations of the department. Further, given its wide ranging functions, day to day reference matter takes precedence over planning functions. Restructuring of the department by functional areas is necessary.

Directorate of Municipal Administration (DMA)

The department acts as an arm of the government in exercising powers related to management of urban local bodies, excluding corporations. The DMA acts as an advisor to the local authorities and also monitors and controls matters related to financial planning, management and control.

One of its main functions is to supervise the functioning of all the local authorities (municipalities and nagar palikas) within the state of Gujarat. It also regulates the

administrative and political appointments within each authority. If a local authority needs to extend its boundary limits, approval of the DMA has to be sought before finalising the limits.

All the projects which are being implemented at the state level by various local bodies (for example, IDSMT, EIUS, UCD, UBSP) have to be monitored by the DMA.

The organisation is under staffed and there is a manpower mismatch due to the increased number of local authorities under its purview, ever since the 74th Amendment came into force.

Gujarat Municipal Finance Board (GMFB)

Gujarat Municipal Finance Board Act (No. 12, 1979) was implemented on 21/9/1979, and the Gujarat Municipal Finance Board came into existence from 21/4/1979.

Powers and Functions of GMFB

- To distribute loans, grants-in-aid to urban local authorities out of the funds provided by state government;
- To advise urban local authorities as to the way and means to be adopted for increasing the income and the pattern to be followed for incurring expenditure,
- To tender advise to the local authorities in respect of preparation of their budget estimates; and
- To tender advise to government about its observations in relation to the budget estimates of local authorities generally or in relation to budget estimates of the local authorities in particular in the interest of municipal finance.

Financial Details

After the formation of the Gujarat Municipal Finance Board, the Government of Gujarat has interalia, earmarked 20 per cent which has been recently raised to 50 per cent of its yearly collections of entertainment tax, for distribution as grants to municipalities through Gujarat Municipal Finance Board. Accordingly the state government has placed at the disposal of Gujarat Municipal Finance Board the following amount as entertainment tax grants for distribution to local bodies (Table 4.1).

The state government has placed at the disposal of the Gujarat Municipal Finance Board for distribution to the local bodies only entertainment tax grants. Other grants which are more than twenty five in number, are distributed through various agencies of the state government. The board has focused its attentions on monitoring the distribution of the grant; developing information system for the working of the urban

local bodies; giving incentives to the urban local bodies for improving recovery of the taxes and looking after the provision of basic amenities. The Board has also developed innovative schemes in order to encourage the urban local bodies in creating good public convenience systems.

Table 4.1: Tax Grants to GMFB for Distribution to Municipal Bodies

Year	Tax Grant (in million Rs.)
1979-80	32.25
1980-81	36.00
1981-82	36.01
1982-83	61.78
1983-84	69.10
1984-85	74.62
1985-86	63.20
1986-87	74.20
1987-88	114.58
1988-89	117.00
1989-90	123.00
1990-91	175.00
1991-92	182.50
1992-93	182.50
1993-94	203.50

The Board functions overlap with the State Finance Commission constituted under the Constitution 74th Amendment and with that of Directorate of Municipalities. Further lack of permanent team of staff is a major drawback. In order to implement a good accounting system in the municipalities, the municipalities require the proper establishment and managerial capacity. The Board has also undertaken in-service training programmes for the various cadre of the officers and the employees of the municipalities and also for the non-officials.

The Board implemented modifications in the present accounting system which is mainly based on receipt and expenditure.

Gujarat Housing Board

Gujarat Housing Board came into existence on 1/5/1960 as a result of the bifurcation of Bombay state into Maharashtra and Gujarat.

Jurisdiction

The jurisdiction of Gujarat Housing Board comprises of all urban areas, i.e., corporations, nagar palikas, nagar panchayats, etc. and also extends over the peripheral area upto 3 or 5 kms. outside these limits. The entire area covered under the jurisdiction of the six urban development authorities, i.e., at Ahmedabad, Vadodara, Rajkot, Surat, Bhavnagar and Jamnagar is also under its purview.

Activities

Gujarat Housing Board constructs houses for people from various income categories, as per norms set by HUDCO and the state government. In addition to housing activities, GHB has also undertaken construction of shopping complexes, school buildings and deposit contribution works for IPCL, such as ESI dispensaries, hospitals, etc.

Tenaments Constructed by GHB

Gujarat Housing Board has constructed 152,284 houses till 31/3/1997. The details by schemes are given below (Table 4.2). Number of houses constructed by Gujarat Housing Board in the last seven years and expenditure incurred by it on these ranges between Rs.46,482 per house to Rs.116,010 per house.

Table 4.2: Scheme-wise Tenaments Built by GHB

Particulars	Upto 3/96	4/96 to 3/97
Subsidised Industrial Housing Schemes(SIHS)	23,364	-
Economically Weaker Section(EWS)	32,987	758
Lower Income Group(LIG)	49,112	1,476
Middle Income Group(MIG)	36,436	2,755
Higher Income Group(HIG)	4,652	427
Deposit Works for ESIC, IPCL(Shops and Stall)	264	53
TOTAL	1,46,185	5,469

Source : Annual Report, Gujarat Housing Board, 1995-1996.

The amount contributed by GHB has been presented below in Table 4.3.

Table 4.3: Number of Houses Constructed by GHB, 1990-91 to 1996-97

Year	No. of Houses	Expenditure (in million Rs.)	Exp. /house (Rs.)
1990-91	4,280	3,76.0	87,850
1991-92	3,323	3,85.5	1,16,010
1992-93	7,618	3,54.1	46,482
1993-94	4,117	4,16.8	101,239
1994-95	6,072	3,80.4	62,648
1995-96	3,851	3,67.9	95,534
1996-97	5,469	3,94.5	72,134

Source: Gujarat Housing Board.

Housing Schemes for the Urban Poor

Gujarat Housing Board undertakes E.W.S schemes as per its budget provisions. In 1992, the government had allotted 25.00 mt. plots to the urban poor and a special scheme for constructing houses on these plots had been entrusted to the Gujarat Housing Board. GHB also undertakes construction of houses on these plots and allots the same.

The land declared surplus under ULC Act is allotted to the poor by dividing the plots. The plot holder who desires to entrust houses on his plot can apply to GHB for a loan. GHB undertakes the construction of houses on such plots for which the government provides a subsidy of Rs.4,000 per unit. Table 4.4 shows the number of houses constructed by GHB since the implementation of this scheme.

Table 4.4: Target and Actual Allotments in EWS and LIG Housing

Year	E.W.S.		L.I.G.	
	Target	No. of Houses Allotted	Target	No. of Houses Allotted
1992-93	2400	161	1000	1216
1993-94	2400	500	1000	1159
1994-95	4800	3096	2000	2101
1995-96	4800	2138	2000	2003
1996-97	5300	5315	2650	2689

Source : Gujarat Housing Board.

Allotment

Gujarat Housing Board undertakes hire purchase as well as self financing schemes, as is stated under :

(a) Hire Purchase Scheme : 40 per cent of the cost is recovered before allotment and the balance is recovered in equal monthly installments, over a period ranging from 10 to 15 years. For the SC/ST category of people, the initial down payment is 10 per cent of the cost and the repayment period is 20 years.

(b) Self Financing Scheme : The tenements are allotted on payment of full cost during the period of construction, in suitable installments.

(c) For fully paid houses : The cost is 25 per cent of the total tenements cost and of this 60 per cent has to be paid in advance. 25 per cent of the tenements are allotted on a priority basis.

GHB's functional area being the entire urban Gujarat, its contribution in past six years is meager. It is observed that there is a concentration of activities in the six major urban areas only and that the impact of GHB's activities has not been felt by the target group, i.e., weaker sections of the society.

Overhead costs are high with constantly increasing administrative and supervision charges. They have increased from 13.6 per cent in 1993-94 to 20.71 per cent in 1995-96. The performance of cost recovery has been poor and only 36 to 37 per cent of the actual costs, on an average, are recovered. Land availability is increasingly becoming a major problem for GHB. In view of the above, a major change in the role of GHB is required.

Gujarat Slum Clearance Board (GSCB)

Started in 1973 under the Gujarat Slum Area (improvement, clearance and redevelopment) Act, the Gujarat Slum Clearance Board has the following functions to perform :

I. Advance loans to the owners or occupants of houses within slum areas, for carrying out improvements or repairs.
II. Operate schemes related to the development of land into plots, with all public amenities and utility services, within slum areas.

The GSCB has had very limited success in its operations, due to operational and financial constraints. In a restructuring exercise, it has been decided to merge GSCB with GHB.

Gujarat Water Supply and Sewerage Board (GWSSB)

The state of Gujarat, through enactment of a special legislation, constituted Gujarat Water Supply and Sewerage Board. This Board is charged with a special responsibility to advise the state government on the status of water supply and effluent disposal. It is instrumental in undertaking water supply and drainage disposal projects for urban local bodies in the state. Nagar palikas and nagar panchayats have access to public borrowing if the projects are prepared through the Board and sanctioned by the state government. Sufficient evidence is available regarding missing links in the working of the Board which has resulted delay in implementation of the projects and consequent financial loss to urban local bodies. In order to improve the financial health of the ULBs the state government will have to undertake a critical review of the projects undertaken by the Board with a view to expediate the implementation of the pending projects and thus enable the ULBs to save on interest payment.

LOCAL LEVEL ORGANISATIONS

Development Authorities, Municipal Corporation, Municipalities, and Nagar Palikas, are the local agencies managing urban development.

Development Authorities

There are six Development Authorities in Gujarat which were constituted under the UD and TP Act. They are apex planning bodies which are responsible for the preparation of development plans and town planning schemes within their jurisdiction areas. They regulate development through a set of development control rules and building bye-laws and are also responsible for the implementation of plan proposals.

A major constraint of these organisations is the mismatch between the functions and resource base. There is even an administrative and jurisdictional conflict between elected local bodies and the Development Authorities.

These organisations lack technical capabilities and are also not capable of attracting good quality manpower. There is even a lack of authority and financial skills to manage critical concerns such as the environment, local economy and urban poverty.

The Development Authorities have been forced to take up the responsibility of local bodies in terms of organisation and management of services outside the corporation areas without adding to their resource base. In view of the provision under the Seventy Fourth Amendment, changes in the organisation is expected.

Local Bodies

Functions of other municipal bodies include planning for infrastructure facilities, developing them and then subsequently undertake the operation and maintenance

activities. Its functions include health and town planning with assistance from the town planning departments. It is a recognised fact that the performance of the local bodies in Gujarat is better than their counter parts in other states. They are democratic and quick to adopt to changing situations/innovations.

This, however, does not mean that they are without limitations. The local bodies, other than corporations are faced with the problem related to lack of trained manpower, limited resource base, dependence on state government on most matters and state interference.

OTHER INSTITUTIONS

I. Gujarat Industrial Development Corporation (GIDC) is an important agency infusing development in areas outside the urban local authority area by establishing industrial estates. Basic infrastructure, electricity and other services are provided by GIDC in these areas. Lack of coordination between GIDC and local authorities appear as a major problem in this case.

II. Gujarat Pollution Control Board (GPCB) is an agency created for monitoring and regulating the environmental conditions within the entire state. But this is a mammoth task and the agency is unable to cope with it.

III. Commissionerate of Transport under the home department regulates the transport activities in the state. It has the responsibility for issuing licenses for driving, vehicle fitness certification, permits for state carriers, auto-rickshaws, etc. The Commissionerate has initiated the action to establish a pollution under control system within the state and pollution units checks are being performed on vehicles, in all major cities of the state.

IV. Commissionerate of Police under the home department, in addition to policing, undertakes traffic management activities.

V. Gujarat State Road Transport Corporation (GSRTC), provides public transport facilities in Surat, Vadodara, Rajkot and a few other smaller towns. Since the agencies task is to provide facilities at the state level only, urban operations suffer significantly.

VI. Ahmedabad Municipal Transport Service (AMTS), an undertaking of Ahmedabad Municipal Corporation, Bhavanagar Municipal Corporation, Anand Municipality and a few others provide public transport within their respective cities as well as in the peripheral areas. But due to a resource constraint, the operations are grossly inadequate.

V. URBAN INFRASTRUCTURE FINANCING

LOCAL BODY FINANCES

Availability, adequacy and reliability of resource base with the local authorities determines the levels of infrastructure in both qualitative and quantitative terms. This section reviews the financial position of the local bodies in terms of income and expenditures. The analysis is based on the information made available from GMFB for sample towns.

Municipal Revenue

The municipal revenues are classified as tax revenue and non tax revenue. The other sources of income are grants in aid and public borrowing.

The municipal corporation in the state can impose following taxes:

- Property tax
- a tax on vehicles, boats and animals
- octroi
- a tax on dogs
- a theater tax
- a toll on animals and vehicles entering the city.
- any other tax (not being a tax on profession, trades, calling and employment or a tax on payments for admission to any entertainment which the State Legislature has power under the Constitution to impose in the state)

Similarly Gujarat Municipalities Act, 1963 provides for levying of taxes by the municipalities. The nagar panchayats are also governed by the same Act, and therefore the same provisions will apply to nagar panchayats.

- a tax on buildings and land
- a tax on vehicles , boats and animals
- a toll on vehicles and animals
- octroi
- a tax on dogs
- special sanitary tax
- a general sanitary tax
- a drainage tax
- a general water rate or a special water rate
- a lighting tax

- a fee on pilgrims
- special educational cess
- a tax on sale of cattle
- a betterment levy on land or buildings
- any other tax (not being a tax on professionals, traders, calling and employments or a tax on payments for admission to any entertainment which under the constitution, the State Legislature has power to impose in the state.)

Over and above these taxes, all the urban local bodies are entitled under their respective Acts to recover charges for services rendered to the cities which are legally identified as fees. These fees can be recovered for 19 items. The example for levying of such fees are license fees, notice fees, warrant fee, water connection fee, registration fee, permission fee, etc.

In addition to the above traditional income there are grants made available to the urban local bodies for specific purposes. One of the distinctive features of Gujarat Municipal Act is that all the taxes are discretionary in nature. Given this provision, many local bodies do not use an important tax source like property tax. Since the provision is discretionary, it is found that even when the taxes are levied, the levels are very low and do not get revised for a long time.

Levels of Revenue

On the whole, local bodies in Gujarat have put up a reasonable performance with respect to the revenues. On an average the municipal corporations raise Rs. 583 per capita (1980-81 prices), while A, B, and C class towns raise 289, 232 and 108 rupees per capita respectively (Table 5.1). The differences in the total income between the corporation cities and other towns is very large. The level of per capita revenue generated in A Class towns is to the tune of 50 per cent of that of corporation cities. This proportion is still lower amongst B and C class towns at 40 per cent and 18 per cent respectively (Table 5.1a). In comparison with Zakaria Committee's expenditure norms, though averages are higher than norms, few local bodies generate and consequently spend less than the norms.

Table 5.1: Levels and Growth of Income

(Rupees per capita at 1980-81 prices)

Town Class	Total Average Revenue			inimum	aximum	CGR	
	1984-85	1989-90	1994-95	1994-95	1994-95	1985-90	1990-95
M. Corporation	371.39	198.16	231.58	196.56	395.25	5.02	6.13
A Class	205.05	272.83	289.34	25.51	449.79	7.94	0.39
B Class	176.02	229.09	232.34	116.94	458.74	7.09	2.20
C Class	-	-	107.79	36.33	363.30	-	-

Note: CGR= Compound Rate.

Table 5.1(a): Size-class Variation in Total Income

(Percentage collection to M. Corporation)

Total Income	Average			Minimum	Maximum
	1984-85	1989-90	1994-95	1994-95	1994-95
A Class Cities	55	52	50	08	26
B Class Cities	47	44	40	36	26
C Class Cities	-	-	18	11	20

Trends in Revenue

In terms of growth in per capita income, (1980-81 prices), the local bodies have recorded a positive growth. However the growth in the latter eighties was found to be higher than that realised during the early nineties. During the period 1990-95 A Class towns have recorded a very low rate of growth of 0.4 per cent in the per capita income (Table 5.1).

Composition of Revenue

Taxes are the most important sources of revenue for municipal bodies. On an average about 70 per cent of the revenue income is generated through taxes. Further it is to be noted that octroi and property tax contribute as much as 90 per cent of the tax income (Table 5.2). Wide variations in terms of composition of revenue is also observed in all the size classes.

Table 5.2: Composition of Incomes

Local Body	Parameters	Averages			Minimum	Maximum
		1984-85	1989-90	1994-95	1994-95	1994-95
M. Crop.	% Tax Income/ T.Ord. Income	57.25	55.45	68.34	40.17	87.76
	% Octroi to Tax Income	65.69	69.16	72.40	41.85	95.50
	% Property Tax/tax income	19.78	17.31	14.87	3.21	33.36
	% Ord. Inc.to T. Inc.	57.05	62.00	64.88	38.05	82.60
A Class	% Tax Income/ T. Ord. Income	65.83	63.02	73.08	50.10	91.70
	% Octroi to Tax Income	71.37	72.74	78.30	63.74	91.08
	% Property Tax / Tax Income	17.06	16.55	12.98	6.67	20.38
	% Ord. Inc. to Tot. Inc.	60.67	56.45	58.12	38.99	78.76
B Class	% Tax Income/ T. Ord. Income	71.66	72.73	70.17	75.22	90.11
	% Octroi to Tax Income	72.17	68.98	56.81	56.53	77.90
	% Property Tax / Tax Income	15.30	15.86	13.47	12.36	20.47
	% Ord. Inc. to Tot. Inc.	50.49	56.49	51.60	25.70	86.12
C Class	% Tax Income/ T. Ord. Income	-	-	78.97	19.93	95.12
	% Octroi to Tax Income	-	-	49.04	11.42	80.70
	% Property Tax / Tax Income	-	-	10.15	1.68	31.61
	% Ord. Inc. to Tot. Inc.	-	-	78.33	66.94	98.45

The level of taxation between classes as well as amongst the size class vary significantly. This is an indication towards inadequacies in the tax collection system as well as the variations in the rates levied by different size class towns.

Income Expenditure Differentials

It can be seen from Table 5.3 that the average income expenditure ratios in many cases is below one. Many local bodies have deficit budgets. In order to match the revenue-expenditure stopping repayment of loans, post phoning transfer of funds into pension accounts are the measures adopted.

Table 5.3: Income-Expenditure Differentials

Parameters	Averages			Minimum			Max.
	1984-85	1989-90	1994-95	1984-85	1989-90	1994-95	1994-95
T.Expenditure / Income	1.07	0.97	0.98	-0.019	0.002	0.62	1.32
Total (Ordinary Expenditure /Income)	1.13	0.99	1.04	-0.026	0.010	0.44	2.81
T.Expenditure / Income	0.90	0.94	0.87	0.009	-0.015	0.53	0.98
Total (Ordinary Expenditure /Income)	0.96	0.97	0.82	0.002	-0.033	0.28	0.98
T.Expenditure / Income	0.94	1.05	0.77	0.022	-0.060	0.79	1.01
Total (Ordinary Expenditure /Income)	0.86	0.90	0.67	0.009	-0.057	0.61	0.91

Expenditure Pattern

Table 5.4 below presents the expenditure pattern of size class towns under major heads. Important observations are presented below :

- Low levels of capital expenditure : capital expenditure varies from nil to 50 per cent.
- High establishment expenditure : Expenditure on establishment comprises of a major share of the expenditure, 23-135 per cent, as a result of which in some local bodies all the money is spent only in maintaining the staff.
- Low revenue account surplus : Corporations spend about 45-50 per cent of their total income on revenue account while other towns spend around 60-70 per cent.
- Narrow base : The local bodies mainly depend on property tax and octroi for revenue generation.

Contribution from Grants-in-Aid and Shared Taxes

The state provides grants-in-aid for general purpose as well as for specific purpose such as education, land revenue, maintenance and repairs of roads, maintenance of hospitals and dispensaries. It also shares the collection in entertainment tax. Table 5.5 below indicates the contribution of external sources to total income. The local bodies

dependence on the state is restricted to below one-fifth of the total income. The corporation cities fare better with only 16 per cent coming in the form of transfers from state. Other municipal towns depend on state grants and transfers to the tune of 28 per cent.

Table 5.4: Expenditure Pattern

Town Class	Parameters	Averages			Minimum	Maximum
		1984-85	1989-90	1994-95	1994-95	1994-95
M.Crop.	% Ord. Exp. / Tot. Exp.	46.83	49.86	46.84	16.34	77.42
	% Cap. Exp. / Tot. Exp.	12.80	10.57	6.92	1.47	11.80
	% Water Exp./ Ord. Income	8.93	9.31	10.91	7.03	16.08
	% Pub. Health/ Ord. Exp.	19.23	16.99	14.75	7.33	22.67
	% Pub. Build./ Ord. Exp.	0.36	0.12	0.03	0.05	0.07
	% Establishment/Ord. Exp.	53.24	47.75	41.96	41.12	59.39
A Class	% Ord. Exp. / Tot. Exp.	65.04	58.14	54.08	28.51	90.86
	% Cap Exp / Tot. Exp.	6.24	12.09	19.18	4.15	50.56
	% Water Exp./ Ord. Income	11.80	12.36	12.46	2.29	18.80
	% Pub. Health/ Ord. Exp	22.88	21.11	24.84	16.01	50.62
	% Pub. Build./ Ord. Exp.	0.19	0.11	0.08	0.02	0.21
	% Establishment/ Ord. Exp.	41.13	53.92	64.83	35.02	134.66
B Class	% Ord. Exp. / Tot. Exp.	59.82	63.07	65.83	32.84	84.69
	% Cap. Exp. / Tot. Exp.	11.05	10.45	10.82	0.02	39.14
	% Water Exp./Ord. Income	12.88	14.36	19.65	3.30	39.69
	% Pub. Health/Ord. Exp.	21.52	20.35	25.44	9.67	44.77
	% Pub. Build./Ord. Exp.	0.31	0.13	0.07	0.02	0.24
	% Establishment/Ord. Exp.	46.85	45.86	48.19	22.83	96.30
C Class	% Ord. Exp. / Tot. Exp.	-	-	78.62	39.34	97.71
	% Cap. Exp. / Tot. Exp.	-	-	14.90	0.46	50
	% Water Exp./Ord. Income	-	-	9.82	2.71	23.64
	% Pub. Health/Ord. Exp.	-	-	21.67	7.36	41.04
	% Establishment/Ord. Exp.	-	-	58.26	25	97.56

Table 5.5: Dependence on State Grants

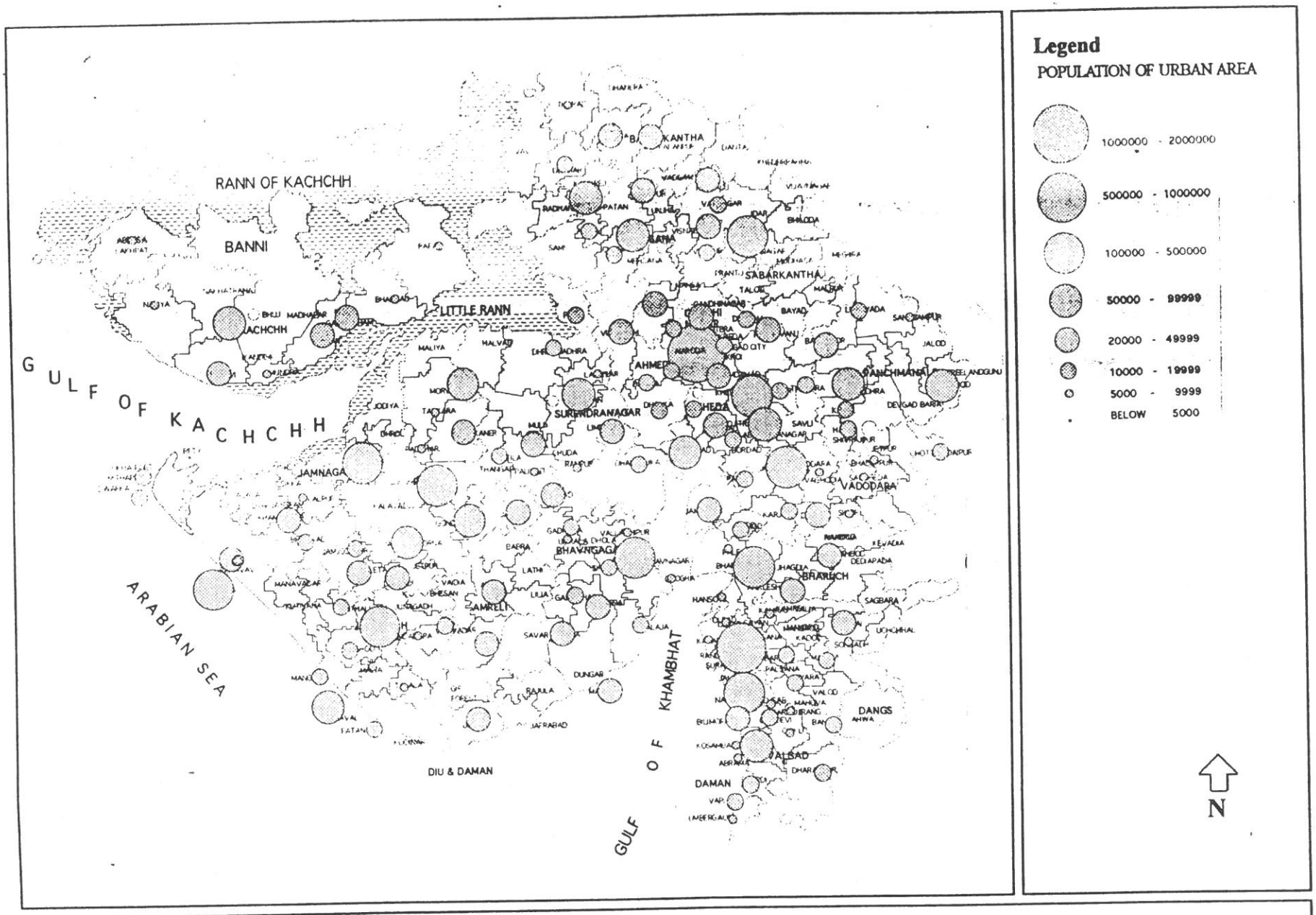
Local Body	Percentage Income
Corporation	16.09
Class A	27.62
Class B	27.85
Class C	27.88
Total	18.66

SUMMARY

Multiplicity of organisations, overlapping functions and lack of trained manpower are major drawbacks of urban management institutional framework in Gujarat. The planning tools have become outdated. Due to overemphasis on procedures, time delays have become inordinate. There is a need for modification in the existing framework and introduction of innovative mechanisms.

Inequalities in municipal income and expenditure are substantial. Few of the large urban areas are performing very well, while a large number of local bodies are poor. Consistency in the growth of income is not found. Lacunae in tax administration is one of the major problem. The level of taxation is also limited in many local bodies. Excessive dependence on octroi and property tax is found. A few of the local bodies do not levy property taxes. Widening the resource base is needed. It is expected that the Finance Commission will look into these matters and come out with necessary recommendations.

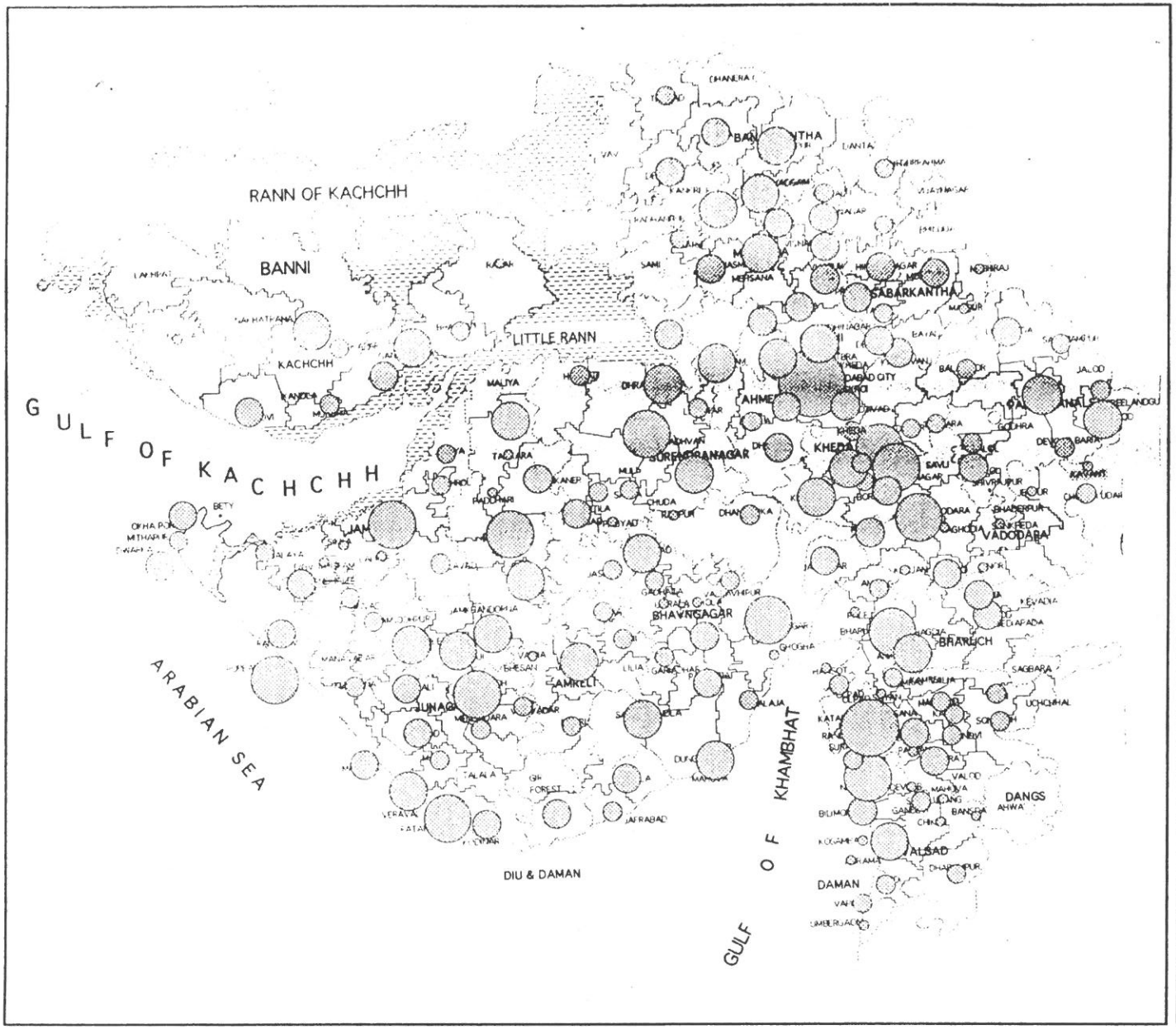
MAPS



SETTLEMENT PATTERN,1971

URBAN PROFILE : GUJARAT

School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



Legend

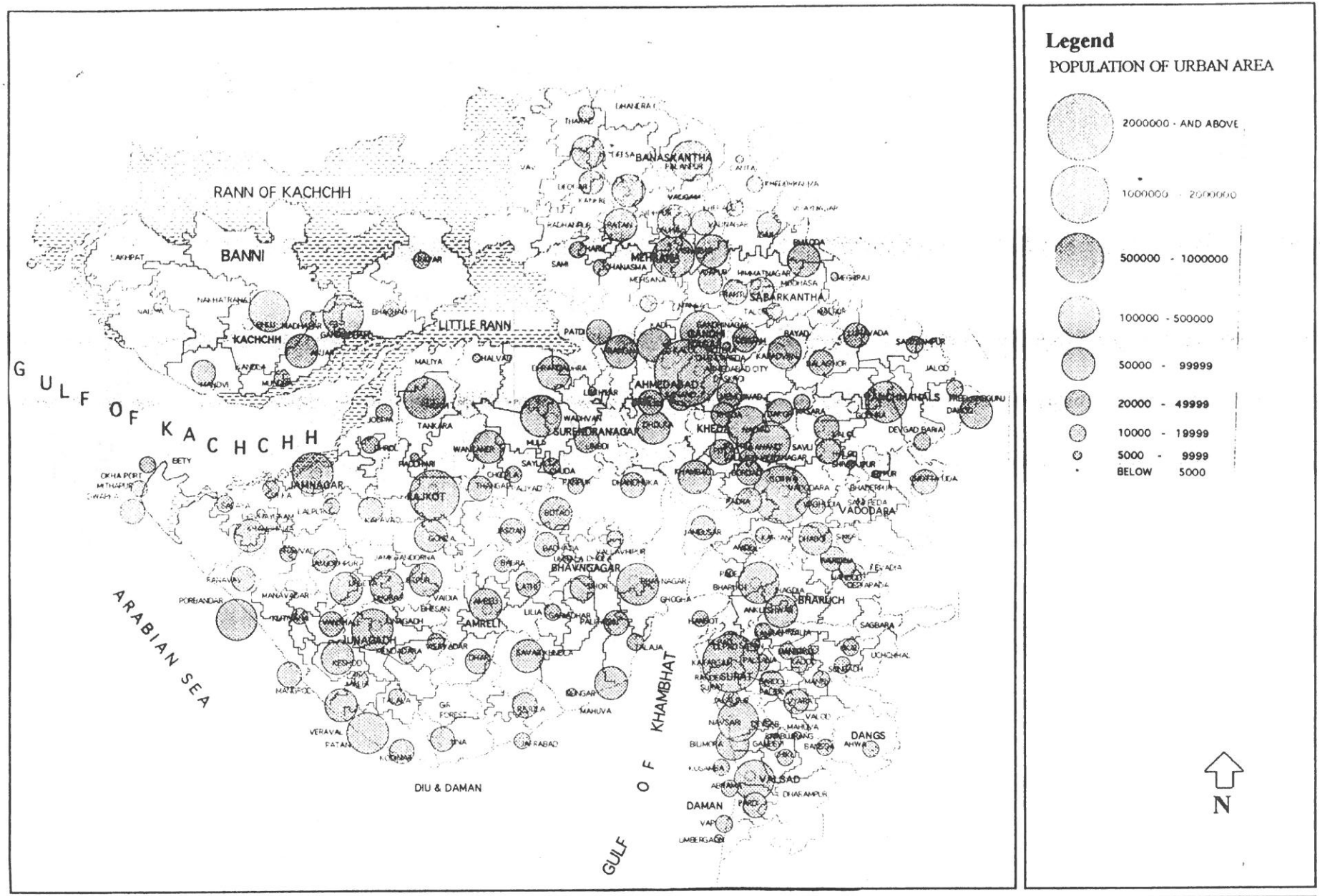
POPULATION OF URBAN AREA

- 2000000 - AND ABOVE
- 1000000 - 2000000
- 500000 - 1000000
- 100000 - 500000
- 50000 - 99999
- 20000 - 49999
- 10000 - 19999
- 5000 - 9999
- BELOW 5000

SETTLEMENT PATTERN,1981

U R B A N P R O F I L E : G U J A R A T

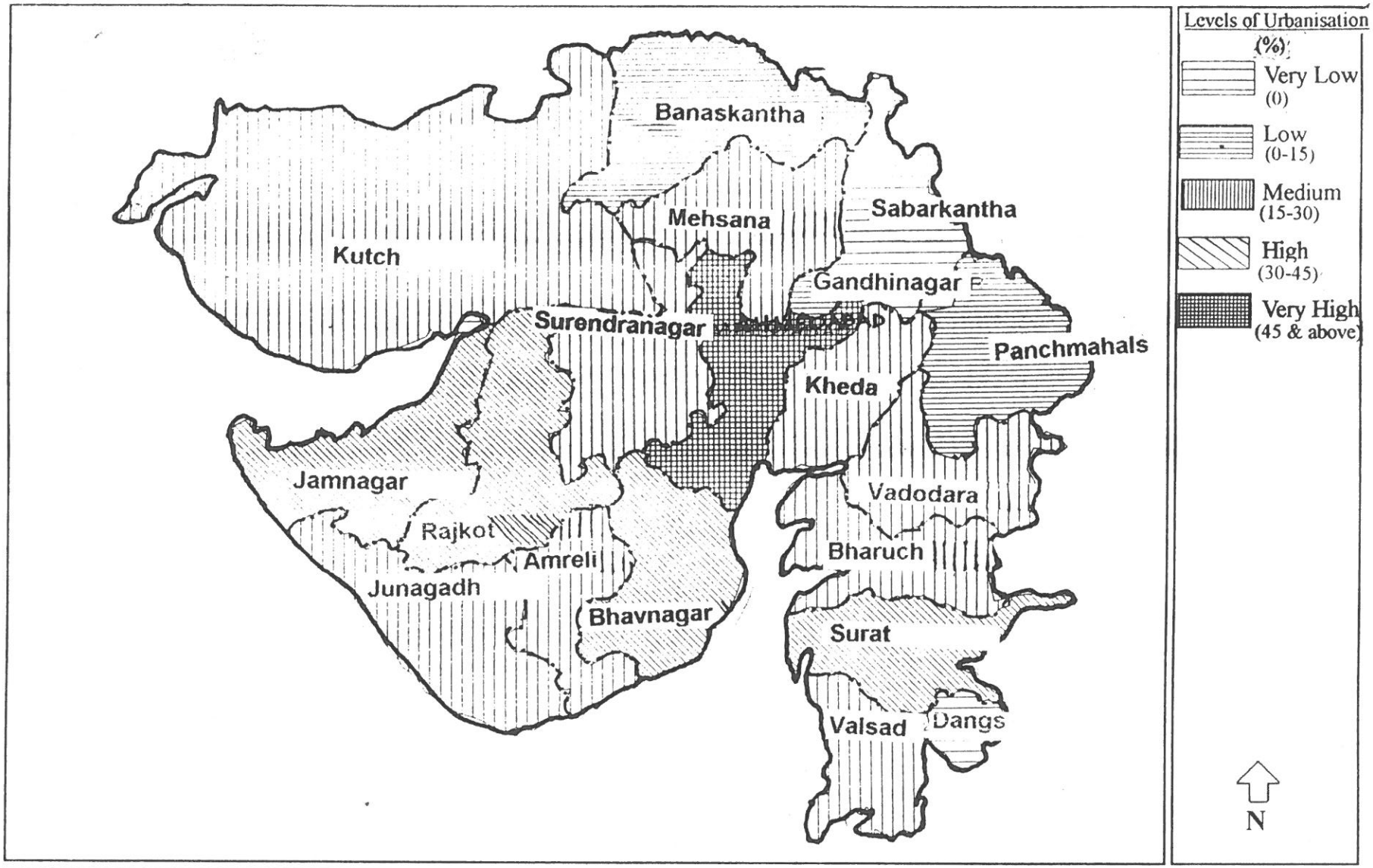
School of Planning, CEPT, and Departament of Urban Developement and Housing, Gujarat



SETTLEMENT PATTERN, 1991

U R B A N P R O F I L E : G U J A R A T

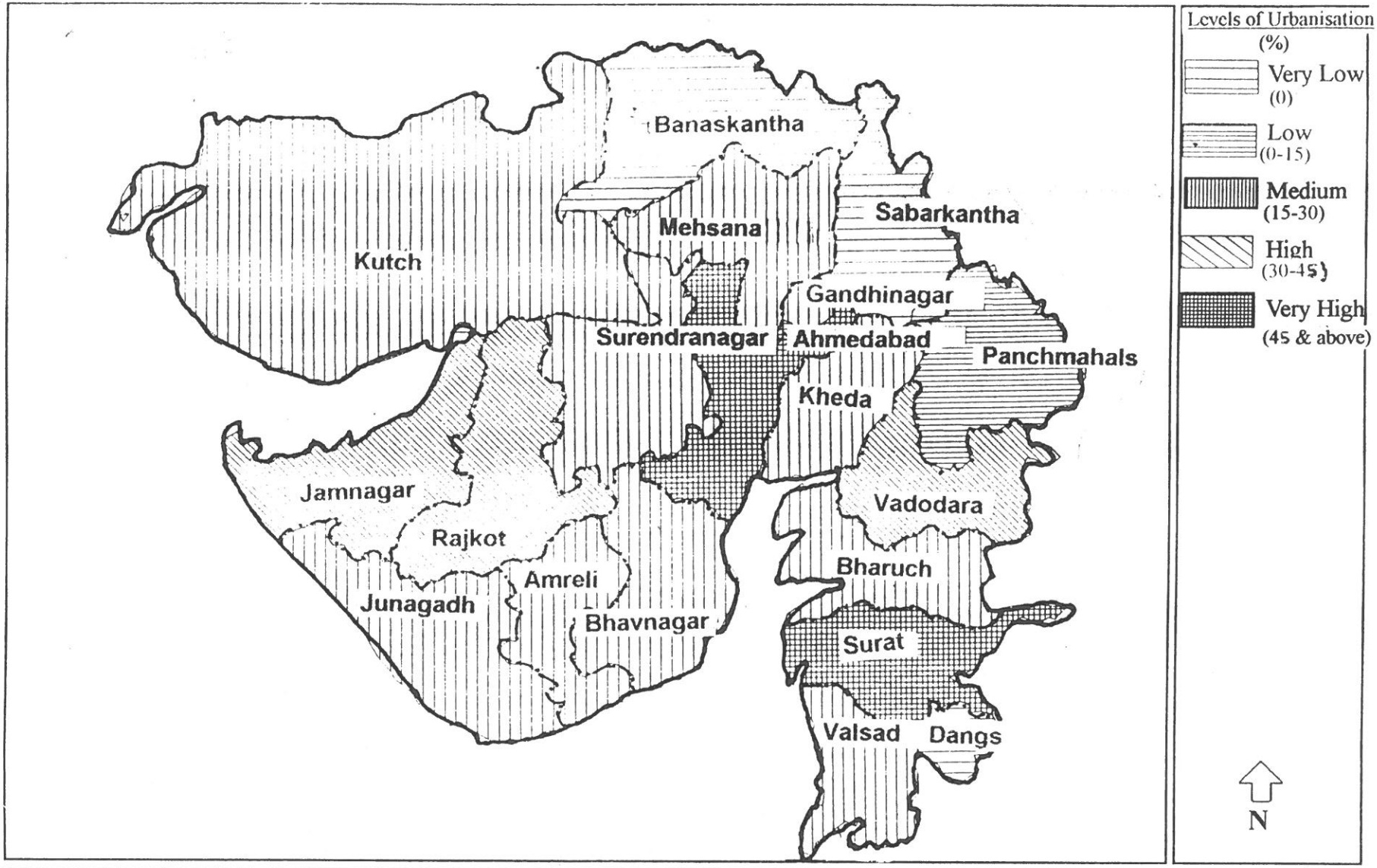
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



LEVELS OF URBANISATION, 1971

U R B A N P R O F I L E : G U J A R A T

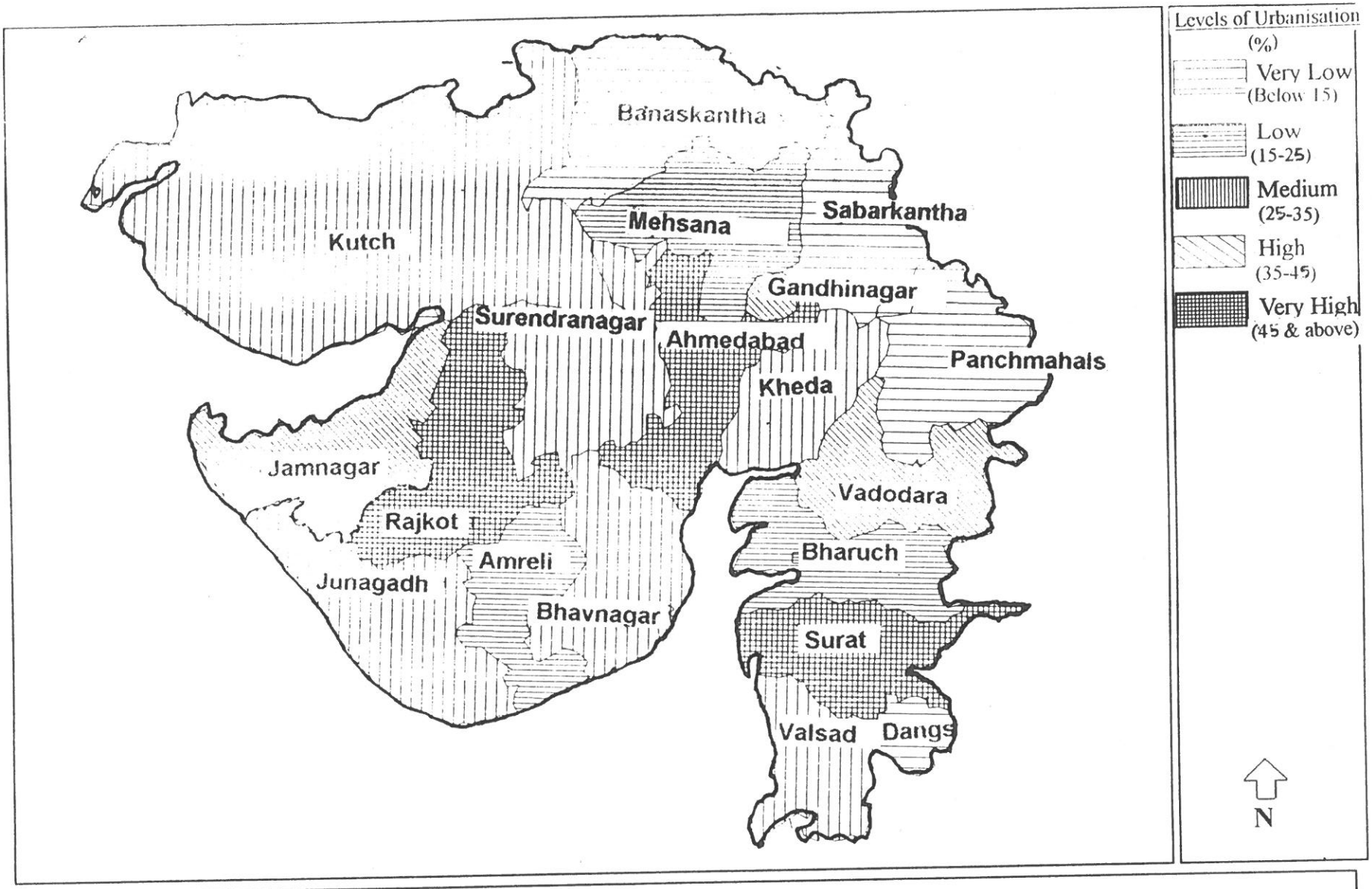
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



LEVELS OF URBANISATION, 1981

U R B A N P R O F I L E : G U J A R A T

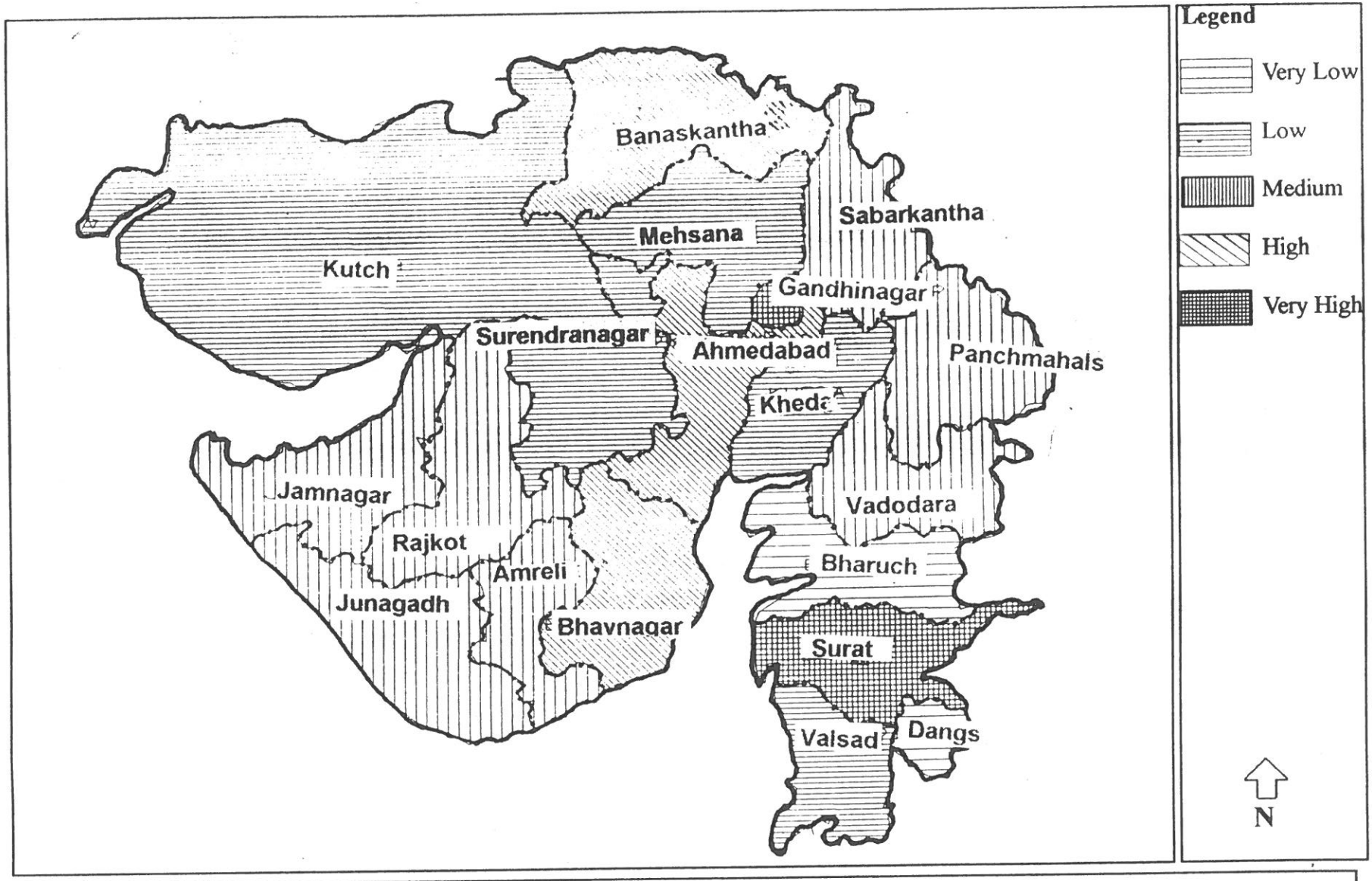
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



