peri urban

Institutional Mechansim: Baroda Case Study

"Sustainable settlements in peri-urban areas: with special reference to impacts of transport and energy on natural resources management" (Acronym: periurban)

Programme: Promoting Competitive and Sustainable Growth

Key Action 2: Sustainable Mobility and Intermodality-
Task 2.1.3/4: Accompanying Measure

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CONTENTS

List of Abbreviations

CEO	Chief Executive Officer
DAO	District Agricultural Officer
DCC	District Coordination Committee
DDA	District Development Authority
DPA	District Planning Authority
DPO	District Planning Office
DRDA	District Rural Development Agency
EIA	Environmental Impact Assessment
EPCL	Effluent Channel Project Limited
GIDC	Gujarat Industrial Development Corporation
GRL	Gujarat Refineries Ltd.
GSRTC	Gujarat State Road Transport Corporation
GEDA	Gujarat Energy Development Agency
GWSSB	Gujarat Water Supply and Sewerage Board
GGY	Gokul Gram Yojana
GPCB	Gujarat Pollution Control Board
GSFC	Gujarat State Fertilizer Corporation Ltd
HUDCO	Housing and Urban Development Corporation
IAY	Indira Awas Yojana
IPCL	Indian Petrochemical Corporation Ltd.
IOCL	Indian Oil Corporation Limited
JGSY	Jawahar Gram Samridhee Yojana
LIC	Life Insurance Corporation
MP	Member of Parliament
MLA	Member of Legislative Assembly
NIA	Nandesari Industrial Association
NGO	Non Governmental Organization
PCC	Petro Chemical Complex
PRI	Panchayati Raj Institution
RKY	Rojgar Khatri Yojana
RRWSS	Rural Water Supply Scheme
SGSY	Swarna Jayanti Gram Swarojgar Yojana
SSNL	Sardar Sarovar Nigam Ltd.
TDO	Taluka Development Authority
TP	Taluka Panchayat
VP	Village Panchayat
VUDA	Vadodara Urban Development Authority
VMC	Vadodara Municipal Corporation
WSMP	Watershed Management Programme
ZP	Zilla Panchayat

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1. Introduction

The European Commission has sponsored a study for the sustainable settlements in periurban areas with special reference to impact of transport and energy on natural resources management. There are six partner institutions to carry out work on various work-pages under the above study. The Institute of Rural Management, Anand (IRMA) has been assigned the task of understanding the existing institutions and institutional mechanisms with respect to natural resources management in the periurban areas. The Vadodara case study is one component of IRMA's task under the above assignment.

In this introductory section, a brief description of Vadodara city, objective, scope, methodology and section plans are presented.

1.1. Brief Description of Vadodara City

Vadodara is historic city founded around 1000 B.C. on the banks of river Vishvamitiri. It is located at 22^0N latitude and 73^0E longitude, about 100 km and 400 km from Ahmedabad and Mumbai respectively. A major transport link was established when Bombay and Vadodara were connected by rail in 1870. The Maharaja Sayajirao Gaekwad of Vadodara led the development of education, industry, trade and commerce in and around the city.

In the process, the city witnessed major changes in physical, socio-cultural and economic fronts. Among the consequent problems of industrialization were the growth in population, housing, traffic and transportation, pollution, waste disposal and the like. The industrial growth attracted many rural migrants to the city and Peri-urban areas. The population of Vadodara Municipal Corporation (VMC) area has almost doubled in decades of 1971-81 and 1981-91 and the Vadodara Urban Development Authority (VUDA) area population has shown increase of 25- 35 %. This has created tremendous pressure on the city's infrastructure facilities like housing, public transport, energy supply, water supply and sewerage facilities. Almost 70-80% of the district industries are located in the VUDA Area.

The VUDA is spread over 564.56 square km, including a VMC area of 150 square km. The VUDA area consists of Vadodara city, Vadodara Taluka and small portions of Padra and Vaghodia Taluka. There are 105 villages in the VUDA area from the three talukas. A belt of 8km from the VMC boundary is selected for the purpose of our study.