LEVELS OF URBANISATION, 1991

U R B A N P R O F I L E : G U J A R A T

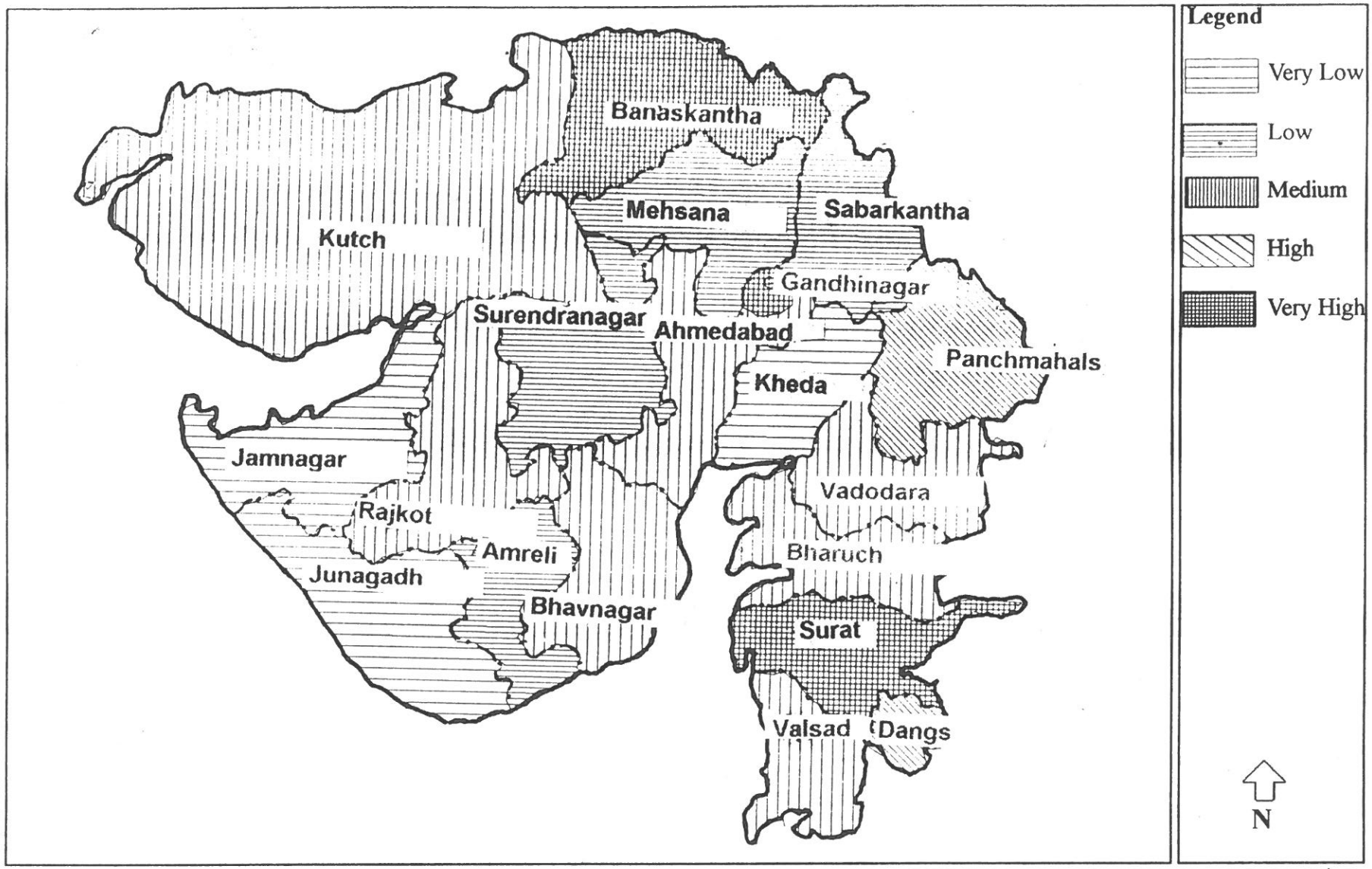
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



POPULATION GROWTH RATE, 1971-81

U R B A N P R O F I L E : G U J A R A T

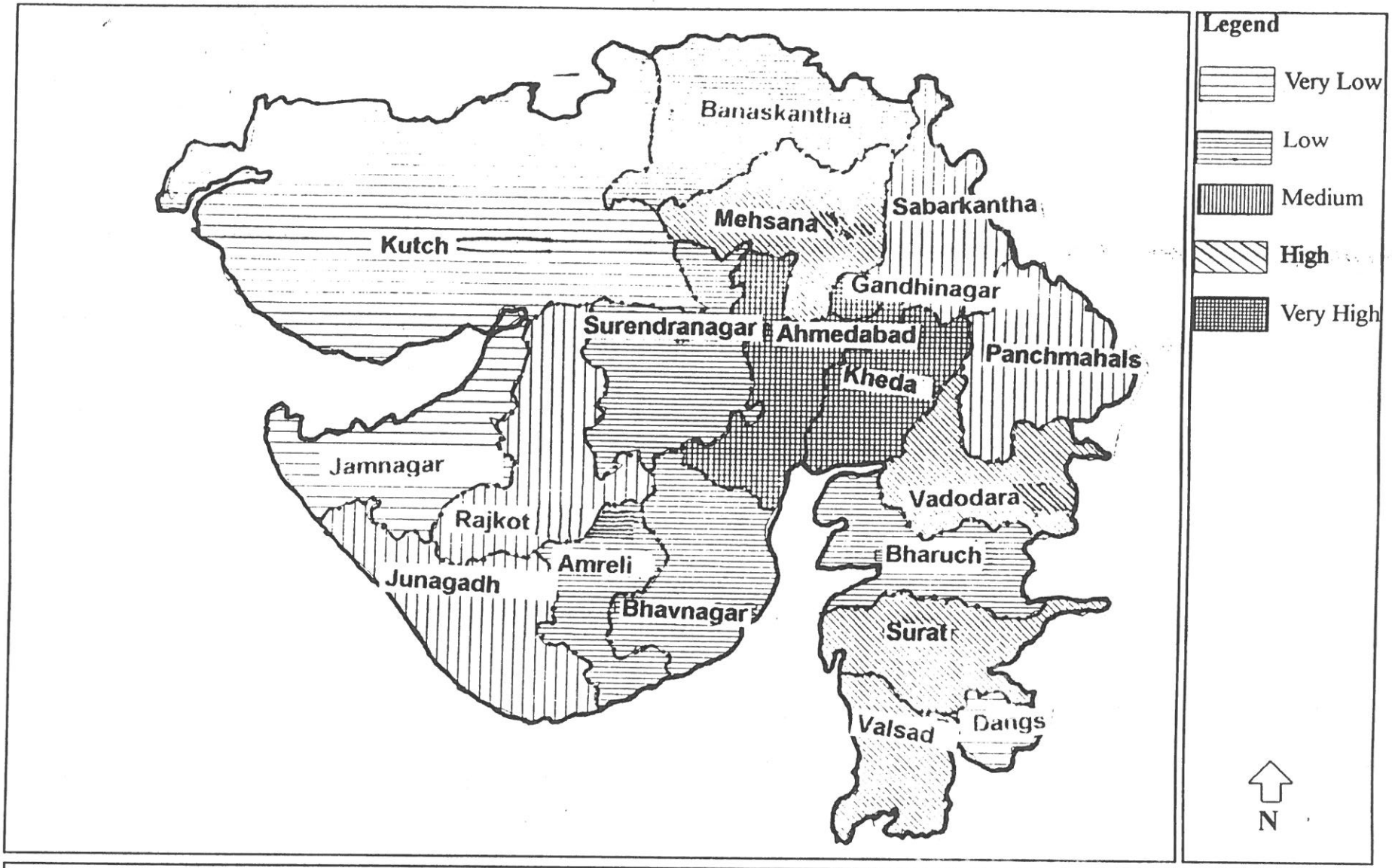
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



POPULATION GROWTH RATE, 1981-91

U R B A N P R O F I L E : G U J A R A T

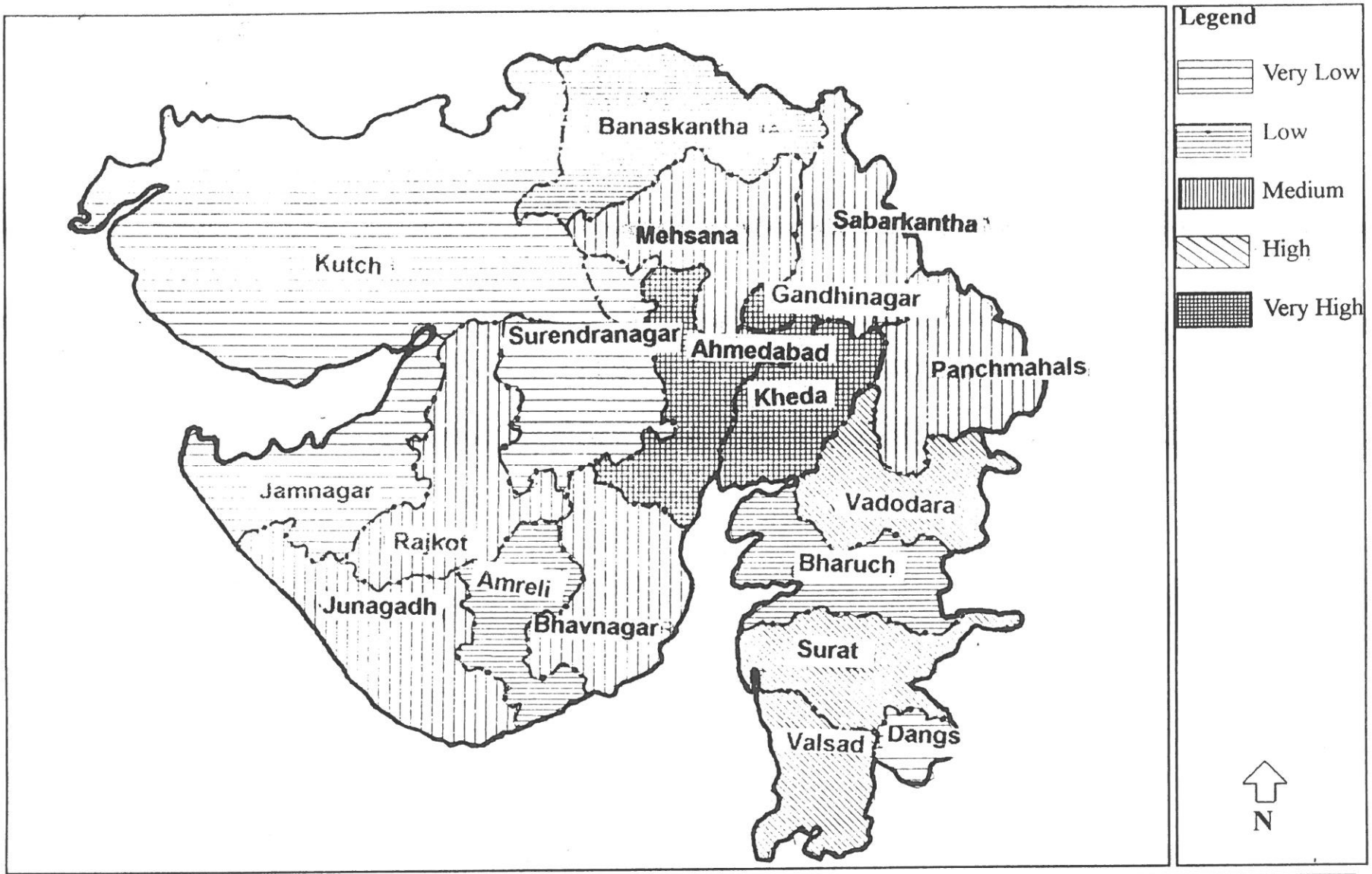
School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



DENSITY OF POPULATION, 1971

U R B A N P R O F I L E : G U J A R A T

School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



DENSITY OF POPULATION,1981

U R B A N P R O F I L E : G U J A R A T

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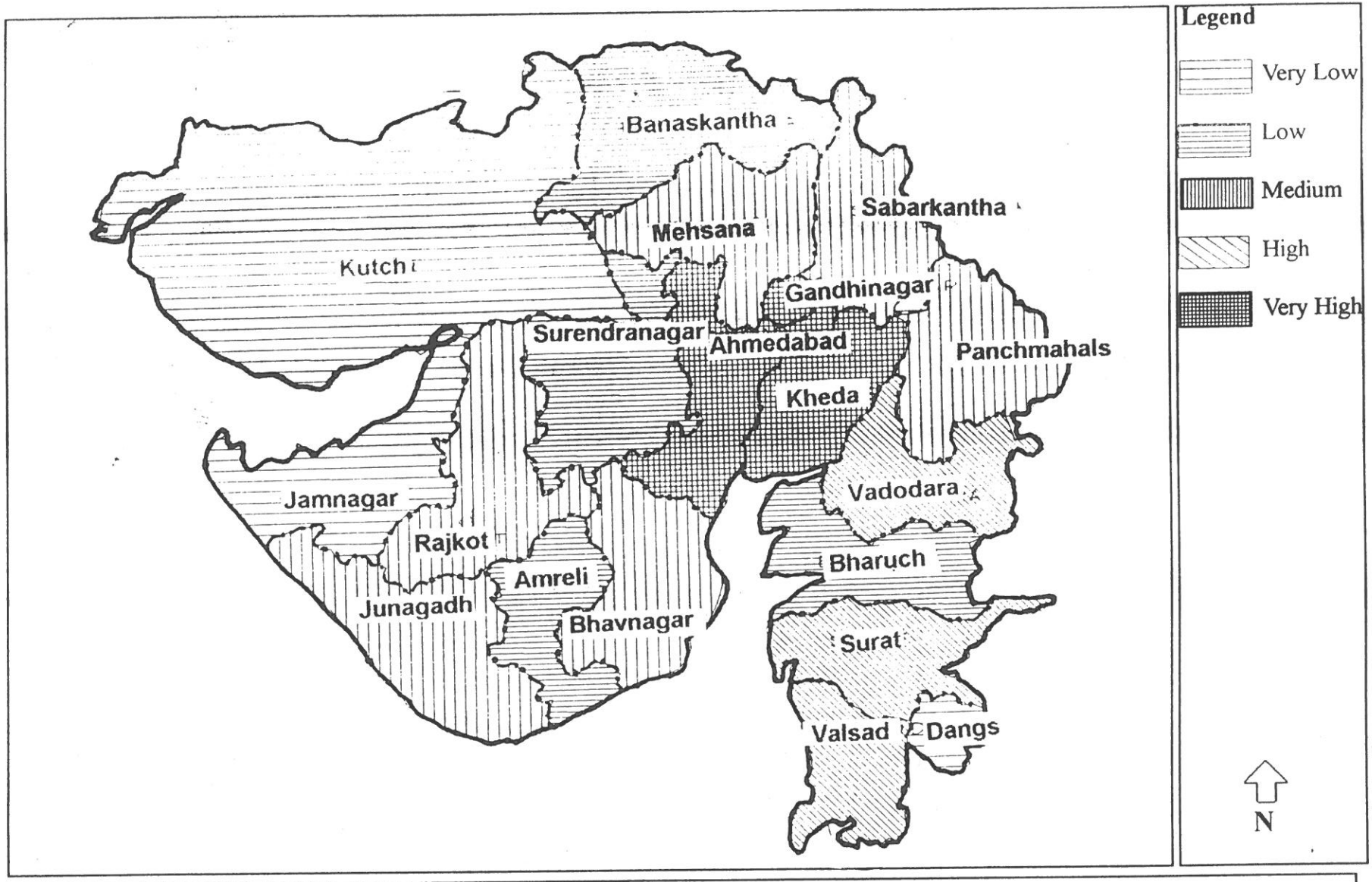

DENSITY OF POPULATION,1991

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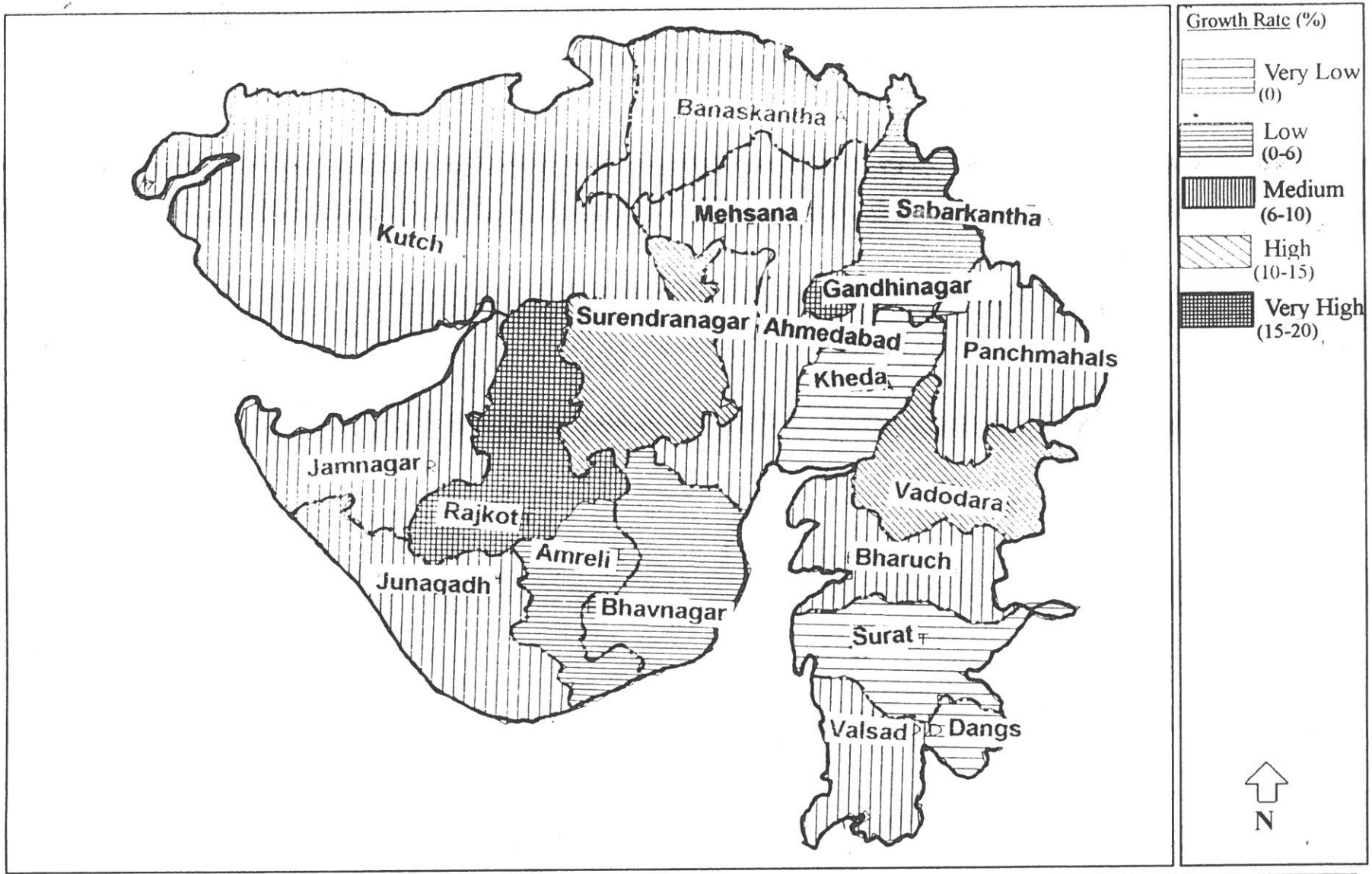
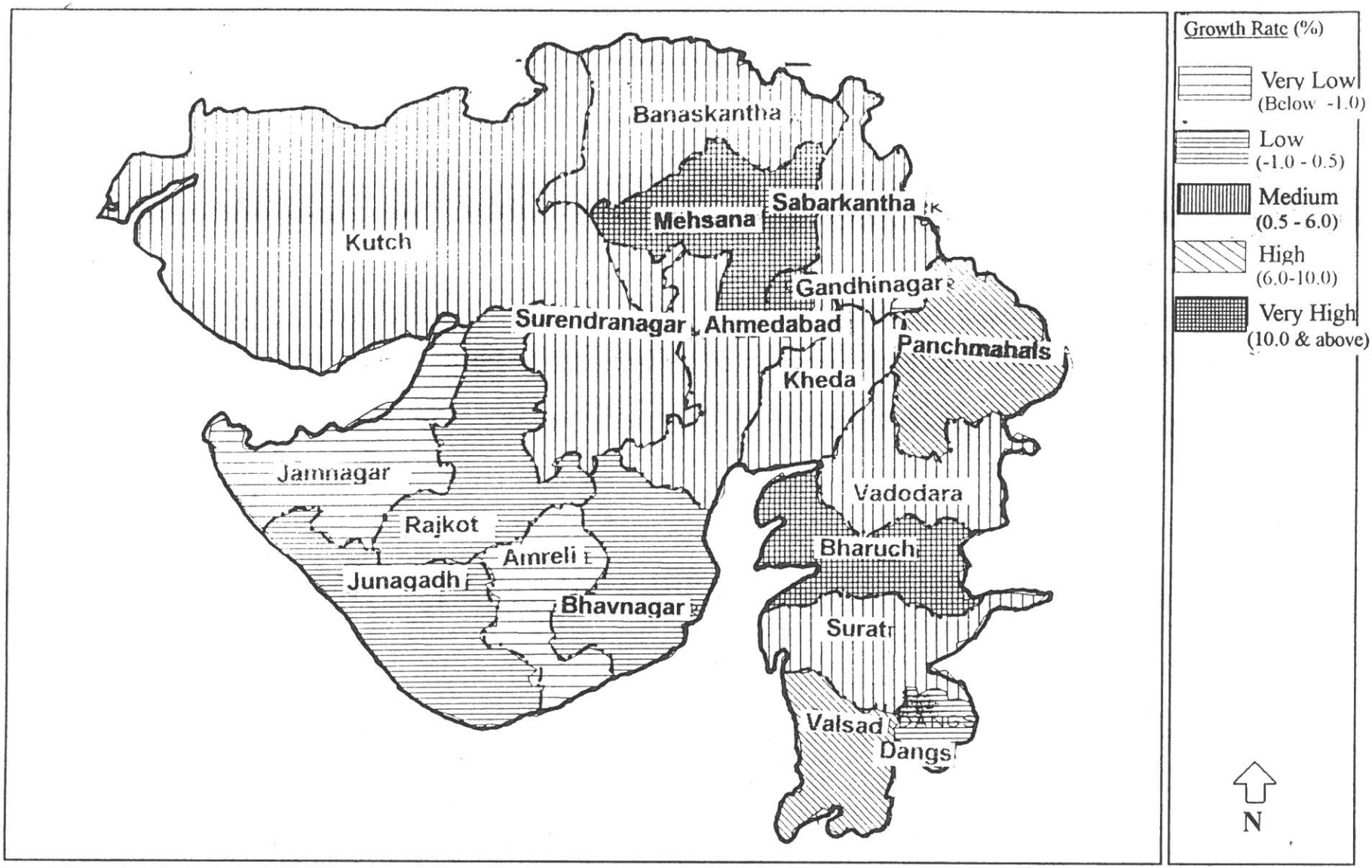


GROWTH OF INDUSTRIAL UNITS 1971-1981

U R B A N P R O F I L E : G U J A R A T

School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat



GROWTH OF INDUSTRIAL UNITS 1981-91

U R B A N P R O F I L E : G U J A R A T

School of Planning, CEPT, and Department of Urban Developement and Housing, Gujarat

ANNEXURE

Annexure I
Population in Urban Centres

	DISTRICT	URBAN AREA	AREA (in sq.km.)			POPULATION			COMPOUND GROWTH RATE (%)	
			1971	1981	1991	1971	1981	1991	1971-81	1981-91
	JAMNAGAR	JAMNAGAR UA	39.7	39.7	40	233800	317362	381646	3.10	1.86
	JAMNAGAR	JAMNAGAR (MC)	25.9	25.9	26	199709	277615	341637	3.35	2.10
	JAMNAGAR	DWARKA (NP)	42.07	42.07	42	17801	21375	27824	1.85	2.67
	JAMNAGAR	KHAMBHALIA (M)	3.24	3.51	4	19973	26368	31794	2.82	1.89
		navagam ghed					9695	17997		6.38
	JAMNAGAR	BHANVAD (NP)	35.26	35.26	35	13509	15451	16715	1.35	0.79
	JAMNAGAR	DHROL (NP)	39.02	39.02	39	11327	14758	17058	2.68	1.46
	JAMNAGAR	JAMJODHPUR (NP)	69.48	69.48	69	16585	19439	20615	1.60	0.59
	JAMNAGAR	KALAVAD (NP)	35.89	35.89	36	12594	16784	21026	2.91	2.28
	JAMNAGAR	SALAYA (NP)	9.24	9.56	10	13017	17398	19363	2.94	1.08
	JAMNAGAR	SIKKA (NP)	9.59	8.36	8	13240	9650	13594	-3.11	3.49
	JAMNAGAR	DIGVIJAYGRAM (NP)		1.23	1		7034	8195		1.54
	JAMNAGAR	LALPUR (VP)	31.87	31.87	32	7514	9613	11542	2.49	1.85
	JAMNAGAR	MITHAPUR (NM)	22.29	22.29	22	15572	19023	16326	2.02	-1.52
	JAMNAGAR	OKHAPORT (NP)	4.39	4.39	4	10687	11820	13778	1.01	1.54
	JAMNAGAR	BEYT (VP)	11.5	11.5	12	3671	4143	4891	1.22	1.67
	JAMNAGAR	SURAJKARADI (VP)*	2.77	2.77	3	2852	5107	14388	6.00	10.91
	JAMNAGAR	JODIYA (NP)	77.59	77.6	78	9277	11734	12087	2.38	0.30
1	JAMNAGAR	TOTAL	190.11	191.35	192	283373	385836	462853	3.13	1.84
	RAJKOT	RAJKOT U.A.	127.38	136	136	309597	460605	654490	4.05	3.58
	RAJKOT	RAJKOT (MC)	60.15	69	69	300612	445076	559407	4.00	2.31
	RAJKOT	GONDAL U.A.				55329	66818	81533	1.90	2.01
	RAJKOT	DHORAJI (M)	15.54	15.54	17	59773	76556	77748	2.51	0.15
	RAJKOT	JETPUR M	10.36	10.36	10	41926	62806	73560	4.12	1.59
	RAJKOT	MORVI (M)	8.62	8.62	9	60972	73327	90357	1.86	2.11
	RAJKOT	UPLETA (M)	4.08	2.76	51	35326	54907	51801	4.51	-0.58
	RAJKOT	WANKANER (M)	4.5	4.5	5	28001	32208	36603	1.41	1.29
	RAJKOT	JASDAN (NP)	44.28	44.28	44	14661	19621	28088	2.96	3.65
	RAJKOT	JETALSAR (VP)	21.91	21.9	22	9507	11031	11309	1.50	0.25
	RAJKOT	JETPUR U.A.	20.36	20.36	20	44669	69885	106606	4.58	4.31
	RAJKOT	MORVI UA	76.89	76.98	77	71260	90943	126857	2.47	3.38
	RAJKOT	DHORAJI U.A.	15.54	15.54	17	60080	77716	79479	2.61	0.22
	RAJKOT	PADDHARI (VP)	16.1	16.1	16	5320	6047	7922	1.29	2.74
	RAJKOT	TANKARA (VP)	34.38	34.38	34	5672	6775	7790	1.79	1.41
	RAJKOT	VINCHHIYA (VP)	18.52	18.52	19	5809	7722	9459	2.89	2.05
2	RAJKOT	TOTAL	518.64	526.39	576	830747	1153853	1526188	3.34	2.84
	SURENDRANAGAR	wadhwan UA	55.62	58.38	58	101673	135259	172102	2.90	2.44
	SURENDRANAGAR	WADHWAN (M)	18.41	18.41	18	30584	38832	49791	2.42	2.52
	SURENDRANAGAR	SURENDRANAGAR (M)	14.19	14.19	14	66667	89619	106110	3.00	1.70
	SURENDRANAGAR	LIMBDI (M)	5.18	5.2	5	25597	30829	35284	1.88	1.36
	SURENDRANAGAR	SAYLA (NP)	65.23	65.2	65	9021	10433	11772	1.46	1.21
	SURENDRANAGAR	CHOTILA (VP)	28.16	28.16	28	7824	9982	11635	2.47	1.54
	SURENDRANAGAR	THANGADH (NP)	31.95	50.39	50	12095	18586	24770	4.39	2.91
	SURENDRANAGAR	HALVAD (NP)	74.14	74.14	74	10286	13193	19576	2.52	4.03
	SURENDRANAGAR	DHRANGADHRA (M)	10.36	10.36	10	40791	51280	57961	2.31	1.23
	SURENDRANAGAR	PATDI (NP)	51.31	51.33	51	9947	12826	14098	2.57	0.95
	SURENDRANAGAR	KHARAGHODA (VP)	11.57	11.57	12	5793	8356	10034	3.73	1.85
	SURENDRANAGAR	LAKHTAR (NP)	50.62	57.4	57	9714	10900	11127	1.16	0.21
3	SURENDRANAGAR	TOTAL	384.14	412.13	412	232741	301644	368359	2.63	2.02
	BHAVNAGAR	VERTEJ (VP)	20.46	20.46	20	6522	8203	8187	2.32	-0.02
	BHAVNAGAR	BHAVNAGAR U.A.	104.27	104.27	104	228103	310785	406681	3.14	2.73
	BHAVNAGAR	BHAVNAGAR (MC)	90.16	90.16	90	225358	307121	402338	3.14	2.74
	BHAVNAGAR	GHOGHA (VP)	11.17	11.9	12	6527	8804	9420	3.04	0.68
	BHAVNAGAR	TALAJA (NP)	14.38	14.4	14	10025	14739	17965	3.93	2.00
	BHAVNAGAR	KATPAR (VP)*	6.5	6.5	7	6746	4184	7088	-4.66	5.41
	BHAVNAGAR	MAHUVA U.A.	5.94	5.94	6	41588	56072	64144	3.03	1.35
	BHAVNAGAR	MAHUVA (M)	5.94	5.94	6	39497	53625	59912	3.11	1.11
	BHAVNAGAR	SAVARKUNDLA U.A.	2.59	8	8	39215	51431	65785	2.75	2.49
	BHAVNAGAR	SAVARKUNDLA (M)	2.59	8	8	37957	49770	64815	2.75	2.68
	BHAVNAGAR	GARIADHAR (NP)	27.65	27.7	28	10644	15227	19723	3.65	2.62
	BHAVNAGAR	PALITANA (M)	12.95	12.95	13	27355	34449	41870	2.33	1.97
	BHAVNAGAR	SIHOR (NP)	32.38	32.38	32	18580	24748	34008	2.91	3.23

	DISTRICT	URBAN AREA	AREA (in sq.km.)			POPULATION			COMPOUND GROWTH RATE (%)	
			1971	1981	1991	1971	1981	1991	1971-81	1981-91
	BHAVNAGAR	SONGADH (VP)	8.43	8.42	8	4795	5370	5670	1.14	0.55
	BHAVNAGAR	UMRALA (VP)	15.53	15.53	16	5058	6818	9091	3.03	2.92
	BHAVNAGAR	DHOLA (VP)	5.61	5.61	6	1668	6747	7510	15.00	1.08
	BHAVNAGAR	GADHADA (NP)	63.39	64.5	65	11962	16050	21955	2.98	3.18
	BHAVNAGAR	BOTAD (M)	10.36	10.36	10	32179	50274	64603	4.56	2.54
	BHAVNAGAR	PALIYAD (VP)	32.77	32.77	33	5751	7022	8316	2.02	1.71
	BHAVNAGAR	VALLABHIPUR (NP)	40.91	40.9	41	8234	10978	14280	2.92	2.66
4	BHAVNAGAR	TOTAL	2386.29	2403.59	2414	466923	633882	808287	3.10	2.46
	AMRELI	AMRELI U.A.	5.18	11.44	11	43794	58241	69366	2.89	1.76
	AMRELI	AMRELI M		11.44	11	39520	56598	67827	3.66	1.83
	AMRELI	BAGASARA (M)	36.88	43.84	44	18999	12036	28389	-4.46	8.96
	AMRELI	KODINAR (NP)	16.58	16.58	17	16286	21731	26643	2.93	2.06
	AMRELI	RAJULA (VP)	26.59	2.32	2	15132	20464	26571	3.06	2.65
	AMRELI	CHALALA (VP)	22.34	22.37	22	9517	12230	16193	2.54	2.85
	AMRELI	LATHI (NP)	43.48	36.15	36	11315	14450	16558	2.48	1.37
	AMRELI	JAFRABAD (NP)	28.77	28.77	29	8926	13544	17553	4.26	2.63
	AMRELI	DUNGAR (VP)	21.66	21.66	22	5472	6556	6713	1.82	0.24
	AMRELI	DHARI (VP)	1	1.53	2	13113	17540	22467	2.95	2.51
	AMRELI	DAMNAGAR (NP)	21.85	21.85	22	8609	10677	13946	2.18	2.71
	AMRELI	VADIA (VP)	15.22	15.22	15	7831	9695	10716	2.16	1.01
	AMRELI	BAGASARA (M)	36.88	43.84	44	18999	12036	28389	-4.46	8.96
	AMRELI	BABRA (VP)	59.62	59.6	60	9752	12199	14541	2.26	1.77
5	AMRELI	TOTAL	256	262.43	262	137328	167168	216442	1.99	2.62
	JUNAGADH	BILKHA (VP)	13.21	13.21	13	8642	10353	11041	1.82	0.65
	JUNAGADH	DUNGARPUR (Rural)	4.98	4.99	5	3940	5415	4674	3.23	-1.46
	JUNAGADH	JUNAGADH U.A.	31.87	31.9	32	104003	133531	163712	2.53	2.06
	JUNAGADH	JUNAGADH	1.6	8.96	9	101330	129434	158195	2.48	2.03
	JUNAGADH	VERAVAL (M)	5.82	6.54	7	58771	85048	93976	3.76	1.00
	JUNAGADH	PORBANDAR (M)	9.91	12.3	12	96881	115182	116671	1.75	0.13
	JUNAGADH	KESHOD (M)	41.87	41.87	42	19613	32036	50172	5.03	4.59
	JUNAGADH	MENDARDA (NP)	19.2	19.24	19	8253	10767	13142	2.69	2.01
	JUNAGADH	TALALA (NP)	9.8	9.8	10	6742	10967	14376	4.99	2.74
	JUNAGADH	PATAN U.A.	57.98	58.03	58	78941	111796	123381	3.54	0.99
	JUNAGADH	PATAN (M)	31.86	31.86	32	16749	20259	21663	1.92	0.67
	JUNAGADH	MALIA (NP)	29	29.04	29	8204	10003	11042	2.00	0.99
	JUNAGADH	MANGROL U.A.				28483	38000	45084	2.92	1.72
	JUNAGADH	PORBANDAR U.A.	55.85	58.16	58	116749	147622	161031	2.37	0.87
	JUNAGADH	PORBANDAR (M)	9.91	12.3	12	96881	115182	116671	1.75	0.13
	JUNAGADH	RANAVAV (NP)	43.81	43.81	44	12764	16290	19607	2.47	1.87
	JUNAGADH	ADITYANA (NP)	35.85	35.85	36	8401	12199	15634	3.80	2.51
	JUNAGADH	KUTIYANA (NP)	35.81	36.81	36	14131	17924	17434	2.41	-0.28
	JUNAGADH	MANAVADAR (VP)	27.66	27.66	28	14490	20509	23397	3.54	1.33
	JUNAGADH	BANTWA (VP)	30.39	30.39	30	15011	16777	15395	1.12	-0.86
	JUNAGADH	VANTHALI (VP)	35.64	35.64	36	14846	17012	16339	1.37	-0.40
	JUNAGADH	SHAPUR (VP)	18.45	18.45	18	8960	10770	9851	1.86	-0.89
	JUNAGADH	VISAVADAR (VP)	26.1	26.12	26	11024	13870	16884	2.32	1.99
	JUNAGADH	UNA (VP)	37.41	37.41	37	21558	29171	38729	3.07	2.87
	JUNAGADH	DELWADA (VP)	15.62	15.62	16	6672	8706	9120	2.70	0.47
6	JUNAGADH	TOTAL	570.5	574	573	511427	673718	780045	2.79	1.48
	KACHH	BHUJ U.A.	56.39	56.39	55	64219	84004	124422	2.72	4.01
	KACHH	BHUJ (M)	9.48	9.48	9	52177	69693	102176	2.94	3.90
	KACHH	ANJAR (UA)	17.81	17.81	18	27302	33623	51209	2.10	4.30
	KACHH	NALIYA (VP)	73.96	73.96	74	6433	7120	8105	1.02	1.30
	KACHH	MANDVI				27849	32114	36636	1.44	1.33
	KACHH	RAPAR (UA)	51.83	51.83	52	7203	10521	16466	3.86	4.58
	KACHH	MUNDRA (NP)	20.75	20.75	21	9183	10149	11652	1.01	1.39
	KACHH	BHACHAU (UA)	92.44	92.44	92	10023	13923	18408	3.34	2.83
	KACHH	ANJAR (UA)	17.81	17.81	18	27302	33623	51209	2.10	4.30
	KACHH	GANDHIDHAM(M)	12.98	12.98	30	38824	61415	104585	4.69	5.47
	KACHH	KANDLA (NM)	2.97	2.97	3	17995	23978	19787	2.91	-1.90
7	KACHH	TOTAL	346.94	346.94	363	236333	310470	442479	2.77	3.61

			AREA (in sq.km.)			POPULATION			COMPOUND GROWTH RATE (%)	
	DISTRICT	URBAN AREA	1971	1981	1991	1971	1981	1991	1971-81	1981-91
	BANASKANTA	CHHAPI (Rural)	6.7	6.7	7	3802	4985	5716	2.75	1.38
	BANASKANTA	DEESA (M)	8.43	8.43	8	28324	41730	62435	3.95	4.11
	BANASKANTA	RADHANPUR (NP)	36.95	36.95	37	18360	21134	24101	1.42	1.32
	BANASKANTA	THARAD (NP)	22.24	22.24	22	8361	13354	18061	4.79	3.07
	BANASKANTA	AMBAJI (Rural)	17.42	17.41	17	3559	7784	10673	8.14	3.21
8	BANASKANTA	TOTAL	91.74	91.73	92	62406	88987	120986	3.61	3.12
	SABARANTA	MODASA (NP)	13.47	13.47	13	22483	31989	42035	3.59	2.77
	SABARANTA	PRANTIJ (NP)	20.43	20.43	20	14502	18168	20722	2.28	1.32
	SABARANTA	TALOD (NP)	22.4	22.4	22	10935	12898	15197	1.66	1.65
	SABARANTA	KHEDBRAHMA (VP)	27.32	27.32	27	8858	14888	17231	5.33	1.47
	SABARANTA	IDAR U.A.	15.79	15.79	16	14633	19656	24910	3.00	2.40
	SABARANTA	IDAR (NP)	15.79	15.79	16	13799	18493	23423	2.97	2.39
	SABARANTA	MEGHRAJ (Rural)	5.6	5.66	6	4682	6454	8287	3.26	2.53
	SABARANTA	MODASA (NP)	13.47	13.47	13	22483	31989	42035	3.59	2.77
	SABARANTA	MALPUR (Rural)	7.9	7.94	8	3740	4698	5325	2.31	1.26
9	SABARANTA	TOTAL	218.12	341.52	342	255560	356863	466047	3.40	2.71
	MEHSANA	MAHESANA U.A.	33.27	33.27	33	56946	81172	119240	3.61	3.92
	MEHSANA	MAHESANA (M)	12.87	12.87	13	51598	72872	88201	3.51	1.93
	MEHSANA	KADI U.A.	20.28	20.35	20	31814	37573	56992	1.68	4.25
	MEHSANA	KADI (M)	2.85	2.85	3	27901	34595	42899	2.17	2.17
	MEHSANA	CHANASMA	20.52	20.52	21	14398	16053	16216	1.09	0.10
	MEHSANA	BECHAR (BECHARAJI)(VP)	8.77	8.77	9	4452	6695	8177	4.16	2.02
	MEHSANA	HARIJ (UA)	30.09	30.19	30	11073	14892	16636	3.01	1.11
	MEHSANA	PATAN U.A.	20.38	35.51	36	66138	82018	101576	2.18	2.16
	MEHSANA	PATAN (M)	13.68	13.62	14	64519	79196	96112	2.07	1.95
	MEHSANA	UNJHA (M)	35.14	35.15	35	27079	37725	51003	3.37	3.06
	MEHSANA	SIDHPUR U.A.				41334	52706	51794	2.46	-0.17
	MEHSANA	KHERALU (NP)	37	37	37	13881	17728	18267	2.48	0.30
	MEHSANA	VADNAGAR (NP)	44.27	44.27	44	19329	22079	25167	1.34	1.32
	MEHSANA	VISNAGAR (UA)	20.67	20.83	21	41137	55254	69591	2.99	2.33
	MEHSANA	VISNAGAR (M)	4.53	4.7	5	34683	46631	57839	3.00	2.18
	MEHSANA	VIJAPUR (UA)	30.26	31.68	32	23200	28488	34190	2.07	1.84
	MEHSANA	VIJAPUR (NP)	1.36	1.36	1	15571	18582	19115	1.78	0.28
	MEHSANA	KALOL (M)	17.23	17.23	17	50321	69946	82137	3.35	1.62
	MEHSANA	MANSA (NP)	26.9	26.9	27	16362	20866	23571	2.46	1.23
10	MEHSANA	TOTAL	346.14	363.03	363	433035	561777	693672	2.64	2.13
	GANDHINAGAR	GANDHINAGAR	56.8	56.8	72	24055	62443	167219	10.01	10.35
	GANDHINAGAR	CHANDKHEDA(N.P)	10.48	10.48	10	4196	10240	35560	9.33	13.26
	GANDHINAGAR	CHANDKHEDA (NP)	10.48	10.47	10.47	4196	10240	18733	9.33	6.23
	GANDHINAGAR	MOTERA (GP)	5.13	5.13	5.13	1980	4172	4393	7.74	0.52
11	GANDHINAGAR	TOTAL	82.89	82.88	98	34427	87095	225905	9.73	10.00
	KHEDA	KHEDA (NP)	21.62	21.62	22	15333	18969	21792	2.15	1.40
	KHEDA	VASO (NP)	11.55	11.55	12	10614	11774	12199	1.04	0.36
	KHEDA	NADIAD U.A.	37.58	37.59	38	110981	146169	173309	2.79	1.72
	KHEDA	NADIAD (M)	28.58	28.48	28	108269	142689	167051	2.80	1.59
	KHEDA	ANAND (M)	21.13	21.13	21	59155	83936	110266	3.56	2.77
	KHEDA	KHAMBHAT (M)	69.24	69.24	69	62097	68791	76746	1.03	1.10
	KHEDA	BALASINOR (NP)	21.6	21.64	22	19207	22641	29596	1.66	2.71
	KHEDA	BORSAD (M)	24.9	24.89	25	30738	38684	46821	2.33	1.93
	KHEDA	KAPADVANJ (M)	19.20	19.21	19	30748	35178	41016	1.36	1.55
	KHEDA	PETLAD (M)	2.28	2.28	2	39525	47020	48552	1.75	0.32
	KHEDA	UMMRETH				24225	28299	30082	1.57	0.61
	KHEDA	MEHMEDABAD (NP)	13.15	13.15	13	17592	22309	26103	2.40	1.58
	KHEDA	SOJITRA (NP)	14.34	14.34	14	12905	15229	14850	1.67	-0.25
	KHEDA	ANAND U.A.	56.81	77.2	77	80590	148835	189014	6.33	2.42
	KHEDA	BORSAD (M)	24.9	24.89	25	30738	38684	46821	2.33	1.93
	KHEDA	DHUVARAN (VP)	12.79	12.79	13	6836	7428	8784	0.83	1.69
	KHEDA	KHAMBHAT U.A.	80.23	80.23	80	69609	68791	89834	-0.12	2.70
	KHEDA	KATHLAL (Rural)	16.69	16.68	17	10006	11464	14152	1.37	2.13
	KHEDA	BALASINOR (NP)	21.6	21.64	22	19207	22641	29596	1.66	2.71
	KHEDA	VIRPUR (Urban in 1991)		5.05	13	5970	6040	6788	0.12	1.17
	KHEDA	THASRA (VP)	14.41	14.41	14	9851	11504	14039	1.56	2.01
	KHEDA	PALI (VP)	14.47	14.47	14	9939	12625	14902	2.42	1.67
	KHEDA	DAKOR T.A.	NA	n.a.	n.a.	16092	19183	20418	1.77	0.63
	KHEDA	V.V NAGAR				15509	18197	21560	1.61	1.71
12	KHEDA	TOTAL	644.53	711	719	878353	1191914	1444819	3.10	1.94

			AREA (in sq.km.)			POPULATION			COMPOUND GROWTH RATE (%)	
	DISTRICT	URBAN AREA	1971	1981	1991	1971	1981	1991	1971-81	1981-91
	PANCH MAHALS	GODHRA U.A.	35.1	35.39	35	69333	89771	104895	2.62	1.57
	PANCH MAHALS	GODHRA U.A.	20.16	20.16	20	66403	85784	96813	2.59	1.22
	PANCH MAHALS	KALOL U.A.	7.63	7.63	8	11081	14281	21275	2.57	4.07
	PANCH MAHALS	SHIVRAJPUR (VP)	19.61	19.61	20	4764	4872	5133	0.22	0.52
	PANCH MAHALS	HALOL U.A.	51.2	51.3	51	21005	26512	38856	2.36	3.90
	PANCH MAHALS	HALOL (NP)	16.26	16.26	16	14629	18600	27349	2.43	3.93
	PANCH MAHALS	LUNAWADA (NP)	12.77	12.77	13	18850	24343	27962	2.59	1.40
	PANCH MAHALS	SANTRAMPUR (NP)	17.15	17.15	17	8534	10997	13921	2.57	2.39
	PANCH MAHALS	DOHAD U.A.	11.24	11.24	11	52858	66234	79345	2.28	1.82
	PANCH MAHALS	DOHAD (M)	6.54	6.54	7	44506	55256	66500	2.19	1.87
	PANCH MAHALS	DEVGADBARIA (NP)	10.25	10.25	10	13235	15975	17608	1.90	0.98
13	PANCH MAHALS	TOTAL	129.85	129.95	130	130327	163214	204100	2.28	2.26
	BHARUCH	PALEJ (VP)	4.11	4.11	4	6362	8060	8962	2.39	1.07
	BHARUCH	BHARUCH INA (INA)			1		1	3029		122.91
	BHARUCH	BHARUCH U.A.	15.6	15.6	26	95391	117989	147169	2.15	2.23
	BHARUCH	BHARUCH (NP)	8.02	8.02	18	91589	110070	133102	1.86	1.92
	BHARUCH	HANSOT (VP)	16.23	16.23	16	7636	7575	9589	-0.08	2.39
	BHARUCH	ANKLESVAR U.A.	25.76	18.13	24	28682	45651	75329	4.76	5.14
	BHARUCH	ANKLESVAR (NP)	9	8.5	11	24814	36123	51739	3.83	3.66
	BHARUCH	JAMBUSAR (UA)	38.7	38.7	39	24251	28369	31561	1.58	1.07
	BHARUCH	AMOD (NP)	18.51	18.54	19	10525	12055	14348	1.37	1.76
	BHARUCH	RAJPIPLA	4.45	4.45	4	25769	29226	33113	1.27	1.26
	BHARUCH	KEVADIYA (VP)	6.28	6.28	6	1626	4154	11097	9.83	10.32
14	BHARUCH	TOTAL	129.64	122.04	140	200242	253080	334197	2.37	2.82
	VALSAD	ATUL (NM)	4.36	4.49	4	4494	5622	5941	2.26	0.55
	VALSAD	PARNERA (Rural)	6.22	6.22	6	3804	6314	8841	5.20	3.42
	VALSAD	VALSAD U.A.	28.22	28.93	30	63071	108967	111775	5.62	0.25
	VALSAD	VALSAD (M)	4.91	4.91	5	54966	72969	70314	2.87	-0.37
	VALSAD	VALSAD INA (INA)		0.50	1		408	509		2.24
	VALSAD	PARDI (NP)	13.10	13.1	13	12743	16319	19863	2.50	1.98
	VALSAD	VAPI (NP)	7.67	7.67	8	13888	19620	31533	3.52	4.86
	VALSAD	VAPI INA (INA)		9.45	9		6147	14478		8.94
	VALSAD	UMBERGAON (VP)	12.86	10.93	11	7768	9956	13508	2.51	3.10
	VALSAD	UMBERGAON INA (INA)		2.67	3		912	1973		8.02
	VALSAD	GANDEVI (NP)	4.38	4.38	4	12231	13518	14569	1.01	0.75
	VALSAD	DEVSAR (Rural)	NA	3.03	3	3764	6363	7626	5.39	1.83
	VALSAD	SARIBUJRANG (Rural)	3.16	3.17	3	5002	5770	6743	1.44	1.57
	VALSAD	BILIMORA U.A.	NA	16	16	33925	43755	51039	2.58	1.55
	VALSAD	NAVSARI U.A.	35.14	34.86	35	101103	149602	198379	4.00	2.86
	VALSAD	NAVSARI (M)	8.52	8.52	9	72979	106793	126089	3.88	1.67
	VALSAD	CHIKHLI U.A.	22.53	22.52	23	12721	20194	22312	4.73	1.00
	VALSAD	CHIKHLI (VP)	1.09	1.09	1	5002	5948	6704	1.75	1.20
	VALSAD	BANSDA (VP)	5.88	5.88	6	7108	8533	9725	1.84	1.32
	VALSAD	DHARAMPUR (NP)	15.51	15.51	16	11958	14116	16588	1.67	1.63
	VALSAD	MAHUVAR (Rural)	3.40	3.44	3	4295	5827	8129	3.10	3.39
15	VALSAD	TOTAL	162.43	192.75	194	54966	72969	70314	2.87	-0.37
	DANGS	AHWA (Rural)	4.03	4	4	5422	8375	10964	4.44	2.73
	DANGS	WAGHAI (Rural)	2.2	2.29	2	3127	590	4947	-15.36	23.69
16	DANGS	TOTAL	6.23	6.29	6	8549	8965	15911	0.48	5.90
	AHMEDABAD	AHMADABAD U.A.	235.82	175.69	255	1827145	2610069	3312216	3.63	2.41
	AHMEDABAD	AHMADABAD (MC)	158.60	98	187	1761689	2389259	2876710	3.09	1.87
	AHMEDABAD	DHOLKA U.A.	3.88	8		35520	44270	54352	2.23	2.07
	AHMEDABAD	DHOLKA (M)	3.88	8	8	35520	44270	49860	2.23	1.20
	AHMEDABAD	VIRAMGAM (M)	8.78	9	9	43790	48275	50698	0.98	0.49
	AHMEDABAD	DEHGAM (M)	26.99	27	27	17768	24868	31378	3.42	2.35
	AHMEDABAD	DHANDHUKA (NP)	62.66	63	63	18445	22109	27781	1.83	2.31
	AHMEDABAD	SANAND (NP)	40.42	40	40	18985	22465	25674	1.70	1.34
	AHMEDABAD	BAVLA (NP)	23.12	23	23	16695	21538	25391	2.58	1.66
	AHMEDABAD	BARWALA (NP)	32.04	32	32	9513	12055	13493	2.40	1.13
	AHMEDABAD	RANPUR(NP)	23.83	24	24	9277	10379	11786	1.13	1.28
	AHMEDABAD	MANDAL (NP)	60.32	60	60	9282	10340	10217	1.09	-0.12

			AREA (in sq.km.)			POPULATION			COMPOUND GROWTH RATE (%)	
	DISTRICT	URBAN AREA	1971	1981	1991	1971	1981	1991	1971-81	1981-91
	AHMEDABAD	SINGARVA (GP)	3.75	4	4	2815	6638	8183	8.96	2.11
	AHMEDABAD	NANDEJ (GP)	9.07		9	5589	7219	6878	2.59	-0.48
	AHMEDABAD	SOLA (GP)	9.45	9	9	3502	6107	5717	5.72	-0.66
	AHMEDABAD	VINZOL (GP)	10.49	8	2	2429	4351	2921	6.00	-3.91
17	AHMEDABAD	TOTAL	2521.62	2463.56	2547	2022726	2852664	3588676	3.50	2.32
	SURAT	VYARA (M)	7.92	7.92	8	18910	23998	30908	2.41	2.56
	SURAT	KOSAMBA U.A.	17.15	17.15	17	7713	10127	25434	2.76	9.65
	SURAT	UKAI (GP)	9.37	9.37	9	31234	14894	17457	-7.14	1.60
	SURAT	SONGADH (NP)	5.69	5.69	6	7166	12163	16009	5.43	2.79
	SURAT	MANDVI (NP)	7.56	7.56	8	10545	12047	14293	1.34	1.72
	SURAT	KATHOR (NP)	11.08	11.07	11	8526	10728	11720	2.32	0.89
	SURAT	OLPAD (GP)	15.01	15.01	15	6295	8656	10780	3.24	2.22
	SURAT	KADOD (NP)	4.90	2.71	3	8177	9791	10495	1.82	0.70
	SURAT	UTRAN (GP)	2.91	2.91	3	4728	6381	8673	3.04	3.12
	SURAT	SAYAN (GP)	7.02	7.02	7	3877	5258	8361	3.09	4.75
	SURAT	CHALTHAN (GP)	3.36	3.36	3	1424	4243	6664	11.54	4.62
18	SURAT	TOTAL	4617.35	4555.81	4652	2147627	2997246	3775160	3.39	2.33
	VADODARA	VADODARA U.A.	157.12	191.09	190	504407	802049	1127534	4.75	3.46
	VADODARA	VADODARA (MC)	78.13	108.26	108	466696	734473	1031346	4.64	3.45
	VADODARA	DABHOI (M)	23.82	23.82	24	37892	44357	50641	1.59	1.33
	VADODARA	PADRA U.A.				24229	30702	33823	2.40	0.97
	VADODARA	PADRA (M)	0.47	0.47	0	21718	27064	28150	2.23	0.39
	VADODARA	CHHOTAUDAIPUR (NP)	4.00	4.01	4	14312	18243	19006	2.46	0.41
	VADODARA	KARJAN (NP)	15.71	15.71	16	11968	15447	18432	2.58	1.78
	VADODARA	BODELI U.A.	5.10	5.1	8	7991	9776	15269	2.04	4.56
	VADODARA	BODELI (GP)	3.05	3.05	3	6229	7642	8650	2.07	1.25
	VADODARA	VAGHODIA (GP)	15.02	15.02	15	7551	9395	11182	2.21	1.76
	VADODARA	SANKHEDA (GP)	1.63	1.63	2	7973	8857	9246	1.06	0.43
	VADODARA	RANOLI (GP)	6.91	6.92	7	4908	7439	9007	4.25	1.93
	VADODARA	SINOR (GP)	16.19	16.2	16	8348	8718	8626	0.43	-0.11
	VADODARA	KAVANT (GP)	2.04	2.04	2	4569	5738	6598	2.30	1.41
	VADODARA	JETPUR (GP)		4.41	4		5198	6466		2.21
	VADODARA	BAHADARPAR (GP)	14.47	14.47	14	6179	6655	6236	0.74	-0.65
	VADODARA	G.S.F.C COMPLEX INA	2.63	3.21	3	5372	5668	4314	0.54	-2.69
	VADODARA	NANDESARI INA (INA)			2		1504	2394		4.76
19	VADODARA	TOTAL	264.64	303.63	308	645699	979746	1328774	4.26	3.09

ANNEXURE II

INFRASTRUCTURE SERVICES PRESENT LEVELS

				WATER SUPPLY						
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	dailyQUANTITY of water supply (mld)	Litres per Capita per Day	Population served WITH Pipe Line
1	AHMEDABAD	GHATLODIA	B	62248	84689	106810	128612			
1	AHMEDABAD	RANIP	B	60537	81482	102129	122477	53	104	48430
1	AHMEDABAD	VIRAMGAM	B	50698	54496	57950	61060	60	120	50000
1	AHMEDABAD	BAVLA	C	25391	30469	35475	40408	2	67	27000
1	AHMEDABAD	CHANDLODIA	C	34667	41600	48434	55170	23	63	8000
1	AHMEDABAD	DEHGAM	C	31378	38281	45086	51793	21	78	59000
1	AHMEDABAD	DHOLKA	C	49860	57557	64727	71370	24	67	35743
1	AHEMDABAD	SANAND	C	25674	29064	32408	35708	25	100	25000
1	AHEMDABAD	VEJALPUR	C	92116	115555	138660	161431	60	150	40000
1	AHMEDABAD	MEMNAGAR	D	23518	28935	34275	39538	12	66	18814
1	AHMEDABAD	AHMEDABAD	M	2876710	3457574	4015084	4549241	463	135	2576710
2	SABARKANTHA	HIMMATNAGAR	B	51461	66092	79940	93006	27	67	41000
2	SABARKANTHA	MODASA	C	42035	51721	61497	71363	34	80	42035
2	SABARKANTHA	KHEDBRAHMA	D	17231	22032	26219	29791	9	66	13785
2	SABARKANTHA	PRANTIJ	D	20722	24017	27127	30052	11	66	16578
2	SABARKANTHA	TALOD	D	15197	17272	19403	21590	8	66	12158
3	AMRELI	AMRELI	B	67827	82955	97109	110287	0	7	64436
3	AMRELI	BAGSARA	C	28389	29198	33893	42474	14	48	28381
3	AMRELI	KODINAR	C	26643	31910	37089	42178	2	67	35000
3	AMRELI	RAJULA	C	26571	32161	37881	43729	24	67	35743
3	AMRELI	CHALALA	D	16193	19323	22661	26207	8	67	12000
3	AMRELI	JAFRABAD	D	17553	21968	26282	30494	9	66	14042
3	AMRELI	LATHI	D	16558	19351	21972	24423	10	66	15000
4	KUTCHCHH	GANDHIDHAM	A	104585	134036	166916	203227	150	136	1101618
4	KUTCHCHH	ANJAR	B	51209	61285	73239	87070	51	84	62000
4	KUTCHCHH	BHUJ	B	91023	124681	149681	177175	120	100	120000
4	KUTCHCHH	BACHUA	C	18408	22078	25696	29261	15	75	20000
4	KUTCHCHH	MANDVI	C	36636	40987	45452	49840	24	67	35743
4	KUTCHCHH	RAPAR	D	16466	20660	25291	30361	9	53	16464
5	JAMNAGAR	DWARKA	C	27824	32356	37368	42858	9	32	27824
5	JAMNAGAR	KHAMBHALIA	C	31794	37866	43777	49526	20	63	31794
5	JAMNAGAR	BHANWAD	D	16715	18431	20034	21524	5	36	14000
5	JAMNAGAR	DHROL	D	17058	20112	22978	25655	9	66	13646
5	JAMNAGAR	JAMJODHPUR	D	20615	22910	24925	26660	17	94	18000
5	JAMNAGAR	KALAWAD	D	21026	25233	29449	33674	21	95	16821
5	JAMNAGAR	NAVAGAM GHED	D	17997	24299	27601	30903	10	66	14398
5	JAMNAGAR	SALAYA	D	19363	22939	26112	28882	7	34	15490
5	JAMNAGAR	JAMNAGAR	M	341637	414915	485879	554529	68	142	480000
6	RAJKOT	DHORAJI	B	80584	89334	98322	104711	71	104	684964
6	RAJKOT	GONDAL	B	81611	94097	107199	120839	41	162	25000
6	RAJKOT	JETPUR	B	95297	91065	106882	121011	130	104	125000

								WATER SUPPLY		
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	QUANTITY	LPCD	NO. SER.WITH PL
6	RAJKOT	MORVI	B	36603	104270	118963	134434	19	19	1000000
6	RAJKOT	JASDAN	C	42032	34217	40931	48229	24	67	35743
6	RAJKOT	RAIYA	C	28088	50438	72470	94183	30	48	61000
6	RAJKOT	UPLETA	C	73560	63820	72057	76513	32	79	40000
6	RAJKOT	WAKANER	C	51801	40873	45174	49506	3	8	33013
6	RAJKOT	BHAYAVADAR	D	18045	21643	25190	28685	12	66	17745
6	RAJKOT	MAVDI	D	22258	26696	31071	35382	17	66	25000
6	RAJKOT	NANAMAVA	D	16765	20107	23401	26648	45	227	20000
6	RAJKOT	RAJKOT	M	559407	693827	823224	947599	92	168	550000
7	KHEDA	NADIAD	A	167051	198118	227509	255224	191	127	150000
7	KHEDA	KHAMBHAT	B	76746	83860	91185	98719	61	79	98618
7	KHEDA	BALASINOR	C	29596	34204	39398	45180	36	129	28000
7	KHEDA	BORSAD	C	46821	54831	62872	70945	49	123	40000
7	KHEDA	CHAKLASI	C	31833	38199	44474	50659	1	7	12000
7	KHEDA	KAPADVANJ	C	41016	45915	51049	56418	12	29	41016
7	KHEDA	MEMDABAD	C	26103	30512	34768	38869	18	67	27074
7	KHEDA	PETLAD	C	48552	54059	58573	62093	24	67	35743
7	KHEDA	UMRETH	C	30082	33392	35684	38655	45	157	30082
7	KHEDA	ANKLAW	D	15431	18507	21539	24528	8	66	12345
7	KHEDA	BORIAVI	D	15033	18030	20984	23896	13	66	19000
7	KHEDA	DAKOR	D	19495	22890	25053	26907	21	108	19000
7	KHEDA	KARAMSAD	D	21132	25345	29498	33591	2	16	15600
7	KHEDA	KHEDA	D	21792	25157	28387	31481	14	70	20000
7	KHEDA	MAHUVA	D	15809	18705	21560	24373	8	66	12647
7	KHEDA	OAD	D	19424	23301	27123	30889	16	84	19428
7	KHEDA	VALLABH VIDYANAGAR	D	21560	24460	27737	30690	6	13	49000
8	JUNAGADH	JUNAGADH	A	130484	186518	214951	243493	138	117	104387
8	JUNAGADH	PORBANDAR	A	115639	129368	139263	146356	113	118	92511
8	JUNAGADH	KEHSOD	B	50172	64499	79779	96011	44	104	426462
8	JUNAGADH	VERAVAL	B	96195	114470	132073	146784	88	97	90000
8	JUNAGADH	CHHAYA	C	26028	34182	42168	50266	17	67	26028
8	JUNAGADH	MANGROL	C	44217	53790	62091	69986	28	70	40000
8	JUNAGADH	UNA	C	38729	46990	55576	64486	2	67	35743
8	JUNAGADH	ADITYANAGAR	D	19607	19311	22928	26484	10	66	15686
8	JUNAGADH	BANTVA	D	18763	16112	16304	15971	10	66	15010
8	JUNAGADH	CHORWAD	D	18763	22504	26192	29826	3	15	20500
8	JUNAGADH	JOSHIPURA	D	15903	19346	22740	26085	8	66	12722
8	JUNAGADH	KULIYANA	D	17434	19799	21451	22388	7	37	17432
8	JUNAGADH	MANAVADAR	D	23397	28372	32826	36757	20	66	30000
8	JUNAGADH	RANAVAV	D	15395	23063	26485	29871	4	40	10000
8	JUNAGADH	SUTRAPADA	D	17018	21321	25563	29743	9	66	13614

								WATER SUPPLY		
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	QUANTITY	LPCD	NO. SER.WITH PL
9	BANASKANTHA	DEESA	B	62435	78274	95330	113602	77	123	62435
9	BANASKANTHA	PALANPUR	B	16339	99887	119159	138471	14	104	138882
9	BANASKANTHA	DHANERA	D	16244	19483	22676	25823	17	85	20000
9	BANASKANTHA	RADHANPUR	D	24101	26939	29810	32712	15	56	25000
9	BANASKANTHA	THARAD	D	18061	22959	27809	32611	12	66	18061
10	PANCHMAHALS	DAHOD	B	66500	77415	88412	99491	59	104	565250
10	PANCHMAHALS	GODHRA	B	96813	113410	128615	142428	65	98	27549
10	PANCHMAHALS	HALOL	C	27349	32913	39273	46429	15	56	27549
10	PANCHMAHALS	LUNAWADA	C	27962	32830	37386	41630	9	30	29762
10	PANCHMAHALS	DEVGADH BARIA	D	17608	19979	22166	24168	9	66	14086
10	PANCHMAHALS	JHALOD	D	20355	24413	28413	32356	11	92	12000
10	PANCHMAHALS	KAALOL	D	18572	25740	30837	36566	20	105	19000
10	PANCHMAHALS	SANTRAMPUR	D	13921	16538	19359	22044	4	40	10000
11	BHAVNAGAR	BOTAD	B	64603	81443	97655	113239	57	104	549126
11	BHAVNAGAR	MAHUVA	B	59912	71426	81634	90535	14	36	71232
11	BHAVNAGAR	SAVAR KUNDA	B	64815	77705	91134	105102	30	40	75000
11	BHAVNAGAR	PALITANA	C	41870	49073	56331	63643	70	100	70000
11	BHAVNAGAR	SIHOR	C	34008	41207	48921	57150	24	67	35743
11	BHAVNAGAR	GARIADHAR	D	19723	24277	28817	33342	2	13	12823
11	BHAVNAGAR	GHADHDA	D	21955	26649	31645	36945	12	66	17564
11	BHAVNAGAR	TALAJA	D	17965	22183	26153	29875	5	40	17965
11	BHAVNAGAR	BHAVNAGAR	M	402338	488586	577076	667808	65	180	362104
12	MEHSANA	KADI	B	42899	50130	57629	65396	66	130	50733
12	MEHSANA	KALOL	B	88201	99284	115192	129861	64	77	83000
12	MEHSANA	MEHSANA	B	96112	107493	125795	143105	122	104	116751
12	MEHSANA	PATAN	B	97025	111535	127332	143501	136	140	97025
12	MEHSANA	SIDHPUR	B	51794	59071	64301	67484	46	104	440249
12	MEHSANA	UNJHA	B	57839	62526	74488	86889	51	104	491632
12	MEHSANA	VISNAGAR	B	82137	69540	81118	92573	73	104	698165
12	MEHSANA	VADNAGAR	C	25167	28030	30949	33924	15	75	20000
12	MEHSANA	CHANASMA	D	16216	17374	18283	18943	4	25	16216
12	MEHSANA	HARIJ	D	16663	19763	22545	24980	3	9	30000
12	MEHSANA	KHERALU	D	18267	21011	23204	24846	10	66	14614
12	MEHSANA	MANSA	D	23571	27475	31080	34384	9	40	23571
12	MEHSANA	VIJAPUR	D	19115	21300	23072	24431	23	138	16000
13	VADODARA	DABHOI	B	50641	57046	63420	69764	54	98	55000
13	VADODARA	CHOTTA UDIAPUR	D	19006	21881	24228	26047	10	66	15205
13	VADODARA	KARJAN	D	18432	21746	24978	28128	36	195	18432
13	VADODARA	PADRA	D	28150	32076	35292	37798	15	66	22520
13	VADODARA	SAVLI	D	15036	18532	21978	25375	8	66	12029
13	VADODARA	VADODARA	M	1031346	1308822	1591147	1878321	190	141	1350000
14	VALSAD	NAVSARI	A	126089	155064	181619	205754	122	89	126089

	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	WATER SUPPLY		
								QUANTITY	LPCD	NO. SER.WITH PL
14	VALSAD	VALSAD	B	70314	81431	83367	91423	112	140	80000
14	VALSAD	VAPI	C	46462	39325	48148	58001	9	15	58500
14	VALSAD	VIJALPOR	C	31533	36400	40164	46150	3	73	37000
14	VALSAD	DHARAMPUR	D	29303	18851	21166	23533	6	42	12000
15	SURAT	BARDOLI	C	37995	47705	57263	67050	22	76	29000
15	SURAT	VYARA	C	19863	36603	42602	48905	1	28	30908
15	SURAT	SURAT	M	1658800	1953198	2434202	2941829	200	148	1350000
16	SURENDRANAGAR	SURENDRANAGAR	A	116371	126908	146630	165274	117	130	90000
16	SURENDRANAGAR	DHRANGADHRA	B	30908	67181	75766	83716	4	70	6000
16	SURENDRANAGAR	LIMBDI	C	57961	40257	45101	49815	24	67	35743
16	SURENDRANAGAR	VADHVAN	C	49038	58943	68546	78601	35	70	50000
16	SURENDRANAGAR	HALVAD	D	19576	23642	28287	33511	10	50	20000
16	SURENDRANAGAR	THANGADH	D	35284	31159	37496	43783	13	66	20000
17	BHARUCH	BHARUCH	A	133102	153100	173857	195372	190	152	119792
17	BHARUCH	ANKLESHWAR	B	71888	64484	77946	92126	100	222	45000
17	BHARUCH	JAMBUSAR	C	31561	35370	39025	42526	36	1091	33000
17	BHARUCH	RAJPIPLA	C	24777	36713	40385	44129	36	60	26490

			SEWERAGE				
	DISTRICT	NAGAR PALIKA	PRESENT sewerage SYSTEM	METHOD OF sewerage DISPOSAL	POPULATION SERVED	POPULATION NOT SERVED	% OF POPULATION SERVED
1	AHMEDABAD	GHATLODIA					0
1	AHMEDABAD	RANIP				60537	
1	AHMEDABAD	VIRAMGAM	1	1	35000	15698	69
1	AHMEDABAD	BAVLA	23			25391	0
1	AHMEDABAD	CHANDLODIA			34667	0	100
1	AHMEDABAD	DEHGAM	24			31378	0
1	AHMEDABAD	DHOLKA				49860	
1	AHEMDABAD	SANAND				25674	0
1	AHEMDABAD	VEJALPUR				92116	0
1	AHMEDABAD	MEMNAGAR				23518	
1	AHMEDABAD	AHMEDABAD	1	7	2241738	634972	
2	SABARKANTHA	HIMMATNAGAR	6	5		51461	0
2	SABARKANTHA	MODASA	6	6		42035	0
2	SABARKANTHA	KHEDBRAHMA				17231	
2	SABARKANTHA	PRANTIJ				20722	
2	SABARKANTHA	TALOD				15197	
3	AMRELI	AMRELI	1	2	40696	27131	62
3	AMRELI	BAGSARA	5		12771	15618	0
3	AMRELI	KODINAR				26643	0
3	AMRELI	RAJULA				26571	
3	AMRELI	CHALALA				16193	0
3	AMRELI	JAFRABAD				17553	
3	AMRELI	LATHI				16558	0
4	KUTCHCHH	GANDHIDHAM	1		110000	104585	100
4	KUTCHCHH	ANJAR	1	4	32000	19209	62
4	KUTCHCHH	BHUJ	1	2	84000	7023	92
4	KUTCHCHH	BACHUA	4	5		18408	0
4	KUTCHCHH	MANDVI				36636	
4	KUTCHCHH	RAPAR	4			16466	0
5	JAMNAGAR	DWARKA		2	27824		0
5	JAMNAGAR	KHAMBHALIA	2	7	31794		0
5	JAMNAGAR	BHANWAD	2	4	12000	4715	72
5	JAMNAGAR	DHROL				17058	
5	JAMNAGAR	JAMJODHPUR	2	4	20615	0	0
5	JAMNAGAR	KALAWAD	2	4	21026	0	100
5	JAMNAGAR	NAVAGAM GHED				17997	
5	JAMNAGAR	SALAYA	2	4	19363	0	100
5	JAMNAGAR	JAMNAGAR	1			341637	
6	RAJKOT	DHORAJI				80584	
6	RAJKOT	GONDAL	12	1	25000	56611	31
6	RAJKOT	JETPUR	2	8	95297	0	100

			SEWERAGE					
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED	POPULATION	%OF POPULATION SERVED
6	RAJKOT	MORVI	1		36603		0	100
6	RAJKOT	JASDAN					42032	
6	RAJKOT	RAIYA	5	5	28088		0	0
6	RAJKOT	UPLETA	2	4	40000		33560	79
6	RAJKOT	WAKANER	2		38333		13468	0
6	RAJKOT	BHAYAVADAR		6	17745		300	98
6	RAJKOT	MAVDI	3				22258	0
6	RAJKOT	NANAMAVA	34				16765	0
6	RAJKOT	RAJKOT	12				559407	
7	KHEDA	NADIAD	13	1	100000		67051	60
7	KHEDA	KHAMBHAT	1	4	76746		0	100
7	KHEDA	BALASINOR	1	3			29596	0
7	KHEDA	BORSAD	13	3			46821	0
7	KHEDA	CHAKLASI	2		10000		21833	31
7	KHEDA	KAPADVANJ	1	3	41016		0	100
7	KHEDA	MEMDABAD					26103	
7	KHEDA	PETLAD	12	3	8000		40552	16
7	KHEDA	UMRETH	1	3	0		30082	0
7	KHEDA	ANKLAW	2	5			15431	0
7	KHEDA	BORIAVI	1	1			15033	0
7	KHEDA	DAKOR	1	2			19495	0
7	KHEDA	KARAMSAD	13	3	17532		3600	83
7	KHEDA	KHEDA	2		20000		1792	92
7	KHEDA	MAHUVA					15809	
7	KHEDA	OAD		2			19424	0
7	KHEDA	VALLABH VIDYANAGA	1	3			21560	0
8	JUNAGADH	JUNAGADH					130484	
8	JUNAGADH	PORBANDAR	6	2	160167			0
8	JUNAGADH	KEHSOD					50172	
8	JUNAGADH	VERAVAL		2	80947		15248	70
8	JUNAGADH	CHHAYA	2	4	26028		0	100
8	JUNAGADH	MANGROL			44217		0	0
8	JUNAGADH	UNA					38729	
8	JUNAGADH	ADITYANAGAR					19607	
8	JUNAGADH	BANTVA					18763	
8	JUNAGADH	CHORWAD	5	5	0		18763	0
8	JUNAGADH	JOSHIPURA					15903	
8	JUNAGADH	KULIYANA	5	5			17434	0
8	JUNAGADH	MANAVADAR					23397	0
8	JUNAGADH	RANAVAV	2	5	20000		-4605	0
8	JUNAGADH	SUTRAPADA					17018	

			SEWERAGE					
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED	POPULATION	%OF POPULATION SERVED
9	BANASKANTHA	DEESA	2		62435	0		100
9	BANASKANTHA	PALANPUR					16339	0
9	BANASKANTHA	DHANERA	1		10000		6244	62
9	BANASKANTHA	RADHANPUR	2	4	21000		3101	87
9	BANASKANTHA	THARAD		4			18061	0
10	PANCHMAHALS	DAHOD					66500	
10	PANCHMAHALS	GODHRA	2				96813	0
10	PANCHMAHALS	HALOL	2				27349	0
10	PANCHMAHALS	LUNAWADA	2	1	27962		0	100
10	PANCHMAHALS	DEVGADH BARIA					17608	
10	PANCHMAHALS	JHALOD	2	1			20355	0
10	PANCHMAHALS	KAALOL		1	18572		0	100
10	PANCHMAHALS	SANTRAMPUR	2		0		13921	0
11	BHAVNAGAR	BOTAD					64603	
11	BHAVNAGAR	MAHUVA	1	1	39000		20912	65
11	BHAVNAGAR	SAVAR KUNDA	1	3	56250		8565	86
11	BHAVNAGAR	PALITANA					41870	0
11	BHAVNAGAR	SIHOR					34008	
11	BHAVNAGAR	GARIADHAR	2		12493		7230	65
11	BHAVNAGAR	GHADHDA					21955	
11	BHAVNAGAR	TALAJA	1	1	9900		8065	55
11	BHAVNAGAR	BHAVNAGAR	1	7	350000		52338	
12	MEHSANA	KADI		1			42899	0
12	MEHSANA	KALOL	123				88201	0
12	MEHSANA	MEHSANA	2	3			96112	0
12	MEHSANA	PATAN	23	6			97025	0
12	MEHSANA	SIDHPUR					51794	
12	MEHSANA	UNJHA					57839	
12	MEHSANA	VISNAGAR					82137	
12	MEHSANA	VADNAGAR	2	4	25167	0		100
12	MEHSANA	CHANASMA	2	6			16216	0
12	MEHSANA	HARIJ	2	6			16663	0
12	MEHSANA	KHERALU					18267	
12	MEHSANA	MANSA	2				23571	0
12	MEHSANA	VIJAPUR	2				19115	0
13	VADODARA	DABHOI	1	1	35000		15641	69
13	VADODARA	CHOTTA UDIAPUR					19006	
13	VADODARA	KARJAN	2				18432	0
13	VADODARA	PADRA					28150	
13	VADODARA	SAVLI					15036	
13	VADODARA	VADODARA	1	7	773510		257837	
14	VALSAD	NAVSARI	1	2	126089	0		100

			SEWERAGE					
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED	POPULATION	%OF POPULATION SERVED
14	VALSAD	VALSAD	1	1	48000		22314	
14	VALSAD	VAPI		1	46462		0	
14	VALSAD	VIJALPOR	2	3	31533		0	
14	VALSAD	DHARAMPUR	1	2	6088		23215	
15	SURAT	BARDOLI	1	1	20000		17995	
15	SURAT	VYARA	6				19863	
15	SURAT	SURAT	1		1011868		646932	
16	SURENDRANAGAR	SURENDRANAGAR	2	2			116371	
16	SURENDRANAGAR	DHRANGADHRA	2	2			30908	
16	SURENDRANAGAR	LIMBDI					57961	
16	SURENDRANAGAR	VADHVAN	2	2				100
16	SURENDRANAGAR	HALVAD		2			19576	
16	SURENDRANAGAR	THANGADH	1	2			35284	
17	BHARUCH	BHARUCH					133102	
17	BHARUCH	ANKLESHWAR	1	3	30000		41888	
17	BHARUCH	JAMBUSAR	1	4	20000		11561	
17	BHARUCH	RAJPIPLA	2	4			24777	

			SOLID WASTE			
	DISTRICT	NAGAR PALIKA	NUMBER OF CLEANERS	DISPOSAL EQUIPMENTS		SOLID WASTE DISPOSAL
1	AHMEDABAD	GHATLODIA	60	31		
1	AHMEDABAD	RANIP		0	0	
1	AHMEDABAD	VIRAMGAM	94	1	1	1
1	AHMEDABAD	BAVLA	30	18	10	1
1	AHMEDABAD	CHANDLODIA	28	26	14	1
1	AHMEDABAD	DEHGAM	59	27	17	1
1	AHMEDABAD	DHOLKA		0	0	
1	AHEMDABAD	SANAND	46	10	5	1
1	AHEMDABAD	VEJALPUR	38	12	0	
1	AHMEDABAD	MEMNAGAR		0	0	
1	AHMEDABAD	AHMEDABAD	7578	74	82	1
2	SABARKANTHA	HIMMATNAGAR	72	13	7	1
2	SABARKANTHA	MODASA			0	
2	SABARKANTHA	KHEDBRAHMA		0	0	
2	SABARKANTHA	PRANTIJ		0	0	
2	SABARKANTHA	TALOD		0	0	
3	AMRELI	AMRELI	191		0	
3	AMRELI	BAGSARA	45	4	0	
3	AMRELI	KODINAR	55	3	0	
3	AMRELI	RAJULA		0	0	
3	AMRELI	CHALALA	35	18	0	
3	AMRELI	JAFRABAD		0	0	
3	AMRELI	LATHI	34	1	0	
4	KUTCHCHH	GANDHIDHAM	346	5	0	1
4	KUTCHCHH	ANJAR	109	9	0	1
4	KUTCHCHH	BHUJ	150	16	8	
4	KUTCHCHH	BACHUA	11	4	1	1
4	KUTCHCHH	MANDVI		0	0	
4	KUTCHCHH	RAPAR	25	2	0	2
5	JAMNAGAR	DWARKA	0		0	
5	JAMNAGAR	KHAMBHALIA	103	6	1	1
5	JAMNAGAR	BHANWAD	24	26	0	3
5	JAMNAGAR	DHROL		0	0	
5	JAMNAGAR	JAMJODHPUR	51	11	10	4
5	JAMNAGAR	KALAWAD	53		0	
5	JAMNAGAR	NAVAGAM GHED		0	0	
5	JAMNAGAR	SALAYA	17	2	2	2
5	JAMNAGAR	JAMNAGAR	287	0	25	1
6	RAJKOT	DHORAJI		0	0	
6	RAJKOT	GONDAL	240	51	10	1
6	RAJKOT	JETPUR	282	18	20	1

			SOLID WASTE			
	DISTRICT	NAGAR PALIKA	NO OF CLEANERS	DISPOSAL EQUITPMENTS		SOLID WASTE DISPOSAL
6	RAJKOT	MORVI	336	4	0	1
6	RAJKOT	JASDAN		0	0	
6	RAJKOT	RAIYA	45	4	1	1
6	RAJKOT	UPLETA	135	4	0	1
6	RAJKOT	WAKANER	74	41	3	
6	RAJKOT	BHAYAVADAR	25	2	1	4
6	RAJKOT	MAVDI	3		0	1
6	RAJKOT	NANAMAVA	1		0	5
6	RAJKOT	RAJKOT	2368	0	34	
7	KHEDA	NADIAD	360	7	0	1
7	KHEDA	KHAMBHAT	288	6	1	1
7	KHEDA	BALASINOR	51	22	2	1
7	KHEDA	BORSAD	10		0	1
7	KHEDA	CHAKLASI	18	0	0	1
7	KHEDA	KAPADVANJ	98	3	2	1
7	KHEDA	MEMDABAD		0	0	
7	KHEDA	PETLAD	161	194	33	1
7	KHEDA	UMRETH	81	11	6	1
7	KHEDA	ANKLAW	100		0	1
7	KHEDA	BORIAVI	9		0	1
7	KHEDA	DAKOR		5	2	1
7	KHEDA	KARAMSAD	50	10	10	1
7	KHEDA	KHEDA	29			1
7	KHEDA	MAHUVA		0	0	
7	KHEDA	OAD	31	1		1
7	KHEDA	VALLABH VIDYANAGA	56	3	3	3
8	JUNAGADH	JUNAGADH		0	0	
8	JUNAGADH	PORBANDAR	486	9	5	4
8	JUNAGADH	KEHSOD		0	0	
8	JUNAGADH	VERAVAL	386	7	0	1
8	JUNAGADH	CHHAYA	48	1	1	1
8	JUNAGADH	MANGROL	72	8	0	1
8	JUNAGADH	UNA		0	0	
8	JUNAGADH	ADITYANAGAR		0	0	
8	JUNAGADH	BANTVA		0	0	
8	JUNAGADH	CHORWAD	17		0	1
8	JUNAGADH	JOSHIPURA		0	0	
8	JUNAGADH	KULIYANA	54	1	0	1
8	JUNAGADH	MANAVADAR	39	2	0	
8	JUNAGADH	RANAVAV	32	5	5	1
8	JUNAGADH	SUTRAPADA		0	0	

			SOLID WASTE			
	DISTRICT	NAGAR PALIKA	NO OF CLEANERS	DISPOSAL EQUITPMENTS		SOLID WASTE DISPOSAL
9	BANASKANTHA	DEESA	158	12	2	
9	BANASKANTHA	PALANPUR			0	
9	BANASKANTHA	DHANERA	46	6	5	
9	BANASKANTHA	RADHANPUR	80	5	3	1
9	BANASKANTHA	THARAD	32	10	9	
10	PANCHMAHALS	DAHOD		0	0	
10	PANCHMAHALS	GODHRA	168	4	1	
10	PANCHMAHALS	HALOL	75	2	1	1
10	PANCHMAHALS	LUNAWADA	80	6	2	
10	PANCHMAHALS	DEVGADH BARIA		0	0	
10	PANCHMAHALS	JHALOD	22		1	1
10	PANCHMAHALS	KAALOL	38	5	3	2
10	PANCHMAHALS	SANTRAMPUR	27	29	25	2
11	BHAVNAGAR	BOTAD		0	0	
11	BHAVNAGAR	MAHUVA	202	123	110	
11	BHAVNAGAR	SAVAR KUNDA	124	2	2	1
11	BHAVNAGAR	PALITANA	98	12	3	1
11	BHAVNAGAR	SIHOR		0	0	
11	BHAVNAGAR	GARIADHAR	82	2	2	4
11	BHAVNAGAR	GHADHDA		0	0	
11	BHAVNAGAR	TALAJA	37	2	0	
11	BHAVNAGAR	BHAVNAGAR	287	0	25	
12	MEHSANA	KADI	114	7	3	1
12	MEHSANA	KALOL	200	3	2	2
12	MEHSANA	MEHSANA	140	11	6	1
12	MEHSANA	PATAN	304		0	1
12	MEHSANA	SIDHPUR		0	0	
12	MEHSANA	UNJHA		0	0	
12	MEHSANA	VISNAGAR		0	0	
12	MEHSANA	VADNAGAR	23	2	2	1
12	MEHSANA	CHANASMA			0	
12	MEHSANA	HARIJ	23	9	8	1
12	MEHSANA	KHERALU		0	0	
12	MEHSANA	MANSA	60	7	5	1
12	MEHSANA	VIJAPUR	12		0	
13	VADODARA	DABHOI	70	3	0	1
13	VADODARA	CHOTTA UDIAPUR		0	0	
13	VADODARA	KARJAN	38	1	0	1
13	VADODARA	PADRA		0	0	
13	VADODARA	SAVLI		0	0	
13	VADODARA	VADODARA	2500	35	4	1
14	VALSAD	NAVSARI	139	6	2	

			SOLID WASTE			
	DISTRICT	NAGAR PALIKA	NO OF CLEANERS	DISPOSAL EQUITPMENTS		SOLID WASTE DISPOSAL
14	VALSAD	VALSAD	281	8	0	2
14	VALSAD	VAPI	18	3	5	1
14	VALSAD	VIJALPOR	17	1	2	
14	VALSAD	DHARAMPUR	47	1	3	1
15	SURAT	BARDOLI	63	4	0	1
15	SURAT	VYARA	30	0	22	3
15	SURAT	SURAT	4700	107	12	3
16	SURENDRANAGAR	SURENDRANAGAR	353	5	0	
16	SURENDRANAGAR	DHRANGADHRA	136	2	2	4
16	SURENDRANAGAR	LIMBDI		0	0	
16	SURENDRANAGAR	VADHVAN	137	0	0	1
16	SURENDRANAGAR	HALVAD	47	2	3	
16	SURENDRANAGAR	THANGADH	32	2	0	
17	BHARUCH	BHARUCH				
17	BHARUCH	ANKLESHWAR	76	0	4	1
17	BHARUCH	JAMBUSAR	83	2	2	1
17	BHARUCH	RAJPIPLA	97	3	0	1

			ROADS	
	DISTRICT	NAGAR PALIKA	UNPAVED	PAVED
6	RAJKOT	MORVI	1.77	101.44
6	RAJKOT	JASDAN		
6	RAJKOT	RAIYA	3.5	2.5
6	RAJKOT	UPLETA	5.6	38.13
6	RAJKOT	WAKANER	10.03	1942
6	RAJKOT	BHAYAVADAR	18.7	10.13
6	RAJKOT	MAVDI		
6	RAJKOT	NANAMAVA	0.3	3
6	RAJKOT	RAJKOT	85.5	1123.6
7	KHEDA	NADIAD	209.157	95.264
7	KHEDA	KHAMBHAT	9.94	65.795
7	KHEDA	BALASINOR	1.791	26.373
7	KHEDA	BORSAD	51.81	19.85
7	KHEDA	CHAKLASI	33	11
7	KHEDA	KAPADVANJ	14.3	15.48
7	KHEDA	MEMDABAD		
7	KHEDA	PETLAD	23.25	17.33
7	KHEDA	UMRETH	11.61	15.5
7	KHEDA	ANKLAW	21.502	18.4
7	KHEDA	BORIAVI		
7	KHEDA	DAKOR	15.5	5.2
7	KHEDA	KARAMSAD	7	11
7	KHEDA	KHEDA	2.8	12.92
7	KHEDA	MAHUVA		
7	KHEDA	OAD	10	7
7	KHEDA	VALLABH VIDYANAG	5	75
8	JUNAGADH	JUNAGADH		
8	JUNAGADH	PORBANDAR	18.472	93.125
8	JUNAGADH	KEHSOD		
8	JUNAGADH	VERAVAL	88.88	44.68
8	JUNAGADH	CHHAYA	8	35
8	JUNAGADH	MANGROL	10.66	16.048
8	JUNAGADH	UNA		
8	JUNAGADH	ADITYANAGAR		
8	JUNAGADH	BANTVA		
8	JUNAGADH	CHORWAD	9	1.5
8	JUNAGADH	JOSHIPURA		
8	JUNAGADH	KULIYANA	9.06	0.53
8	JUNAGADH	MANAVADAR		
8	JUNAGADH	RANAVAV	6	4
8	JUNAGADH	SUTRAPADA		

			ROADS	
	DISTRICT	NAGAR PALIKA	UNPAVED	PAVED
9	BANASKANTHA	DEESA	9.5	86.5
9	BANASKANTHA	PALANPUR	39	33.11
9	BANASKANTHA	DHANERA	9.953	3.872
9	BANASKANTHA	RADHANPUR	21	11.5
9	BANASKANTHA	THARAD		
10	PANCHMAHALS	DAHOD		
10	PANCHMAHALS	GODHRA	33.43	56.28
10	PANCHMAHALS	HALOL	8	15
10	PANCHMAHALS	LUNAWADA		18
10	PANCHMAHALS	DEVGADH BARIA		
10	PANCHMAHALS	JHALOD		
10	PANCHMAHALS	KAALOL	6.5	700
10	PANCHMAHALS	SANTRAMPUR	2.1	10.1
11	BHAVNAGAR	BOTAD		
11	BHAVNAGAR	MAHUVA	11.66	49
11	BHAVNAGAR	SAVAR KUNDA	31.627	40.585
11	BHAVNAGAR	PALITANA	12.594	48.03
11	BHAVNAGAR	SIHOR		
11	BHAVNAGAR	GARIADHAR	22	5
11	BHAVNAGAR	GHADHDA		
11	BHAVNAGAR	TALAJA	30	10
11	BHAVNAGAR	BHAVNAGAR	19	211
12	MEHSANA	KADI	16.12	8.96
12	MEHSANA	KALOL	51.563	34.477
12	MEHSANA	MEHSANA		34.542
12	MEHSANA	PATAN	6.81	44.181
12	MEHSANA	SIDHPUR		
12	MEHSANA	UNJHA		
12	MEHSANA	VISNAGAR		
12	MEHSANA	VADNAGAR	8	9.4
12	MEHSANA	CHANASMA		
12	MEHSANA	HARIJ	15	73
12	MEHSANA	KHERALU		
12	MEHSANA	MANSA		
12	MEHSANA	VIJAPUR	0.136	5.13
13	VADODARA	DABHOI	23.466	37.532
13	VADODARA	CHOTTA UDIAPUR		
13	VADODARA	KARJAN	23.79	13583
13	VADODARA	PADRA		
13	VADODARA	SAVLI		
13	VADODARA	VADODARA	360.438	1018.354
14	VALSAD	NAVSARI	43	155

			ROADS	
	DISTRICT	NAGAR PALIKA	ROAD LENGTH (IN KMS.) UNPAVED	ROAD LENGTH (IN KMS.) PAVED
1	AHMEDABAD	GHATLODIA		
1	AHMEDABAD	RANIP		
1	AHMEDABAD	VIRAMGAM	8.82	12.36
1	AHMEDABAD	BAVLA	2	5
1	AHMEDABAD	CHANDLODIA	1.12	7.25
1	AHMEDABAD	DEHGAM	17.5	7.65
1	AHMEDABAD	DHOLKA		
1	AHEMDABAD	SANAND	8	8.512
1	AHEMDABAD	VEJALPUR		
1	AHMEDABAD	MEMNAGAR		
1	AHMEDABAD	AHMEDABAD	157.06	1057.75
2	SABARKANTHA	HIMMATNAGAR	11.98	75.75
2	SABARKANTHA	MODASA		
2	SABARKANTHA	KHEDBRAHMA		
2	SABARKANTHA	PRANTIJ		
2	SABARKANTHA	TALOD		
3	AMRELI	AMRELI	32.847	53.419
3	AMRELI	BAGSARA	12.42	12.5
3	AMRELI	KODINAR		
3	AMRELI	RAJULA		
3	AMRELI	CHALALA		
3	AMRELI	JAFRABAD		
3	AMRELI	LATHI		
4	KUTCHCHH	GANDHIDHAM	123.012	182.849
4	KUTCHCHH	ANJAR	15.6	31.12
4	KUTCHCHH	BHUJ		98.19
4	KUTCHCHH	BACHUA	11	9.53
4	KUTCHCHH	MANDVI		
4	KUTCHCHH	RAPAR	2	5.2
5	JAMNAGAR	DWARKA		
5	JAMNAGAR	KHAMBHALIA	27.191	13.137
5	JAMNAGAR	BHANWAD	3	17
5	JAMNAGAR	DHROL		
5	JAMNAGAR	JAMJODHPUR	10.15	12.953
5	JAMNAGAR	KALAWAD	6	15
5	JAMNAGAR	NAVAGAM GHED		
5	JAMNAGAR	SALAYA	0.3	3
5	JAMNAGAR	JAMNAGAR	113	329.1
6	RAJKOT	DHORAJI		
6	RAJKOT	GONDAL	34.45	32.53
6	RAJKOT	JETPUR	77.419	70.894

			ROADS	
	DISTRICT	NAGAR PALIKA	UNPAVED	PAVED
14	VALSAD	VALSAD	4	32
14	VALSAD	VAPI	15.49	16
14	VALSAD	VIJALPOR	35	3.5
14	VALSAD	DHARAMPUR	25	6
15	SURAT	BARDOLI	59	34.76
15	SURAT	VYARA	3.65	24.8
15	SURAT	SURAT	102.96	578.86
16	SURENDRANAGAR	SURENDRANAGAR	48.92	239.18
16	SURENDRANAGAR	DHRANGADHRA	50.566	66.269
16	SURENDRANAGAR	LIMBDI		
16	SURENDRANAGAR	VADHVAN	5.56	49.96
16	SURENDRANAGAR	HALVAD	9.7	100
16	SURENDRANAGAR	THANGADH	10.5	10.9
17	BHARUCH	BHARUCH		
17	BHARUCH	ANKLESHWAR	7.654	15.28
17	BHARUCH	JAMBUSAR	4	23.29
17	BHARUCH	RAJPIPLA	4.57	27

			STREET LIGHTS			
	DISTRICT	NAGAR PALIKA	STREETLIGHTS	TOTAL STREET LIGHTS REQUIRED		
1	AHMEDABAD	GHATLODIA				
1	AHMEDABAD	RANIP				
1	AHMEDABAD	VIRAMGAM		1500		
1	AHMEDABAD	BAVLA		1050		
1	AHMEDABAD	CHANDLODIA		375		
1	AHMEDABAD	DEHGAM				
1	AHMEDABAD	DHOLKA				
1	AHEMDABAD	SANAND		1100		
1	AHEMDABAD	VEJALPUR				
1	AHMEDABAD	MEMNAGAR				
1	AHMEDABAD	AHMEDABAD	71848	71848		
2	SABARKANTHA	HIMMATNAGAR		4200		
2	SABARKANTHA	MODASA				
2	SABARKANTHA	KHEDBRAHMA				
2	SABARKANTHA	PRANTIJ				
2	SABARKANTHA	TALOD				
3	AMRELI	AMRELI		2490		
3	AMRELI	BAGSARA		843		
3	AMRELI	KODINAR				
3	AMRELI	RAJULA				
3	AMRELI	CHALALA				
3	AMRELI	JAFRABAD				
3	AMRELI	LATHI				
4	KUTCHCHH	GANDHIDHAM		16000		
4	KUTCHCHH	ANJAR		2600		
4	KUTCHCHH	BHUJ		4800		
4	KUTCHCHH	BACHUA		672		
4	KUTCHCHH	MANDVI				
4	KUTCHCHH	RAPAR		425		
5	JAMNAGAR	DWARKA				
5	JAMNAGAR	KHAMBHALIA		1415		
5	JAMNAGAR	BHANWAD		733		
5	JAMNAGAR	DHROL				
5	JAMNAGAR	JAMJODHPUR		594		
5	JAMNAGAR	KALAWAD		1122		
5	JAMNAGAR	NAVAGAM GHED				
5	JAMNAGAR	SALAYA		202		
5	JAMNAGAR	JAMNAGAR	24825	24825		
6	RAJKOT	DHORAJI				
6	RAJKOT	GONDAL		3000		
6	RAJKOT	JETPUR		2829		

			STREET LIGHTS			
	DISTRICT	NAGAR PALIKA	STREETLIGHTS	TOTAL STREET LIGHTS REQUIRED		
6	RAJKOT	MORVI		3739		
6	RAJKOT	JASDAN				
6	RAJKOT	RAIYA		437		
6	RAJKOT	UPLETA		1588		
6	RAJKOT	WAKANER		1418		
6	RAJKOT	BHAYAVADAR		435		
6	RAJKOT	MAVDI		170		
6	RAJKOT	NANAMAVA				
6	RAJKOT	RAJKOT	24825	24825		
7	KHEDA	NADIAD		9991		
7	KHEDA	KHAMBHAT		3680		
7	KHEDA	BALASINOR		971		
7	KHEDA	BORSAD		1452		
7	KHEDA	CHAKLASI		695		
7	KHEDA	KAPADVANJ		2100		
7	KHEDA	MEMDABAD				
7	KHEDA	PETLAD		3278		
7	KHEDA	UMRETH		1550		
7	KHEDA	ANKLAW		230		
7	KHEDA	BORIAVI		35		
7	KHEDA	DAKOR		1253		
7	KHEDA	KARAMSAD				
7	KHEDA	KHEDA		498		
7	KHEDA	MAHUVA				
7	KHEDA	OAD				
7	KHEDA	VALLABH VIDYANAGAR		2500		
8	JUNAGADH	JUNAGADH				
8	JUNAGADH	PORBANDAR		3672		
8	JUNAGADH	KEHSOD				
8	JUNAGADH	VERAVAL		3250		
8	JUNAGADH	CHHAYA				
8	JUNAGADH	MANGROL		1195		
8	JUNAGADH	UNA				
8	JUNAGADH	ADITYANAGAR				
8	JUNAGADH	BANTVA				
8	JUNAGADH	CHORWAD		259		
8	JUNAGADH	JOSHIPURA				
8	JUNAGADH	KULIYANA		587		
8	JUNAGADH	MANAVADAR				
8	JUNAGADH	RANAVAV		1000		
8	JUNAGADH	SUTRAPADA				

			STREET LIGHTS			
	DISTRICT	NAGAR PALIKA	STREETLIGHTS	TOTAL STREET LIGHTS REQUIRED		
9	BANASKANTHA	DEESA		1800		
9	BANASKANTHA	PALANPUR		4696		
9	BANASKANTHA	DHANERA		465		
9	BANASKANTHA	RADHANPUR		1700		
9	BANASKANTHA	THARAD		670		
10	PANCHMAHALS	DAHOD				
10	PANCHMAHALS	GODHRA		8000		
10	PANCHMAHALS	HALOL		1685		
10	PANCHMAHALS	LUNAWADA		1603		
10	PANCHMAHALS	DEVGADH BARIA				
10	PANCHMAHALS	JHALOD		628		
10	PANCHMAHALS	KAALOL				
10	PANCHMAHALS	SANTRAMPUR		630		
11	BHAVNAGAR	BOTAD				
11	BHAVNAGAR	MAHUVA		1964		
11	BHAVNAGAR	SAVAR KUNDA		2450		
11	BHAVNAGAR	PALITANA		1392		
11	BHAVNAGAR	SIHOR				
11	BHAVNAGAR	GARIADHAR		875		
11	BHAVNAGAR	GHADHDA				
11	BHAVNAGAR	TALAJA		1032		
11	BHAVNAGAR	BHAVNAGAR	10877			
12	MEHSANA	KADI		1700		
12	MEHSANA	KALOL		2100		
12	MEHSANA	MEHSANA		2425		
12	MEHSANA	PATAN		3240		
12	MEHSANA	SIDHPUR				
12	MEHSANA	UNJHA				
12	MEHSANA	VISNAGAR				
12	MEHSANA	VADNAGAR		982		
12	MEHSANA	CHANASMA				
12	MEHSANA	HARIJ		400		
12	MEHSANA	KHERALU				
12	MEHSANA	MANSA				
12	MEHSANA	VIJAPUR		1200		
13	VADODARA	DABHOI		1571		
13	VADODARA	CHOTTA UDIAPUR				
13	VADODARA	KARJAN		910		
13	VADODARA	PADRA				
13	VADODARA	SAVLI				
13	VADODARA	VADODARA	38550	38550		
14	VALSAD	NAVSARI		8753		

			STREET LIGHTS			
	DISTRICT	NAGAR PALIKA	STREETLIGHTS	TOTAL STREET LIGHTS REQUIRED		
14	VALSAD	VALSAD		5300		
14	VALSAD	VAPI		899		
14	VALSAD	VIJALPOR		486		
14	VALSAD	DHARAMPUR		1200		
15	SURAT	BARDOLI		2300		
15	SURAT	VYARA		962		
15	SURAT	SURAT	19409	19409		
16	SURENDRANAGAR	SURENDRANAGAR		7700		
16	SURENDRANAGAR	DHRANGADHRA		2350		
16	SURENDRANAGAR	LIMBDI				
16	SURENDRANAGAR	VADHVAN		4953		
16	SURENDRANAGAR	HALVAD		236		
16	SURENDRANAGAR	THANGADH		900		
17	BHARUCH	BHARUCH				
17	BHARUCH	ANKLESHWAR		2334		
17	BHARUCH	JAMBUSAR		1390		
17	BHARUCH	RAJPIPLA		1425	1705883	1407140

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SECTION – II

SURAT CITY PROFILE

I. CITY PROFILE

INTRODUCTION

Historical Development of the City

The city of Surat is one of the oldest historical trade centers of India. The development of Surat dates back to 300 BC. Surat was colonised by Brigus or the King from Sauvira on the bank of River Tapi. The common story tracing the origin of the name Suryapur refers to the time in 1500-1520 AD, when Surat was already a city of great trade. It seems possible that the modern city of Surat was built on the site of the old town of Suryapur (as quoted by Barbosa). In course of time, the name Suryapur, city of Suryt changed into Surat.