1.2. Objective and Scope of the Study

The broad objective of Vadodara Case Study is to understand existing institutional mechanisms with respect to natural resource management in Peri-urban regions. The scope of work for the study includes

i. Identifying institutions engaged in peri-urban areas for managing/influencing stock of natural resources (land, water, forest, air) and service providers (energy and transportation)
ii. Analysis of institutions identified with respect to objectives (ownership, access, control, equity, gender, empowerment, creating opportunity, etc.), strategies (decentralization, mobilization, etc.), structures, system of operation (participation, accountability, transparency, advocacy, etc.) and linkage with other organizations.
iii. Detailed study of three villages

1.3. Methodology

A set of both conventional and participatory tools was used for data collection. The details of techniques used are given below.

i. Household level data collection was done using a structured questionnaire in three representative village in the periurban area
ii. Data collection from officials/staff of VUDA, GEB, GEDA, GSRTC, GWSSB, DRDA, Collectorate, Panchayats, NGOs, etc.
iii. For the above set of respondents, Key Informants were identified and interviewed using a Check List covering different issues of the study.
iv. Group discussions were conducted with the villagers using a Check List covering different issues of the study.
v. The data and information collected through above means and the feedback of the workshops were analyzed and incorporated in the draft report.

Both primary and secondary sources of data were used for the study. Secondary sources of data included studies conducted by the government agencies, other organizations and scholars; and Panchayat records. Primary data were generated by using different tools as stated above.

1.4. Section Plan

After the introductory remark in the first section, the general overview of periurban area of Vadodara, institutions involved in management of natural resources and case study of three villages are presented in sections 2, 3 and 4 respectively. Last section contains some concluding remarks.

2. Overview of Periurban Areas of Vadodara

In this section, demographic details, state of natural resources and the institutions engaged in natural resource management in Vadodara taluka that includes both urban and rural areas are presented. The location of Vadodara and the areas of VUDA and VMC are shown in Figures 2.1 and 2.2 respectively.

2.1. Population

In 2001, out of 17.06 lakh population in Vadodara taluka, 87.5% live in the urban area and 12.5% population resides in rural area. In 1991, 85.2% of total population of Vadodara taluka lived in urban area and VMC contributed to 90.3% of total urban population. Hence, for this study, the census data available for urban area of Vadodara taluka is can be a surrogate measure of VMC. The demographic details of population living in Vadodara urban area are presented in Table 2.1 and those in the outskirts (100 rural settlements) are presented in Table 2.2. Between 1971 and 2001, there is 4% compounded annual population growth rate in the urban area of Vadodara. During the same period, the compounded annual rural population growth rate is only 0.46%. A large chunk of the rural area surrounding VMC is in the peri-urban region. Between 1971 and 1991, employment in industry, transportation and trade and commerce has nearly remained same at about 62%. However, in absolute sense the number of non-workers has doubled during the same period.

In rural area, between 1971 and 1991, the number of cultivators has come down by 8% and that of agricultural labourers has gone up by 4%. During the same period, there is 3% drop in industry workforce and 8% increase in transportation services.

Table 2.1: Demographic Details of Vadodara Urban Area

Description	2001	1991	1981	1971
Area of city (km^2)		108.26[1]	108.26	87.7
Total population	14,92,398	10,61,598	7,34,473	4,78,524
No of household		2,19,905	1,41,818	88,659
Total main workers		3,15,994	2,14,037	1,32,618
Type of workers (% of main workers)				
• Cultivators		1	1.4	1.4
• Agricultural labourers		1.3	4.3	1.2
• Livestock, etc.		1	-	0.6
• Quarrying		1.2	-	1.1
• Industry		31.4	-	36.5
• Construction		6	-	3.6
• Trade and commerce		20.7	-	17.1
• Transportation		9.1	-	9.5
• Other services		28.4	94.3	29
Marginal workers		2,469	3,088	-
Non-workers		7,43,135	5,17,348	3,45,906