Various dynasties like Maurya, Satarvardhans, Kshtruphas, Gupta's, Traikutakar, Chalukyas have ruled the region. This region was the bone of contention between the rulers of Deccan, viz. Chalukyas and Yadavs, when Muslims finally conquered Gujarat.

In 1228 A.D., Arabs from Kafa came to Rander, the principal trade center. The Arabs were enterprising navigators and successful merchants, trading with Malacca, China, Tenasarim, Pepu and Sumatra in spices, silk, musk, porcelain and various other commodities. In the sixteenth century, as the prosperity of Rander declined on account of raids by the Portuguese, Surat began to assume more importance. The port of Surat enjoyed great prosperity in the sixteenth, seventeenth and eighteenth century. However, with the rise of Bombay port, Surat lost its importance.

Regional Linkages

The city of Surat is situated at latitude 21° 15'N and 72° 52'E on the banks of river Tapi. The coast line of Arabian sea is on its west at a distance of about 22 kilometres by boat along the Tapi stream and about 16 kilometres by road, along Dumas.

Surat occupies a pivotal position on the Ahmedabad-Bombay regional corridor as well as on the 225 km. long industrial belt, having direct linkages with the industrial urban centres of Vadodara, Ankaleshwar and Vapi.

The National Highway - 8 passes within 16 km. of the Surat Municipal Corporation boundary and is one of the busiest inter-state trunk routes in the country. Surat is located midway on the 500 km. long Ahmedabad-Bombay western railway corridor and as many as 40 pairs of express, mail, passenger trains pass through it. The state government has also established an air strip to facilitate smaller size air craft landing. No domestic air service has been started as yet.

Geographical Characteristics

Topography

Surat lies at a bend of the river Tapi, where its course swerves suddenly from south-east to south-west with the castle in its center, the city forms an arc of a circle, the bends enclosed by its walls stretching far about a mile and a quarter along the bank. From the right bank of the river, the ground rises slightly towards the north. The height above mean sea level is 13 mts.

Climate

The climate of Surat can be divided as follows :-

(i) Summer Season from.March to May;
(ii) Rainy Season from June to September;
(iii) Autumn Season during October and November; and
(iv) Winter from December to February.

Summers are very hot with temperatures ranging between 100^0F to 112^0F. During monsoon the climate is pleasant, while in autumn it is temperate. The winter is not very cold. In January the temperature is between 50^0 F to 60^0 F. Average annual rainfall is 45 cms.[1]

Geographical Area of the City

Established in 1853, the municipality of Surat covered an area of 7.36 sq. km. Its status was upgraded to that of a municipal corporation in 1971 when it covered an area of 24.01 sq. km. Since then the area of SMC has been expanded to cover 112 sq.km. (Table 1.1).

Table 1.1: City Limits

Year	Name of Area	Area (sq. km.)
1664	Inner wall area	1.78
1707	Outer wall area	7.36
1963	S.M.C. area	8.30
1971	S.M.C. area	24.01
1975	S.M.C. area	55.56
1986	S.M.C. area	110.00
1996	S.M.C. area	112.27
1978	S.U.D.A. area	722.00

Source : SUDA Development Plan, 1980.

[1] Gazetteer, Surat District, Census of India, 1961.

Until 1963 all development within the city was restricted to the walled city area. Subsequent additions were made to the municipal limits in 1971 and 1975 and villages of Ved, Dabholi, Singanpore were added. By 1986 Nana Varachha, Karanj, Umarwada, Magob, Dumbhal, Anjana, Lymbayat, Dindoli, Bhedwad, Bhestan, Pandesara, Udhna, Bamroli, Majura, Bhatar, Althan, Umra, Piplod, Jahangirabad and Jahangirpura were added.

SUDA was constituted by the Government of Gujarat under the provision of the Gujarat Town Planning and Urban Development Act, 1976, as an apex planning body. Its area in 1978 as per the notification was 722 sq.km. (which includes areas within the Surat Municipal Corporation and 148 villages in the periphery areas).

DEMOGRAPHY

Population Growth

The spatial and temporal population growth of a city is one of the most important indicators of urban development. Growth of population over the time period 1971 to 1991 has been analysed in Table 1.2.

Table 1.2 : Area and Population, SMC and SUDA

S.No.	Head	Area	Population (100,000)			Growth Rate (%)	
		(sq.km.)	1971	1981	1991	1971-81	1981-91
A.	**SMC (total)**	**112.08**	**5.30**	**9.37**	**14.98**	**76.79**	**59.87**
1	Walled city	8.18	3.63	4.41	4.23	78.00	-4.00
2	Area added upto 1975	47.37	1.30	3.35	6.43	157.60	91.44
3	Area added after 1975	56.53	0.37	1.61	4.32	335.13	168.32
B.	**SUDA (excluding SMC limits)**	**609.72**	**1.49**	**2.04**	**2.19**	**36.91**	**43.13**
C.	**SUDA (including SMC area)**	**722.00**	**6.79**	**11.41**	**17.91**	**68.04**	**56.96**

Source : Census of India, SMC and SUDA.

In the Surat urban agglomeration, SMC area is the centre of economic activities and the city forms the core of the Surat Urban Development Authority (SUDA). The development of the city has not kept pace with the increase in population and urbanisation, leading the city to transcend its limits. The peripheral areas of SMC are experiencing a faster growth rate. The villages along the urban periphery of SMC, within the SUDA area, are also developing rapidly.

During the past two decades, the city has experienced very high rates of growth in population. This is mainly due to the presence of power looms and diamond cutting industries in Surat.

Spatial Patterns

The spatial distribution of population indicates the directions in which the city has grown. To understand the spatio-temporal growth of population in the area, maps plotting the compound growth rate for the decades 1971-81 and 1981-91 have been prepared indicating wardwise growth rates for the SMC area and village wise growth rates for the area under SUDA (See Maps: Plates I and II).

Population growth rates in the 1981-91 decade graphically represents the further consolidation of growth along the southern corridor. However, the development of the west-east Nana Varachha-Kamrej belt also becomes quite evident.

Population Densities

The issue of population density is another important indicator of urban development.(See Table 1.3 and Maps Plates III, IV & V). In 1971, the population was concentrated within the old core city and population densities in the surrounding SUDA areas were relatively very low. In the SMC area, the ward of

Table 1.3 : Zone-wise Density

(persons/ hac.)

Zone No.	1971	1981	1991
Zone 1	412	504	487
Zone 2	9	17	57
Zone 3	29	106	222
Zone 4	12	47	108
Zone 5	14	34	70
Zone 6	20	34	65
Zone 21	3	4	6
Zone 22	8	12	20
Zone 23	2	3	5
Zone 24	2	2	4
Zone 25	2	3	4
Zone 30	1	2	3
SMC	**48**	**84**	**135**
SUDA	**2**	**3**	**5**
SUDA+SMC	**9**	**16**	**25**

Source: Census of India.

Vadifalia had a density of 1,029 persons per hectare, Gopipura had 915 persons per hectare while wards such as Pandesara, Majura, Bamroli, Jahangirpura, Jahangirbad had densities as low as one person per hectare.

In 1981, a very distinct pattern of population movement seems to have taken place. The south corridor linking Surat with Navsari via Sachin began to appear as the major direction of development. Further, growth also consolidated along the Civil Lines-Dumas road, the Adajan-Olpad road, the Nana Varachha-Kamrej road as well as the Bardoli road. The Map (Plate XV) also clearly indicates the nodes of development around major junctions of roads leading to Surat from the national highway.

In 1991, the 1981 pattern was further consolidated, with enhancement in densities along the corridors mentioned above. In addition, there was development along the Surat-Amroli Kosad link, and the Adajan-Hazira road.

Sex Ratio

Surat attracts a large number of male migrants who work in the diamond cutting and polishing industry as well as in the thriving textile powerloom sector. Keeping this in mind the pattern of sex ratio in the city was analysed (Table 1.4).

In 1971, the sex ratio pattern in Surat was relatively uniform across space, but variations existed even then. For instance, the SMC ward of Tunki had a sex ratio of 1,019 females per thousand males while Umarvada ward had a sex ratio of only 521 females per 1,000 males. It becomes evident from the Maps (Plates VII, VII & VIII) on sex ratios of Surat that male migrants are concentrated in the north-east areas, just outside the old city. Similar concentrations are also present along the southern corridor of Udhana-Sachin.

In 1981, the areas with low sex ratio ranging around 600 females per 1,000 males, increase along the Adajan-Hazira road as well as Katargam, Ashwani Kumar, Umarvada, Fulpada, and Pandesara.

The industrial nature and compatible employment patterns of the city are reflected in the sex ratio patterns in 1991. More areas of the city have shown a declining sex ratio with wards such as Tunki showing a rapid fall in the ratio from 1,019 in 1971 to only 699 females per 1000 males. Varachha and Majura also show very dramatic fall in the sex ratios from 511 and 521 females per 1000 males respectively.

Table 1.4 : Zone-wise Sex Ratio

(females per 1000 males)

Zone No.	1971	1981	1991
Zone 1	904	907	935
Zone 2	928	866	828
Zone 3	762	701	764
Zone 4	803	802	806
Zone 5	802	829	811
Zone 6	929	922	904
Zone 21	954	941	872
Zone 22	910	864	845
Zone 23	986	945	885
Zone 24	1109	988	826
Zone 25	970	948	877
Zone 30	1025	966	660
SMC	**880**	**840**	**839**
SUDA	**994**	**952**	**877**
SUDA+SMC	**903**	**859**	**845**

Source: Census of India.

URBAN ECONOMY

Workforce Characteristics

Worker Participation

On the whole the workforce participation rates have remained stable over the three time periods under consideration (Table 1.5). Zonal differences clearly indicate the concentration of migrant workforce into certain zones. This has a significant implication on the shelter and service requirements in these areas.

Occupational Structure

This section presents the distribution of resident workforce by occupational pattern using adaptations from the nine point classification as presented by the Census of India.

In terms of occupational distribution, SMC area is dominated by the secondary sector in general and industrial sector in specific with over 60 per cent of the resident workers engaged in secondary activities. Another one third of the workers are engaged in tertiary sector. The peripheral areas still depict predominantly rural character with about half of its resident workers engaged in primary activities (Table 1.6).

Table 1.5 : Zone-wise Work Participation

(figures in per cent)

Zone No.	Male Workers			Female Workers			Total Workers		
	1971	1981	1991	1971	1981	1991	1971	1981	1991
Zone 1	52.35	54.51	55.41	6.84	7.25	8.25	30.74	28.59	32.63
Zone 2	54.83	58.07	56.52	19.75	9.23	4.81	37.94	31.11	33.09
Zone 3	61.25	63.90	59.38	10.90	5.40	2.95	39.47	37.57	34.93
Zone 4	61.50	60.35	59.06	7.38	4.57	3.67	37.39	33.50	34.34
Zone 5	52.88	57.30	59.36	12.99	10.08	8.22	35.12	31.32	36.46
Zone 6	47.66	49.91	53.30	11.57	9.03	8.87	30.28	25.97	32.20
Zone 21	55.58	57.17	58.42	21.86	22.76	15.69	39.11	29.46	38.51
Zone 22	52.97	57.05	57.86	11.93	10.36	7.94	33.42	30.61	35.00
Zone 23	53.20	57.11	59.28	24.87	23.10	18.00	39.13	29.37	39.90
Zone 24	38.61	46.75	57.26	13.73	12.36	8.08	25.53	23.51	35.02
Zone 25	52.74	55.10	58.90	18.38	20.33	15.78	35.82	28.29	38.75
Zone 30	45.49	52.42	68.84	10.37	13.43	11.84	27.71	26.67	46.17
SMC	**53.64**	**57.45**	**57.55**	**8.29**	**6.95**	**5.83**	**32.42**	**31.23**	**33.95**
SUDA	**51.73**	**56.11**	**58.66**	**21.86**	**22.25**	**16.20**	**36.85**	**28.75**	**38.82**
SUDA + SMC	**53.25**	**57.22**	**57.72**	**11.36**	**9.83**	**7.55**	**33.37**	**30.78**	**34.74**

Source : Census of India.

Table 1.6 : Occupational Structure, 1991

Sector	Surat (SMC)		SUDA area (outside SMC)	
	Persons	(%)	Persons	(%)
Primary Sector	9,468	1.87	48,203	49.00
Secondary Sector	310,293	61.38	33,022	33.62
Tertiary Sector	185,811	36.75	17,051	17.38
Total	**505,572**	**100.00**	**98,276**	**100.00**

Source : Census of India.

The declining nature of the household industries becomes quite evident from the fact that in 1971, approximately 7 per cent of the workers were engaged in such activities within the SMC area, which came down to 2 per cent in 1991 (Table 1.7).

Similarly, the percentage of workers in the primary sector has also declined across the SUDA area. The SMC area has seen a decline from 7 per cent to 2 per cent, while in the outer area the distribution has come down from a high of approximately 71 per cent in 1971 to a low of 47 per cent in the year 1991.

Table 1.7 : Zone-wise Distribution of Workers by Industrial Category

(figures in per cent)

Zone No.	All Industries		Household Industries		Primary Sector	
	1971	1991	1971	1991	1971	1991
Zone 1	56.86	49.68	9.17	6.32	0.81	0.39
Zone 2	50.24	64.72	1.93	0.57	32.85	5.88
Zone 3	59.65	72.29	1.93	0.34	13.25	1.80
Zone 4	56.12	65.26	1.07	0.69	15.08	0.93
Zone 5	39.00	46.56	1.41	1.18	16.66	2.59
Zone 6	31.74	27.26	3.25	1.07	26.89	7.60
Zone 21	16.97	36.91	1.74	0.42	66.01	42.11
Zone 22	43.18	52.67	5.52	1.94	25.65	11.95
Zone 23	15.31	33.93	1.96	1.18	73.55	49.00
Zone 24	18.08	42.89	2.24	1.72	64.01	32.32
Zone 25	17.52	32.77	7.55	0.18	72.4	45.45
Zone 30	15.19	58.39	11.29	0.70	71.34	21.31
SMC	**54.23**	**57.95**	**6.65**	**2.22**	**7.05**	**2.04**
SUDA	**16.05**	**33.50**	**2.43**	**0.98**	**71.22**	**46.63**
SUDA + SMC	**45.17**	**53.51**	**5.65**	**2.00**	**22.29**	**10.13**

Source : Census of India.

Growth of Factories

The office of the Chief Inspector of Factories maintains the records of all factories in a district. A number of factories in Surat, Ahmedabad, and Vadodara districts were analysed over time (Table 1.8). The annual compound growth rate (ACGR) of factories indicates that Surat experienced a short-term negative growth in its factory in the 1985 to 1990 period. Subsequently, the growth rate has risen to 4.57 per cent (Table 1.9).

Table 1.8 : Working Factories in Surat, Ahmedabad and Vadodara Districts

State/ District	1960	1970	1976	1980	1981	1982	1983	1984	1985	1986	1987	1990	1991	1992	1993
Surat	696	832	1006	1022	1000	1335	1210	1152	1395	1373	994	1165	1290	1661	1332
Ahmedabad	910	1508	2544	3115	3476	3766	3978	4171	4212	4285	4375	4667	4566	4136	4277
Vadodara	251	461	831	1302	1318	1315	1385	1228	1203	1286	1246	1395	1676	1639	1842
Gujarat	3649	5544	8857	10674	11438	12286	12586	12734	13067	13498	13045	14513	15298	15031	15854

Source : Chief Inspector of Factories.

Table 1.9 : Annual Compound Growth Rate of Working Factories in Surat, Ahmedabad and Vadodara Districts

(figures in per cent)

State/District	1960-70	1970-76	1976-80	1980-85	1985-90	1970-80	1980-90	1990-93
Surat	1.80	3.22	0.40	6.42	-3.54	2.08	1.32	4.57
Ahmedabad	5.18	9.11	5.19	6.22	2.07	7.52	4.13	-2.87
Vadodara	6.27	10.32	11.88	-1.57	3.01	10.94	0.69	9.72
Gujarat	4.27	8.12	4.78	4.13	2.12	6.77	3.12	2.99

Source : Chief Inspector of Factories.

Growth of Employment

Surat has a predominant industrial employment base. The growth of industrial activity experienced during the past three decades has been phenomenal. The absolute number of workers in registered working factories has gone up from around 24,000 in 1960 to as much as 70,000 in 1990 (Table 1.10). During the eighties Gujarat experienced a sharp decline in the rate of growth in industries. In Surat too, a moderate decline in the industrial growth rate was observed. The recovery during the nineties has been quick and sharp. The district recorded a high growth rate of over 10 per cent during 1990-93 period (Table 1.11).

Table 1.10 : Employment in Working Factories in Surat, Ahmedabad and Vadodara Districts

State/ District	1970	1976	1980	1981	1982	1983	1984	1985	1986	1987	1990	1991	1992	1993
Surat	31543	41219	52751	58666	61938	57228	58032	62366	65182	57100	69549	76941	103188	93436
Ahmedabad	186296	222213	246701	253072	263150	272487	246110	231913	230362	226706	255743	255625	232841	231408
Vadodara	52444	63837	87478	88900	77456	75122	82170	81084	87108	90869	79108	79878	96458	97046
Gujarat	437554	540665	635684	668033	694628	689269	668017	663614	674618	666749	747569	760908	787599	795552

Source : Chief Inspector of Factories.

Table 1.11 : Annual Compound Growth Rate of Employment in Working Factories in Surat, Ahmedabad and Vadodara Districts

(figures in per cent)

State/District	1960-70	1970-76	1976-80	1980-85	1985-90	1970-80	1980-90	1990-93
Surat	2.90	4.56	6.36	3.41	2.20	5.28	2.80	10.36
Ahmedabad	1.10	2.98	2.65	-1.23	1.98	2.85	0.36	-3.28
Vadodara	5.95	3.33	8.19	-1.51	-0.51	5.25	-1.01	7.09
Gujarat	2.36	3.59	4.13	0.86	2.41	3.81	1.63	2.10

Source : Chief Inspector of Factories.

Industrial Structure

In order to assess the potential development of Surat city and its surrounding region, it is necessary to analyse the structure of industrial development in the area. Most of the industrial activity in the district is within or adjacent to the city of Surat. Therefore, it would be a fair assumption that the district data would be representative of the SUDA region as a whole.

The most striking feature of Surat's industrial structure is its near-total dependence on the synthetic textile sector. It is found that both in terms of the percentage of factories and workers, the synthetic textile sector has the lion's share (Table 1.12). It accounts for 41 per cent of the total factories and 47 per cent of the industrial work force in 1992. This sector has shown a consistantly positive growth rate over the years. The chemical industries sector is the second most important sector accounting for 7 per cent of the total factories and employing 11 per cent of the industrial workers.

Table 1.12 : Industrial Structure of Surat District , 1988-1992

(figures in per cent)

NIC	Product Type	1988		1989		1990		1991		1992		Change 1988-1992	
		Facts.	Workers	Facts.	Workers	Facts.	Workers	Facts.	Workers	Facts.	Workers	Facts.	Workers
20	Food Products	4.27	10.16	4.55	8.95	4.12	12.98	3.88	9.02	2.69	8.80	-1.58	-1.36
21	Food Products	0.78	0.49	0.95	0.53	0.94	0.67	0.73	0.41	0.59	0.27	-0.19	-0.22
22	Tobacco, Beverage	0.78	0.23	0.76	0.26	0.69	0.18	0.65	0.17	0.29	0.17	-0.48	-0.06
23	Cotton Text.	1.07	7.46	1.14	8.51	1.12	6.28	1.13	7.32	0.88	4.43	-0.19	-3.04
24	Wool, Silk, Syn.	37.38	42.75	38.01	42.22	35.71	38.55	36.86	39.73	41.28	47.21	3.90	4.45
26	Textile Products	1.17	2.07	1.04	1.65	1.03	1.59	1.21	1.33	1.41	1.44	0.24	-0.63
27	Wood, Wood Products	2.52	0.21	2.46	0.24	2.32	0.21	2.10	0.21	1.52	0.26	-1.00	0.05
28	Paper, Paper Products	1.94	2.67	2.27	2.85	2.66	3.08	2.26	2.04	2.11	2.36	0.17	-0.31
29	Leather & Products	0.10	0.01	0.00	0.00	0.09	0.01	0.08	0.01	0.06	0.01	-0.04	0.00
30	Basic Chemicals	9.03	9.60	9.38	11.70	9.36	10.67	9.14	10.94	7.08	11.26	-1.94	1.66
31	Rubber, Plastic, Pet.	3.40	1.38	3.22	1.65	2.66	2.88	2.75	5.10	2.17	2.48	-1.23	1.10
32	Non Metl. Min.	4.76	3.04	5.12	3.43	5.06	2.86	4.93	2.86	4.63	2.44	0.13	-0.60
33	Basic Meta. Alloy	4.17	3.37	3.13	1.14	3.26	1.61	3.23	1.51	2.69	1.47	-1.48	-1.90
34	Metal Prod & Prts.	3.59	1.60	6.26	4.83	5.24	4.83	5.50	4.11	4.27	3.33	0.68	1.73
35	Machine & Equip.	6.41	3.80	4.08	2.35	6.09	2.83	6.63	3.13	4.74	2.89	-1.67	-0.91
36	Machine & Equip.	1.26	0.70	1.42	1.73	1.89	1.39	1.78	1.22	1.35	0.97	0.08	0.27
37	Transport Equip.	0.49	0.30	0.66	0.28	0.60	0.24	0.57	0.24	0.53	0.18	0.04	-0.12
38	Others	2.62	5.09	13.27	5.72	13.13	5.40	12.37	5.22	18.44	6.09	5.82	1.00
Rest of The Groups		4.27	5.08	2.27	1.98	4.03	3.68	4.20	5.44	3.28	3.94	-0.99	-1.14
	Total	100	100	100	100	100	100	100	100	100	100		

Source : Chief Inspector of Factories.

Notes: Facts. - Factories.

Critical Industrial Concentrations

The above discussion has taken an aggregate view of industrial activities. It is imperative, however, to analyse local concentrations of industrial locations by the NIC classification. As mentioned above, it was found that the major concentrations of the predominant industries such as synthetic textiles and

chemicals are well within the SMC limits. For instance, the synthetic textiles are concentrated in zone 1 and 4, that is, SMC central and south-east areas. These areas also have the most critical stresses in demographic structure and urban infrastructure. Basic chemicals' industries which are environmentally critical, are present in zone 4 and zone 23, i.e., the south-east areas.

Table 1.13 : Industrial Concentration

Zone No.	Zones	NIC Code Wise % to Total District														Total
		20	22	24	26	27	28	30	31	32	33	34	35	38	Rest	
1	SMC-Cent.		0.05	5.67	0.30	0.25	0.10	0.20	0.05		0.35	0.35	0.10	6.22		14.16
2	SMC Nrth.	0.0	0.05	0.40	0.05			0.05		0.05						0.71
3	SMC-Nrthwst.	0.05		2.53		0.05	0.05	0.15		0.15	0.30	0.10	0.30	2.18	0.10	6.22
4	SMC-Sthest.	0.30	0.10	8.90	0.51	0.86	0.30	3.95	0.96	0.15	1.06	2.43	3.19	1.06	0.20	24.23
5	SMC-Sthwst.			0.91	0.05				0.05	0.05			0.05		0.05	1.16
6	SMC-Nrthwst.						0.05	0.05		0.20		0.05				0.61
21	SUDA-North.						0.15			0.05						0.25
22	SUDA-Nrthest.	0.05		0.15			0.05			0.15				0.46	0.05	0.96
23	SUDA-Sthest.	0.10	0.05	3.39		0.05	0.15	1.67	0.46	0.91	0.10	0.46	0.76	0.15		8.24
24	SUDA-Sthwst.											0.05				0.05
25	SUDA-West	0.05							0.15	0.25						0.46
	SMC	0.91	0.35	28.73	0.96	1.42	0.86	5.16	1.26	1.16	2.43	3.79	4.20	12.80	0.40	66.92
	SUDA	1.11	0.40	32.37	0.96	1.47	1.21	6.83	1.87	2.53	2.53	4.30	4.96	13.40	0.46	76.88
	Rest Of Dist.	1.92	0.10	9.16	0.15	0.40	0.91	0.81	0.46	2.12	0.10	0.25	0.51	4.50	0.15	23.12
	Total Dist.	3.03	0.51	41.43	1.11	1.87	2.12	7.64	2.33	4.65	2.63	4.55	5.46	17.91	0.61	100

Source : Chief Inspector of Factories.

POPULATION FORECASTS

Surat's population grew at an annual compound growth rate of 2.48 per cent in the 1951-61 decade, by 4.83 per cent in the 1961-71 period, by 5.30 per cent in the 1971-81 decade and by 4.53 per cent in the 1981-91 period (Table 1.14). The trend has been arrived at by averaging out the growth rates for the past two decades and assuming that the stabilisation of the growth rate will occur around 4.53 per cent, in the new plan period of 1996-2011. For each time period, three estimates, i.e., low, medium and high, were identified.

Based on the above, it is expected that the SUDA (which includes the SMC area) had a population between 1.9 and 2 million in 1994. This population is expected to increase between 2.5 and 2.7 million by the year 2001 AD. A further rise between 3.4 to 4.3 million with an average of 3.7 million is expected by the year 2011 AD. The resident population within SMC area has been estimated at 2.56 million and 3.47 million persons by the years 2001 and 2011 respectively.

Table 1.14 : Population Forecast, SUDA Area

Year	C.G.R. (%)			Year	Population		
	Trend	Average	Stabilised		Low	Medium	High
				1951	334941	334941	334941
1951-61	2.48	2.48	2.48	1961	428084	428084	428084
1961-71	4.83	4.83	4.83	1971	685831	685831	685831
1971-81	5.30	5.30	5.30	1981	1149422	1149422	1149422
1981-91	4.53	4.53	4.53	1991	1789869	1789869	1789869
1991-94	3.76	4.14	4.53	1994	1999294	2021665	2044202
1994-2001	3.76	4.14	4.53	2001	2588249	2686051	2787167
2001-2011	2.99	3.37	4.53	2011	3473713	3742232	4340150

Source : Census of India and study estimates.

It is important to note that while the overall population projections have been made for the SUDA area, due to various constraints, the forecasts for urban infrastructure have been made only for the area within SMC limits in this study.

LAND USE

The SMC as well as SUDA have recently conducted a detailed survey of the land use in their respective areas. The growth in land use under different categories was identified by contrasting the same with land use maps of 1978 and data provided by SUDA for 1995 (Table 1.15).

On analysing this time series data it was found that between 1978 and 1995, 3,462 hectares of land was added for residential purposes. This indicates that during 1978 to 1995 period, around 203.65 h.a. of land was converted for residential uses every year. Similarly, about seven hectares of land was added every year for commercial uses. The largest land conversion, after residential purpose was done for industrial purposes, with about 48 hectares of land being brought under industrial uses every year. Presently 4 per cent of the developed land is under industrial use.With the trends continuing, about 500 heactares of land is likely to be brought under urban use every year.

The pattern of land use existing in SMC area shows that the entire walled city is concentrated with mixed land use of residential, commercial and household industries (especially the powerloom, jari, diamond industries). Large industrial estates have been developed in Katargam in the northern part, Khatodara, Udhana and Bhestan in the southern and eastern parts of SMC. It is important to note that the development of areas for public purposes, such as roads, open spaces, has not kept pace with the growth in residential and industrial sectors (Plate IX).

Table 1.15 : Land Use Statements, SUDA ,1978 to 1995

Land Use	SUDA Area		SMC Area		SUDA (Periphery)		SUDA Area	
	1978		1995		1995		1995	
	Area (Ha.)	% Devp. Area	Area (Ha.)	% Devp. Area	Area (Ha.)	% Devp Area	Area (Ha.)	% Devp. Area
Residential	2,727	51.87	4,976	63.68	1,213	30.48	6,189	52.97
Commercial	143	2.72	204	2.64	52	1.30	256	2.20
Industrial	1,019	19.37	954	12.39	1,830	45.99	2,784	23.82
Edu. & Public	546	10.39	516	6.69	219	5.51	735	6.30
Open & Rec.	22	0.43	58	0.76	-	-	58	0.49
Roads	800	15.22	996	12.92	665	16.72	1,661	14.23
Vacant land	-	-	1,974	25.62	-	-	1,974	16.89
Total Devp. Area	5,257	100	7,704	100.00	3,979	100.00	11,683	100.00
Agricultural	66,918	-	1,550	-	56,968	-	58,518	-
Total Area	72,175	-	11,228	-	60,947	-	72,175	-

Source : Calculated from 1978 maps of existing land use supplied by SMC & SUDA; 1995 data from SUDA revised draft development plan.

Note: Devp. = Developed

PLANNING EFFORTS

Development plan for the area of the walled city of Surat (old town) was prepared and sanctioned by the Local Self Government Resolution No. TPS/1956/E dated 20.08.1959 (corrigendum issued No. TPS/1959/E dated 10.10.1959). This plan came into force from 1st February, 1960.

Surat Municipal Corporation under its Resolution No. 47 dated 02.03.1963 declared its intention to prepare the development plan for its area. This included the revision of development plan sanctioned as per (A) and preparation of a development plan for the additional area. The development plans of Rander and Adajan which were included within the Surat Municipal Corporation limits on 01.02.1970, were sanctioned by the government as in 1961 and 1969 respectively.

For the areas which were included within the Surat Municipal Corporation on 18.03.1975, the Surat Municipal Corporation declared its intention to prepare the development plan for these extended areas on 13.04.1976. For the peripheral area, outside the Surat Municipal Corporation, two plans were prepared, the first one was prepared through the City Co-ordination Committee and the second plan under the U.L.C Act of 1976, which came into existence on 17th February, 1976.

Surat Urban Development Authority (SUDA) was established on 1st February, 1978. It prepared the development plan for its entire area (including Surat Municipal Corporation's area). In 1996, a revised development plan has been prepared by SUDA. The plan is in the process of finalisation.

SUDA has prepared a number of town planning schemes for various parts of Surat city. Twelve schemes have been implemented either in full or in part, while seven have been awarded preliminary sanction. For ten areas, draft TP schemes have been sanctioned. Another fourteen schemes are in the process of preparation.

HOUSING

Occupancy Rates and Household Sizes

At the aggregate level, the general housing condition in Surat has shown improvement. The occupance rates have come down to around five per house (Table 1.16). However, this is deceptive because the composition of the population growth indicates a high incidence of male migration. It is also to be noted that certain areas in the city, especially the central areas show very high occupancy rates indicating overcrowded housing condition.

Table 1.16 : Occupancy Rates and Household Sizes

(person per household)

Zone no.	Zones	Occupancy Rates			Household Sizes			
		1971	1981	1991	1971	1981	1991	1994
1	SMC-CENTRAL	6.90	6.83	6.35	6.56	6.49	6.35	6.31
2	SMC-NORTH	5.62	5.61	5.50	5.39	5.61	5.50	5.46
3	SMC-NE	5.29	5.63	5.22	5.02	5.43	5.22	5.15
4	SMC-SE	4.59	4.78	4.78	4.52	4.88	4.78	4.76
5	SMC-SW	5.73	5.36	4.83	5.58	4.90	4.83	4.81
6	SMC-NW	5.77	5.69	5.14	5.57	5.25	5.14	5.11
21	SUDA-NORTH	5.50	5.72	4.93	5.31	5.57	4.93	4.91
22	SUDA-NE	5.84	5.36	4.89	5.33	5.03	4.89	4.85
23	SUDA-SE	4.95	5.97	4.82	4.76	5.09	4.82	4.74
24	SUDA-SW	5.98	5.93	4.93	5.69	4.98	4.93	4.92
25	SUDA-WEST	7.05	6.07	5.02	6.16	5.00	4.88	4.84
	SUDA+SMC	**6.20**	**5.99**	**5.39**	**6.06**	**5.53**	**5.39**	**5.35**
	SMC	**5.42**	**5.78**	**4.90**	**5.14**	**5.16**	**4.90**	**4.82**
	SUDA	**5.98**	**5.95**	**5.30**	**5.79**	**5.47**	**5.30**	**5.25**

Source: Census of India.

Vacancy Rates

The vacancy rate of housing in Surat is as high as 15 per cent. This is an indicator of a strong speculative market in housing, and the constraints posed by the Rent Control Act which inhibit owners from renting out properties.

Slums

Growth and Distribution

Slums housed 27.5 per cent of the total city population in 1992 as compared to 17.3 per cent in 1973. Thus, between 1983 to 1992 the slum population increased

by 14.6 per cent whereas the city population grew by only 7.8 per cent (Table 1.17). This trend is expected to continue in the future because of industrial investments coming in Surat and adjoining areas like Hazira.

Table 1.17 : Growth Trends in Slum Population within Surat City

Growth Trends	1973	1982	1983	1992
Total city population (100,000)	5.30	8.50	9.20	15.70
Annual growth rate (%)	-	6.70	8.20	7.80
Total slum population (100,000)	0.92	1.54	1.87	4.34
Annual growth rate (%)	-	7.50	21.40	14.60
Slum population as % of total population	17.30	18.10	20.30	27.50

Source : Biswaroop Das, 1994.

Inspite of a higher growth rate of slum population in Surat, the net addition to the number of slums has actually declined (Table 1.18). Easy access to open spaces for squatting near work places, is decreasing, leading to densification of old slums.

Table 1.18 : Estimated Growth in the Number of Slums

Period	Number of Slums	Cumulative Total
Upto 1960	79	79
1961-66	54	133
1966-72	46	179
1973-78	41	220
1979-84	50	270
1985-90	24	294
Mid 1991	294	294

Source : Biswaroop Das, 1994.

Growth and concentration of powerlooms, small industrial units, other formal activities and easy availability of space in and around these peripheral zones has attracted the migrant slum dwellers to settle in the south and south-eastern parts of the city, accounting for 65 per cent of the total slum population (Table 1.19).

Table 1.19 : Zonal Distribution of Slum Population and Household

Zone No.	Slum Population (Nos.)	Slum Households (Nos.)	Slum Population to Total Population (%)
1	62361	12453	14.28
2	14684	3167	14.74
3	111730	24289	26.94
4	189195	41571	65.13
5	24219	6170	16.70
6	31307	6293	31.20
Total	**433496**	**93943**	**100.00**

Source : Biswaroop Das, 1994.

Location Characteristics

Slums in Surat are primarily encroachments on municipal and government land accomodating 41 per cent and 13 per cent of slum households, respectively. Another 37 per cent of slums households have encroached on private lands (Table 1.20).

Table 1.20 : Status of Land of Slum Households

(figures in per cent)

Ownership of Land	1973	1992
Private	43.7	37.3
Government	4.7	13.3
Municipality	42.2	41.0
Others	9.4	8.4

Source: Archana Ghosh, 1995.

Majority of the slums are located along major transport corridors (45.9%), and along the Tapi river bank and the canal lines (11%). Few are developed on land adjacent to factories (Table 1.21 and Plate X).

Table 1.21 : Relative Location of Slums

Location	Number	Per cent
Along transport corridors	135	45.9
Parallel to or along canals	10	3.4
Along or near river banks	20	6.8
Adjacent to or along factory walls	14	4.8
Others	115	39.1

Source: Biswaroop Das, 1994.

Housing Conditions in Slums

The households live in extremely unhygenic conditions. About 86 per cent of the dwelling units are one room units and 58 per cent of them are not more than 100 to 200 sq.ft. in area. Often migrant laborers sometimes share a single room on shift basis, most of which are kachha.

Socio-Economic Profile

About 80 per cent of all the slum households in Surat are migrants from rural areas of Gujarat as well as other states of the country. The major share of migrants from different origins is shown below in Table 1.22.

Table 1.22 : Migrant Slum Households and their States of Origin

States	Percentage
Maharashtra	46.8
Uttar Pradesh	17.8
Gujarat	13.3
Orissa	10.8
Andhra Pradesh	5.1
M.P., Rajasthan, Bihar and others	< 2 each

Source: Biswaroop Das, 1994.

The work induced migration pattern of Surat is reflected in a low sex ratio in the slum areas adjoining industrial locations. Single male migrants form a considerable proportion of workers in the industry. Besides working in industries, many of the migrants are also involved in other activities, like construction.

From Table 1.23 below it is apparent that around 35 per cent of the households have a per capita monthly income below Rs.152. These households lie at the margin and below the poverty line, and need to be targeted under the poverty amelioration strategies.

Table 1.23 : Distribution of Slum Households by Income

Income Range (Rs.)	Monthly Income (%)
< 700	7.8
701-1000	26.9
1001-2000	42.4
2001-3000	11.6
3001 +	11.0

Source: Biswaroop Das, 1994.

Basic Amenities

Slum dwellers in Surat have little or no access to basic amenities such as piped water supply, sewerage and sanitation services, and solid waste collection and disposal. While slums in the old city areas have piped water supply, those in the peripheral areas are not covered by such a network. In these areas hand pumps have been provided, but the groundwater is contaminated due to industrial effluents in a number of places. Access to clean potable water becomes a major problem particularly during the rainy season.

Table 1.24 shows the availability of basic facilities in 1973 and 1992. The facilities like number of private toilets and water connections have increased during this period. However with an increase in the population, most of the basic facilities are inadequate and much below the prescribed norms for decent

habitation. Subsequent to the plague in 1994, major programmes for slum improvements were undertaken, details of which are presented in the following section.

Table 1.24 : Basic Amenities in Slums

Amenities	1973	1992
Private water taps (% household)	7.00	18.96
Private latrines (% household)	2.00	20.93
Separate electricity connection (% household)	7.79	25.01
Private ownership of land (% household)	33.32	37.30
Drainage facility (% slums)	16.00	40
Private water connection in slums (No.)	2062	23040
Public stand posts (No.)	343	1299
Households per public stand post (No.)	45	72
Persons per stand post (No.)	236	334
Private latrines (No.)	550	19667
Public Toilets (No)	655	558
Households per public toilet (No.)	23	168
Person per public toilet (No.)	377	777
Non-availability of municipal dispensaries (% slum)	-	72
Non-availability of Balwadi (% slum)	-	62
Availability of Primary Schools (% slum)	-	11

Source: Biswaroop Das, 1994 and Archana Ghosh, 1995.

Slum Improvement Efforts

Given the fact that slums constitute a considerable share of the city's population, and are also spread over a large area of the city, improvement of the physical environment by efficient delivery of basic services needs to be emphasised for making the city habitable and productive. The physical improvement programmes need to be supplemented by other socio-economic development programmes, for enriching the human resource base.

So far, in the administrative set up of the local body, i.e. SMC, there is no department which deals only with slums. There is, however, a slum improvement committee of the SMC which monitors and suggests measures for the welfare of slum dwellers. In 1991, SMC began paving the internal roads in slums by Kota stones and by 1996, 75 per cent of the roads were paved. After 1994, surface drains have been constructed in all the slums. The slums are cleaned every day by sweepers and the drains are cleaned once a week.

SMC launched the construction of toilets in 1995 and by 1996 as many as 41 toilet complexes were constructed by two NGO's namely, Sulabha and Paryavaran. Functioning on the basis of pay and use, each toilet block is provided with 20 seats and men pay Rs. 15/month or Rs.0.50 per use. It is free for women, and children below 12 yrs. The cost of the project is Rs. 60 million. It is observed that these toilet blocks are still under used, showing thereby that clean sanitary

habits are still to be cultivated amongst the slum dwellers. These facilities are even inadequate (50 persons per seat is the norm), in the morning hours, when they are most needed.[2]

Besides its own efforts, SMC is also administering few centrally sponsored programmes for the uplift of the poor and slum dwellers. These programmes are Integrated Child Development Scheme (ICDS), Urban Community Development (UCD) and Urban Basic Services for the Poor (UBSP).

The UCD was launched in 1967. However, the overall achievement of this programme has been limited. So far the UCD programme has covered 1,90,017 persons belonging to 33,562 families.

The UBSP programme was launched in 1990 with an aim of providing proper attention to women and children and help them in raising the living standard of the populace. Major thrust of the programme is on health, nutrition, formal education, provision of clean potable water and disposal of waste. However, the reach of the UBSP programme is also limited. So far it has covered 1,400 households with a total population of 62,000. Its effectiveness with regards to the provision of basic amenities is marginal.

LAND AND HOUSING REQUIREMENTS

Estimates of Occupancy Rates and Household Sizes

Trends of occupancy rates and household sizes in the study area have been analysed to enable the estimation of pressure on housing in various regions of the study area. The census decades from 1971 to 1991 have been analysed for the same (Table 1.25).

The household size of the total SUDA area seem to be falling from 6.06 persons in 1971 to 5.53 in 1981 and 5.39 in 1991. It was estimated that the household size in the SMC area is expected to be much lower, with only 4.40 persons in each household in the year 2011, while the rate for the outer SUDA areas is expected to be 4.98 persons.

Vacancy Rate Estimates

The vacancy rates are expected to fall as pressure on housing stock pushes up rents and sale prices, making it more attractive to owners selling or renting their units. On the other hand, as the overall economic scenario opens up new investment opportunities at the state and national level, the attraction to speculate in the real estate market may come down. This is a trend that has been noticed all over the larger cities of Gujarat state. The vacancy rates in the year 2011 are expected to be

[2] Pg. 249 & 250, Ghanshyam Shah: Public Health and Urban Development, The Plague in Surat, Sage Publications, New Delhi.

14.35 per cent. An important aspect of this exercise is the fact that vacancy rates in the central parts of the city are expected to be higher (Table 1.26). This indicates that such units that are currently being used for residences may be converted for commercial and other related uses.