Source: Census 1991, Series 7 Gujarat, District Census Handbook, Vadodara District, Parts XII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1981, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts XIII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1971, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts X A&B, Village and Town Directory, Village and Townwise Primary Census Abstract

[1] Represents area of Vadodara Municipal Corporation. City area is more than that of VMC area

Table 2.2: Demographic Details of Vadodara Rural Area

Description	2001	1991	1981	1971
Area (km^2)		544.3[2]	538.5	582.3
Total population	2,13,219	1,99,036	2,02,022	1,86,782
No of household		38,807	38,448	35,412
Total main workers		71,800	70,416	62,813
Type of workers (% of main workers)				
• Cultivators		19.7	22.7	28.4
• Agricultural labourers		41	37.1	37.4
• Livestock, etc.		2.6	-	1.1
• Quarrying		0.1	-	0.8
• Industry		21.4	-	18.1
• Construction		1.6	-	1.3
• Trade and commerce		4.6	-	3.5
• Transportation		9.1	-	1.8
• Other services		6.1	40.2[3]	7.5
Marginal workers		4,816	4,776	-
Non-workers		1,22,420	1,26,830	1,23,969

Source: Census 1991, Series 7 Gujarat, District Census Handbook, Vadodara District, Parts XII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1981, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts XIII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1971, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts X A&B, Village and Town Directory, Village and Townwise Primary Census Abstract

[2] Represents all the rural area of Vadodara Taluka and approximately same as the 105 rural settlements around VMC
[3] Includes livestock, quarrying, industry, construction, trade and commerce, transportation and others

Figure 2.1: Location Map of Vadodara

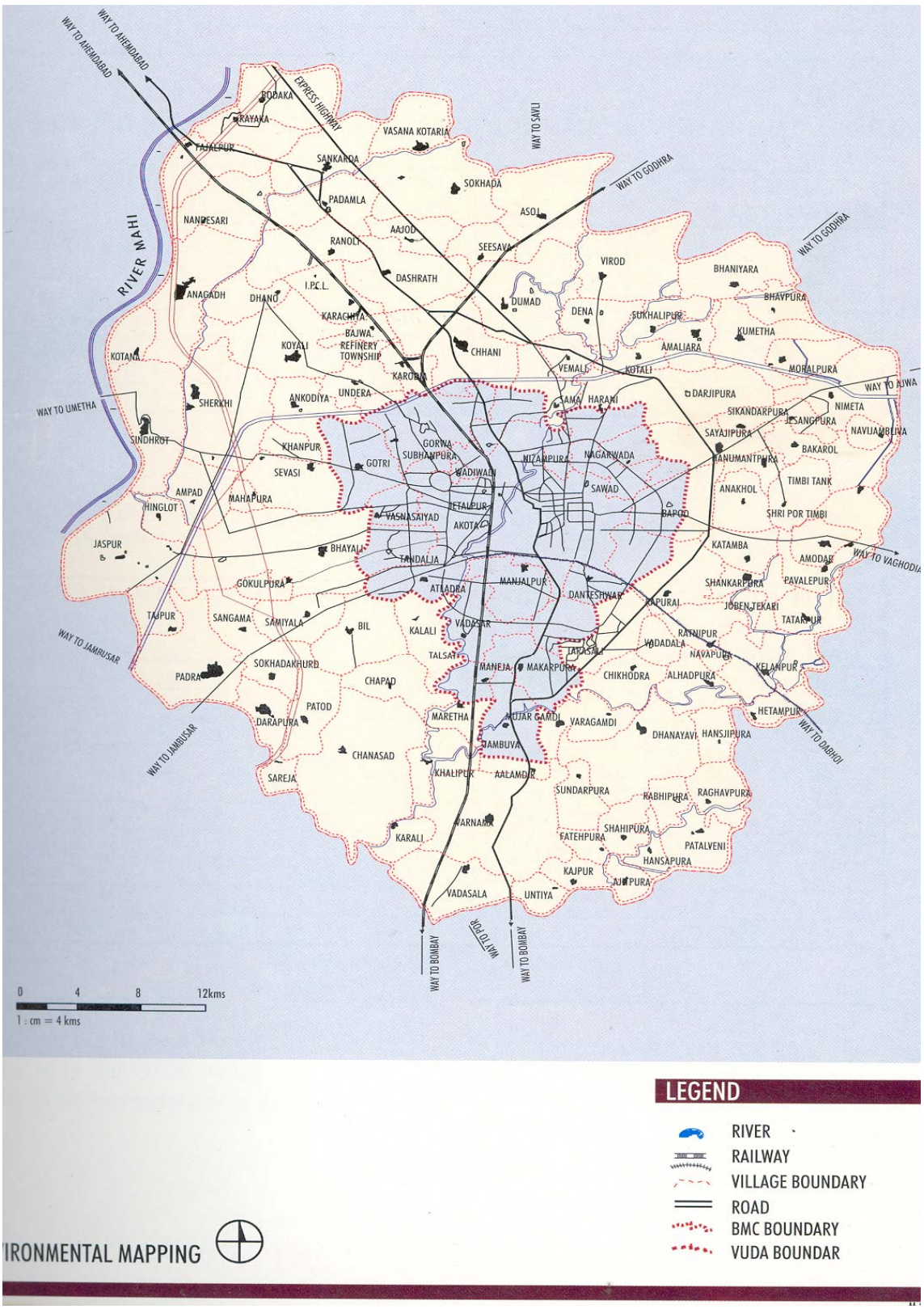

Figure 2.2: Area Under VUDA and VMC

2.2. State of Natural Resources

An overall observation in the region reveals a few elements of inconsistency of planning related to the industrial location in the western corridor. For instance, a vast stretch of land towards Ajwa lake remains barren and unused, while large tracts of highly fertile black cotton soil land surrounded by Bajwa, Nandesari and Ranoli had been used by chemical/polymer industrial units. Large land owners and industries came together to locate industries in fertile agricultural land to take advantage of the benefit from land acquisition and existing road and rail connectivity. However, a rich natural resource in the form of fertile agricultural land was wasted and livelihood of small and marginal farmers in the region was lost.

Additionally, locating industries adjacent to Mahi river resulted in acute ground water pollution in the downstream side of the river. High intensity of ground water consumption by the industries has resulted in steep decline in ground water table. Visible impacts of air and water pollution are seen on the crops and health of residents of villages around industrial areas. At the beginning, although some villagers were optimistic of the benefits of industrial development in their neighbourhood, one can observe a sense of disillusionment and helplessness since last many years.

The process of Industrialization in Vadodara started with large petrochemical and polymer units and over time Vadodara became a hub of chemical industries. There are 678 industries (including 216 medium and 42 small ones) in VUDA area. Some of the major industries such as IPCL, Gujarat Refinery, GACL, GSFC and Deepak Nitrite limited are located in the in the Northern part of VUDA. In south and western region of VUDA, Makarpura, Por, Savli and Kalali industrial estates of GIDC are located. In eastern side of the city golden tobacco is grown and processed. The adverse impact of industry and agriculture on water, air and land quality in the periurban areas are discussed below.

2.3. Water Quality in Periurban Area

Out of 105 villages, 28 villages complain of Ground water pollution as per the records of Gujarat Pollution Control Board (GPCB). However, in reality, all the villages starting from Nandesari in north till Padra in south adjacent to river Mahi face problems of ground water pollution. The agricultural yields have decreased from 20% to 80% even after providing significant amount of inorganic fertilizers and pesticides. Diseases affecting skin, kidney, stomach and overall mental growth are significantly visible in the periurban region.