Table 1.25 : Occupancy Rates and Household Sizes

(persons per household)

Zone No.	Zones	Household Size		
		1994	2001	2011
1	SMC-CENTRAL	6.31	6.21	6.07
2	SMC-NORTH	5.46	5.38	5.27
3	SMC-NE	5.15	5.01	4.82
4	SMC-SE	4.76	4.69	4.60
5	SMC-SW	4.81	4.76	4.69
6	SMC-NW	5.11	5.04	4.94
21	SUDA-NORTH	4.91	4.84	4.75
22	SUDA-NE	4.85	4.76	4.63
23	SUDA-SE	4.74	4.56	4.31
24	SUDA-SW	4.92	4.89	4.85
25	SUDA-WEST	4.84	4.75	4.62
	SUDA+SMC	**5.35**	**5.25**	**5.12**
	SMC	**4.82**	**4.64**	**4.40**
	SUDA	**5.25**	**5.14**	**4.98**

Source: Census of India.

Estimate of Housing Requirements

Having worked out the overall population estimates and determined the occupancy rates, households and vacancy rates, it is possible to determine the total housing requirements for 2001 and 2011 AD.

Table 1.26 : Vacancy Rate Estimate

(figures in per cent)

Zone No.	Zones	1994	2001	2011
1	SMC-CENTRAL	12.00	12.00	12.00
2	SMC-NORTH	7.44	7.22	7.00
3	SMC-NE	6.84	6.62	6.40
4	SMC-SE	6.94	6.74	6.54
5	SMC-SW	11.00	10.77	10.54
6	SMC-NW	10.30	10.19	10.08
21	SUDA-NORTH	9.00	8.78	8.56
22	SUDA-NE	11.50	11.06	10.62
23	SUDA-SE	13.00	12.80	12.60
24	SUDA-SW	12.00	11.33	10.66
25	SUDA-WEST	12.00	11.56	11.12

Source : Study estimates.

Table 1.27 indicates that there were 314,642 houses in the total SMC and 77,599 houses in the SUDA area. A total of 392,241 houses presently exist. By the year 2011, it is estimated that a total of 847,766 housing units will be required. It is estimated that between 1991 and 2011 around 380,000 new housing units will be required across the total SMC + SUDA area. Of this, around 75 thousand units will be required only in zone 4, within the SMC area.

Table 1.27 : Zone-wise Housing Requirements

Zone No.	Zones	Total Housing Requirements			Additional Units		Additional Units On New Development	
		1994	2001	2011	1994-2001	2001-11	1991-2001	2001-11
1	SMC-CENTRAL	46,588	77,287	81,986	699	4,699	0	0
2	SMC-NORTH	24,296	44,499	76,024	20,203	31,525	17,173	26,796
3	SMC-NE	93,683	118,814	123,399	25,131	4,585	18,848	3,439
4	SMC-SE	77,664	118,554	179,025	40,890	60,471	30,668	45,353
5	SMC-SW	39,411	61,442	101,483	22,031	40,041	22,031	40,041
6	SMC-NW	33,000	51,566	89,323	18,566	37,757	18,566	37,757
	SMC Total	**314,642**	**472,162**	**651,240**	**127,520**	**179,078**	**107,286**	**153,386**
21	SUDA-NORTH	18,282	26,460	46,351	8,178	19,891	8,178	19,891
22	SUDA-NE	15,030	21,297	37,127	6,267	15,830	6,267	15,830
23	SUDA-SE	25,239	336,971	66,757	11,732	29,786	11,732	29,786
24	SUDA-SW	12,503	18,174	31,622	5,671	13,448	5,671	13,448
25	SUDA-WEST	6,545	8,690	14,669	2,145	5,979	2,145	5,979
	Total SUDA	**77,599**	**411,592**	**196,526**	**33,993**	**84,934**	**33,993**	**84,934**
	Total SMC + SUDA	**392,241**	**883,754**	**847,766**	**161,513**	**264,012**	**141,279**	**238,320**

Source: Census of India, Study Estimates.

ENVIRONMENT AND HEALTH

Environment of a city is a critical determinant of the health of its inhabitants and consequently urban productivity. Urban environmental quality in turn is determined by water and air quality. Water quality in particular is a direct result of the level of services such as piped water supply, sewerage network and treatment facilities, and solid waste management. In slums and low income settlements particularly, quality of living environment has a direct bearing on health and productivity of workers. Therefore it is extremely important to analyse the environmental status of any city and identify potential areas of improvement, whether in terms of land use planning, industrial locations, infrastructure facilities or any other aspects. This chapter provides an overview of the existing environmental conditions of Surat city.

The Gujarat Pollution Control Board (GPCB) is responsible for monitoring water and air quality in the state. It includes under its purview, testing of the water quality of both surface water (rivers, lakes, reservoirs) and ground water (well) and also testing the ambient air quality.

Water Quality

Water quality of river Tapi is tested and samples analysed on a monthly basis by GPCB. The critical parameters are pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Three location comparisons have been made over the time period 1991 to 1995 as given below in Table 1.28.

Table 1.28 : Status of Water Quality of River Tapi

S.No.	Location	Parameters																			
		1991				1992				1993				1994				1995			
		pH	DO	BOD	COD	pH	DO	BOD	COD	pH	DO	BOD	COD	pH	DO	BOD	COD	pH	DO	BOD	COD
1	Ukai Dam	8.18	7.50	1.70	11	8.18	6.70	2.60	10	8.0	7.40	2.00	10	8	6.4	3.5	20	8	6	3.7	24
2	Kathor Bridge	8.13	7.45	1.70	11	8.27	7.40	2.40	13	8.0	7.30	2.20	17	8	7.3	3.4	22	8.2	5.7	4.1	28
3	Mandvi	8.38	7.42	1.86	12	8.17	7.00	2.30	11	8.1	7.50	2.00	17	8	7.3	3.2	25	8.1	5.9	3.8	25

Source : Gujarat Pollution Control Board Reports, 1991-96.

Note : 1. All values in mg/L
2. Water Quality Standards (inland surface water)
Permissible Limits for disposal of effluents into river water :
pH 6.5-8.5
BOD 30mg/lts. (5days @ 20°C)
COD 100mg/lts.

The quality of water at all three locations, i.e. at the Ukai Dam which is 100 km upstream to Surat, at Kathar bridge where the river passes through the city and at Mandvi (before river Tapi reaches the Arabian Sea) is quite similar. Almost all parameters have shown virtually no change over space or time, except COD levels, which have registered an increase at all sites in 1994 and 1995. There is however, no great threat as yet with pollution levels well within prescribed limits. Stricter monitoring of effluent discharge is essential, however, and the polluting units should be checked and action taken against them.

Air Quality

GPCB monitors air quality at three locations covering three parameters, viz., SOx, NOx, and SPM. The SPM levels are found to be exceeding limits specified for residential areas at all the three locations. The levels are excessively high with regards to Oxides of Sulphur and by 1995, the levels crossed prescribed limits at two locations. Levels of NOx, though varying, have remained much within prescribed limits (Table 1.29).

Table 1.29 : Status of Ambient Air Quality

($\mu g/m^3$)

S. No.	Location	Parameters														
		1991			1992			1993			1994			1995		
		SOx	NOx	SPM	SOx	NOx	SPM	SOx	NOx	SPM	SOx	NOx	SPM	SOx	NOx	SPM
1	Air India Bldg.	78	26	378	31	51	286	50	43	185	46	15	565	101	33	363
2	S.V.R.Engg. College	18	22	180	23	67	218	45	39	159	44	14	402	75	24	214
3	B.R.C.Udhna	22	23	260	31	46	249	57	46	465	46	15	486	92	27	236

Source : Gujarat Pollution Control Board Reports, 1991-96.

Note : Ambient Air Quality Standards for Rural and Residential areas, under the Environment Protection Act, 1986.
1. SPM : 200 $\mu g/ m^3$
2. SOx : 80 $\mu g/ m^3$
3. NOx : 80 $\mu g/ m^3$

Table 1.30 : Existing Health Facilities in SMC

S.No.	Facilities	No.
1	General Hospital	1
2	I.D. Hospital	1
3	Maternity Home	4
4	Maternity C.H.C	6
5	Urban Health Centre	14
6	P.H.L.	1
7	Pathological Laboratory	1
8	Mobile Dispensary with I.E.C Services	4
9	Water Monitoring Lab	2
10	P.W. Centre	40
11	I.C.D.S.	166

Health Status

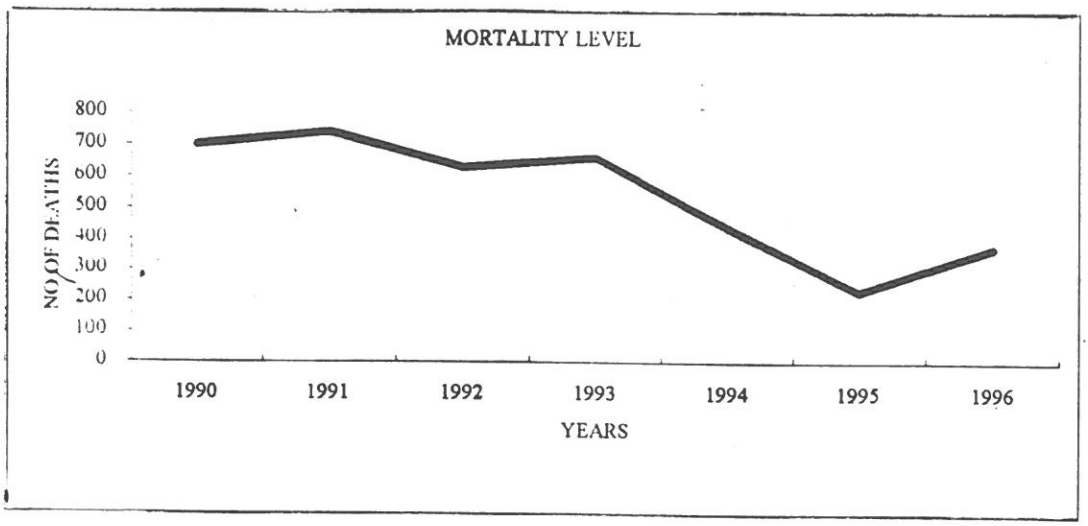
A range of health facilities have been identified at the city level (Table 1.30). The lowest level begins with dispensaries and health centres and the range goes up to include special facilities like hospitals for infectious diseases, and mental hospitals.

Mortality Level

A decline in the number of deaths has been observed in the past six years in Surat with over 700 deaths in 1990 to 373 in 1996. In spite of the fact that plague struck the city in 1994, the mortality levels do not reflect epidemic equivalent figures.

There was actually a decrease in the number of deaths in 1994 (439 deaths), from the previous year figures (658 deaths). If these numbers were seen in terms of rates, the decline is even more dramatic indicating an all round improvement in the situation (Fig. 1.1).

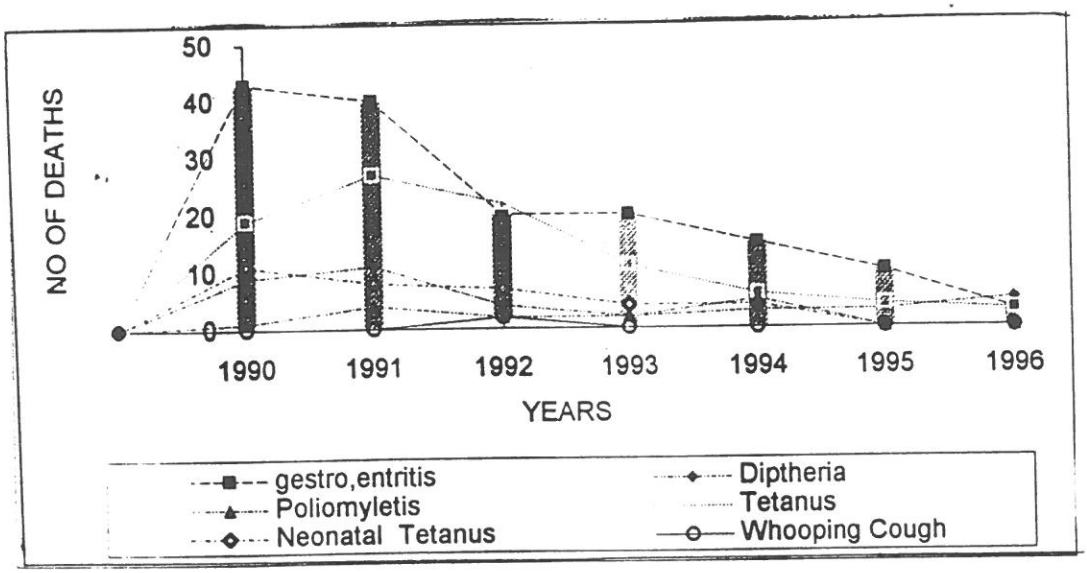
Figure 1.1 : Mortality Rates in Surat, 1990-96



Disease Pattern

The maximum reported disease cases are of influenza followed by gastroenteritis and whooping cough.This trend has remained the same over the years. Even during 1994, the reported cases for Influenza were the highest. After the cleanliness drive was initiated by SMC in 1994, the number of reported cases of different diseases have decreased. Especially after 1995 there has been a sharp fall, as can be seen from Fig. 1.2 below :

Figure 1.2 : Mortality Pattern by Diseases



The paramedics employed by SMC have started monitoring and treating minor ailments on a fortnightly basis and reporting the problematic cases to the government hospitals or dispensaries. The number of reported cases proving fatal, especially for gastroenteritis and tetanus, have also decreased.

There has been a clearly noticeable improvement in the health status of the city, with the morbidity and mortality rates decreasing significantly. All these improvements are clearly attributable to the efforts of SMC in various fields as well as to the increase in public awareness since 1994. To sustain the above trend there is a need for an all round improvement in infrastructure facilities, in terms of both quantity and quality. As part of the World Bank project, a proposal to prepare an Environmental Action Plan for the city of Surat is under process.

II. STATUS OF URBAN SERVICES

INTRODUCTION

This section analyses existing infrastructure arrangements in Surat city as compared to standards proposed by various organisations, and identifies gaps and future needs. These needs are then translated from physical to financial requirements. The sectors studied are water supply; sewerage and sanitation; roads, mass transportation and street lighting; stormwater drainage; and solid waste management. Due to data availability constraints, however, the analysis has been restricted to SMC area only.

CIVIL SERVICES IN SMC AREA

Water Supply

Surat Municipal Corporation has the responsibility of supplying water to the residents of the city. Presently SMC is serving about 35 per cent of the total area and 67 per cent of the population. Detailed account of the water supply system has been presented in Table 2.1 below.

Table 2.1 : Existing Situation of Water Supply

Head	1991	1993	1996
Total area of Surat (sq.km.)	111.15	111.15	112.274
Area covered by piped water supply (sq.km.)	n.a.	38.94	38.94
Area not served by piped water supply (sq.km.)	n.a.	n.a.	73.339
% of area served	n.a.	35.03	34.68
% of area not served	n.a.	64.97	65.32
Total population of Surat (100,000)	14.98	16.08	18.71
Population coverage (100,000)	8.81	12.05	12.05
Population not getting piped water supply (100,000)	6.17	4.03	6.66
% of population served	58.81	74.94	64.40
Total water supply capacity (ground and surface) (MLD)	n.a.	330	356
Total water supplied (ground and surface) (MLD)	n.a.	110.35	200
Net lpcd supplied	n.a.	124.48	166.67

Source : SMC, Study estimates.

Sources of Supply

The city exploits both ground and surface sources of water. Since surface water from river Tapi alone doesn't suffice, tapping of ground water through bore wells, both SMC owned as well as private, is a common practice.

Tankers are used as a coping mechanism in areas where a network for piped water does not exist. SMC as well as privately owned tankers, supply water to these areas (Plate XII). But these tankers are often over worked during summers, when the demand for water is very high.

Surface Source: There are two major water works on the banks of river Tapi (north-east corner of the city). The water released from the Ukai dam, 100 km. upstream, is drawn at Warachha and Sarthana water works for treatment.

Ground Water: Due to the seasonal character of river Tapi, ground water exploitation through French wells, infiltration wells and tube wells takes place even at the two water works. Of the total area, about 55 sq.km. area which was added to the city in 1986, is not covered by a regular distribution network. In these areas SMC operates about 50 borewells, serving a population of approximately 59,000 persons. Water from the borewells is pumped into overhead tanks which are connected to standposts. In some cases, water is directly pumped into standposts.[3]

Table 2.2 : Source Details of Water Supply

S.No.	Water Works	1993					1996					
		Inst. Cap.	% to total Cap.	Avg. Yield	% to total yield	yield/ inst. cap.	Inst. Cap.	% to total Cap.	Avg. Yield	% to total yield	yield/ inst. Cap.	Change Inst. Cap.
		(MLD)	(%)	(MLD)	(%)	(%)	(MLD)	(%)	(MLD)	(%)	(%)	(MLD)
	Warachha											
1	Surface water treatment plant	18	5.45	14	9.33	77.78	68	19.10	68	34.00	100.00	50.00
2	System of infiltration of wells	90	27.27	23	15.33	25.56	90	25.28	40	20.00	44.44	0.00
3	16 tube wells	48	14.55	25	16.67	52.08	40	11.24	20	10.00	50.00	-8.00
	Total	156	47.27	62	41.33	39.74	198	55.62	128	64.00	64.65	42.00
	Sarthana											
1	French well no. 1	45	13.64	20	13.33	44.44	45	12.64	17	8.50	37.78	0.00
2	French well no. 2	45	13.64	23	15.33	51.11	45	12.64	35	17.50	77.78	0.00
3	25 tubewells	90	27.27	45	30.00	50.00	68	19.10	20	10.00	29.41	-22.00
	Total	180	54.55	88	58.67	48.89	158	44.38	72	36.00	45.57	-22.00
	Total water supply	**330**	**100.00**	**150**	**100.00**	**45.45**	**356**	**100.00**	**200**	**100.00**	**56.18**	**26.00**

Source : SMC.

Table 2.2 gives the water supply details of Warachha and Sarthana water works during 1993 and 1996. It is observed that with the inclusion of ground water, the total installed capacity at present is 356 MLD (1996), upgraded from 330 MLD (1993), yielding an average of 200 MLD (36.18 per cent in 1996). With this supply, a per capita supply of about 107 lpcd is achieved. If 30 per cent transmission and distribution losses are taken into account, the supply is only

[3] Pg.9, SMC Water Supply Master Plan, Project Identification Report by T.C.E., April 1994.

74.83 lpcd, a figure only slightly better than the 1993 figure of 50 lpcd and incomparable to the proposed standard of 135 lpcd.

As early as 1983, SMC initiated public-private partnership projects in water supply source development scheme. A wier at the cost of Rs.130 million was built, wherein the industrialists bore the full cost of the wier. The arrangement is such that a portion of the water stored will be shared by these industrialists as well.

Katargam water works was commissioned in 1997 and has a treatment plant of the capacity of 120 mld, augmenting the total treatment capacity of water supplied to 476 mld.

Water Treatment

Raw water treatment for surface water is only done at Warachha water works, which has a capacity of 68 mld. and approximately the same amount is pumped out everyday from the plant (Table 2.2). There has been an increase in the river water treatment facilities at Warachha and the yield has increased from 9.3 per cent to 34 per cent (1993-96).

Storage, Transmission and Distribution

Water from Sarthana and Warachha water works is stored in the underground sumps at Warachha. There is also a jackwell at Warachha which receives water from the infiltration well. The water from the jackwell and underground sumps is pumped into three over head tanks at Warachha, from where, it is further transmitted to Katagram, Umarwada, Khatodia and Chowk Bazaar distribution stations, via 1200 and 950 mm. HS mains (Plate XI). The same mains are used for distribution of water in the east, north and south zones. The west zone receives water from the chowk bazaar distribution station and Tadwadi pumping station. The total quantity of water treated has increased from 150 MLD in 1993 to 200 MLD in 1996 (Table 2.3).

Table 2.3 : Existing Network, Storage and Treatment Details

Head	1993	1996
No. of water supply zones	4	4
Distribution network length excluding transmission lines (km.)	236.5	236.5
Area covered by piped water supply (sq.km.)	38.94	38.94
Total storage available (MLD)	91	-
Total treatment available (MLD)	150	200

Source : SMC, GMFB.

Due to a large area of the zones, each zone has to be served from more than one distribution station. For the purpose of supplying water there are 126 pumps. Of

these, 66 pumps are in regular use with an average pumping of 4 hours/day, while 60 are stand-bys. The details of the pumps are given below in Table 2.4:

Table 2.4 : Details of Pumping Machinery

Pumping Machinery	Details
Machinery	
Number of pumps	126
Average hours of pumping per day	4
Frequency of supply	1
Details of Pumps	
Below 100 HP (Regular use)	11
Above 100 HP (Regular use)	55
Below 100 HP (Stand-by)	11
Above 100 HP (Stand-by)	49
Booster Stations	8

Source : SMC.

The supply timings and sources of water vary for each zone, as stated below in Table 2.5:

Table 2.5 : Supply Timings and Sources of Water

S.No.	Zones	Areas Supplying Water	Supply Timings	Hours of Supply
1	East	Wraith and Umarwada	2.30-4.00 pm.	1.50 hrs.
2	North	Wraith, Katargam and Umarwada	8.00-9.30 pm.	1.50 hrs.
	Ved Gamtal	Katargam	6.00-7.00 am.	1.00 hrs.
3	South	Wraith, Katargam and Umarwada	6.00-7.30 am.	1.50 hrs.
	Athwa area	Khatorda	8.30-9.30 pm.	1.00 hrs.
4	West	To 9 different zones	-	45-60 min.

Source : SMC.

Alternative Supply Methods

Water is also supplied from Umarwada distribution station by tankers of 10,000 litres each. The supply details are given below in Table 2.6:

Table 2.6 : Alternative Supply Methods

Alternative Supply Details	Details
Mode of supply	Tankers
No. of trips	140
Quantity of water supplied	1.40 MLD
Period of supply	All seasons
Main areas supplied to	Udhana, Umra, Piplod and Pandesara, Khatodra

Source : SMC.

Levels of Supply

A study conducted by TCE in 1993 determined the per capita supply at Warachha and the four distribution stations of Umarwada, Katagram, Khatodia and Chowk Bazaar, as shown below in Table 2.7:

Table 2.7 : Per Capita Supply, 1993

Zone	Estimated Population (100,000)	Water Supply (mld)	Gross per capita Supply	
			(lpcd)	(lpch)
East	2.03	21.68	107	71
North	3.52	36.05	103	52
South	5.15	48.55	94	63
West	1.35	4.07	30	-
Total	12.05	110.35	93	-

Source : Tata Consulting Engineers.

The present level of supply is very low. The shortages are very pronounced in the west zone. The hourly flow rates are also low. The reasons for this, being stated by officials, are (i) people tend to consume water over a short period; (ii) many consumers have installed their own pumps on the municipal connections; (iii) high capacity of the existing network; and (iv) leakages.

High flow rates tend to dissipate the pressures over a short distance. Consumers near the distribution stations draw more water because of higher pressures in the upper reaches of the pipelines than those who are far-off. With the commissioning of Katargam water works, the present capacity has been augmented to 476 mld. If this treatment facility functions at 80 per cent efficiency, the lpcd supplied at the city level will increase from 110 lpcd to 142 lpcd.

Connections and Tariff

Connection Details:

The connections can be divided into domestic and non-domestic. They can further be sub-divided as metered and unmetered. However, a mere 3 per cent are metered. The details are enumerated in the Tables 2.8 and 2.9. It is observed from Table 2.8 that although there has been an increase in the total number of connections during 1993 and 1996, the proportion of metered connections has declined.

Table 2.8 : Water Supply Connection Details

Head	1993		1996	
	No.	% to total	No.	% to total
Total No. of connections	**105,951**	**100.00**	**142,275**	**100.00**
Unmetered	101,641	95.93	137,965	96.97
Metered	4,310	4.07	4,310	3.03

Source : Gujarat Municipal Finance Board.

Table 2.9 : Break-up of Connection Details, 1996

Head	No.	% to total
Total	**142,275**	**100.00**
Domestic	126,892	89.19
Non - domestic	15,383	10.81
Unmetered	**137,965**	**100.00**
Domestic	133,655	89.63
Non - domestic	3,238	10.37
Metered	**4,310**	**100.00**
Domestic	3,238	75.13
Non - domestic	1,072	24.87

Source : Gujarat Municipal Finance Board.

Water Tariff and Water Charge: Section 129 (a) of the BPMC Act specifies a water tax at such percentage of the rateable value as the corporation deem reasonable and necessary for supplying water. Table 2.10 gives water tariff according to the fixed annual rateable value (ARV).

Table 2.10 : Water Tariff as per fixed ARV

Category	Rateable Value (Rs.)	Rate per annum
Domestic	1 - 3600	Rs. 36
	3601 and above	1% of rateablevalue
Non-domestic	1 - 6000	Rs. 60
	6001 and above	1% of rateable value

Source : Report on SMC Resource Mobilisation Study, Jan. 1995, Price Waterhouse, Calcutta.

The present basic rates of water charge/tariff per month, irrespective of the tax payer's category, are given below in Table 2.11. It is observed that the monthly rate for a family located outside the city area is almost 5 to 6 times more than that of a family living in the city.

Table 2.11 : Water Charge per Month

Connection Size	Monthly Rate per Family (Rs.)	
	Located in City Area	Located Outside City Area
1/2"	5.00	30.00
3/4"	10.50	70.00
1"	27.00	140.00
1-1/2"	54.00	300.00

Source : Report on SMC Resource Mobilisation Study, Jan . 1995, Price Waterhouse, Calcutta.

The existing basic water meter tariff rates per 1,000 lts. of water supplied to various categories of consumers are given in Table 2.12.

Table 2.12 : Water Meter Tariff Rates

(Rs./'000 lts.)

Category	Located in Walled City	Located Outside walled City
Domestic	0.50	3.00
Non-domestic	2.00	7.00

Source : Report on SMC Resource Mobilisation Study, Jan. 1995, Price Waterhouse, Calcutta.

A basic minimum water meter charge is levied, according to the consumer category. Like in the case of water charge, a fixed additional charge per month per category is levied on premises having attached gardens, of more than 50 metre size.

The water tax rates as a basis of ARV were last revised in 1978. There is a need to revise the rates since the billing of unmetered connections is mostly through fixed annual rateable value.

Manpower Deployed

About 95 per cent of the staff, as specified in the Schedule, has been deployed by the Water Supply Department of SMC. The absenteeism rate of the manpower deployed by the department varies between 20-25 per cent (Table 2.13).

Table 2.13 : Manpower Deployed for Water Supply

Staff Details	Actual Staff Deployed
Chief Engineer	1
Executive Engineer	2
Deputy Engineer	6
Assistant Engineer	22
Junior Engineer	3
Manpower Deployed	
Supervisor	24
Clerks	18
Pump operators	40
Maintenance	5
Fitters	28
Others	509
Total	**658**

Source : SMC.

Future Requirements : Physical and Financial

The present supply by SMC is an average of 82 lpcd (after 30% transmission and distribution losses have been taken into account). This is not comparable, however, even to the minimum proposed standard of 125 lpcd. There is a need to enhance the water supply source, treatment facilities (from a present of 200 MLD), distribution network to cover 79 per cent area (present coverage is 34%) and from 91 MLD storage capacity to 40 per cent of total storage required.

The component and phase-wise investment requirements for water supply augmentation are presented below in Table 2.14.

Table 2.14 : Projected Costs for Water Supply

(in 100,000 Rs.)

Head/ Total Cost	Source and Trunkline			Treatment Facilities			Distribution Network			Storage Facilities			Total		
	1997-2001	2001-2011	Total	1997-2001	2001-2011	Total	1997-2001	2001-2011	Total	1997-2001	2001-2011	Total	1997-2001	2001-2011	Total
High	2,637	2,095	4,733	3,758	1,746	5,504	1,279	1,360	2,639	2,786	1,104	3,890	10,460	6,305	16,765
Medium	1,486	1,746	3,232	1,839	1,164	3,003	1,136	1,360	2,496	1,059	690	1,749	5,519	4,960	10,479
Low	910	1,571	2,481	1,239	982	2,221	921	1,360	2,281	339	517	857	3,409	4,431	7,840

Source : Study estimates.

Sewerage and Sanitation

Sewerage Network

The entire Municipal Corporation area has been divided into six sewerage zones. The city limits of SMC were extended in stages, thereby including villages on the outskirts of the city. The sewerage schemes outside the walled city area were designed and commissioned stage wise, and to a large extent function independently. However, the area under the sewerage system has not increased along with an increase in the city limits. Thus the sewerage network, from a 100 per cent coverage in 1963 (SMC's area was 8.18 sq.km.) has been reduced to the present coverage (1996) of only 29.16 per cent (SMC's area is 112.27 sq.km.). Only 61 per cent of the total population is served. Details of the existing sanitation system and sewerage network are given in Tables 2.15 and 2.16 below:

Table 2.15 : Existing Situation of Sewerage and Sanitation

Head	1993	1996
Area of SMC (sq.km.)	111.16	112.27
SMC total population (100,000)	16.08	18.71
Actual population served (100,000)	9.81	11.41
Underground drainage (% pop. served)	61	61
Drainage network area (sq.km.)	29.55	32.74
% area covered	26.32	29.16
Total length of the drainage network (km.)	93.98	104.13
Additional area to be covered (sq.km.)	81.61	79.53
Population to be covered (100,000)	6.27	7.30
Sewage pumping stations installed	14	14
Scraper manholes and vent shafts	none	none

Source : SMC, GMFB, AIC-Watson..

Table 2.16 : Existing Sewerage Network in Surat

S.No	Name	Year	Area (sq.km.)	No.of SPS	Pop. served (lakhs)	Dia of sewers (mm)	Total length (km.)	Peak flow capacity (mld)	Disposal	Treatment
1	Walled city area (ward 1-12)	1958	8.26	3	4.24					
2	Athwa-Majura-Umra (North)	1979	4.7	2	0.43	150-750	14.61	65	site near Khadi	None
3	Navagam TPS-4, FulpadaTPS-15, Karanj TPS-3, Umarwada part TPS-8	1990	3.96	1	1.36	150-1000	23.17	90	site near Khadi	None
4	AnjanaTPS-7, Khatorada TPS-6	1992	2.39	1	0.5	150-600	15.55	35	site near Khadi	Anjana sewage plant
5	Khatorada part TPS-6, Althan part, Bhatar Part.	1993	3.15	1	1.25	150-1000	13.66	60	site near Khadi	None
6	Pandesara GIDC area, .	1994	7.99	1	1.57	150-1400	27.00	110	site near Khadi	None
7	Adajan TPS-10,11,12, 13, 14	1996	2.29	2	2.06		10.15			Bhesan plant
	Total		**32.74**	**11**	**11.41**		**104.13**			

Source : SMC, AIC- Watson.

The oldest network, covering the entire walled city was installed in 1958. However, treatment facilities for this area are lacking. In fact only two zones have treatment facilities while the remaining sewage flows untreated into the disposal site near Khadi.

There is no under ground sewerage system in the rest of Surat city. Here, sanitation facilities provided consist only of a provision of drains in order to collect sullage and storm water. The sewage from such areas is also disposed in the adjoining creek/nallah, which ultimately reaches the river Tapi.

Treatment Plant and Pumping Stations

The existing treatment plants are at Anjana and Bhesan and have a total capacity of 278.5 mld. (Table 2.17 and Plate XIII). This facility is sufficient for the present waste water generation of 160 mld @ 80 per cent of total supply. If Warachha and Sarthana waterworks supply water to their total capacity of 356 mld the present treatment facility will become grossly inadequate.

Table 2.17 : Treatment Plants and their Capacity

Name of Area	Treatment Plant Capacity (MLD)		
	Primary	Secondary	Total
Anjana	76	82	158
Bhesan	60	60	120
Total	**136**	**142**	**278**

Source : SMC, AIC -Watson..

Details of the sewage pumping stations are given below in table 2.18 and Plate XIV:

Sanitation is generally provided by way of latrines with septic tanks and soak pits. In some areas bucket or pit latrines are also provided. At many places, effluent from septic tanks flows into road side drains and low lying areas. In several places, defecation is even done in the open, due to lack of sanitation facilities. However, with the efforts of SMC in terms of sanitation facilities provided in the slums in the recent years, this problem has been reduced significantly.

Table 2.18 : Zonewise List of Existing Sewage Pumping Stations

Zone	Number of SPS		Name of SPS	
	Main	Auxiliary	Main	Auxiliary
Central	3	0	Salabatpura, Saiyadpura, Nanpura	-
North	0	3	-	Shantiniketan old GIDC-Katargam, New GIDC-Katargam
South	2	0	Anjana, Pandesara-GIDC	-
West	3	0	Rander*, Adajan (Pal), Adajan (Bhulka Bhavan)	-
East	1	1	Navagam	Patelnagar
South-west	4	1	Athwa, Umra North, Khatodara, Piplod*	Khatodara GIDC
Total	**13**	**5**		

Source : SMC, AIC –Watson
Note : * SPS under construction.

Manpower

The sewerage and sanitation staff comprises of 2,624 employees of which 2,454 are safai kamdars (Table 2.19).

Table 2.19 : Manpower Details of Sewerage Department

Staff	No.
Chief Engineer	1
Deputy Engineers	3
Assistant Engineers	3
Junior Engineer	1
Supervisor	2
Senior Inspector	6
Senior Clerk	1
Draftsmen	1
Sr. Sub Inspector	15
Tracer	1
Technical Assistant	1
Clerks	3
Electric Wiremen	18
Fitter and Mason	4
Mukadam	10
Cleaners	31
Beldar	10
Drainage in Slums	40
Drainage Urban Poor Cell	18
Adhoc - Dy. Engineer	1
Safai Kamdars	2,454
Total	**2,624**

Source : SMC.

Future Requirements : Physical and Financial

Of the total area of the city, the underground drainage network covers an average of 29 per cent of the total area and 61 per cent of the population. But by 2011 the entire area of SMC will be developed, requiring an adequate coverage of 78 per cent or even more.

Requirements, if the present UGD network has to be upgraded in order to serve 100 per cent of the resident population, are given in Table 2.20.

Table 2.20 : Sewerage and Sanitation Targets

Head	Existing 1997	Add.requ. 1997-2001	Add.requ. 2001-2011
Area of SMC (sq.km.)	112.27	112.27	112.27
Total population of SMC (100,000)	18.71	25.59	34.74
Actual population served (100,000)	11.41	19.19	26.06
Underground drainage (% pop. served)	61	80	100
Drainage network area served (sq.km.)	32.74	67.36	112.27
% area covered	29.16	60	100
Additional area to be covered (sq.km.)	104.13	44.91	0.00

It will cost SMC Rs.4.76 billion for the treatment process which will have to be installed by 2011 AD, in order that the city becomes sustainable and a better place to live in (Table 2.21).

Table 2.21 : Projection of Costs for Sewerage at 1996 Prices

(in million Rs.)

S.No.	Head	Add.requ. 1997-2001	Add.requ. 2001-2011	Total
1	Cost of UGD System	1785.2	2975.3	4760.4
2	Cost of Treatment Processes			
a	Capital Works @ Rs.2.10 million/mld	56.6	39.5	96.1
b	Land Cost @ Rs. 1.16 million/mld	31.3	21.8	53.1
c	Total @ Rs 3.25 million/mld	87.6	61.1	148.7

Source : Study estimates.

Note : Cost of UGD @ Rs. 26.5 million/sq.km.
Capital cost includes cost of civil works, mechanical works and electric works.

Roads, Transportation and Street Lights

The century old streets, originally designed for the movement of slow moving vehicles and for walking, have outlived their utility. There has been no systematic road widening programme except in case of main roads, widening of which was undertaken very recently. The total length of municipal roads in SMC area was 372 kms. in 1975-76 and 682 kms. in 1996, thus showing an average increase of about 14 kms. per annum (Table 2.22).

Table 2.22 : Particulars of Road Network and Journey Speed

S.No.	Particulars/Areas / Years	Walled City	Suburbs of SMC 1975-76	Entire City 1989-90	Entire City 1996
I	**Road network (km.)**				
a	Nature and type	Grid iron pattern along with some radial links with 90% being of single lane width	Radial arterials with grid iron for local streets mostly with width of 2 lanes	a mix of both	a mix of both
b	Total length of Roads		380	640	681.82
c	Length of existing roads for improvement	59	172	231	143.48
II	**Avg. vehicular speed (mph)**	13	28	19	n.a.

Source : Revised Draft D. P., SUDA, Feb.1996.

Existing Road Network

The city of Surat has a total length of roads equal to 682 km (1996), which includes BT roads, WBM, concrete surfaced as well as unsurfaced roads (earthen). This 682 km. road length comprises of 13 per cent of the total SMC area. The pattern of roads is radial and the main artery runs along the fort wall in a north-east to south-west direction, joining NH-8 at a distance of 15 kms. from Surat (Plate XV). Of the total road length, 85 per cent is surfaced (Table 2.23). In terms of length and area under roads, the coverage appears reasonably high. However, most of the roads are not built according to the prescribed standard. During heavy rains surface quality deteriorates rapidly needing frequent resurfacing.

Table 2.23 : Details of Road Network, 1996

Heads	Length (km.)	% to Grand Total
Area under roads (sq.km.)	13.64	12.15
Total Area of SMC	112.27	100.00
Length of Roads (km.)	681.82	-
Surfaced Roads	578.86	84.90
Black Topped	538.35	78.96
WBM	39.95	5.86
Concrete	0.57	0.08
Unsurfaced Roads	102.96	15.10
Grand Total	**681.82**	**100.00**

Source : GMFB, SMC.

Note : Weighted average width of roads is assumed @ 20mts.

A description of the road network is given below:

Ring Road : One of the major roads in the city, channelises the traffic from the congested streets in the walled city to other parts of Surat. This road encircles the walled city in the eastern and southern sides but lacks continuity in the northern and western sides.

Outer Ring Road : The existing outer ring road is aligned with the existing SMC boundary, except in the southern direction. Entire length of the outer ring road works out to be approximately 31.5 kms., but of this only 7.3 km. length of road, spread over three small stretches, exists today. Consequently the remaining road needs to be constructed. The outer road crosses the western railway line at three points :

1. Ashwanikumar
2. Dindoli where it crosses the Surat-Jalgaon branch of the railway line
3. Bhedwad, south Pandesara area

Other Roads : A radial pattern of roads exist outside the ring road. Each road leading away from the city gate bifurcates into radial roads thus giving a radial pattern to the urban areas which have developed outside the city walls. The important radial roads in the urban agglomeration are :

1. Athwalines road
2. Majura gate-(Udhna-Majura road)
3. Navsari gate to Udhna road
4. Sabatpur gate to Municipal Anjana society
5. Sabatpur gate to Dumbhal
6. Delhi gate to Karanj road
7. Lal darwaja to Nana Varachha road
8. Katargam gate to Varachha road
9. Chowk to Rander-Adajan road

The regional bus trips from all these corridors enters into the city area near the railway station. The north-south flow of traffic is predominant.

Bridges : Presently there are five bridges on river Tapi, namely :

1. Athwa Sardar bridge
2. Magadalla bridge
3. Rander Singanpore causeway bridge
4. Nehru bridge
5. Katargam-Amroli bridge

Vehicular Traffic

Although one sixth of the area in the walled city is under roads, much of its utility is filtered away in the form of too many narrow streets/lanes and mangled

intersections, instead of being fashioned in a hierarchical order, which is much more utilitarian.

The number of vehicles in Surat has gone up from 131,997 to 359,471 within the span of a decade. Two wheelers have registered the maximum increase. The growth of light vehicles is next in hierarchy, followed by cars and three wheelers, as is evident from Table 2.24 below. The rapid growth in private vehicles is attributable mainly to the lack of public transportation facilities in the city. The distributional effect of economic growth on household income has also led to increased vehicular ownership rates.

Table 2.24 : Growth of Vehicles Under the Area of R.T.O.

S.No.	Particulars	1984-86	1986-88	1988-90	1990-92	1993	Growth (1984-93)
1	Motor cycle	94,434	137,916	200,238	256,173	281,657	
		(19.95)	(20.85)	(20.49)	(13.11)	(4.86)	(17.57)
2	Cars	11,381	14,878	21,382	26,618	29,154	
		(8.10)	(14.34)	(19.88)	(11.57)	(4.66)	(12.95)
3	Auto rickshaw (3 wheelers)	7,330	9,494	12,706	14,983	15,703	
		(14.08)	(13.81)	(15.69)	(8.59)	(2.37)	(12.07)
4	Buses	129	154	182	252	247	
		(7.80)	(9.26)	(8.71)	(17.67)	(-1.00)	(9.29)
5	Heavy vehicles (>9 tons)	5,685	6,394	7,543	8,459	8,593	
		(5.50)	(6.05)	(8.61)	(5.90)	(0.79)	(5.95)
6	Light vehicles	3,197	4,058	8,465	7,751	8,281	
		(15.34)	(12.66)	(44.43)	(-4.31)	(3.36)	(14.74)
7	Trailers	4,218	4,746	5,440	6,195	6,434	
		(8.50)	(6.07)	(7.06)	(6.71)	(1.91)	(6.72)
8	Ambulance	71	82	97	102	106	
		(13.62)	(7.47)	(8.76)	(2.54)	(1.94)	(7.56)
9	Police vans	48	57	68	79	81	
		(3.28)	(8.97)	(9.22)	(7.79)	(1.26)	(6.75)
10	Tractors	5,407	6,277	7,363	8,688	9,048	
		(5.14)	(7.75)	(8.31)	(8.63)	(2.05)	(7.07)
11	Others	97	119	136	156	167	
		(34.03)	(10.76)	(6.90)	(7.10)	(3.47)	(13.37)
Total		**131,997**	**184,175**	**263,620**	**329,456**	**359,471**	
		(16.50)	**(18.12)**	**(19.64)**	**(11.79)**	**(4.46)**	**(15.63)**

Source : SMC and RTO and study estimates.

Note : The figures in brackets are compounded growth rates.

Mass Transportation Facilities

The main mode of mass transportation in Surat are buses operated by GSRTC. The growth trends show that in the last decade, the number of bus routes have doubled. However, the thin spread of the fleet over a large area has brought down the service quality of the system drastically. Table 2.25 below gives the position of bus-routes and passengers served. Over the years, the number of passengers using the bus system has steadily declined.

Table 2.25 : Buses, Routes and Passengers

Year	Routes covered by city buses		Buses in operation/day		Passengers using buses daily	
	(Nos.)	(% increase)	(Nos.)	(% increase)	(Nos.)	(% increase)
1981	123	-	133	-	221113	-
1982	147	19.51	143	7.52	225638	2.05
1983	149	1.36	143	0.00	214694	-4.85
1984	172	15.44	165	15.38	188707	-12.10
1985	174	1.16	165	0.00	156864	-16.87
1986	175	0.57	165	0.00	127072	-18.99
1987	179	2.29	165	0.00	153902	21.11
1988	183	2.23	162	-1.82	147504	-4.16
1989	204	11.48	162	0.00	148990	1.01
1990	205	0.49	162	0.00	152272	2.20
1991	229	11.71	168	3.70	158771	4.27
1992	232	1.31	170	1.19	136883	-13.79
1993	247	6.47	171	0.59	136171	-0.52
1994	257	4.05	172	0.58	115303	-15.32

Source : Revised Draft D. P., SUDA, Feb.1996 and study estimates.

A comparative statement of the public transport situation in the four largest cities of Gujarat has been presented in Table 2.26.

Table 2.26 : Public Transport Supply Levels

City	% Trips Serviced by PTS		Fleet Availability (Buses per 100,000 Pop.)
	High Estimate	Low Estimate	
Ahmedabad	16.8	13.9	19
Surat	8.8	7.6	9
Vadodara	11.1	9.5	13
Rajkot	6.4	3.5	9

The public transport supply level in Surat is totally inadequate as the number of buses available per 100,000 population is limited to 9. The main reason for such a sorry state of affairs is the acute resource constraint faced by the agency. Recently the state government has initiated moves to divest GSRTC from its responsibility of providing public transport services in Surat. It is intended to shift this responsibility to SMC, based on the Ahmedabad model. Given the meager resources with SMC this responsibility may only become a burden. Instead a combination of public-private partnership, where the public body has the responsibility of coordination, may be the solution.

Street Lights

The town is lit by 37,528 lights. Majority of these are point fittings rather than poles (Table 2.27).

Table 2.27 : Existing Situation of Street Lights

Head	Nos.	Per cent to Total
Poles	18119	48.28
Point fittings	19409	51.72
Total	37528	100.00

Source : GMFB.

With an average spacing of street lights being 18 metres, the roads in Surat seem to be sufficiently lit. The suggested norm for streetlight spacing is 25 metres.

Manpower Details: The staff strength with the department appears inadequate, as may be seen in Table 2.28.

Table 2.28 : Manpower Details for Street Lights

Staff	Nos.
Chief Engineer	1
Deputy Engineer	2
Junior Engineer	2
Supervisor	1
Wiremen	9
Fitter Auto Mechanic	3
Clerks	4
Light Inspector	4
Patawalas	4
Total	28

Source : SMC.

Future Requirements : Physical and Financial

In Surat, the major issues with regard to roads are the construction of new roads in developing areas, upgradation of the surface quality of existing roads, removal of bottlenecks through junction improvements and rail overbridges, and access impovement through bridges over canals, rivers etc. Only the first two aspects have been considered here, since the other two need detailed surveys and the data is not presently available. While on an average 20 per cent of the entire city/town area is considered to be the norm, SMC has only 12 per cent of the city area (20% of developed area) under roads. This gap needs to be filled in future.

By 2011 AD, the entire 112.27 sq. km. area of SMC will be developed, anticipating 20 per cent road coverage for that year, the total road additions and

upgradation works out to be 543.88 km. There will have to be more additions by 2001 AD rather than 2011 AD (Table 2.29).

The investments that will be required for the upgradation of roads is Rs. 16.4 million, to be invested by 2001 AD. New formation of roads will require a sum of Rs. 628.31 million by 2011 AD.

From the discussion, it emerges that along with the above, construction of two river bridges, a river drive road and rebuilding of major arteries are priority projects. Rough estimates of the costs of these are to the tune of 1.2 to 1.4 billion.

Table 2.29 : Capital Costs for Roads

Head	Total Road Length (km.)				Capital Costs (in million Rs.)			
	Existing 1997	Add.requ. 1997-2001	Add.requ. 2001-2011	Total	Existing 1997	Add.requ. 1997-2001	Add.requ. 2001-2011	Total
Upgradation								
WBM to BT		40.51		40.51		16.41		16.41
New Formation								
Black Topped	538.35	184.61	190.87	913.83	744.53	255.31	263.96	519.27
WBM	39.95	134.73	33.68	208.36	21.97	74.10	18.52	92.62
Total Capital Works		**319.33**	**224.55**	**543.88**	**766.51**	**345.81**	**282.49**	**628.31**

Source : Study estimates.

The street lights are linked with roads and are placed at a length of 18 metres from each other, which is good as compared to the norm of 25 metres. On the basis of road length and average distance between street lights, the requirement has been projected in Table 2.30.

Table 2.30 : Street Lighting Projections

Head	Add. Requ. 1997-2001	Add. Requ. 2001-2011
Existing		
Total Road Length (km.)	898.192	1122.74
Total Requirements		
Requirements (High @ a dist. of 23 mts.)	39052	48815
Requirements (Medium @ a dist. of 28 mts.)	32078	40098
Requirements (Low @ a dist. of 35 mts.)	25663	32078
Additional Requirements		
Requirements (High @ a dist. of 23 mts.)	11865	5450
Requirements (Medium @ a dist. of 28 mts.)	5450	2570
Requirements (Low @ a dist. of 35 mts.)	1524	11287

Source : Study Estimates.

Due to inadequate information on unit costs for street lights, cost estimates have not been made.

Solid Waste Management

After 1994, the SMC has made efforts to improve its solid waste management system. Surat is presently rated as the cleanest city in Gujarat and on an all India basis it is second only to Chandigarh. New ideas like private contracting are also being tried out successfully.

For efficient solid waste management, the city has been divided into 6 zones. A total of 1,000 metric tonnes per day of garbage is collected in 1,000 dust bins, which are distributed throughout the city (Table 2.31). The waste is collected from these and dumped in the Bhatar disposal site (6 ha.). A small amount is used for filling depressions at Palanpur. There were five sites (Gowalak, Naka, Anjana, Sewage farm, Chimney, Tekra, Katargam and Bhatar), within the corporation limits. Of these four have been filled. Since the incineration plant is non-functional, even hospital waste is dumped at Bhatar.

Table 2.31 : Existing Situation of Solid Waste Management

Head	1996
Zones (No.)	6
Refuse garbage collected per day (metric tonne)	1000
% garbage handled by S.M.C.	60
% garbage handled by Contractor	40
Collection per Person (gms/day)	491
Generation per Person (gms/day)	589
Efficiency % (collect/generate)	93.16
Density of waste (kg./cu.m.)	580
Moisture content of waste	34.6
No. of Dustbins (2-3 cu.mts. capacity)	400
No. of Dustbins (4.5 cu.mts. capacity)	600
Total capacity of dustbins (cu.mts.)	3900

Source : SMC, Preeti Parekh, 1997.

Of the total waste generated, 93 per cent is collected per day, as seen from Table 2.32

Table 2.32 : Estimated Waste Generation and Collection

S.Nos.	Head	Details
1	**Collection (TPD)**	
a	Corporation	895
b	Ragpicker	135
2	**Generation**	
a	TPD	1073
b	Gms/capita/day	589
3	**Collection/Generation (%)**	**93.16**

Source : SMC, 1987.

Of the waste generated by the city dwellers, 30 per cent is combustible while 54 per cent is brick, stone and earth used for construction purposes, as shown in Table 2.33.

Table 2.33 : Composition of Waste

S.No.	Type of Waste	Percentage
1	**Combustible**	**30.32**
2	**Recyclable**	**26.01**
a	Paper	5.48
b	Plastic	3.57
c	Metal	0.86
d	Glass	1.13
e	Brick stone	14.97
3	**Earth**	**38.89**
4	**Miscellaneous**	**4.78**
	Total	**100.00**

Source : SMC, 1987.

Waste from dust bins is manually or mechanically loaded into trucks, by the corporation staff or private contractors. A total of 100 vehicles are available for the transportation of waste to the disposal sites. Of these,89 vehicles are medium tipping vehicles while 11 are heavy machines. The medium tipping vehicles have a capacity of 24.50 cu. mts. (Table 2.34). The ratio of SMC to private contractors is 3:2; of this 40 per cent of the waste is transported by private contractors while 60 per cent is mechanically lifted by SMC's trucks.

Table 2.34 : Existing Fleet of Vehicles

S.No.	Vehicle Type	Nos.	Capacity (cu.mts.)
1	**Medium Tipping Vehicles (Total)**	**89**	-
a	Dumper Placer	60	4.50
b	Roll on/off Tipper	4	10.00
c	Trucks	18	5.00
d	Tractor	6	3.00
e	Market Van	1	2.00
2	**Heavy Machines (Total)**	**11**	-
a	Loader	9	-
b	Bulldozer	1	-
c	Breakdown Vehicle	1	-
	Total	**100**	**24.50**

Source : Health Deptt., SMC, 1995, Preeti Parekh,1997.

Note : Total mechanical assets : Rs. 54.2 million.

Private Contracting System

Private contracting for garbage collection was started after plague hit the city in 1994. The city is divided into four zones for this purpose, which are described as follows:

Central and West Zones : The private contractor uses his own vehicle and staff, charging Rs. 70-90/ton for transportation of waste. In 1994-95 about 2,00,000 tons of waste was transported by private contractors for which they received Rs. 15.5 million.

South, East and North Zones : Here the contractors hire vehicles from the government and only labour charges need to be paid to the contractor for transporting waste.[4]

Details regarding some of the other contracts are shown in Table 2.35.

Manpower Details

There has been an increase in the manpower of SMC at all levels, varying from 19 to 114 per cent[5]. Presently, there are 4,754 sweepers collecting waste from streets, containers and nuisance spots. The details of manpower are given in Table 2.36.

[4] Pg.33, Solid waste management of large cities, Preeti Parekh, Unpublished Dissertation, School of Planning, 1997.

[5] Pg 243, Ghanshyam Shah: Public Health and Urban Development, The Plague in Surat, Sage Publications, New Delhi.

Table 2.35 : Solid Waste Contracts in Surat

Component	Nature of Contract	Rate of Payment
Cleaning		
Cleaning and road scraping work	area-wise payments	Rs.0.70/sq.m. Contractor to sweep road width, payment limited to 0.75 m. from road edges and 0.30 m. from each road divider end.
Employing private sweepers	area-wise payments	Rs.600/sweeper/month by SMC to private societies.
Transportation		
Lifting and disposing refuse from collection point to municipal disposal site	by tonnage with penalty for non-compliance	For trucks/tractors Rs.130/MT. including loading and unloading of garbage, to a max. ceiling of 4MT./ trip.
Hiring of private vehicles	by number of vehicles	Without labourers, with driver: Rs.750/12hrs., no. of trips to be decided by SMC.
Disposal of dead animals	by number of dead animals, with penalty	Rs.200/large animal, Rs.42.75/small animal.

Source : SMC.

Table 2.36 : Manpower Details for Solid Waste Management

Staff Composition	Number
Chief Sanitary Inspector	26
Sanitary Inspector	81
S.S.I.	225
Mukadam	159
Sweepers	4754
Total	5245

Source : SMC, 1996.

Absenteeism rate of sweepers has been recorded as 31 per cent on the basis of record of June 1995-96, reducing the efficiency of operation.

Future Requirements : Physical and Financial

The parameters of concern in case of solid waste are the overall quantum of waste generated, target collection performance, duration capacity, convenience factor from the household point of view (measured in terms of distribution of dustbins), and vehicle requirements. Total waste collected in Surat is 1,000 metric tonnes per day. The corporation's present collection performance is as high as 93 per cent. As the population will increase, subsequent additions to dustbins, number of vehicles and staff will have to be made.

The total waste that will be generated by the year 2011 A.D. at 687 gms./day, will be 2,387 tonnes (Table 2.37).

Table 2.37 : Solid Waste Management

Head	1997	1997-2001	2001-2011
Population of Surat (100,000)	18.71	25.59	34.74
Generation per person (gms./day)	589	638	687
Waste generated per day (tonnes)	1102	1633	2387
Collection per person (gms./day)	491	-	-
Collection per day (tonnes)	919	-	-
Collection of garbage (tonnes)			
High @ 90% collection performance	992	1469	2148
Medium @ 83% collection performance	915	1355	1981
Low @ 74% collection performance	815	1208	1766
Dustbins req. according to vol. of waste generated			
Volume of waste generated per day (cu.mts.)	1900	2815	4115
Dustbins capacity (cu. mts.)	3900	4222	6172
% collected in dustbins	205	150	150
Total number of dusbins	1000	1100	1610
Additional Requirements			
No. of Dustbins (2-3 cu.mts.capacity)		50	260
Total cost (Rs.)		750,000	3,900,000
No. of Dustbins (4.5 cu.mts.capacity)		50	250

Source : Study estimates.

Assuming : Generation of waste will reach a maximum of 687gms/day by 2011A.D.

The 1995 collection performance was high at 93.16 per cent efficiency and as much as 1,000 MT./day of garbage was collected, but collection will have to more than double in order to cope up with the waste generated, by 2011 AD. Additions in terms of dustbins have been calculated, but due to data constraints additional vehicles needed and land fill site requirements cannot be calculated (Table 2.38). An investment of Rs. 7.5 million will be required, depending on the level of services provide to the residents by the health department.

Table 2.38 : Requirement of Dustbins

Head	1997-2001	2001-2011
Total length of roads (km.)	898.192	1122.74
Total Requirements of Dustbins		
High @ a distance of 230 m.	3905	4881
Medium @ a distance of 860 m.	1044	1306
Low @ a distance of 2151 m.	418	522
Shortages in Dustbins		
High @ a distance of 230 m.	2905	3881
Medium @ a distance of 860 m.	44	306
Low @ a distance of 2151 m.	-	-

Source : Study estimates.

Note : Average dust bin spacing should not be more than 100 m., so that a dust bin is not more than 50 m. away from any house.

INFRASTRUCTURE INVESTMENT REQUIREMENTS

The desired service levels (norms) in case of water supply and sewerage and sanitation sectors have been categorised into low, medium and high levels. Low service level is the minimum that is required in order to support a population of any size, in terms of quality, quantity and level of services. High service level is the optional that should be in any given area, while medium service level is the average of these two.

Table 2.39 : Requirements in Infrastructure

S.Nos.	Head	Additional Requirement 1997-2001	Additional Requirement 2001-2011
1	**Water Supply**		
	Requirements @ 150 lpcd (MLD)	624	813
	Shortages @ 150 lpcd (MLD)	267	189
2	**Sewerage facilities**		
	Underground drainage (% pop. served)	80	100
	Drainage Network Area served (sq.km.)	67.36	112.27
3	**Roads**		
	Total Road Length (km.)	898.192	1122.74
	Total Capital Works Required (km.)	319.33	224.55
4	**Street Lights**		
	Requirements @ a dist. of 28 mts.	32078	40098
	Shortage @ a dist. of 28 mts.	5450	2570
5	**Solid Waste (tonnes)**		
	Collection of garbage @ 83% collection performance	1355	1981
	Additional Dustbin Requirements (2-3 cu.mts.capacity)	50	260
	Additional Dustbin Requirements (4.5 cu.mts.capacity)	50	250

Source : Study estimates.

Based on the above options given in Table 2.39, gaps in service levels and additional requirements for the projected population have been assessed and investment requirements estimated, using unit costs for the provision of respective services. The investments have been phased over two time periods of 1997-2001 AD. and 2001-2011 AD. depending on the urgency of need.

A summary of the resulting total investments under each level has been given in Table 2.40.

Table 2.40 : Total Investment Required for Infrastructure

(in million Rs.)

S.No.	Head	1997-2001	2001-2011	Total
1	Water Supply	926.3	603.9	1530.2
2	Sewerage and Sanitation	1872.8	3036.4	4909.1
3	Roads	345.8	282.5	628.3
4	Solid Waste Management	58.1	77.6	175.0
	Total Investment	**3203.0**	**4000.4**	**7242.6**

Source : Study estimates

ONGOING/ PROPOSED PROJECTS

SMC has initiated project formulation covering basic infrastructure sectors. This section presents details of these projects.

Water Supply

To meet the demands of the growing population, SMC has begun the implementation of a water supply project. The project has been divided into two phases, Phase-I is from 2001-2011 and Phase II from 2011-2021. The estimated demand of water will be 820 MLD. by 2021. Details are presented in Table 2.41. Some works have been taken up on a priority basis, in order to provide immediate relief (by 2001 AD.) to certain areas, at a limited cost.

Table 2.41 : Ongoing Water Supply Projects

Head	Priority Phase	Phase I	Phase II
	2001	2011	2021
Population (100,000)	26	35	43
Water Demand (mld.) @ 190 lpcd	490	660	820
Storage Capacity (ml.)	160	330	328

Source : SMC.

Out of the 55.60 sq.km. of area which was added to the city in 1986, the areas of Nana Warachha, Majura and parts of Karanj, ad-measuring to a total of 5.55 sq.km. have already been covered by a distribution network. Based on the development and nearness to the distribution stations, it has been decided that the areas of Umra, Piplod, Udhana, Pandesara and remaining parts of Karanj, ad-measuring to a total of 17.03 sq.km. will be covered by a distribution network in the priority phase. In addition, the west zone, which presently has a very low per capita supply, is to be dealt with on a priority basis.

In order to augment supplies, a weir has been constructed on Tapi river, near Singanpore. The purpose of the weir is to increase the surface water availability. The impoundage caused by the weir may result in an increase in the yield of French wells at Sarthana and infiltration wells at Warachha by about 50 mld. Two additional surface water treatment plants of 50 mld. total capacity are under construction at Warachha. It is proposed to augment the supply by 60 mld. at Rander, yielding a total supply of about 320 to 370 mld. in the priority phase. The present storage capacity will be upgraded from 91 ml. to 328 ml. by the end of Phase II in 2021.

The city has been divided into 6 water zones north, west, central, east, south and south-west. In order to meet the requirements of the year 2021, 11 additional distribution stations are proposed at Singanpore, Ved, Rander, Jahangirpura. Jahangirabad, Limbayat, Athwa, Althan, Sagrampura, Udhana and Bhestan. Rander, Athwa, Sagrampura and Udhana are to be taken up on priority.

The total cost of the priority phase works is estimated to be about Rs. 690 million (1993 prices). Separate cost estimates for Phase I and Phase II are not available.

The priority phase under which the Katargam water works is being commissioned in 1997; will augment the existing treatment capacity for water to 476 mld. The Katargam water works has been constructed from the Corporation funds, but the Corporation does not have enough funds in order to complete the project in totality. Application for funds has been made to World Bank and HUDCO.

Sewerage and Sanitation System

Drainage and Low Cost Sanitation Facilities in Slums

As many as 253 of the 294 slums that exist in Surat, did not have drainage and sanitation facilities till 1995. In 1995, SMC started a programme for the provision of drainage facilities and low cost sanitation to these slums and has so far provided 215 slums with drainage facilities (either drainage lines or half round pipe instead of drainage lines) and latrines. The provision of these facilities cost the SMC Rs.6,305.58 per hut or Rs.1,415.60 per capita. Only 36 slums remain without facilities. Details of the project are given below in Table 2.42.

The funds for this project have come through SMC's own account and an additional amount of Rs.53.37 million is needed in order to provide facilities in the remaining slums (1996 prices).

Sewerage Master Plan

The system is proposed to be designed keeping in consideration an average water supply rate of 220 lpcd (year 2021 AD). Eighty per cent of the total water supplied is taken as reaching the consumers on the basis of the design. The estimated waste

water flows are 548 mld, 736 mld, and 916 mld for years 2001, 2011 and 2021 AD.

Table 2.42 : Drainage and Low Cost Sanitation Facilities in Slums

(cost in million Rs.)

S.Nos.	Block	Slums covered			Slums to be covered			Total			Investment
		Nos.	Pop.	Huts	Nos.	Pop.	Huts	Nos.	Pop.	Huts	required
1	A	33	26721	5414	6	859	249	39	27580	5663	1.49
2	B	5	9501	2008	2	1475	360	7	10976	2368	2.52
3	C	64	47455	9845	21	24070	5555	85	71525	15400	36.49
4	D	25	54062	11664	1	1105	262	26	55167	11926	1.84
5	E	47	178887	42303	0	0	0	47	178887	42303	.00
6	F	41	35932	7717	6	7074	1536	47	43006	9253	11.00
	Total	215	352558	78951	36	34583	7962	251	387141	86913	53.37

Source : SMC

Nine waste water treatment and disposal sites have been identified after considering the topography and natural slopes of the terrain. These are : 1. Anjana; 2. Bheasan; 3. Bhatar; 4. Karanj; 5. Singanpore; 6. Bamreli; 7. Dindoli; 8. Sanari; 9. Puna. Of these Anjana and Bhesan already house SMC's existing treatment and disposal facilities.

The waste water from individual drainage zones will be collected through the sewer network and intermediate waste water pumping stations and finally brought to the particular waste water treatment plant for treatment and disposal.

Project Phasing

Envisaged phasing of works in terms of actual work and the area proposed to be covered are as presented below:

Phase / Work	Phase I	Phase II	Phase III
Year of Execution	**1996-97 to 1998-99**	**1998-99 to 2001-2002**	**2001-02 to 2004-2005**
Improvement in existing sewerage system of walled city area	1. Saiyadpura 2. Nanpura 3. Salabatpura		
Providing sewerage system	1. Uma South 2. Piplod 3. Karanj and Fulpada 4. Udhana and Pandesara (part) 5. Katagram (part) & Tunki 6. Dumbhal, Limbayat & Dindoli (part)	1. Althan 2. Dabholi & Singanpore 3. Ved & Katargam (part) 4. Umarwada 5. Nana Varachha & Kapadra 6. Bhestan (part) 7. Adajan (part)	1. Govalak & Bamroli 2. Dindoli (part) & Bhestan (part) 3. Jahangirpura & Pisad 4. Jahangirabad
Construction of sewage treatment plants	1. Bhatar 2. Karanj	Bamroli Singanpore Puna Extension of Anjana Sewage Treatment Plant Extension of Bhesan Sewage Treatment Plant	1. Sonari 2. Dindoli

Sewerage Project Cost

The total cost of the project has been worked out to be Rs. 3,203.68 million. Phase wise costs are as presented below in Table 2.43.

Table 2.43 : Estimated Cost of Sewerage Projects

(in million Rs.)

S.No.	Head	Phase I	Phase II	Phase III
1	Improvement in existing system	209.48	-	-
2	Providing sewerage system	502.65	457.17	187.48
3	Construction of sewerage treatment plants	310.50	685.40	851.00
Total		**1022.63**	**1142.57**	**1038.48**

Source : SMC.

The project has been approved by the corporation. The implementation is delayed due to lack of funds.

Upgradation of Infrastructure after Plague

The plague epidemic struck Surat in September 1994. Though plague cases were reported in several cities across a number of states, the worst-hit was Surat. Subsequently, Mr. S.R.Rao was appointed as the Municipal Commissioner of Surat. His novel approach focusing on increasing efficiency, accountability and transparency of operations brought about changes in attitudes and work practices of SMC staff. The general public also responded positively to the situation leading to an all round improvement in the city.

A number of steps have been taken to increase service levels and coverage and, consequently improve the urban environment in Surat. One of the foremost requirement was to clean up the city on a permanent basis.The measures adopted for this are outlined below.

Garbage Removal

- Garbage removal contracted out
- Garbage trucks to be covered
- Stiff penalties for contractors' non-performance
- Number of sweepers increased from 3000 to 4545
- Number of garbage collection bins increased by 50 per cent
- Total solid waste removal increased from 450 tpd to 850 tpd
- Twice daily clearance from problem spots
- Addition of three new dumping sites
- Increase in the number of garbage bins from 400 to 984

Prevention of Littering

- Litter Patrol
- Spot administrative charges for littering
- All shops must maintain dustbins and ensure cleanliness of surrounding street areas
- Restaurants and hotels to maintain separate bins, contents to be packed and disposed in designated disposal sites
- Educational drive to persuade housewives to pack garbage, dispose in designated bins

Sanitation for Slums

- Pay and use toilets built in 41 slums locations with 615 seats
- Special attention to garbage removal from slums
- Resettlement of slums from flood prone areas
- Municipal water supply through tankers to all slums

Water Supply

- Piped water supply coverage increased to 60 per cent of population and the remaining provided through tankers.
- Scheme to cover all regularised residences with piped water supply by 2008
- Construction of new water reservoir, pumping station underway which is estimated to cost Rs. 600 million

Road Widening and Paving

- 48 kms. of roads widened
- 12 kms. of roads under widening programme
- 42 kms. of roads newly paved
- 100 kms. of roads to be paved by the year 2000
- Increase in paved roads cover from 80 per cent to 100 per cent in slums

Improved Primary Health Care

- Spraying and fogging to control mosquitoes increased by 200 per cent
- Daily monitoring and reporting of water borne and water related diseases recorded at all urban health centres
- Epidemic control and surveillance facility established 250 private practice, 19 UHC, 8 major hospitals
- Budget of UHC's increased significantly

III. FINANCING OF URBAN SERVICES

URBAN MANAGEMENT

Introduction

The functioning of SMC is governed by provisions of the Bombay Provincial Municipal Corporation (BPMC) Act, 1949. The framework of the Act provides for a Municipal Commissioner appointed by the state government, from the civil service cadre, for normally a term of three years, in whom the entire executive power vests. Though the Commissioner is a government official, he is responsible and accountable to the corporation for the period he acts as Municipal Commissioner.

The Commissioner's executive powers are subject to his obtaining sanctions, financial and otherwise, for items beyond specified limits. Otherwise, he derives his powers independently from the statute and not by delegation from the body of councillors. The number of councillors is related to the population. At present the corporation consists of 97 councillors elected from single member constituencies on adult franchise.

The corporation has several statutory and non-statutory functional committees of which the standing committee is the most important. The Mayor is the Chairman of the Council for conducting its proceedings and also the ceremonial head in the British tradition. Though he is not vested with executive powers, as the First Citizen of Surat, he commands a position of great prestige and honour. Notwithstanding the occasional friction, the administration runs fairly smoothly and efficiently.

The Municipal Commissioner, as the Principal Executive Officer of the Corporation, is assisted by several senior officers-in-charge of various activities and functions who are designated as City Engineer, Medical Officer of Health, Deputy Municipal Commissioner, Assistant Municipal Commissioner, etc. In addition, there are Municipal Chief Auditor and Municipal Secretary.

Administrative Set Up

The Commissioner has the power to reorganise administrative setup and delegate powers. Significant changes have been brought in by Mr. S.R.Rao since his appointment as the Commissioner of SMC in 1994. Presented below is the administrative setup prior to 1994. The setup was a rigid departmental system with vertical hierarchy, as can be seen in Table 3.1.

Table 3.1 : Administrative Set up - Pre 1994

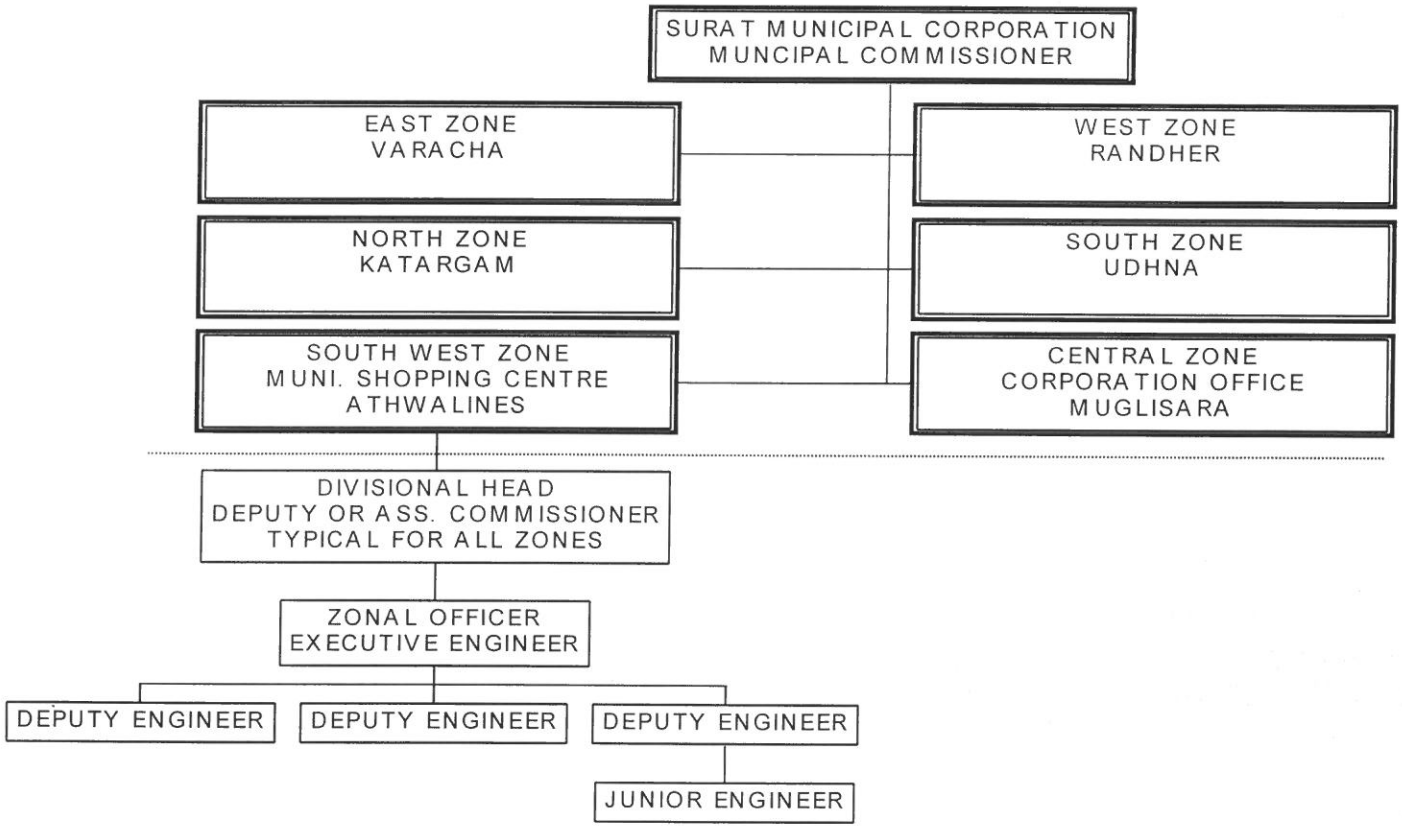
MUNICIPAL COMMISSIONER									
City Engineer	Director of Planning	Dy. Commissioner (H & H)	Addl. City Engineer	Dy. Commissioner (G)	Dy. Commissioner (Sp.)	Health Medical Officer	Asst. Commissioner	Asst. Commissioner (F).	Asst. Commissioner (Ph)
Drainage Dept.	Town Planning Dept.	All Hospitals , Dispensaries, Maternity Homes, Health Centres, Mobile Dispensaries etc.	Hydraulic Dept.	Municipal Library	Direct Tax Dept.	Sanitation & Conservancy	Vigilance & Inspector Branch	Accounts Dept.	Central Establishment Dept.
Drainage (Slum)	Town Development Dept.	Central Medical Store	Water Supply & Maintenance, City Water Works, Head Water Works	Museum	Assessment Dept.	Food Inspection Licensing	Muni. School Board	E.D.P Dept..	Training & Departmental Inquiries
Bridge Cell	Land & Estates Dept..	Pathological Laboratory	World Bank Aided Projects (Co.-ordination Officer)	Planetarium	Legal Dept.	ICDS	Election	Computer Section	Recruitment's
Fire Brigade	Central Design (Architectural Wing)	Family Welfare & Mch. Department	Storm Water Projects & Maintenance (Including Side Drains)	Central Office Record, Registry & Compilation Branch	Cultural Section	Public Health Laboratory	U.C.D	Grant From Entertain-ment Tax & Small Savings	Shops & Est. Dept.
Central Design (Except Architec-tural Wing)	Parks & Gardens	Solid Waste Project	Public Service Dept..(Technical & Supervision)	Toll & Octroi Dept.	Gandhi Smruthi Bhavan (Auditorium)	Vaccination Branch Control Of Communicable Diseases	N.R.Y Scheme		All Personnel Matters, Policies Union Matters, etc. Transfer of Clerical Cadres & Above or Central Est. To Be Routed By A.C (P& I) Through Dy. Commissioner(H & H) for submission to the municipal commissioner for final orders.
Census	Special projects of Stadium & Commercial Complex Buildings	Mdm. Scheme	Roads & Street Lights	Public Relation Dept..	Rang Upvan (Open Air Theatre)	Malaria, Filaria Dept. Epi, etc.			
Housing Dept..		Transportation, Catering & Disposal of Solid Waste	Traffic Branch			Leprosy Control Dept.			
Workshop		PSD				Electric Crematorium			
Municipal Press		All Personnel Matters, Policies, Union Matters, Etc. Transfer Of Clerical Caders, & Above of Central Est. To Be Routed By A.C.(P&I) Through Dy. Commissioner				Markets & Slaughter Houses			
Central Stores						Birth & Death Registration			
						SNP Health camp activities (except transportation, carting and disposal of solid waste)			
						Personnel & policy matters			

Changes in the Administrative Set up

After 1994, significant changes were made in the administrative setup of SMC from a vertically-rigid-hierarchical system to a horizontally-more-interactive system. There has been a shift from mere 'paper pushing' to 'field level operations'. Decentralisation of administration is a major aspect of this change. The city has been divided into six zones, viz., Varacha (East), Randher (West), Katargam (North), Udhna (South), Athwa lines (South West) and Muglisara (Central), each zone having complete authority to address local problems and mitigate them at the source. Further, transparency and collective decision making have become key elements of the administrative process.

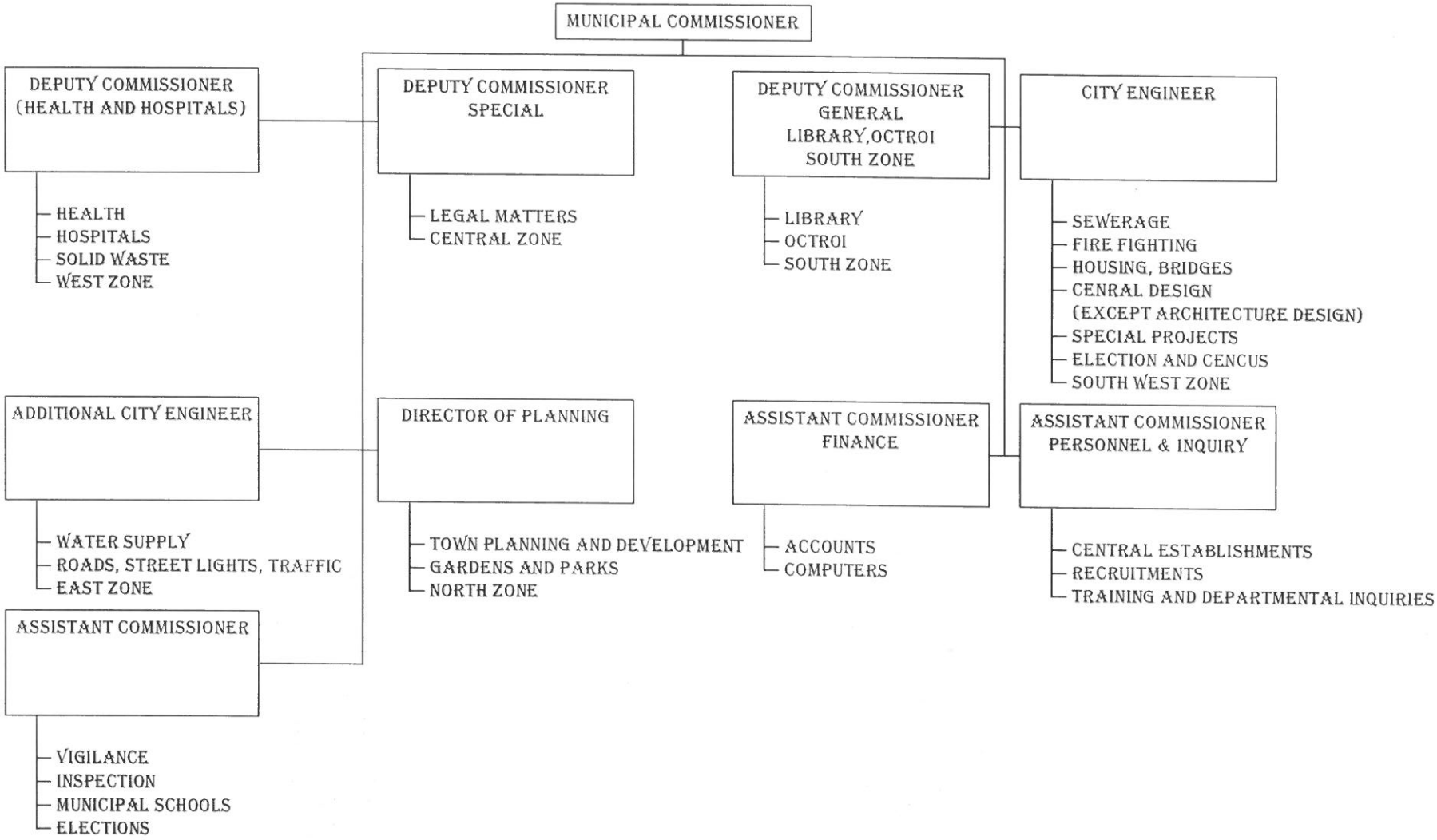
The new administrative setup of SMC is given below.

ADMINISTRATIVE SET UP - POST 1994



Apart from heading different zones, the deputy/assistant commissioners also head specific departments, as shown in the chart on the following page.

SURAT MUNICIPAL CORPORATION ORGANASATION CHART



Reforms undertaken by SMC

Continuous Monitoring System

Monitoring within SMC is done at four levels, namely, corporation level, zone level, ward level and on the field. Under the present Municipal Commissioner it has become a daily practice for the standing committee to meet every afternoon between 3 to 4 p.m., wherein all the heads discuss their problems and mitigation if possible, is done on a daily basis.

Decentralisation

Each zone is headed by a divisional head, who is either an Assistant Commissioner or a Deputy Municipal Commissioner. Depending upon the size of the ward, the divisional head has one or two zonal officers under him, who has about three to four deputy engineers working for him. In each zone there are about six to seven junior engineers, typists, etc.

Enhanced Powers

The divisional head has the authority to sanction works upto a value of Rs. 200,000, without the permission of the Municipal Commissioner.

Complaint Monitoring System

At ward level all complaints are logged in a register and a complaint logger is given a white card for sanitation purposes and red card for engineering and public works. These complaints can be made between 7 a.m. to 6 p.m. either in person or on the phone. Mitigation is done within a specific time period, minimum of 24 hrs. with the upper limit as a week.

Collective Responsibility

There is no distinction between departments in SMC. Any official who observes something on the field is free to make suggestions or complaints. There is no water tight compartmentalisation. All officials are in a way responsible for all activities of the zone, in addition to their regular duties. There is perfect team work and all employees of SMC right from the Municipal Commissioner to the Karamchari are equal partners in administration. Further, decisions with respect to transfers etc. within SMC are taken collectively by all the senior SMC officials who comprise of the standing committee.

Improved Supportive Infrastructure

Communication has become far more efficient. Officials are provided with vehicles fitted with wireless sets and are expected to pass information to the Zonal

Commissioner, if they find any thing wrong, and are expected to visit the nearest ward officer or instruct the SSI/SI to attend to a particular job.

Public Participation

The present drive in Surat is to upgrade its status from the second cleanest city to the cleanest city in India. Each locality has a member picked up on a voluntary basis, and he/she is responsible for the area and answerable to the grievances of the residents of that locality. He/ she in turn interacts with SMC and tries to mitigate the problems at the earliest. It is an attempt by SMC to take management to the masses.

The efforts of SMC are finally paying off and there is wide public support for all the drives initiated by the Municipal Commissioner. A few NGO's have also joined hands with SMC and the results are clearly visible.

URBAN FINANCE

The corporation, in order to perform a series of obligatory and discretionary functions, is vested with powers to raise resources through several tax and non-tax sources under the BPMC Act, 1954. In terms of financial performance the SMC has done fairly well during the past five years. The performance during the recent past has been quite good, with the revenue and total income showing a steep increase (Table 3.2 and Fig. 3.1). The expenditures have also increased along with the incomes. The corporation has also recorded a reasonable operating ratio.

Figure 3.1: Income and Expenditure Differential Graph of SMC

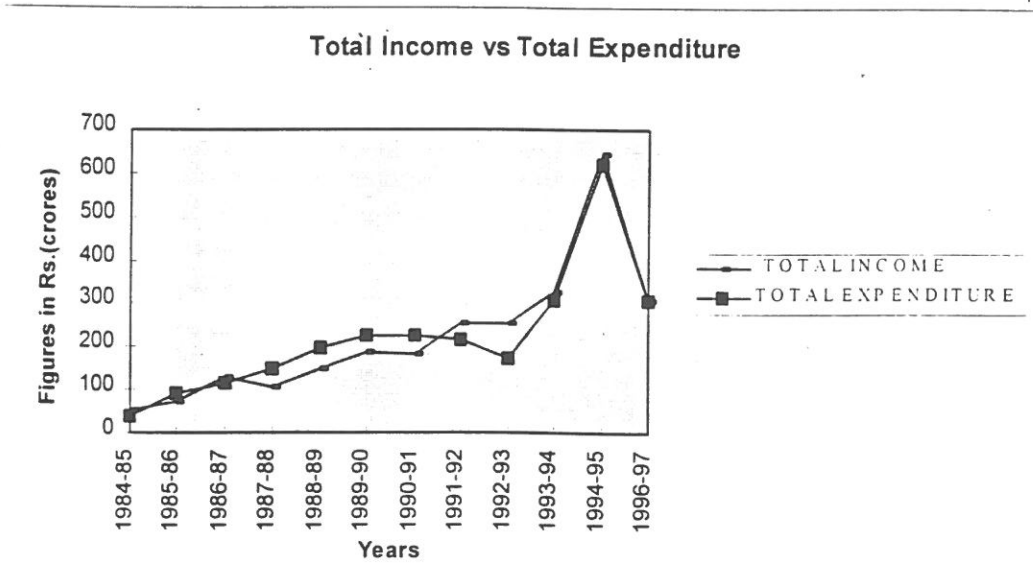


Table 3.2 : Growth in Income and Expenditure

(in '000 Rs.)

Year	INCOME				EXPENDITURE			
	Revenue	Capital	Extra-Ordinary	Total	Revenue	Capital	Extra-Ordinary	Total
1984-85	279,562	45,985	211,891	537,438	207,665	50,195	134,866	392,726
1985-86	373,647	85,772	238,766	698,185	223,394	67,154	599,582	890,130
	(33.65)	(86.52)	(12.68)	(29.91)	(7.57)	(33.79)	(344.58)	(29.61)
1986-87	432,747	105,793	769,810	1,308,350	310,279	81,506	761,937	1,153,722
	(15.82)	(23.34)	(222.41)	(87.39)	(38.89)	(21.37)	(27.08)	(100.00)
1987-88	505,169	99,175	447,401	1,051,745	360,672	119,127	1,009,239	1,489,038
	(16.74)	(-6.26)	(-41.88)	(-19.61)	(16.24)	(46.16)	(32.46)	(29.06)
1988-89	647,638	147,972	705,431	1,501,041	446,954	122,820	1,375,549	1,945,323
	(28.20)	(49.20)	(57.67)	(42.72)	(23.92)	(3.10)	(36.30)	(30.64)
1989-90	798,846	161,923	891,431	1,852,200	661,443	161,942	1,429,300	2,252,685
	(23.35)	(9.43)	(26.37)	(23.39)	(47.99)	(31.85)	(3.91)	(15.80)
1990-91	827,900	261,998	741,896	1,831,794	597,705	272,157	1,399,707	2,269,569
	(3.64)	(61.80)	(-16.77)	(-1.10)	(-9.64)	(68.06)	(-2.07)	(0.75)
1991-92	993,738	243,775	1,280,333	2,517,846	522,888	314,646	1,333,980	2,171,514
	(20.03)	(-6.96)	(72.58)	(37.45)	(-12.52)	(15.61)	(-4.70)	(-4.32)
1992-93	1,019,819	378,721	1,162,076	2,560,616	798,847	273,740	647,064	1,719,651
	(2.62)	(55.36)	(-9.24)	(1.70)	(52.78)	(-13.00)	(-51.49)	(-20.81)
1993-94	1,385,704	302,034	1,551,052	3,238,790	899,226	279,415	1,904,285	3,082,926
	(35.88)	(-20.25)	(33.47)	(26.48)	(12.57)	(2.07)	(194.30)	(79.28)
1994-95	1,646,819	17,423	4,744,548	6,408,790	1,010,516	526,639	4,646,699	6,183,854
	(18.84)	(-94.23)	(205.89)	(97.88)	(12.38)	(88.48)	(144.01)	(100.58)
1996-97	2,530,000	209,800	342,700	3,082,500	1,586,200	1,489,800	-	3,076,000
	(23.95)	(247.01)	(-73.12)	(-30.65)	(25.29)	(68.19)	-	(-29.47)

Source : GMFB, SMC.

Note : 1. Figures in parentheses indicate annual growth rate.
2. Steep increase in total income in 1994-95 is because of taking a large amount of loan.

Revenue Account

Revenue account includes income from taxes, rent on properties, charges, fees, grants, etc.; and expenditure on salaries, general administration, operation and maintenance of basic services, debt servicing, etc.

Revenue Income

Like most local bodies in the country, SMC's resource base is also very narrow, with about 88 to 90 per cent income coming from tax sources. Further more, on an average, the contribution of octroi income in total tax income is as high as 80 per

cent. The other major tax source, property tax accounts for about 15 per cent of the income. In effect the corporation's income largely depends on a single source, i.e., octroi with some addition by the property tax head. A detailed account of the revenue sources is presented below in Table 3.3.

Table 3.3 : Revenue Account - Income Statement

S.No.	Head	1984-85	1989-90	1994-95	1985-90	1990-95
		('000)			(% Change)	
	Tax Income					
1	Octroi	174,181 (62.30)	527,521 (66.04)	1,123,051 (68.20)	24.81	16.31
2	Property Tax	35,579 (12.73)	73,169 (9.16)	243,590 (14.79)	15.51	27.19
3	Water Tax	8,648 (3.09)	18,544 (2.32)	16,307 (0.99)	16.48	-2.54
4	Sanitary tax	8,145 (2.91)	15,830 (1.98)	21,061 (1.28)	14.21	5.88
5	Drainage Tax	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00	0.00
6	Vehicle Tax	915 (0.33)	1,662 (0.21)	1,740 (0.11)	12.68	0.92
7	Theatre Tax	687 (0.25)	812 (0.10)	868 (0.05)	3.40	1.34
8	Toll Tax	2 (0.00)	0.00 (0.00)	0.00 (0.00)	-100.00	0.00
9	Other Tax	51 (0.02)	7,313 (0.92)	35,132 (2.13)	169.96	36.87
	Total Taxes	228,208 (81.63)	644,851 (80.72)	1,441,749 (87.55)	23.09	17.46
	Non - Tax Income					
10	Education Grant	35,607 (12.74)	90,872 (11.38)	72,493 (4.40)	20.61	-4.42
11	Other Grant	5,115 (1.83)	4,826 (0.60)	14,057 (0.85)	-1.16	23.84
12	Subsidy	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00	0.00
13	Commercial Activities	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00	0.00
14	Municipal Institutions	1,161 (0.42)	2,361 (0.30)	1,987 (0.12)	15.25	-3.39
15	Rents	3,002 (1.07)	4,534 (0.57)	15,958 (0.97)	8.60	28.62
16	Donation	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00	0.00
17	Fees	932 (0.33)	6,613 (0.83)	46,148 (2.80)	47.98	47.49
18	Others	5,537 (1.98)	44,789 (5.61)	54,427 (3.30)	51.91	3.97
	Total Non-Tax Income	151,354 (8.37)	153,995 (19.28)	205,070 (12.45)	24.56	5.90
	Total	279,562 (100.00)	798,846 (100.00)	1,646,819 (100.00)	23.37	15.57

Source : GMFB, SMC.

Note : Figures in parentheses shows percentages to total income.

Tax Sources: Taxes levied by the corporation are mainly listed in Section 127 of the BPMC Act. Property tax, tax on vehicles, boats and animals are the two taxes which are compulsorily levied, while octroi, theater tax and other taxes (as may be levied by the state government) can be imposed by the corporation.

Property tax is a generic term, under which at present three different revenue taxes are levied. They are : (i) general tax; (ii) water tax/water charge/water meter charge; and (iii) conservancy tax.

The basis for levy of all these taxes (except water charge and/water meter charge) is the 'rateable value' of the premises.

SMC raises between 14-18 per cent of its income from property tax. Water and conservancy taxes are charged on the basis of fixed Net Rateable Value (NRV), along with property tax. The present overall tariff rates of property tax which is at a maximum of 34 per cent and 40 per cent of NRV for domestic and non-domestic uses respectively, appear to be on the higher side (Table 3.4). General tax at 30 per cent of NRV largely contributes to the overall rate. This together with education cess at a maximum rate of 10 per cent (for domestic usage) and 20 per cent (for non-domestic usage) of NRV, exerts a dampening effect on the assessees in order to pay the taxes, thus affecting SMC's resource mobilisation efforts.[6]

Table 3. 4 : Rates of Property Tax

Property Tax	Present Tariff Rates per annum on RateableValue (%)			
	Domestic		Non-Domestic	
	Minimum	Maximum	Minimum	Maximum
General Tax	12	30	12	30
Water Tax	1	1	1	1
Conservancy Tax	3	3	3	9
Total	**16**	**34**	**16**	**40**

Source : GMFB.

Conservancy tax is levied for collection, removal and disposal of human and other wastes. A minimum rate of Rs. 2 per annum is charged.

It is on account of the buoyancy of income from octroi that SMC has largely been able to meet its expanding financial obligations. It is levied on the entry of goods into Surat city area for use, consumption or sale therein. The rates are ad-valorem ranging from 1/2 per cent to 3 per cent. The last revision of rates took place in 1984-85.

Non-Tax Revenue Income Sources: Non tax sources comprise of rent income which includes rent from commercial buildings, lease rent from slum dwellers, long term and short term lease from land and rent from temporary market structures. Its over all contribution has been ranging between 6-10 per cent of total income. SMC receives grants and contribution from the state government under eleven heads, for general as well as specific purposes. About 62 per cent of non-tax revenue and 11 per cent of total revenue generated, falls under this head. Noted heads are :

1. Family Planning
2. 75 per cent of Non-Agricultural Assessment and 15% of Land Revenue

[6] Pg.13 & 42, Report on SMC. Resource Mobilisation Study, Jan 1995, Price Waterhouse, Calcutta.

3. Primary Education
4. Integrated Child Development Scheme (ICDS)
5. Urban Community Development (UCD)
6. Assistance for Road Repairs and Maintenance
7. Local Fund and Irrigation Cess
8. Penalty under BPMC Act and other Acts
9. Share in Tax collected under Motor Vehicles Act

Table 3.5 : Revenue Account - Expenditure Statement

S.No.	Head	1984-85	1989-90	1994-95	1985-90	1990-95
		(Rs.'000)			(% Change)	
1	Fire Fighting Services	3,556 (1.71)	20,677 (3.13)	26,000 (2.57)	42.20	4.69
2	Street Light Service	3,161 (1.52)	8,003 (1.21)	17,462 (1.73)	20.42	16.89
3	Water Supply Account	18,016 (8.68)	53,482 (8.09)	115,763 (11.46)	24.31	16.70
4	Public Health Service	47,283 (22.77)	105,663 (15.97)	167,255 (16.55)	17.45	9.62
5	Medical Service	0.00 (0.00)	32,343 (4.89)	177,449 (17.56)		40.56
6	Education	40,449 (19.48)	121,334 (18.34)	57,000 (5.64)	24.57	-14.02
7	Public Building	23,941 (11.53)	100,232 (15.15)	176,248 (17.44)	33.16	11.95
8	Commercial Activities	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
9	Municipal Institutions	1,086 (0.52)	10,465 (1.58)	22,659 (2.24)	57.32	16.71
10	General Administration	15,211 (7.32)	62,465 (9.44)	212,170 (21.00)	32.65	27.71
11	Grant Paid	368 (0.18)	0.00 (0.00)	0.00 (0.00)	-100.00	0.00 (0.00)
12	Interest Paid	11,099 (5.34)	0.00 (0.00)	0.00 (0.00)	-100.00	0.00 (0.00)
13	Funds - P.F., Shrinking, Pension	43,495 (20.94)	146,779 (22.19)	38,510 (3.81)	27.54	-23.48
	Total Revenue Expenditure	207,665 **(100.00)**	661,443 **(100.00)**	1,010,516 **(100.00)**	**26.07**	**8.85**
	Establishment Exp. to Total Exp.	**28.65**	**14.86**	**8.24**		
	Revenue Exp. to Total Exp.	52.87	29.36	16.34		

Source : GMFB, SMC.

Note : Figures in parentheses are percentage.

Revenue Expenditure

Revenue expenditure is clubbed under the main heads of general administration, public health service, water supply account and education. The others are street light, medical service, public building, debt servicing, etc.

Expenditure on establishment has increased from a total of Rs.112.5 million (1984-85) to Rs.509.4 million (1994-95). The percentage of establishment expenditure to total expenditure has decreased from 28.65 per cent to 8.24 per cent over the same time period, showing thereby that there are funds available with the corporation in order to be channelised into various developmental activities which are being proposed at the city level (Table 3.5).

Capital Account

Capital Income

The income from capital grants has decreased over the years and so have the other capital incomes (Table 3.6).

Table 3.6 : Capital Account - Income

S.No.	Head	1984-85	1989-90	1994-95	1985-90	1990-95
		(Rs.'000)			(% Change)	
1	Capital Grants	341 (0.74)	4,693 (2.90)	0.00 (0.00)	68.94	-100.00
2	Other Capital Income	45,644 (99.26)	157,230 (97.10)	17,423 (100.00)	28.06	-35.60
	Total	45,985 **(100.00)**	161,923 **(100.00)**	17,423 **(100.00)**	**28.63**	**-35.97**

Source : GMFB, SMC.

Note : Figures in parentheses are percentage.

SMC is empowered by the BPMC Act to levy betterment charges for increase in the value of land and building, if they are a result under a scheme of improvement, clearance or are developments carried out by the corporation. SMC levies an incremental contribution termed as betterment charge, which is realised from the land owners, at a rate equal to one half of such increase in value of the land because of improvement schemes (Town Planning Schemes) carried out by SMC, under the Gujarat Town Planning and Urban Development Act, 1976. The revenue under this head is not accounted for separately. Therefore, the contribution of this source cannot be ascertained precisely.

Capital Expenditure

Capital income and expenditure have both decreased as a percentage of total. In real terms also, this share has decreased from 12.78 per cent to 8.52 per cent of the total expenditure.