Mini Mahi, a tributary of river Mahi (that joins at Angadh) has Ph level of 2-3 and one can not breathe comfortably near it. Untreated effluent from Nandesari Industrial estate is the major polluting source for this river. Figures 2.3 and 2.4 indicate the corroded columns of newly constructed bridge of river Mini Mahi near Angadh from the high level of acidity of the river discharge. Unverified

information points to the presence of bore wells for pumping of industrial effluents in to ground water. Over and above the depleted ground water resources, further pollution limits the utility of remaining water for drinking and cultivation purpose as well.

Figure 2.3: Stagnated Effluent in the River Bed

Figure 2.4: Corroded Pillars of Bridge

Sources of Drinking Water

Most of the villages in Vadodara sub-region are dependent on tube-wells, hand pumps and stand posts. The provision of private taps has not reduced the level of dependence on tube well and hand pump. Table 2.3 gives details of drinking water dependence of villages from different sources.

Inter sub-region comparison shows that 76% of villages of Vadodara depend on tube-wells. In Padra sub-region corresponding level of dependence is 100%. Other sources such as the hand pumps, open-wells and lake are considered to be of marginal importance. In Vaghodia sub-region, dependence for drinking water is more on lake and river (30.7).

Table 2.3: Sources of Drinking Water Supply

Source	Number of Villages			Total
	Vadodara	Vaghodia	Padra	
1. Tube well	63(75.9)	3(23.0)	9(100.0)	75(71.4)
2. River	10(12.1)	-		10(9.5)
3. Ajwa-lake	02(2.4)	3(23.0)		05(4.7)
4. Hand pump	02(2.4)	2(15.3)		04(3.8)
5. Open-well	02(2.4)	2(15.3)		04(3.8)
6. River/Tube well	04(4.8)	4(30.7)		08(7.8)
Total	83(100.0)	13(100.0)	9(100.0)	105(100.0)

Note: Figures in the parentheses indicate percentage

For non drinking domestic use, dependence on tanks and ponds is quite pronounced in the case of Vadodara and Vaghodia Sub-region.

Agency responsible for the provision of drinking water

A wide range of agencies is responsible for the provision and maintenance of drinking water supply system (Table 2.4). These are Gujarat Water Supply and Sewerage Board (GWSSB), Village Panchayat (VP), Taluka Panchayat (TP) and other private agencies like the Gujarat State Fertilizer Corporation Ltd. (GSFC), Indian Petrochemical Company Ltd. (IPCL), etc. The interest to supply piped drinking water to villages has primarily come from the fact that a large chunk of ground water is already polluted.

As far as the funding is concerned, the GWSSB raises loans form the Housing and Urban Development Corporation Ltd. (HUDCO), Life Insurance Corporation Ltd. (LIC), while VP and TP get usual funding from the taluka administration and in certain occasions from the discretionary funds of the Member of Parliament (MP) and Member of Legislative Assembly (MLA). In the case of GSFC and IPCL the fundings are from their own sources.

The drinking water supplied by GWSSB is inadequate and unreliable for many villages. Hence, villagers are forced to consume polluted ground water. Additionally, GWSSB's water tariff makes the system financially unviable. Lack of users' ownership, poor participation of the community, inadequate revenue generation (Rs. 14/family/year), weak financial status of villagers and village panchayat, and salt water ingress into Mahi river put a big question mark on the future health of the above drinking water supply program.

Table 2.4: Agencies Responsible for Supplying Drinking Water

Agency responsible	Number of Village Catered			Total
	Vadodara	Vaghodia	Padra	
GWSSB	32(38.6)	4(30.7)	3(34.0)	39(37.1)
Village Panchayat (VP)	20(24.1)	3(23.0)	2(22.0)	25(23.8)
Taluka Panchayat (TP)	15(18.1)	-	-	15(14.2)
VP/GWSSB	03(3.6)	4(30.7)	2(22.0)	9(8.6)
TP/GWSSB	02(2.4)	1(7.6)	-	3(2.9)
JP/GWSSB	01(1.2)	-	-	1(1.0)
Others	10(12.0)	1(8.0)	2(22.0)	13(12.4)
Total	83(100.0)	13(100.0)	9(100.0)	105(100.0)

Note: Figures in the parentheses indicate percentage

2.4. Air Quality in Periurban Area

Vadodara is one of the focal points for industrial growth in Western India. Industrialization, urbanization and growth of transportation vehicles have considerably increased the quantum of suspended particulate matter (Baroda Citizens Council, 1990). Unpleasant fumes and odors, reduced visibility, injury to human health and vegetation by corrosive gases are major environmental problems faced by the urban and periurban dwellers.

A map of air pollution zones marked by the Government of Gujarat (Based on Survey carried out by NIOH for VUDA) is shown in Figure 2.5. Out of 105 villages in VUDA area, 34 villages complain of serious air pollution as per the records of GPCB. Many settlements have reported eye burning, breathing problems due to air pollution. It is a matter of serious concern in the region particularly in winter months.

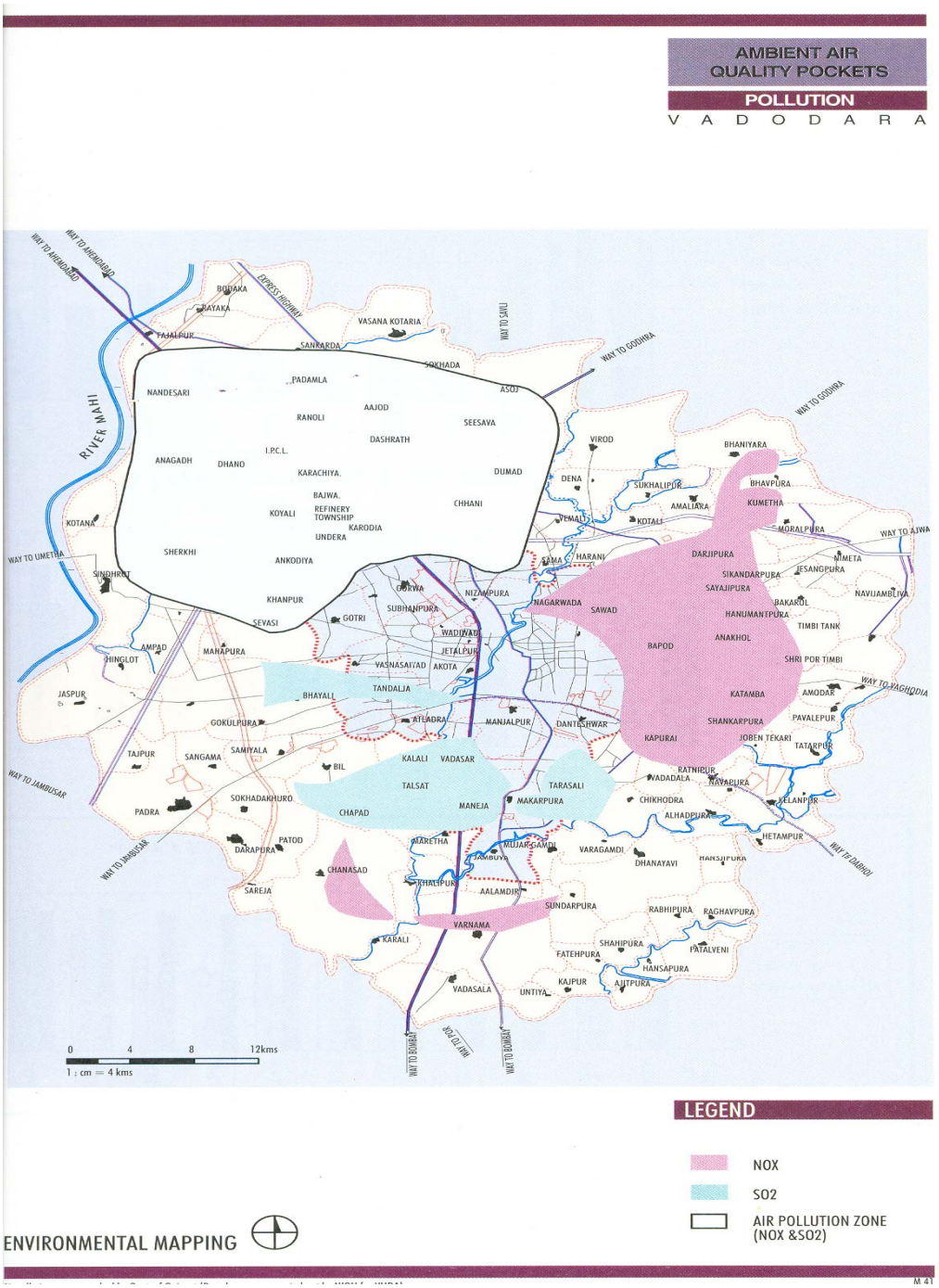

Figure 2.5: Air Quality in VUDA Area

2.5. Land Quality in Periurban Area

Most of the villages depended on Agriculture for their livelihood before industrialization. More than 30 % farmers sold their lands due to good prices offered by industries in the Petrochemical Complex (PCC) area. The belief of farmers that they would develop along with the industry by getting a fair compensation for their land and through employment opportunities in the neighbouring industries remained an illusion. Money received in lieu of land was spent in social functions. In the absence of required skill for the job, most of the local people remained unemployed.

With the growing congestion and pollution in the city it has become a fashion for rich people to acquire periurban land for constructing farm houses/resorts. In some neighbouring villages of Vadodara, as high as 60% of agricultural land has moved the ownership from small/marginal farmers to farm house owners. Often, these farm houses keep the acquired agricultural land barren or use for horticultural crops. In the process, a large chunk of farmers have become wage labourers and without regular wage opportunity. VUDA had proposed to set up a Transportnagar on the junction of Vadodara – Godhra State highway and Vadodara – Mumbai by-pass (National Highway No., 8) to overcome the transportation problem due to movement of goods vehicle in the urban area. The transportnagar would cover 55.59 Hectares of land of village Harni-Kotali and Amaliyara.