Extraordinary Account

Also referred to as capital non-tax sources, SMC has the following sources of extra ordinary income:

1. Loans
2. Capital grants and contributions
3. Premium for letting out SMC properties
4. Capital profit on out right sale of SMC properties
5. Hire purchase sale of SMC properties

Table 3.7 : Expenditure (Capital and Extraordinary)

S.No.	Head	1984-85	1989-90	1994-95	1985-90	1990-95
		(Rs'000)			(% Change)	
A	**Total Capital Expenditure**	50,195	161,942	526,639	**26.40**	**26.60**
	Total Capital Exp./ Total Exp.	**12.78**	**7.19**	**8.52**		
B	**Extra Ordinary Expenditure**					
1	Repayment-Loan Installment	4,662 (3.46)	2,722 (0.19)	5,739 (0.12)	-10.20	16.09
2	Repayment - Loan Interest	0.00 (0.00)	29,771 (2.08)	58,070 (1.25)	100.00	14.30
3	Other Expenses	98,201 (72.81)	612,601 (42.86)	4,206,280 (90.52)	44.22	47.01
4	Education Cess paid to Government	25,129 (18.63)	45,880 (3.21)	201,857 (4.34)	12.79	34.49
5	Funds Paid	6,874 (5.10)	738,326 (51.66)	174,753 (3.76)	154.80	-25.04
	Total Other Expenditure	134,866 **(100.00)**	1,429,300 **(100.00)**	4,646,699 **(100.00)**	**60.34**	**26.59**
	Total Extraordinary Exp./ Total Exp.	**34.34**	**63.45**	**75.14**		
	Total Exp.(Revenue, Capital, Ordinary)	**392,726**	**2,252,685**	**6,183,854**	**41.81**	**22.38**

Source : GMFB, SMC.

Note : Figures in parentheses are percentage.

BPMC Act has the provision that the corporation may borrow for financing capital expenditures of a long term basis. The important type of loans taken by SMC are :

1. Open market debenture loans
2. State government loans
3. World bank loans
4. Loans from institutions such as, LIC, GIC, HUDCO, etc.[7]

Extraordinary Income

Table 3.8 below shows the sources of extraordinary income of SMC.

Extraordinary Expenditure

Extraordinary expenditure includes repayment of loan instalments and its interest, other extra ordinary expenses, educational cess paid to the government and funds paid.

[7]Pg.22, Report on SMC Resource Mobilisation Study, Jan. 1995, Price Waterhouse, Calcutta.

Table 3.8 : Extraordinary Account - Income

S.No.	Head	1984-85	1989-90	1994-95	1985-90	1990-95
		(Rs.'000)			(% Change)	
1	Government Loan	5,000 (2.36)	8,966 (1.01)	109,040 (2.30)	12.39	64.82
2	Other Institutions Loans	32,000 (15.10)	21,000 (2.36)	0.00 (0.00)	-8.08	-100.00
3	Other Extraordinary Income	141,765 (66.90)	756,126 (84.82)	4,162,617 (87.73)	39.77	40.65
4	Education Cess (collection)	25,129 (11.86)	47,533 (5.33)	220,904 (4.66)	13.60	35.97
5	Provident Pension Fund	7,997 (3.77)	57,806 (6.48)	251,987 (5.31)	48.53	34.24
	Total Extraordinary Account - Income	211,891 (100.00)	891,431 (100.00)	4,744,548 (100.00)	33.29	39.71
	Extraordinary income/ total income	39.43	48.13	74.03		
	Total Income(Revenue+Capital+Extraordinary)	**537,438**	**1,852,200**	**6,408,790**	**28.08**	**28.18**

Source : GMFB, SMC.

Note : Figures in parentheses represent percentages.

Extraordinary expenditure has increased from 39 per cent to 74 per cent. Of this, only 1.37 per cent (1994-95) goes into repayment of loan instalments and their interest. A large sum is spent as other expenses (Rs.4582.8 million in 1994-95). There was a surplus in this account to the tune of Rs. 9.78 million in 1994-95.

OVERALL SITUATION

SMC's performance with respect to resource mobilisation and expenditures has been reasonably good during the recent past. The per capita income, both (total as well as revenue) of SMC, are found to be higher than that of the Ahmedabad Municipal Corporation by 50-80 per cent, indicating the soundness of the local body's resource position. It is also to be noted that this has been achieved with the tax rates which have not been revised for the past 10 to 15 years. The capital expenditure has, however, more or less remained stagnant, which is a cause for concern. The debt servicing ratio to current revenue is also quite low at 4.2 per cent, with an outstanding loan of Rs. 777 million in 1996-97.

IV. CRITICAL AREAS FOR REFORM AND INVESTMENT

Surat, the second largest and one of the fastest growing urban area of Gujarat has experienced dramatic ups and downs in its economic and physical conditions. The decades of seventies and eighties saw Surat emerging as a major generator of wealth for the state and the country through industrialisation. The diamond cutting and polishing industry, synthetic textiles in power loom sector and other chemical industries form core activities of Surat's economic base. Coupled with the rapid industrial growth, large scale immigration of people from other parts of the country (mainly Orissa and Maharashtra) and different parts of the state (Saurashtra region) took place, leading to a very high rate of growth in population. While the city continued to generate wealth on the way, both the private and public agencies lagged behind in their responsibilities turning the city into a 'city of filth'. The catastrophe in the form of 'plague' brought the city into focus world wide, though negatively. Along with this slide, Surat experienced a slowing down in industrial growth during the latter part of eighties and early nineties. Reforms taken within SMC since 1994 and the change in attitudes in the public has taken the city towards becoming a city of health. Along with this change, the city's economy has also been showing signs of improvement. This chapter briefly summarises sector-wise status and identifies issues to be addressed.

HOUSING

With the increase in migration, problems of housing in general and low-income single-migrant industrial workers in specific, emerged as a major issue of concern in the city. Existing state and local level public institutions have not been able to tackle these problems effectively. There is a need for incorporating policies which facilitate public-private participation in housing development.

The city, though, has a long history of planning, illegal developments and enroachments have became major problems. The land market in the city is very vibrant. Recently, SMC has taken stringent measures to curb these illegal developments and has so far met with a fair amount of success. However, given the levels of such development, continuation of such efforts as well as preventive measures are to be enforced.

SLUM IMPROVEMENT PROGRAMMES

There is a slum improvement committee of SMC in order to monitor and suggest measures for the welfare of slum dwellers, which comprise 27.5 per cent of the total population of the city.

The local body has been administering few centrally sponsored programmes for the uplift of the poor and slum dwellers. These programmes are Integrated Child

Development Scheme (ICDS), Urban Community Development (UCD), Urban Basic Services for the Poor (UBSP) and slum improvement programmes under World Bank assistance. Besides these, SMC has recently on its own, taken significant and practical measures.

The changes are visible in the city. In 1991, SMC began paving the internal roads in slums by kota stones and by 1996, 75 per cent of the roads were paved. After 1994, surface drains have been constructed in all the slums. The slums are cleaned every day by sweepers and the drains are cleaned once a week. SMC launched the construction of toilets in 1995 and by 1996, 40 toilet complexes were constructed by two NGO's, Sulabha and Paryavaran. Functioning on the basis of pay and use, each toilet block is provided with 20 seats. However, these facilities are still inadequate since 50 persons per seat is the norm.

ENVIRONMENT AND HEALTH

The "Plague of 1994" brought health and environmental services into focus. Through concentrated efforts, the city once known as the "filthiest city" of the country has transformed in just a matter of three years into the second "cleanest and the healthiest" city in the country (the first being Chandigarh). All credit goes to SMC administration. The morbidity and mortality rates are on the decline. However, this could only be sustained in the future if the existing gaps in infrastructure are plugged.

Deteriorating air quality as well as waste water (domestic and industrial) disposal practices are emerging as major problem areas. As part of the World Bank project, a proposal for preparation of an Environmental Management Plan are on the way. A public interest litigation-objecting to waste water disposal through storm water drainage channels, has been filed recently bringing the problem into a priority area.

Physical conditions in the central area of the city are very poor. SMC is in the process of formulating specific strategies to address these problems. This effort is also likely to identify gaps for which projects would have to be identified and under taken.

SERVICES AND INFRASTRUCTURE

The inability of public agencies to keep up with the rapid industrial and population growth observed in the city in provision of infrastructure facilities has resulted into large gaps. Current deficits and future requirements have been discussed in previous chapters. There are also deficiencies in the existing operating and maintenance expenditure levels. The required capital investment also amounts to a substantial sum, i.e., Rs.7.24 billion during 1997 to 2011 AD.

Privatisation in solid waste management is a notable experiment. These experiments have been effective. Expansion of such innovations in terms of widening the coverage within the sector as well as to other sectors is critical. The potential of partnerships in capital improvement programmes have not been explored adequately so far. Given the investment requirements, such arrangements appears to be the only option to bridge the infrastructure gap.

TRANSPORTATION

The problems in the sector of urban transportation in general and public transport in specific are acute. The city transport service provided by Gujarat State Road Transport Corporation (GSRTC) is extremely limited with only 9 buses available per 100,000 population (as against the norm of 30 buses/100,000 population). Recently, the state government has initiated moves to hand over the responsibility of operations of public transport services in the city to SMC. Given SMC's constrained resources such a move would only burden the organisation. Alternate arrangements to augment and operate the public transport service is the requirement.

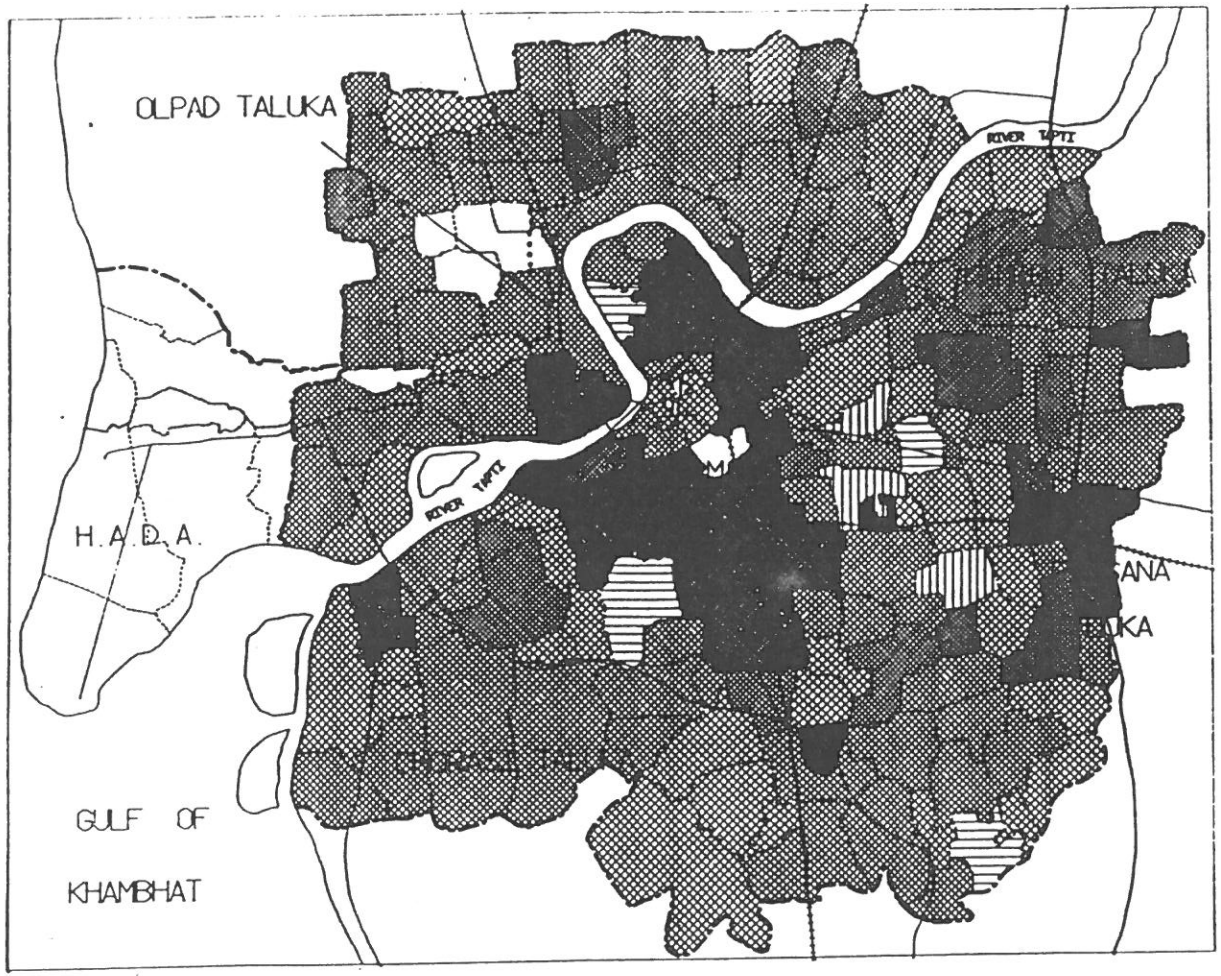
FINANCE

Despite low rates of taxes and non-existence of direct cost recovery on the resource mobilisation front, SMC has been putting up a fair level of performance. Initiatives to rationalise the property tax system have been made during 1995. Proposed changes in the property taxation system have been given approvals by the elected wing. State approval and necessary amendments are awaited. A study to rationalise the 'octroi system' is under way.

CONCLUSION

Wide ranging reforms initiated by SMC have started yielding results. Decentralisation of administration through delegation of powers and functions, emphasis on field level operations, continuous monitoring and efforts to involve general public in SMC's activities and decision making, are important actions which have been successfully initiated. Reforms on the tax collection performance have also been found effective. Efforts to widen the tax base and revision of rates need initiation in a serious manner. The long term sustainablity of the improvements observed in physical environment will depend largely on SMC making adequate capital investment for the provision of infrastructure.

MAPS



GROWTH RATES
1971 - 1981

LEGEND

(C.G.R. IN %)

- NEGATIVE GROWTH RATE
- LESS THAN 5
- 5 - 10
- 10 - 25
- 25 - 50
- 50 - 75
- 75 - 100
- GREATER THAN 100

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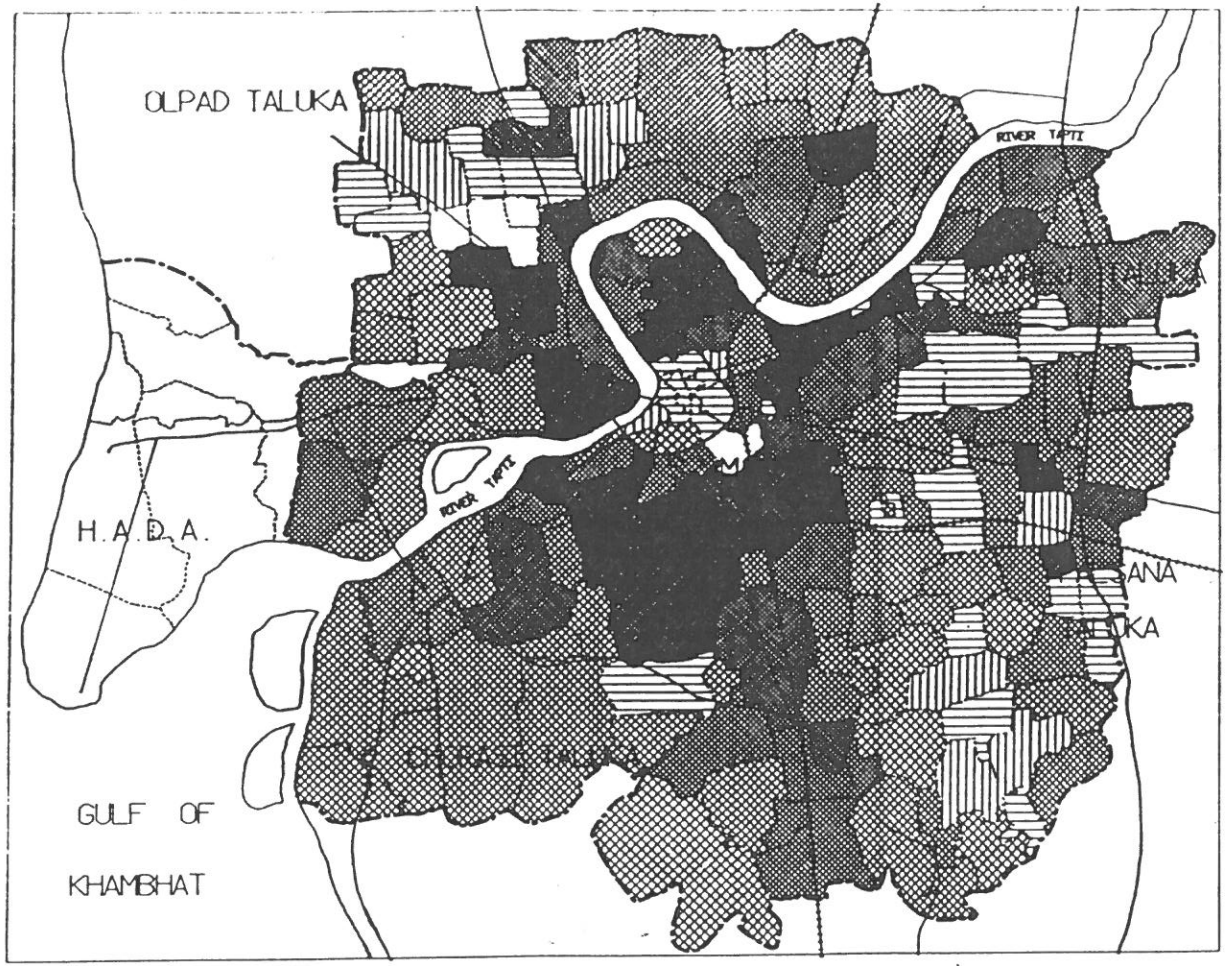
CITY PROFILE, SURAT

PLATE I



GROWTH RATES
1981 - 1991

LEGEND

(C.G.R. IN %)

NEGATIVE GROWTH RATE

LESS THAN 5

5 - 10

10 - 25

25 - 50

50 - 75

75 - 100

GREATER THAN 100

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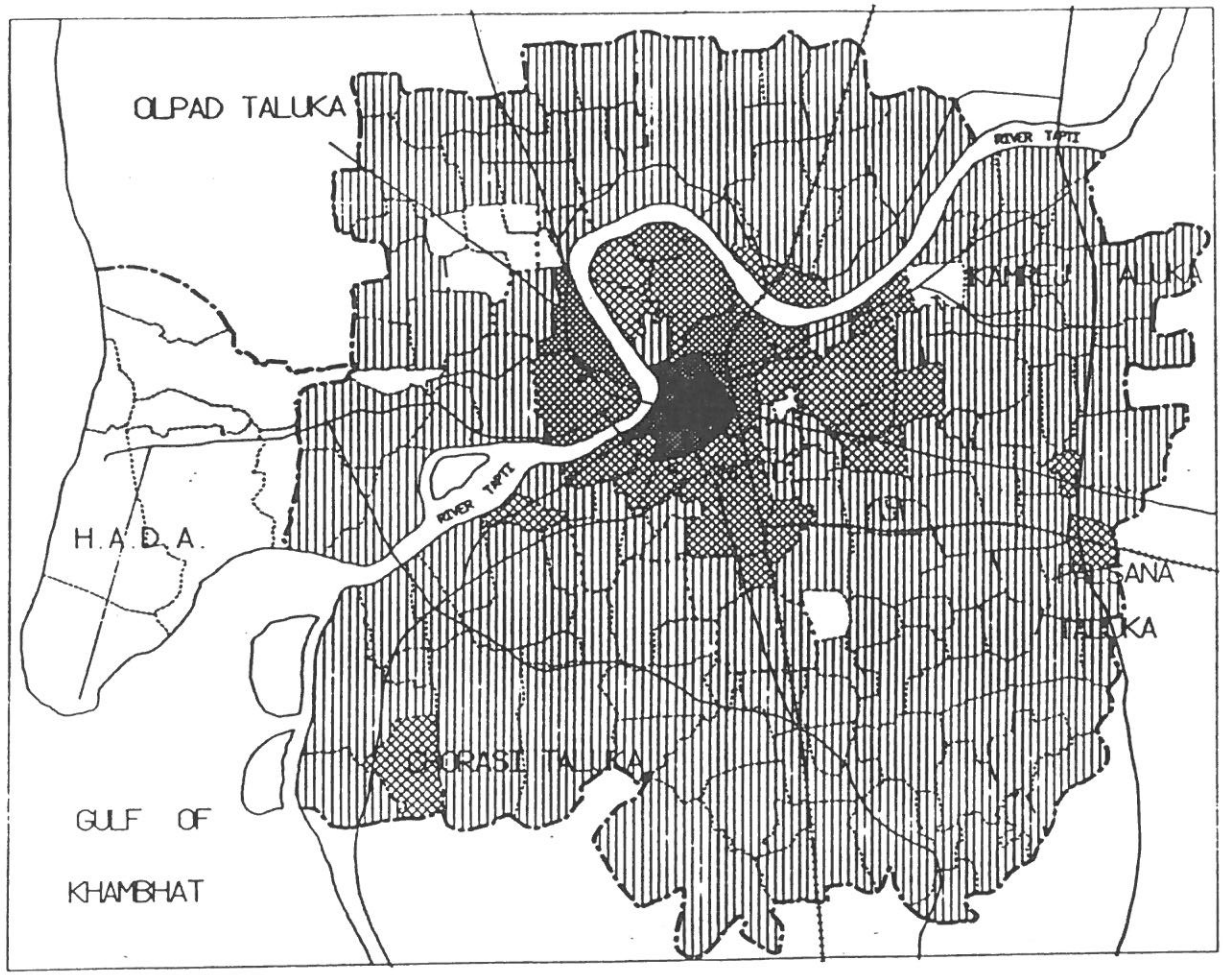
PLATE II



POPULATION DENSITY 1971

LEGEND

(Persons/Hectare)

- MORE THAN 501
- 251 - 500
- 100 - 250
- 51 - 100
- 11 - 50
- 6 - 10
- LESS THAN 5

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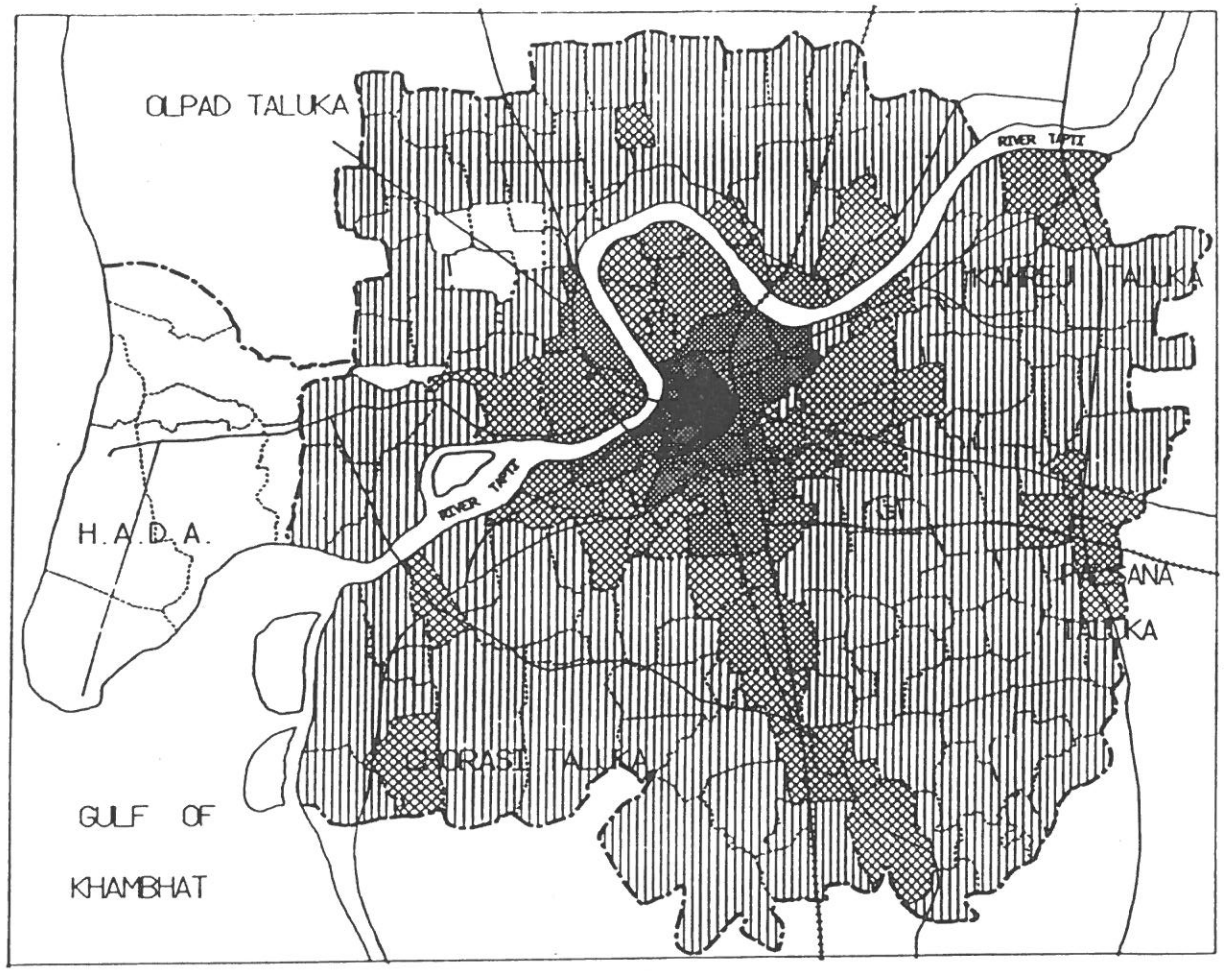
PLATE III



POPULATION DENSITY 1981

LEGEND

(Persons / Hectare)

- MORE THAN 501
- 251 - 500
- 100 - 250
- 51 - 100
- 11 - 50
- 6 - 10
- LESS THAN 5

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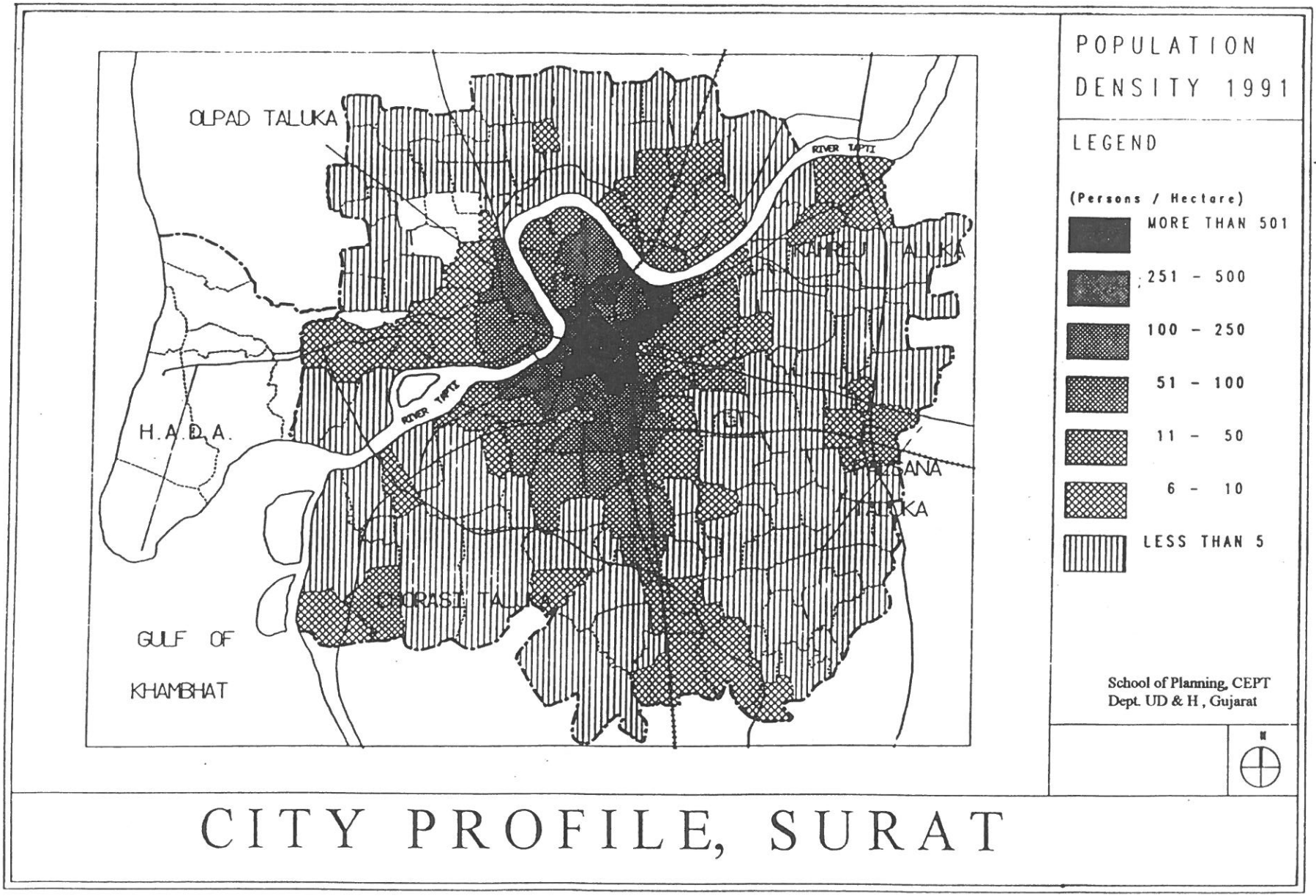
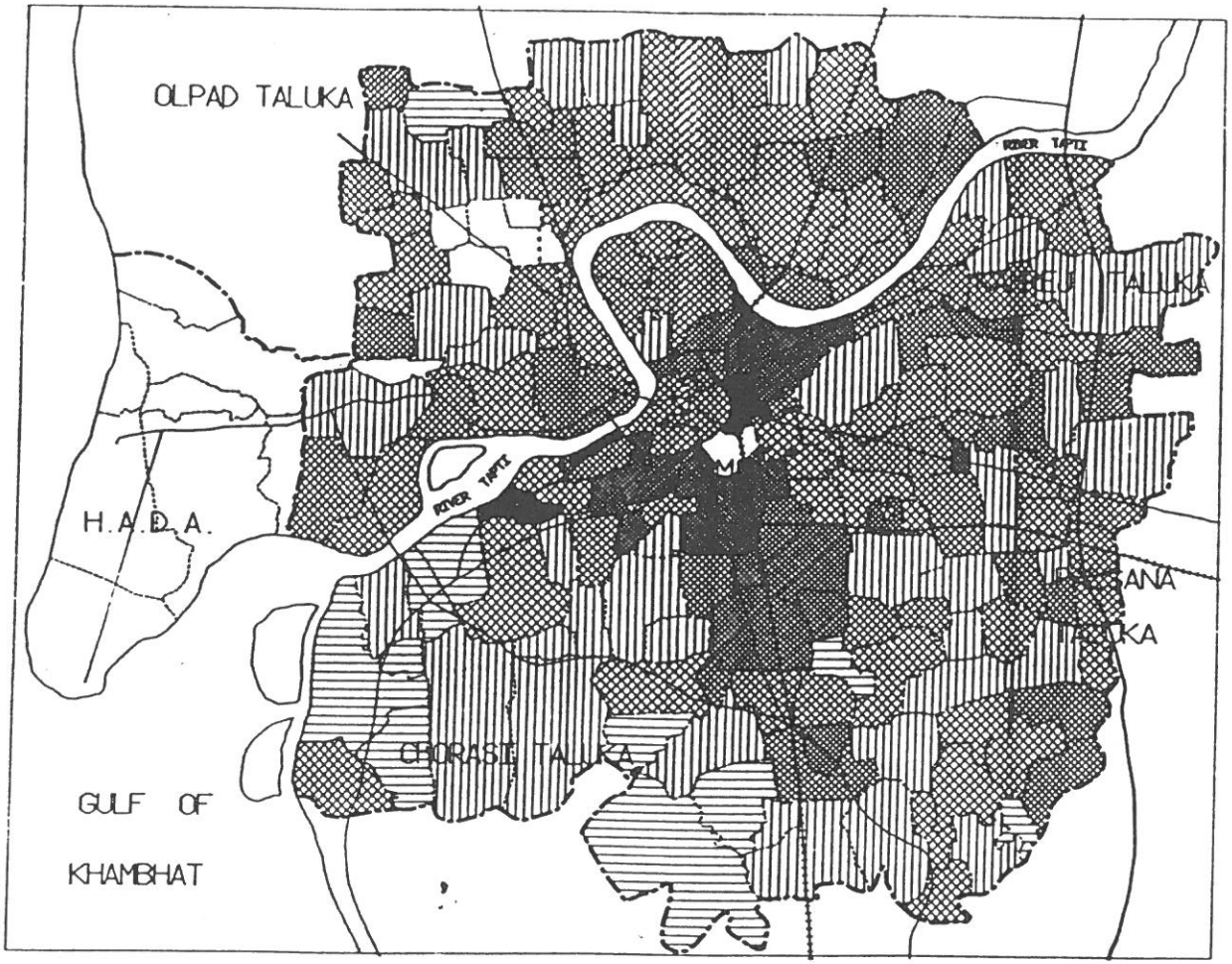
PLATE IV



CITY PROFILE, SURAT

PLATE V



SEX RATIO
1971

LEGEND

(Females / 1000 Males)

- LESS THAN 700
- 701 - 800
- 801 - 850
- 851 - 900
- 901 - 950
- 951 - 1000
- 1001 - 1100
- MORE THAN 1101

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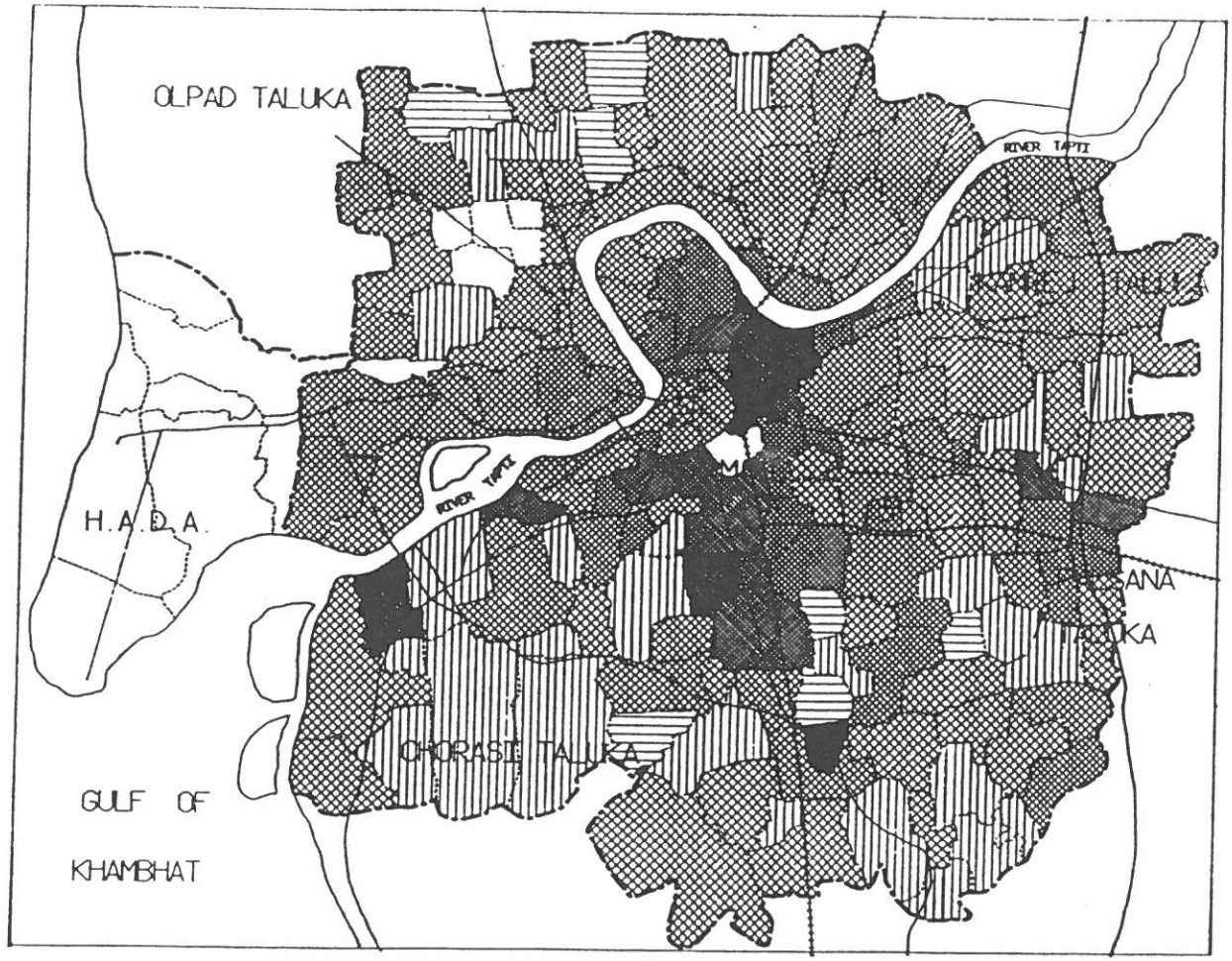
CITY PROFILE, SURAT

PLATE VI



SEX RATIO
1981

LEGEND

(Females / 1000 Males)

- LESS THAN 700
- 701 - 800
- 801 - 850
- 851 - 900
- 901 - 950
- 951 - 1000
- 1001 - 1100
- MORE THAN 1101

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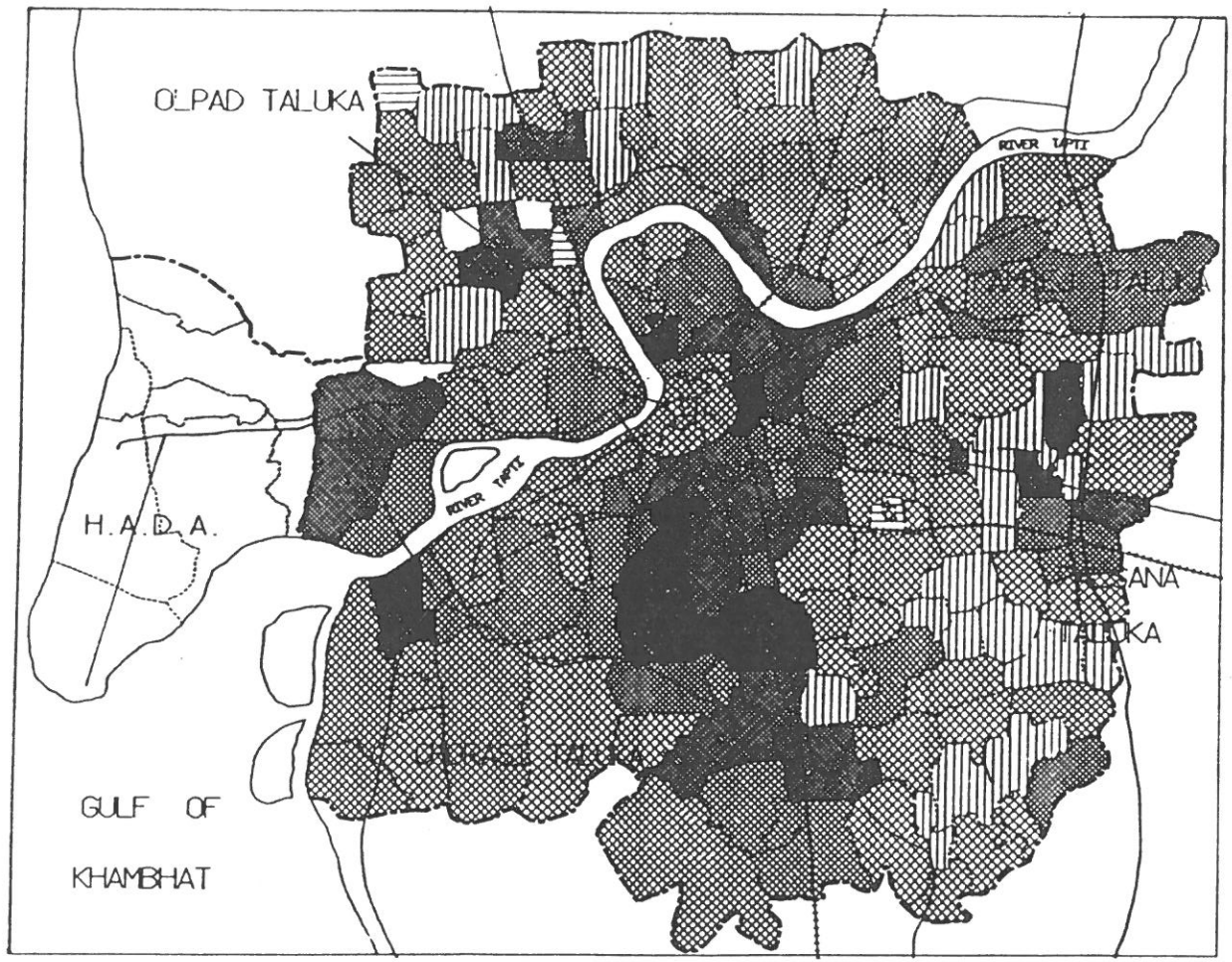
CITY PROFILE, SURAT

PLATE VII



SEX RATIO
1991

LEGEND

(Females / 1000 Males)

- LESS THAN 700
- 701 - 800
- 801 - 850
- 851 - 900
- 901 - 950
- 951 - 1000
- 1001 - 1100
- MORE THAN 1101

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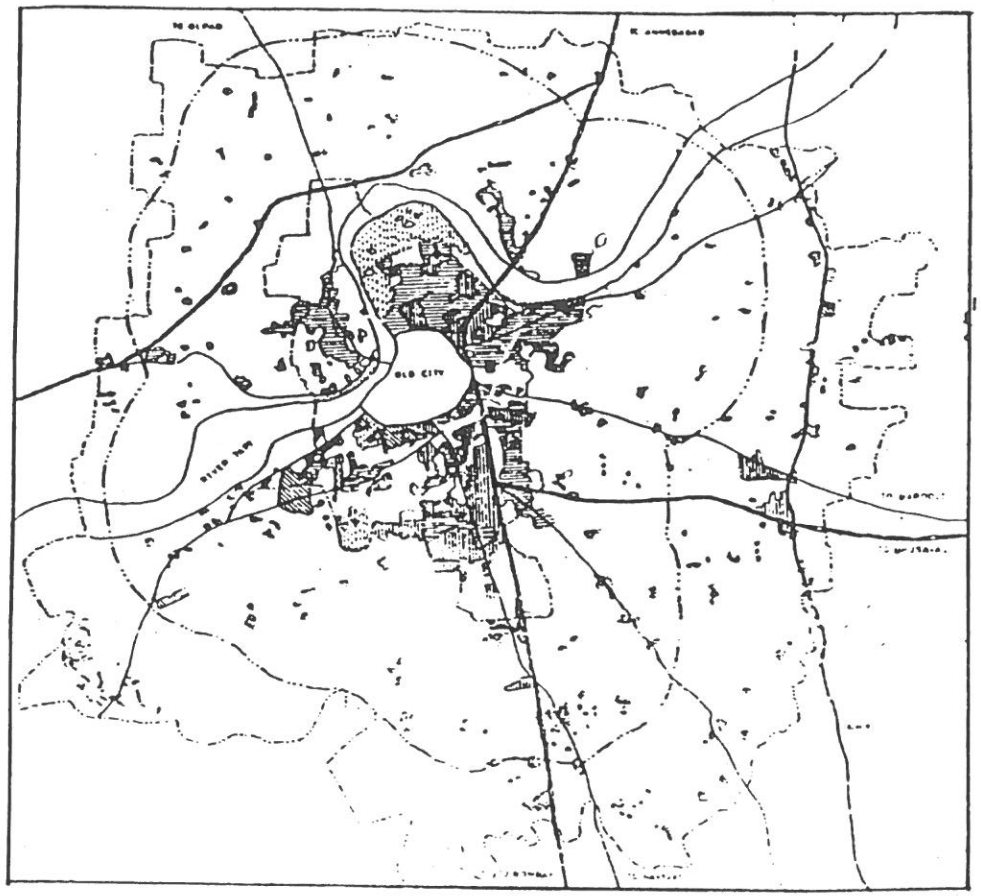

EXISTING LANDUSE
1994

LEGEND

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC PURPOSE
- OPEN SPACES
- AGRICULTURAL
- RESERVATIONS
- B.G RAILWAY
- EXISTING ROADS
- PROPOSED ROADS
- S.M.C LIMIT
- SUDA LIMIT
- ULCA LIMIT

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0 4KM
SCALE

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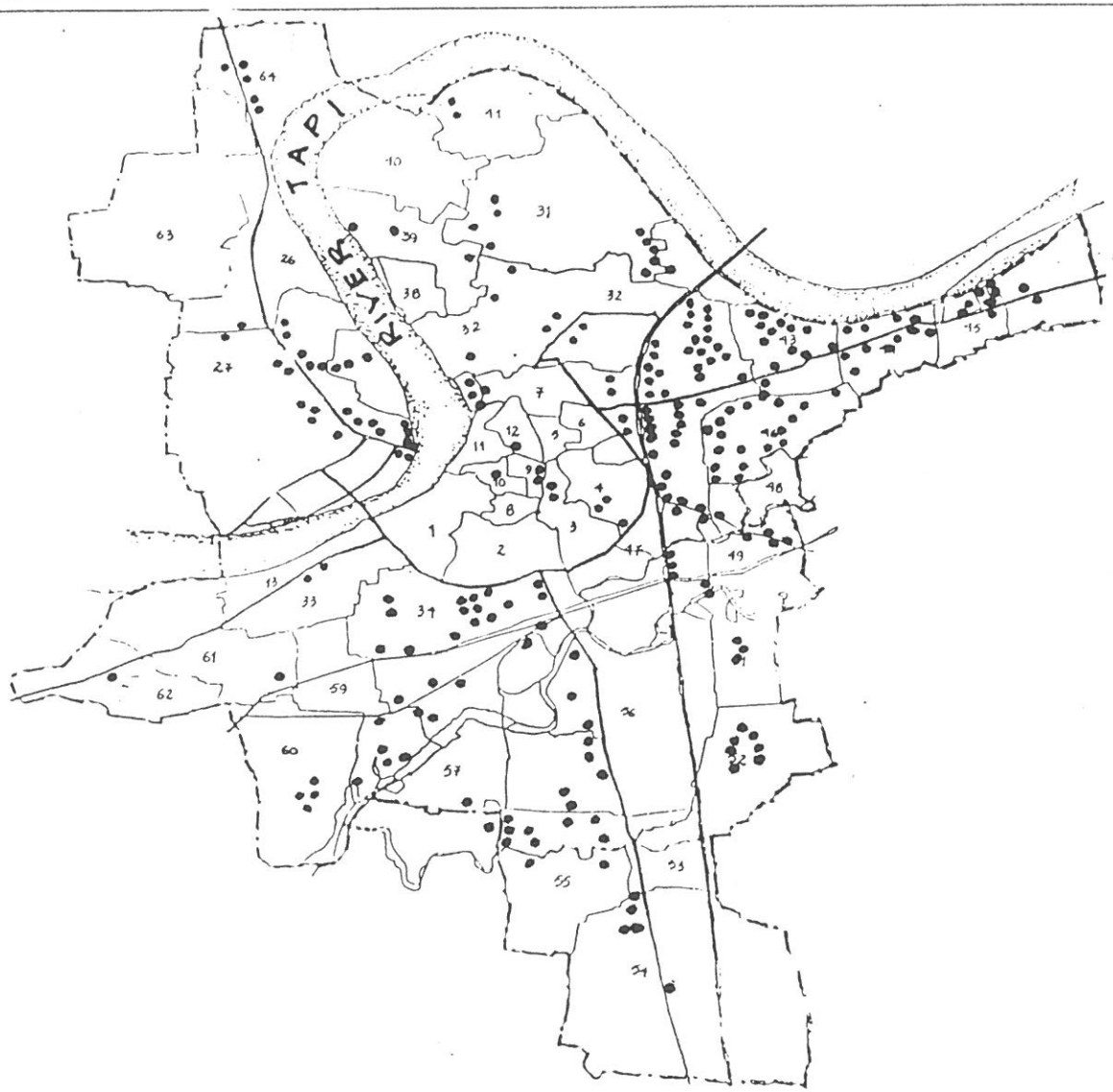
CITY PROFILE, SURAT