On once side the land holding of farmers is decreasing whereas on other side the productivity of the land is reducing very fast due to use of polluted water for cultivation and salt water ingress. The Vadodara District agriculture officer have received several complains regarding land degradation due to industrial pollution from villages in northern and south-western part of the city, such as Chhani, Dasrath, Sherkhi, Koyali, Undera, Sindhrot, Luna Dabhasa Ekalbara, Munjpur and Ranu. As a routine, on receipt of such complains the soil samples are collected by the District Agriculture Office and sent to Krishi Vidhyalaya for investigation and the matter ends there.

In last three decades, the land and water quality has deteriorated to an extent that the yield has declined to 20% of its original value in spite of using hybrid seeds, fertilizers and pesticides. There appears to be no mechanism to revert the process is in sight. The livelihood sustainability of the local residents in these periurban areas is questionable. Rich bio diversity of the area is a story of the past. Leopards that used to move in the ravines of Mahi river are not visible.

2.6. Transportation and Energy Infrastructure Service Quality in Periurban Area

Vadodara is an ancient settlement. Over a period of time the city has grown and today it is a major landmark in the region and an important center for trade and industry. National highway No. 8 passes through the district. State highways and other roads link the district headquarters to all parts of the district. Jambusar-

Padra-Vadodara-Halol and Vadodara-Dabhoi-Tilakwada are the State highways that pass through Vadodara.

Over the last decade and a half, the annual rate of growth of registered motor vehicles in Gujarat is approximately 14%, resulting in a three-fold increase in the overall vehicle density[4]. With the increase in traffic the disparity between the carrying capacity and demand has also increased. Over a period 1985 to 2001, there has been 372 percent increase in number of vehicles registered in Vadodara district. The growth in number of vehicles registered is maximum in case of Cars/Cabs (476 %) followed by Two-wheelers (438 %). The details of vehicles registered in Vadodara district is presented in Table 2.5.