PLATE IX



SPATIAL DISTRIBUTION OF SLUMS

LEGEND

SLUM LOCATIONS

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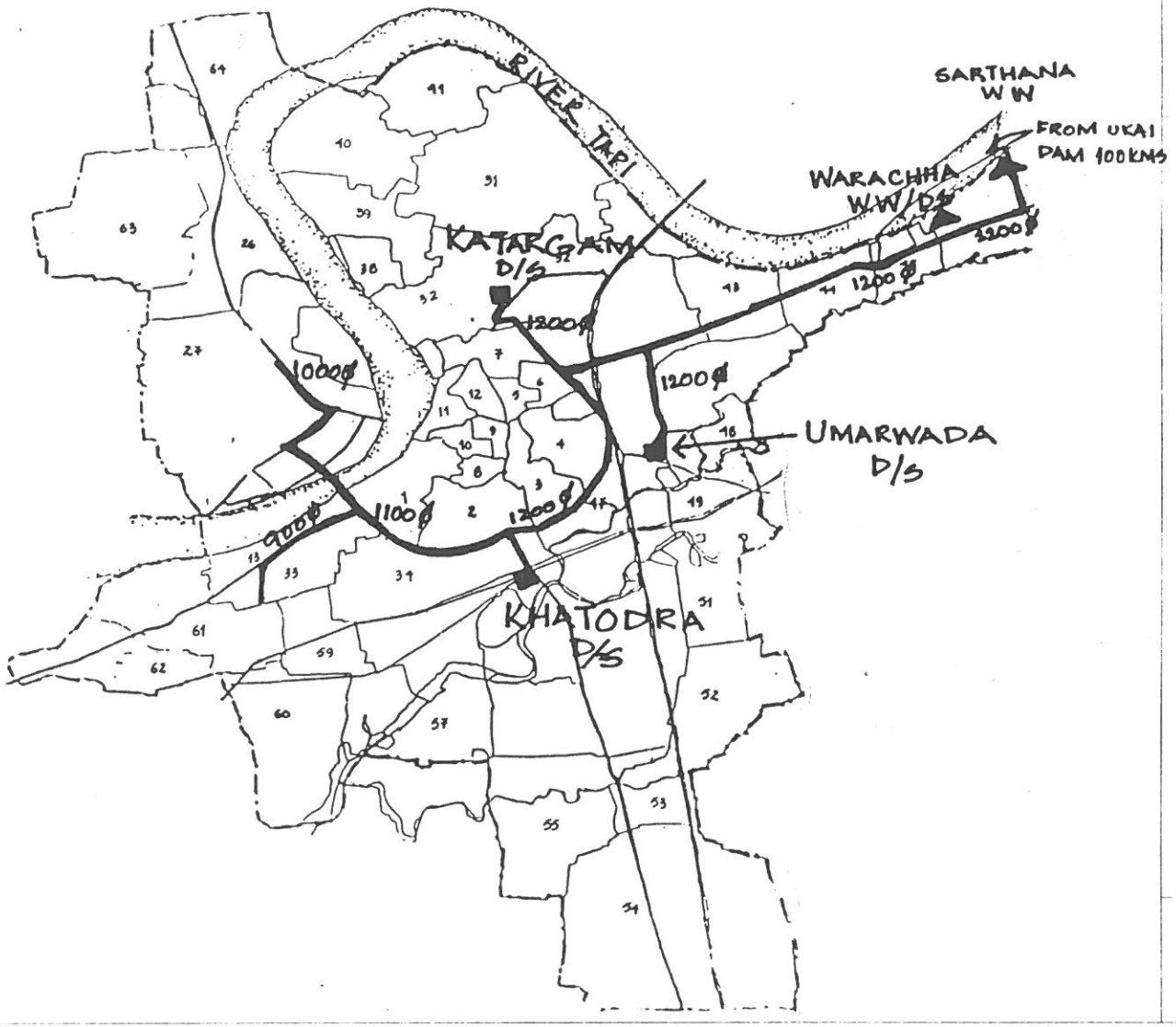
CITY PROFILE, SURAT

PLATE X



SURAT
WATER SUPPLY

LEGEND

- WATER WORKS
- DISTRIBUTION STATIONS
- LINES FOR TRANSMISSION

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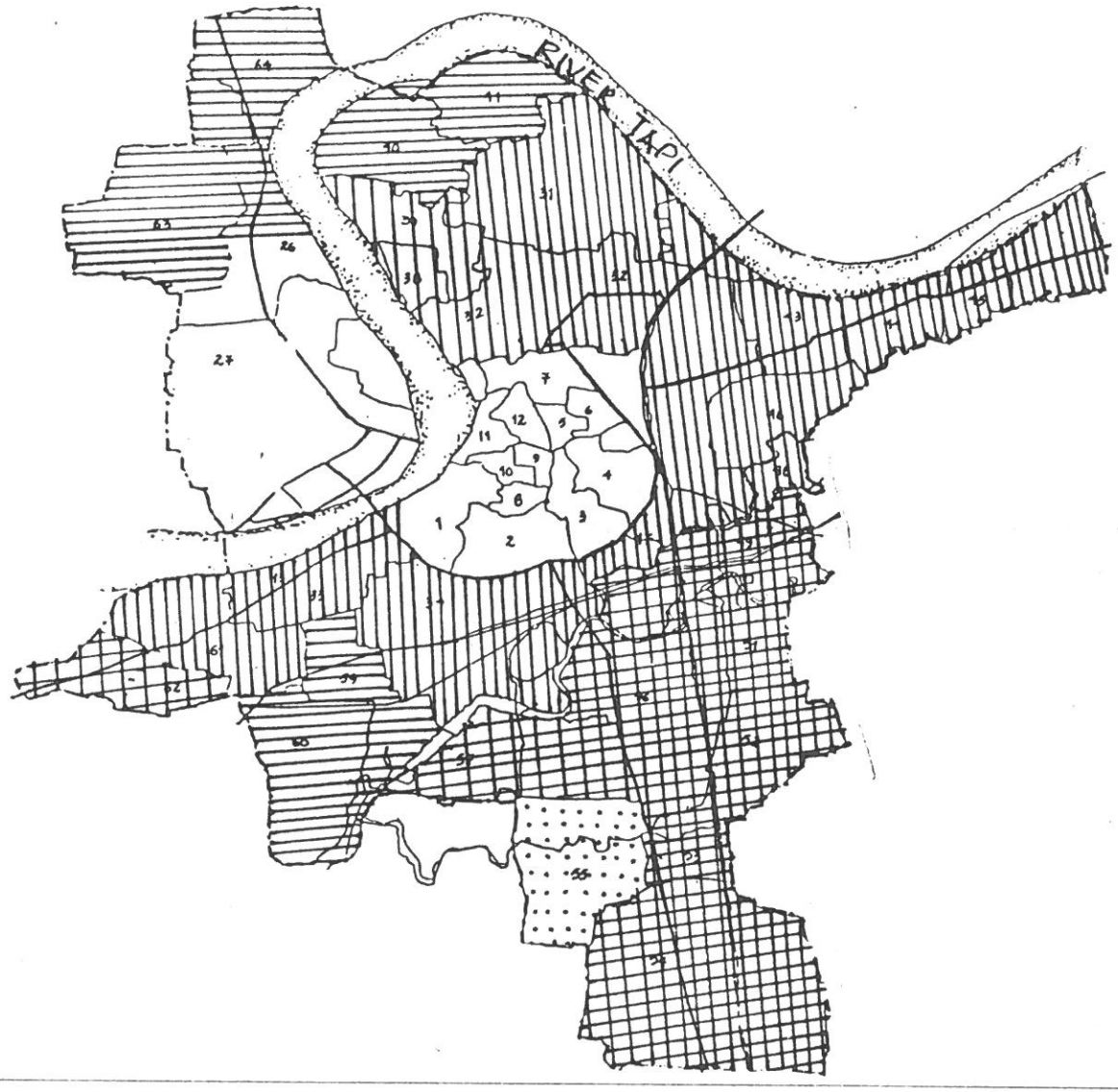
CITY PROFILE, SURAT

PLATE XI



WATER SUPPLY IN DIFFERENT AREAS

LEGEND

- MUNICIPAL
- MUNICIPAL + BORE
- ONLY BORE
- BORE + TANKER
- ONLY TANKER

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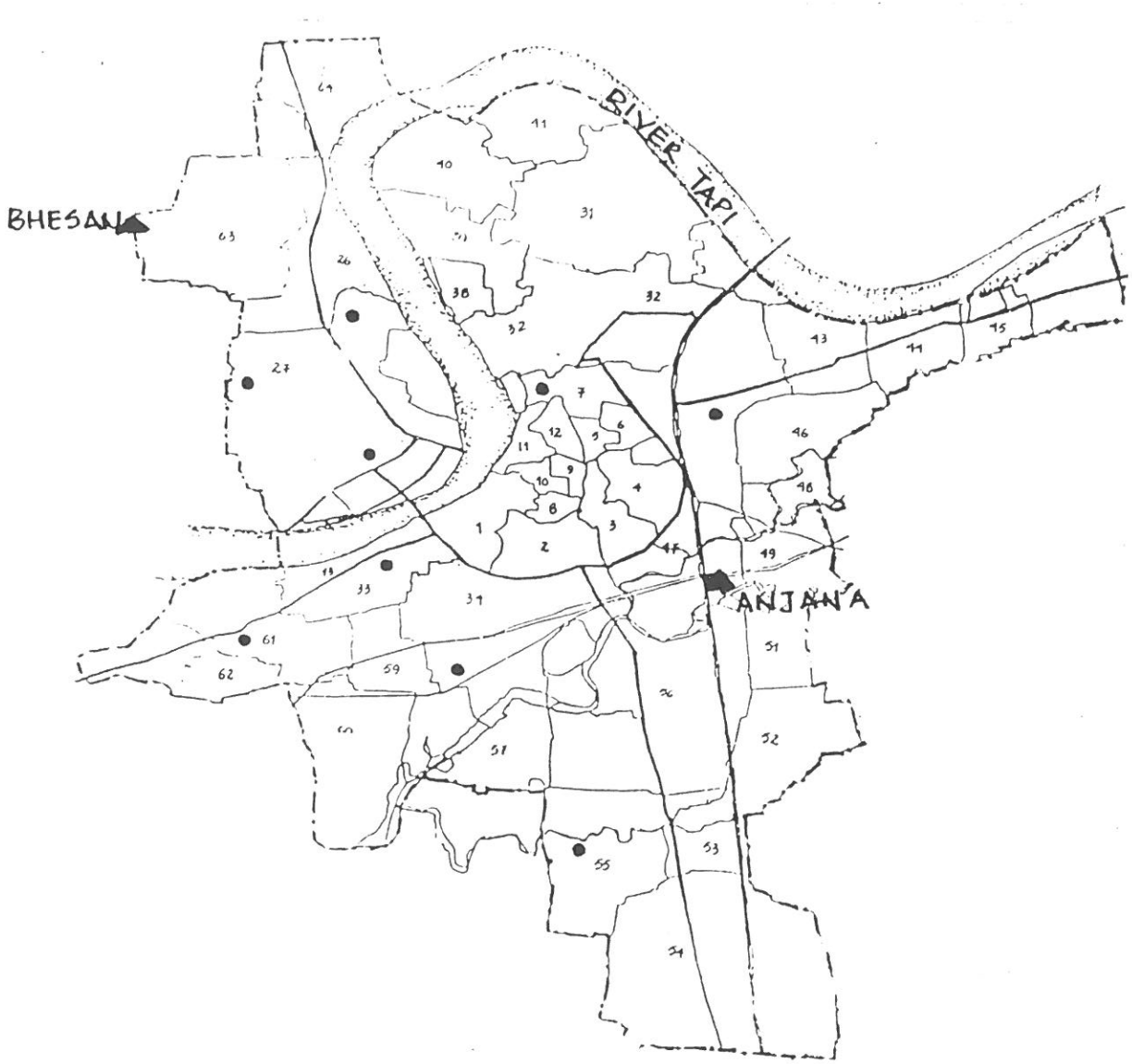
CITY PROFILE, SURAT

PLATE XII



SEWAGE SYSTEM

LEGEND

PUMPING STATIONS

TREATMENT PLANTS

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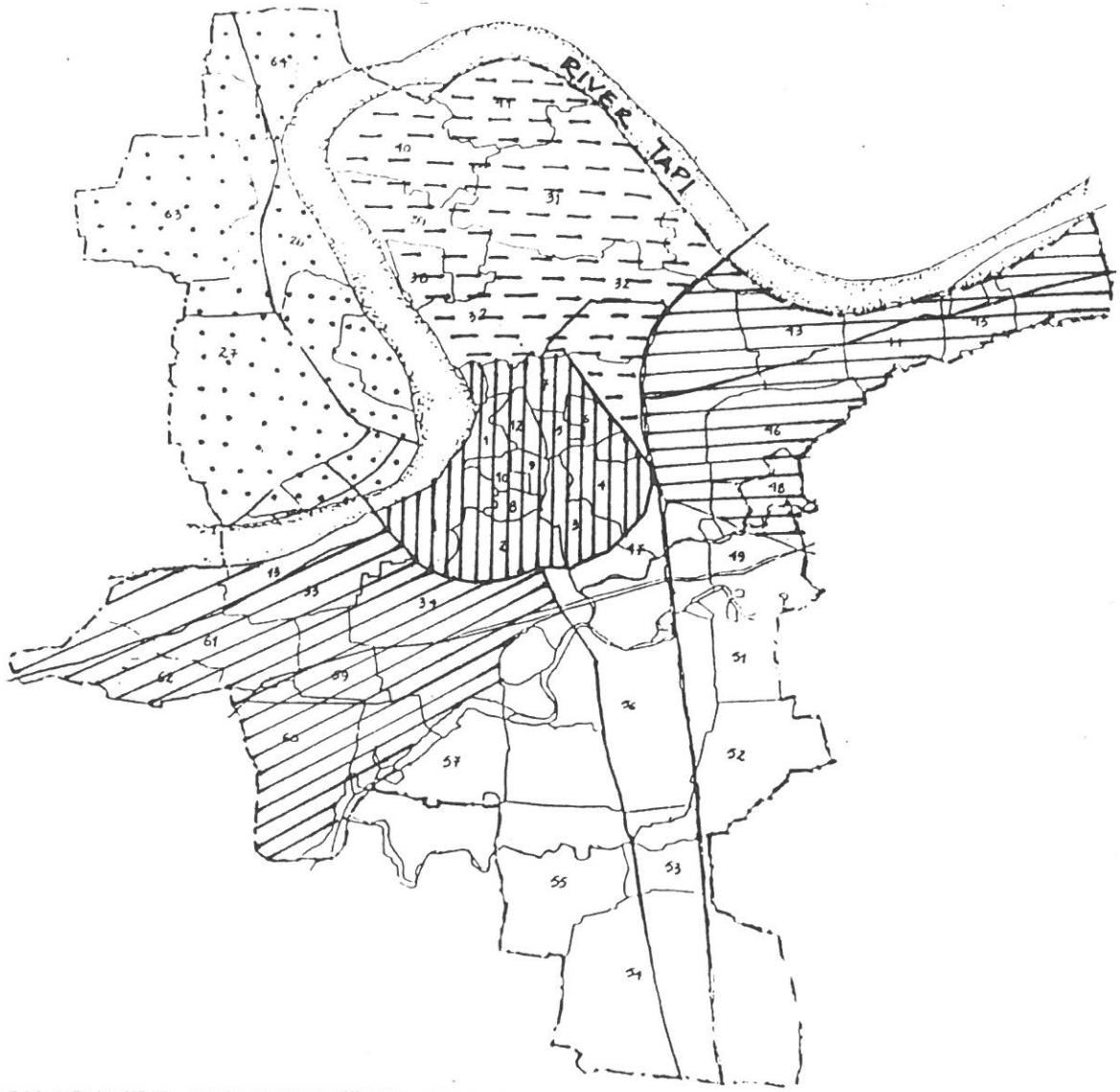

SEWERAGE AND SANITATION ZONES

LEGEND

NORTH ZONE

SOUTH ZONE

CENTRAL ZONE

SOUTH-WEST ZONE

WEST ZONE

EAST ZONE

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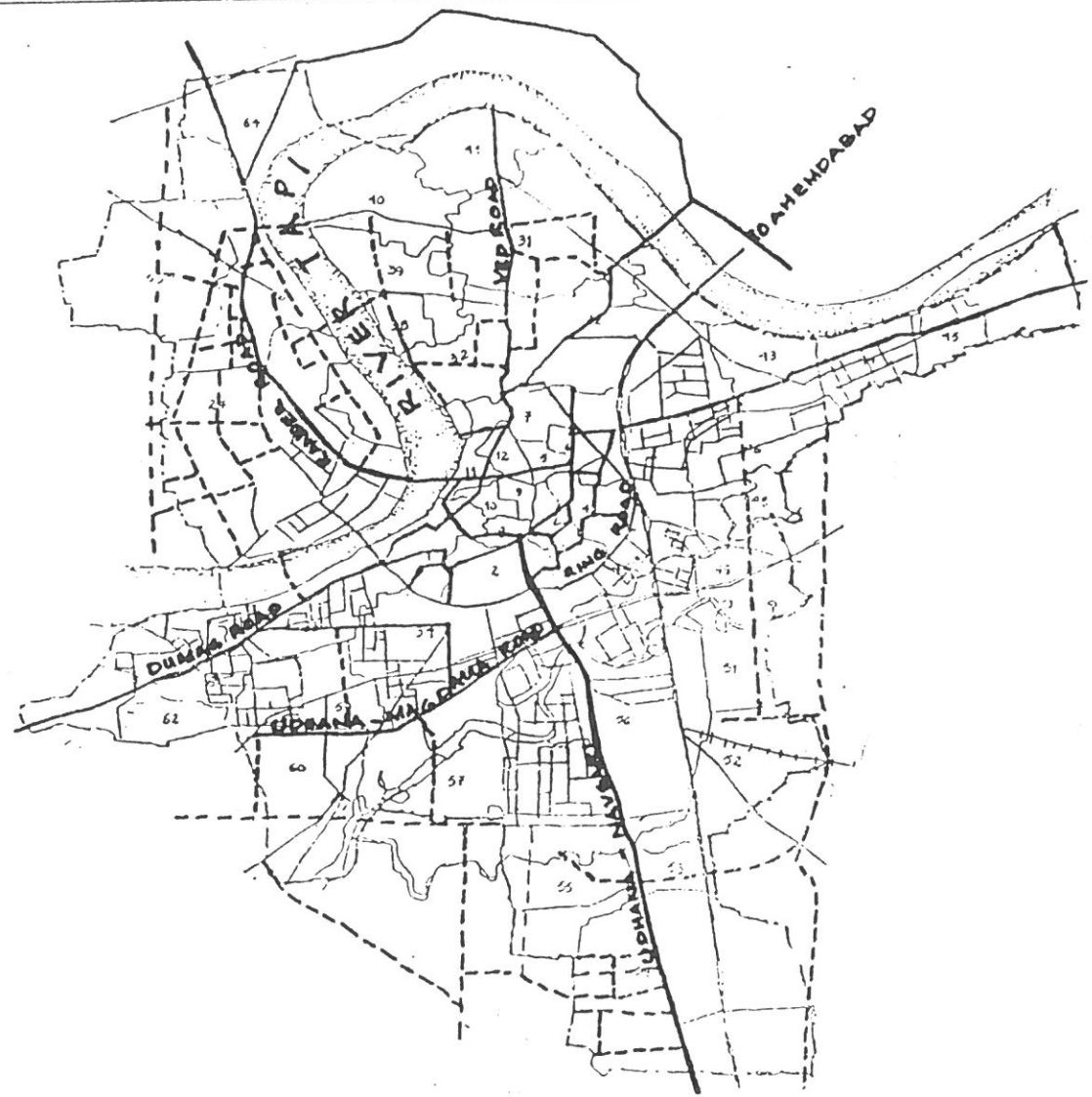
PLATE XIV



EXISTING ROAD NETWORK

LEGEND

- MAJOR ROADS
- MINOR ROADS
- RAILWAY
- PROP. ROAD (SUDA)

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CITY PROFILE, SURAT

PLATE XV

ANNEXURES

PHYSICAL INFRASTRUCTURE : NORMS AND UNIT COSTS FOR SERVICES

A. Water Supply

Table A1 : Norms for Water Supply Network

S.No.	Category	Average	Minimum	Maximum
1	Water supply (lpcd)	150	135	180
2	Distribution network coverage (%)	77	74	79
3	Total storage required (%)	30	25	40
4	Storage capacity ratio	90	42	199
5	Total treatment required (%)	80	75	100
6	Population dependent on house service connection (%)	59	36	78
7	Persons per standpost/hand pump	127	54	227

Table A2 : Water Supply Service Level Recommendations

Institutions/ Committees	Levels
Ministry of Urban Affairs and Employment	150 lpcd
CPHEEO	150-200 lpcd
Eighth Five Year Plan	125 lpcd
TCPO	180 lpcd

Table A3 : Unit Costs for Project Costing - Water Supply (1996 Prices)

Service	Cost in Rs. 100,000
Source and trunkline	12.00 per MLD
Treatment facility	10.00 per MLD
Distribution network	12.75 per Km.
Storage facilities	20.00 per ML

Table A4 : Water Supply Projections : Low level Option

Head	Existing 1997	Additional Requirement 1997-2001	Additional Requirement 2001-2011
Total water required (MLD)			
Total water supply @ 135 lpcd (MLD)	328	432	563
Total storage (ML) @ 25% total requirement	82.09013	107.9578	140.697
Treatment facilities @ 75% total requirement	246.2704	323.8734	422.091
Distr. network area coverage (Low std. 74%)	237	309	415
Shortages if the requirements are as above			
Total water supply @ 135 lpcd (MLD)	128.3605	75.83125	130.9568
Total storage (ML) @ 25% total requirement		16.95781	25.86769
Treatment facilities @ 75% total requirement	46.27038	123.8734	98.21756
Distr. network area coverage (Low std. @ 74%)	72	72	107

Source : Study estimates.

Table A5 : Water Supply Projections : Medium level Option

Head	Existing 1997	Additional Requirement 1997-2001	Additional Requirement 2001-2011
Total water required (MLD)			
Total water supply @ 150 lpcd (MLD)	365	480	625
Total storage (ML) @ 30% total requirement	109	144	188
Treatment facilities @ 80% total requirement	292	383.85	500.256
Distri. network area coverage (medium std.@ 77%)	237	326	432
Shortages if the requirements are as above			
Total water supply @ 150 lpcd (MLD)	164.845	123.8125	145.5075
Total storage (ML) @ 30% total requirement	18.45	52.94	34.49
Treatment facilities @ 80% total requirement	91.876	183.85	116.406
Distri. network area coverage (medium std.@ 77%)	89	89	107

Source : Study estimates.

Table A6 : Water Supply Requirements : High level Option

Head	Existing 1997	Additional Requirement 1997-2001	Additional Requirement 2001-2011
Total water required (MLD)			
Total water supply (MLD) (high std. @180 lpcd)	438	576	750
Total storage (ML) @ 40% total requirement	175.13	230.31	300.15
Treatment facilities (MLD) @ 100% total requirement	437.81	575.78	750.38
Distribution network (km.) (Area coverage @ 79%)	237	337	443
Shortages if the requirements are as above			
Total water supply (MLD) (high std. @180 lpcd)	238	220	175
Total storage (ML) @ 40% total requirement	84	139	55
Treatment facilities (MLD) @100% total requirement	238	376	175
Distribution network (km.) (Area coverage @ 79%)	100	100	107

Source : Study estimates.

B. Sewerage and Sanitation

Table B1 : Norms of Sewerage and Sanitation

Category	Average	Min.	Max.
Safe disposal system coverage (% HH)	44	28	84
UGD network coverage (% area)	26	0	78
Population covered by septic tanks (%)	16	2	32
Population covered by LCS (%)	2	0	4

Table B2 : Cost Estimates for Sewerage per MLD (1996 prices)

(in million Rs.)

Head	Capital cost	Land cost	Total cost
Average cost of treatment processes	2.10	1.16	3.25
Capital cost includes cost of civil works, mechanical works and electric works			
Cost of UGD per sq.km.	25.60		

C. Roads and Street Lights

On an average 20 per cent of the entire city/town area under roads is considered to be the norm.

Table C1 : Norms for Type of Road and Street lights

(%)

S.Nos.	Category of Roads	Average	Minimum	Maximum
1	BT/Concrete surface (%)	85.00	70.00	100.00
2	WBM surface (%)	15.00	30.00	0.00
	100% of all roads with high to medium traffic should be black topped, while the rest should be at least WBM			
3	Staff per km of road length (Nos.)	0.58	0.05	1.12
	Min. No. of staff required for maintenance of roads as per Highway Stds. is 0.30 per/km.			
4	Area under roads (%)	17	15	20
5	Average street lights spacing (mts.)	28	23	35

Note : 20% of the area should be under roads.

Table C2 : Costs for Road Conversion and New Construction (1996 prices)

Services	Project Costs (Rs. 100,000/Km.)
Upgradation Conversion Costs (Rs. 100,000/km.)	
Metal to BT	8.50
Metal to WBM	7.00
WBM to BT	4.00
New Formation - Capital Costs (Rs. 100,000/km.)	
WBM	5.50
BT	14.00

Source : State Finance Commission, Tamil Nadu.

Note : Average road width is assumed to be 12 metres.

D. Solid Waste Management

Table D1 : Norms for Solid Waste Management

S.Nos.	Category of Roads	Average	Minimum	Maximum
1	Per capita waste generated/day (grams)	447	333	687
2	Collection performance (%)	83	74	90
	A collection performance of 80 % and above is desirable			
3	Average distance between dustbins (mts.)	816	230	2151
	The average dust bin spacing should not be more than 100m, so that a dust bin is not more than 50 m. away from any house			
4	Vehicle capacity adequacy ratio (%)	31	11	68
	Vehicular carrying capacity required for complete garbage disposal depends on the number of trips performed in collection of garbage disposal			
5	Road length/conservancy staff (mts.)	280	145	364
	Avg. road length/sweeper should be around 300-600 mts. depending on density of population.			
6	Collection performance (%)	83	74	90
	An overall collection performance of 80 % and above is desirable			

Unit costs are available only for dustbins (based on the costs incurred by SMC in buying bins, at 1996 prices), any other could not be arrived at .

Table D2 : Unit Costs for Dustbins

Capacity (cu. mts.)	Cost/bin (Rs.)
2-3 cu.mts.capacity	15000
4.5 cu.mts.capacity	25000

Source : SMC.

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			SEWERAGE					
	DISTRICT	NAGAR PALIKA	PRESENT sewerage SYSTEM	METHOD OF sewerage DISPOSAL	POPULATION SERVED	POPULATION NOT SERVED	% OF POPULATION SERVED
1	AHMEDABAD	GHATLODIA					0
1	AHMEDABAD	RANIP				60537	
1	AHMEDABAD	VIRAMGAM	1	1	35000	15698	69
1	AHMEDABAD	BAVLA	23			25391	0
1	AHMEDABAD	CHANDLODIA			34667	0	100
1	AHMEDABAD	DEHGAM	24			31378	0
1	AHMEDABAD	DHOLKA				49860	
1	AHEMDABAD	SANAND				25674	0
1	AHEMDABAD	VEJALPUR				92116	0
1	AHMEDABAD	MEMNAGAR				23518	
1	AHMEDABAD	AHMEDABAD	1	7	2241738	634972	
2	SABARKANTHA	HIMMATNAGAR	6	5		51461	0
2	SABARKANTHA	MODASA	6	6		42035	0
2	SABARKANTHA	KHEDBRAHMA				17231	
2	SABARKANTHA	PRANTIJ				20722	
2	SABARKANTHA	TALOD				15197	
3	AMRELI	AMRELI	1	2	40696	27131	62
3	AMRELI	BAGSARA	5		12771	15618	0
3	AMRELI	KODINAR				26643	0
3	AMRELI	RAJULA				26571	
3	AMRELI	CHALALA				16193	0
3	AMRELI	JAFRABAD				17553	
3	AMRELI	LATHI				16558	0
4	KUTCHCHH	GANDHIDHAM	1		110000	104585	100
4	KUTCHCHH	ANJAR	1	4	32000	19209	62
4	KUTCHCHH	BHUJ	1	2	84000	7023	92
4	KUTCHCHH	BACHUA	4	5		18408	0
4	KUTCHCHH	MANDVI				36636	
4	KUTCHCHH	RAPAR	4			16466	0
5	JAMNAGAR	DWARKA		2	27824		0
5	JAMNAGAR	KHAMBHALIA	2	7	31794		0
5	JAMNAGAR	BHANWAD	2	4	12000	4715	72
5	JAMNAGAR	DHROL				17058	
5	JAMNAGAR	JAMJODHPUR	2	4	20615	0	0
5	JAMNAGAR	KALAWAD	2	4	21026	0	100
5	JAMNAGAR	NAVAGAM GHED				17997	
5	JAMNAGAR	SALAYA	2	4	19363	0	100
5	JAMNAGAR	JAMNAGAR	1			341637	
6	RAJKOT	DHORAJI				80584	
6	RAJKOT	GONDAL	12	1	25000	56611	31
6	RAJKOT	JETPUR	2	8	95297	0	100

			SEWERAGE				
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED POPULATION	%OF POPULATION SERVED
6	RAJKOT	MORVI	1		36603	0	100
6	RAJKOT	JASDAN				42032	
6	RAJKOT	RAIYA	5	5	28088	0	0
6	RAJKOT	UPLETA	2	4	40000	33560	79
6	RAJKOT	WAKANER	2		38333	13468	0
6	RAJKOT	BHAYAVADAR		6	17745	300	98
6	RAJKOT	MAVDI	3			22258	0
6	RAJKOT	NANAMAVA	34			16765	0
6	RAJKOT	RAJKOT	12			559407	
7	KHEDA	NADIAD	13	1	100000	67051	60
7	KHEDA	KHAMBHAT	1	4	76746	0	100
7	KHEDA	BALASINOR	1	3		29596	0
7	KHEDA	BORSAD	13	3		46821	0
7	KHEDA	CHAKLASI	2		10000	21833	31
7	KHEDA	KAPADVANJ	1	3	41016	0	100
7	KHEDA	MEMDABAD				26103	
7	KHEDA	PETLAD	12	3	8000	40552	16
7	KHEDA	UMRETH	1	3	0	30082	0
7	KHEDA	ANKLAW	2	5		15431	0
7	KHEDA	BORIAVI	1	1		15033	0
7	KHEDA	DAKOR	1	2		19495	0
7	KHEDA	KARAMSAD	13	3	17532	3600	83
7	KHEDA	KHEDA	2		20000	1792	92
7	KHEDA	MAHUVA				15809	
7	KHEDA	OAD		2		19424	0
7	KHEDA	VALLABH VIDYANAGA	1	3		21560	0
8	JUNAGADH	JUNAGADH				130484	
8	JUNAGADH	PORBANDAR	6	2	160167		0
8	JUNAGADH	KEHSOD				50172	
8	JUNAGADH	VERAVAL		2	80947	15248	70
8	JUNAGADH	CHHAYA	2	4	26028	0	100
8	JUNAGADH	MANGROL			44217	0	0
8	JUNAGADH	UNA				38729	
8	JUNAGADH	ADITYANAGAR				19607	
8	JUNAGADH	BANTVA				18763	
8	JUNAGADH	CHORWAD	5	5	0	18763	0
8	JUNAGADH	JOSHIPURA				15903	
8	JUNAGADH	KULIYANA	5	5		17434	0
8	JUNAGADH	MANAVADAR				23397	0
8	JUNAGADH	RANAVAV	2	5	20000	-4605	0
8	JUNAGADH	SUTRAPADA				17018	

			SEWERAGE				
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED POPULATION	%OF POPULATION SERVED
9	BANASKANTHA	DEESA	2		62435	0	100
9	BANASKANTHA	PALANPUR				16339	0
9	BANASKANTHA	DHANERA	1		10000	6244	62
9	BANASKANTHA	RADHANPUR	2	4	21000	3101	87
9	BANASKANTHA	THARAD		4		18061	0
10	PANCHMAHALS	DAHOD				66500	
10	PANCHMAHALS	GODHRA	2			96813	0
10	PANCHMAHALS	HALOL	2			27349	0
10	PANCHMAHALS	LUNAWADA	2	1	27962	0	100
10	PANCHMAHALS	DEVGADH BARIA				17608	
10	PANCHMAHALS	JHALOD	2	1		20355	0
10	PANCHMAHALS	KAALOL		1	18572	0	100
10	PANCHMAHALS	SANTRAMPUR	2		0	13921	0
11	BHAVNAGAR	BOTAD				64603	
11	BHAVNAGAR	MAHUVA	1	1	39000	20912	65
11	BHAVNAGAR	SAVAR KUNDA	1	3	56250	8565	86
11	BHAVNAGAR	PALITANA				41870	0
11	BHAVNAGAR	SIHOR				34008	
11	BHAVNAGAR	GARIADHAR	2		12493	7230	65
11	BHAVNAGAR	GHADHDA				21955	
11	BHAVNAGAR	TALAJA	1	1	9900	8065	55
11	BHAVNAGAR	BHAVNAGAR	1	7	350000	52338	
12	MEHSANA	KADI		1		42899	0
12	MEHSANA	KALOL	123			88201	0
12	MEHSANA	MEHSANA	2	3		96112	0
12	MEHSANA	PATAN	23	6		97025	0
12	MEHSANA	SIDHPUR				51794	
12	MEHSANA	UNJHA				57839	
12	MEHSANA	VISNAGAR				82137	
12	MEHSANA	VADNAGAR	2	4	25167	0	100
12	MEHSANA	CHANASMA	2	6		16216	0
12	MEHSANA	HARIJ	2	6		16663	0
12	MEHSANA	KHERALU				18267	
12	MEHSANA	MANSA	2			23571	0
12	MEHSANA	VIJAPUR	2			19115	0
13	VADODARA	DABHOI	1	1	35000	15641	69
13	VADODARA	CHOTTA UDIAPUR				19006	
13	VADODARA	KARJAN	2			18432	0
13	VADODARA	PADRA				28150	
13	VADODARA	SAVLI				15036	
13	VADODARA	VADODARA	1	7	773510	257837	
14	VALSAD	NAVSARI	1	2	126089	0	100

			SEWERAGE					
	DISTRICT	NAGAR PALIKA	PRESENT SYSTEM	METHOD OF DISPOSAL	NO. SER	NOT SERVED	POPULATION	%OF POPULATION SERVED
14	VALSAD	VALSAD	1	1	48000	22314		
14	VALSAD	VAPI		1	46462	0		
14	VALSAD	VIJALPOR	2	3	31533	0		
14	VALSAD	DHARAMPUR	1	2	6088	23215		
15	SURAT	BARDOLI	1	1	20000	17995		
15	SURAT	VYARA	6			19863		
15	SURAT	SURAT	1		1011868	646932		
16	SURENDRANAGAR	SURENDRANAGAR	2	2		116371		
16	SURENDRANAGAR	DHRANGADHRA	2	2		30908		
16	SURENDRANAGAR	LIMBDI				57961		
16	SURENDRANAGAR	VADHVAN	2	2				100
16	SURENDRANAGAR	HALVAD		2		19576		
16	SURENDRANAGAR	THANGADH	1	2		35284		
17	BHARUCH	BHARUCH				133102		
17	BHARUCH	ANKLESHWAR	1	3	30000	41888		
17	BHARUCH	JAMBUSAR	1	4	20000	11561		
17	BHARUCH	RAJPIPLA	2	4		24777		

ANNEXURE II

INFRASTRUCTURE SERVICES PRESENT LEVELS

				WATER SUPPLY						
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	dailyQUANTITY of water supply (mld)	Litres per Capita per Day	Population served WITH Pipe Line
1	AHMEDABAD	GHATLODIA	B	62248	84689	106810	128612			
1	AHMEDABAD	RANIP	B	60537	81482	102129	122477	53	104	48430
1	AHMEDABAD	VIRAMGAM	B	50698	54496	57950	61060	60	120	50000
1	AHMEDABAD	BAVLA	C	25391	30469	35475	40408	2	67	27000
1	AHMEDABAD	CHANDLODIA	C	34667	41600	48434	55170	23	63	8000
1	AHMEDABAD	DEHGAM	C	31378	38281	45086	51793	21	78	59000
1	AHMEDABAD	DHOLKA	C	49860	57557	64727	71370	24	67	35743
1	AHEMDABAD	SANAND	C	25674	29064	32408	35708	25	100	25000
1	AHEMDABAD	VEJALPUR	C	92116	115555	138660	161431	60	150	40000
1	AHMEDABAD	MEMNAGAR	D	23518	28935	34275	39538	12	66	18814
1	AHMEDABAD	AHMEDABAD	M	2876710	3457574	4015084	4549241	463	135	2576710
2	SABARKANTHA	HIMMATNAGAR	B	51461	66092	79940	93006	27	67	41000
2	SABARKANTHA	MODASA	C	42035	51721	61497	71363	34	80	42035
2	SABARKANTHA	KHEDBRAHMA	D	17231	22032	26219	29791	9	66	13785
2	SABARKANTHA	PRANTIJ	D	20722	24017	27127	30052	11	66	16578
2	SABARKANTHA	TALOD	D	15197	17272	19403	21590	8	66	12158
3	AMRELI	AMRELI	B	67827	82955	97109	110287	0	7	64436
3	AMRELI	BAGSARA	C	28389	29198	33893	42474	14	48	28381
3	AMRELI	KODINAR	C	26643	31910	37089	42178	2	67	35000
3	AMRELI	RAJULA	C	26571	32161	37881	43729	24	67	35743
3	AMRELI	CHALALA	D	16193	19323	22661	26207	8	67	12000
3	AMRELI	JAFRABAD	D	17553	21968	26282	30494	9	66	14042
3	AMRELI	LATHI	D	16558	19351	21972	24423	10	66	15000
4	KUTCHCHH	GANDHIDHAM	A	104585	134036	166916	203227	150	136	1101618
4	KUTCHCHH	ANJAR	B	51209	61285	73239	87070	51	84	62000
4	KUTCHCHH	BHUJ	B	91023	124681	149681	177175	120	100	120000
4	KUTCHCHH	BACHUA	C	18408	22078	25696	29261	15	75	20000
4	KUTCHCHH	MANDVI	C	36636	40987	45452	49840	24	67	35743
4	KUTCHCHH	RAPAR	D	16466	20660	25291	30361	9	53	16464
5	JAMNAGAR	DWARKA	C	27824	32356	37368	42858	9	32	27824
5	JAMNAGAR	KHAMBHALIA	C	31794	37866	43777	49526	20	63	31794
5	JAMNAGAR	BHANWAD	D	16715	18431	20034	21524	5	36	14000
5	JAMNAGAR	DHROL	D	17058	20112	22978	25655	9	66	13646
5	JAMNAGAR	JAMJODHPUR	D	20615	22910	24925	26660	17	94	18000
5	JAMNAGAR	KALAWAD	D	21026	25233	29449	33674	21	95	16821
5	JAMNAGAR	NAVAGAM GHED	D	17997	24299	27601	30903	10	66	14398
5	JAMNAGAR	SALAYA	D	19363	22939	26112	28882	7	34	15490
5	JAMNAGAR	JAMNAGAR	M	341637	414915	485879	554529	68	142	480000
6	RAJKOT	DHORAJI	B	80584	89334	98322	104711	71	104	684964
6	RAJKOT	GONDAL	B	81611	94097	107199	120839	41	162	25000
6	RAJKOT	JETPUR	B	95297	91065	106882	121011	130	104	125000

								WATER SUPPLY		
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	QUANTITY	LPCD	NO. SER.WITH PL
6	RAJKOT	MORVI	B	36603	104270	118963	134434	19	19	1000000
6	RAJKOT	JASDAN	C	42032	34217	40931	48229	24	67	35743
6	RAJKOT	RAIYA	C	28088	50438	72470	94183	30	48	61000
6	RAJKOT	UPLETA	C	73560	63820	72057	76513	32	79	40000
6	RAJKOT	WAKANER	C	51801	40873	45174	49506	3	8	33013
6	RAJKOT	BHAYAVADAR	D	18045	21643	25190	28685	12	66	17745
6	RAJKOT	MAVDI	D	22258	26696	31071	35382	17	66	25000
6	RAJKOT	NANAMAVA	D	16765	20107	23401	26648	45	227	20000
6	RAJKOT	RAJKOT	M	559407	693827	823224	947599	92	168	550000
7	KHEDA	NADIAD	A	167051	198118	227509	255224	191	127	150000
7	KHEDA	KHAMBHAT	B	76746	83860	91185	98719	61	79	98618
7	KHEDA	BALASINOR	C	29596	34204	39398	45180	36	129	28000
7	KHEDA	BORSAD	C	46821	54831	62872	70945	49	123	40000
7	KHEDA	CHAKLASI	C	31833	38199	44474	50659	1	7	12000
7	KHEDA	KAPADVANJ	C	41016	45915	51049	56418	12	29	41016
7	KHEDA	MEMDABAD	C	26103	30512	34768	38869	18	67	27074
7	KHEDA	PETLAD	C	48552	54059	58573	62093	24	67	35743
7	KHEDA	UMRETH	C	30082	33392	35684	38655	45	157	30082
7	KHEDA	ANKLAW	D	15431	18507	21539	24528	8	66	12345
7	KHEDA	BORIAVI	D	15033	18030	20984	23896	13	66	19000
7	KHEDA	DAKOR	D	19495	22890	25053	26907	21	108	19000
7	KHEDA	KARAMSAD	D	21132	25345	29498	33591	2	16	15600
7	KHEDA	KHEDA	D	21792	25157	28387	31481	14	70	20000
7	KHEDA	MAHUVA	D	15809	18705	21560	24373	8	66	12647
7	KHEDA	OAD	D	19424	23301	27123	30889	16	84	19428
7	KHEDA	VALLABH VIDYANAGAR	D	21560	24460	27737	30690	6	13	49000
8	JUNAGADH	JUNAGADH	A	130484	186518	214951	243493	138	117	104387
8	JUNAGADH	PORBANDAR	A	115639	129368	139263	146356	113	118	92511
8	JUNAGADH	KEHSOD	B	50172	64499	79779	96011	44	104	426462
8	JUNAGADH	VERAVAL	B	96195	114470	132073	146784	88	97	90000
8	JUNAGADH	CHHAYA	C	26028	34182	42168	50266	17	67	26028
8	JUNAGADH	MANGROL	C	44217	53790	62091	69986	28	70	40000
8	JUNAGADH	UNA	C	38729	46990	55576	64486	2	67	35743
8	JUNAGADH	ADITYANAGAR	D	19607	19311	22928	26484	10	66	15686
8	JUNAGADH	BANTVA	D	18763	16112	16304	15971	10	66	15010
8	JUNAGADH	CHORWAD	D	18763	22504	26192	29826	3	15	20500
8	JUNAGADH	JOSHIPURA	D	15903	19346	22740	26085	8	66	12722
8	JUNAGADH	KULIYANA	D	17434	19799	21451	22388	7	37	17432
8	JUNAGADH	MANAVADAR	D	23397	28372	32826	36757	20	66	30000
8	JUNAGADH	RANAVAV	D	15395	23063	26485	29871	4	40	10000
8	JUNAGADH	SUTRAPADA	D	17018	21321	25563	29743	9	66	13614

								WATER SUPPLY		
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	QUANTITY	LPCD	NO. SER.WITH PL
9	BANASKANTHA	DEESA	B	62435	78274	95330	113602	77	123	62435
9	BANASKANTHA	PALANPUR	B	16339	99887	119159	138471	14	104	138882
9	BANASKANTHA	DHANERA	D	16244	19483	22676	25823	17	85	20000
9	BANASKANTHA	RADHANPUR	D	24101	26939	29810	32712	15	56	25000
9	BANASKANTHA	THARAD	D	18061	22959	27809	32611	12	66	18061
10	PANCHMAHALS	DAHOD	B	66500	77415	88412	99491	59	104	565250
10	PANCHMAHALS	GODHRA	B	96813	113410	128615	142428	65	98	27549
10	PANCHMAHALS	HALOL	C	27349	32913	39273	46429	15	56	27549
10	PANCHMAHALS	LUNAWADA	C	27962	32830	37386	41630	9	30	29762
10	PANCHMAHALS	DEVGADH BARIA	D	17608	19979	22166	24168	9	66	14086
10	PANCHMAHALS	JHALOD	D	20355	24413	28413	32356	11	92	12000
10	PANCHMAHALS	KAALOL	D	18572	25740	30837	36566	20	105	19000
10	PANCHMAHALS	SANTRAMPUR	D	13921	16538	19359	22044	4	40	10000
11	BHAVNAGAR	BOTAD	B	64603	81443	97655	113239	57	104	549126
11	BHAVNAGAR	MAHUVA	B	59912	71426	81634	90535	14	36	71232
11	BHAVNAGAR	SAVAR KUNDA	B	64815	77705	91134	105102	30	40	75000
11	BHAVNAGAR	PALITANA	C	41870	49073	56331	63643	70	100	70000
11	BHAVNAGAR	SIHOR	C	34008	41207	48921	57150	24	67	35743
11	BHAVNAGAR	GARIADHAR	D	19723	24277	28817	33342	2	13	12823
11	BHAVNAGAR	GHADHDA	D	21955	26649	31645	36945	12	66	17564
11	BHAVNAGAR	TALAJA	D	17965	22183	26153	29875	5	40	17965
11	BHAVNAGAR	BHAVNAGAR	M	402338	488586	577076	667808	65	180	362104
12	MEHSANA	KADI	B	42899	50130	57629	65396	66	130	50733
12	MEHSANA	KALOL	B	88201	99284	115192	129861	64	77	83000
12	MEHSANA	MEHSANA	B	96112	107493	125795	143105	122	104	116751
12	MEHSANA	PATAN	B	97025	111535	127332	143501	136	140	97025
12	MEHSANA	SIDHPUR	B	51794	59071	64301	67484	46	104	440249
12	MEHSANA	UNJHA	B	57839	62526	74488	86889	51	104	491632
12	MEHSANA	VISNAGAR	B	82137	69540	81118	92573	73	104	698165
12	MEHSANA	VADNAGAR	C	25167	28030	30949	33924	15	75	20000
12	MEHSANA	CHANASMA	D	16216	17374	18283	18943	4	25	16216
12	MEHSANA	HARIJ	D	16663	19763	22545	24980	3	9	30000
12	MEHSANA	KHERALU	D	18267	21011	23204	24846	10	66	14614
12	MEHSANA	MANSA	D	23571	27475	31080	34384	9	40	23571
12	MEHSANA	VIJAPUR	D	19115	21300	23072	24431	23	138	16000
13	VADODARA	DABHOI	B	50641	57046	63420	69764	54	98	55000
13	VADODARA	CHOTTA UDIAPUR	D	19006	21881	24228	26047	10	66	15205
13	VADODARA	KARJAN	D	18432	21746	24978	28128	36	195	18432
13	VADODARA	PADRA	D	28150	32076	35292	37798	15	66	22520
13	VADODARA	SAVLI	D	15036	18532	21978	25375	8	66	12029
13	VADODARA	VADODARA	M	1031346	1308822	1591147	1878321	190	141	1350000
14	VALSAD	NAVSARI	A	126089	155064	181619	205754	122	89	126089

								WATER SUPPLY		
	DISTRICT	NAGAR PALIKA	GRADE	POPULATION 1991	POPULATION 2001	POPULATION 2011	POPULATION 2021	QUANTITY	LPCD	NO. SER.WITH PL
14	VALSAD	VALSAD	B	70314	81431	83367	91423	112	140	80000
14	VALSAD	VAPI	C	46462	39325	48148	58001	9	15	58500
14	VALSAD	VIJALPOR	C	31533	36400	40164	46150	3	73	37000
14	VALSAD	DHARAMPUR	D	29303	18851	21166	23533	6	42	12000
15	SURAT	BARDOLI	C	37995	47705	57263	67050	22	76	29000
15	SURAT	VYARA	C	19863	36603	42602	48905	1	28	30908
15	SURAT	SURAT	M	1658800	1953198	2434202	2941829	200	148	1350000
16	SURENDRANAGAR	SURENDRANAGAR	A	116371	126908	146630	165274	117	130	90000
16	SURENDRANAGAR	DHRANGADHRA	B	30908	67181	75766	83716	4	70	6000
16	SURENDRANAGAR	LIMBDI	C	57961	40257	45101	49815	24	67	35743
16	SURENDRANAGAR	VADHVAN	C	49038	58943	68546	78601	35	70	50000
16	SURENDRANAGAR	HALVAD	D	19576	23642	28287	33511	10	50	20000
16	SURENDRANAGAR	THANGADH	D	35284	31159	37496	43783	13	66	20000
17	BHARUCH	BHARUCH	A	133102	153100	173857	195372	190	152	119792
17	BHARUCH	ANKLESHWAR	B	71888	64484	77946	92126	100	222	45000
17	BHARUCH	JAMBUSAR	C	31561	35370	39025	42526	36	1091	33000
17	BHARUCH	RAJPIPLA	C	24777	36713	40385	44129	36	60	26490