Table 2.5: Details of vehicles registered in Vadodara District

Period	Two-wheelers	Autos/ Tempos	Cars/ Cabs	Buses	Goods carriages	Tractors/ Others	Total
01.04.1985	84713	9159	10358	369	10032	13630	128261
01.04.1990	167012	14805	20886	644	15160	16985	235492
01.04.1995	263390	17784	32582	986	22174	20182	357098
01.04.2001	455501	22052	59623	1478	36144	31177	605975
% increase over the period 1985 to 2001	438	141	476	301	260	129	372

Source: http://petroleum.nic.in/ch_5.pdf.

As of March, 1999, out of the total 1542 villages in the district, 1438 villages (93.26 %) are connected by Pucca roads, 15 villages (0.97 %) are connected by Kuchcha roads and 89 villages (5.77 %) are not connected by any roads. The road connectivity of number of villages on population group wise is presented in Table 2.6.

Table 2.6: Population Group-wise Number of Villages Connected by Pacca, Kachcha Roads and villages not connected in Vadodara District

(As on 31.03.99)

Type of Road	Total Villages	Population Group-wise Number of Villages						% of Villages Connected
		1-499	500-999	1000-1499	1500-2999	Above 3000	Total	
Pucca Roads	1542	393	478	258	218	91	1438	93.26
Kuchcha Roads	1542	6	6	2	1	0	15	0.97
Not Connected by Any Roads	1542	75	11	1	2	0	89	5.77

Source : www.gujaratstat.com
Note : Based on Public Works Department, Govt. of Gujarat.

[4] http://www.indiainbusiness.nic.in/indian-states/gujarat/roadpol.html

In a stark contrast to the adjoining industrial giants and their residential colonies having best facilities in terms of communication, transportation, energy, water supply and sanitation and education, most of the villagers have inadequate infrastructure facilities.

The approach road to the village and the road network inside the village are in pathetic condition. Quality of road and electricity supply condition improves if some influential person acquires land in the village. The transportation facility form government side is inadequate and unreliable, and private transportation is expensive. This also has an impact on other social development indicators like education, health, etc. For better schooling and health facilities the villagers have to travel for about 25-30 minutes on average on their private vehicles. Very few families can bear the cost of such service.

There is a gradual shift in cooking energy from fuel wood, crop residue and dung cake to kerosene and LPG. Quality of electricity supply is poor.

3. Institutions Engaged in Periurban Area of Vadodara

A large number of institutions and acts/ordinances affect the natural resources in the periurban areas of Vadodara. Table 3.1 indicates a list of such institutions and acts.

Table 3.1: List of Institutions and Acts Affecting Periurban Area of Vadodara

List of Institutions	List of Acts
• District Collectorate • District Development Agency • District Rural Development Agency • Taluka Panchayat • District Education Department • District Agriculture Department • District Statistical Agency • District Animal Husbandry Department	• Gujarat Town Planning and Urban Development Act, 1979. • Land Acquisition Act, 1894. • Bombay Provincial Municipal Corporation Act, 1949. • Gujarat Land Revenue Act • The Gujarat Agricultural Produce Market Act, 1963. • The Gujarat Compulsory Primary Education Act, 1961. • The Bombay Primary Education Act, 1947. • The Gujarat Co-operative Societies Act, 1961. • The Gujarat Secondary Education Act, 1972. • The Gujarat Industrial Development Act, 1968. • The Gujarat Municipalities Act, 1963. • The Gujarat Panchayat Act, 1961. • The Gujarat Shops & Establishment Act, 1980. • The Gujarat Water supply and Sewerage Board Act, 1978. • The Gujarat Medical Council Act, 1967.

There are four apex bodies for developmental activities in the periurban area of Vadodara. These are

1. District Rural Development Authority (DRDA)
2. District Planning Authority (DPA)
3. District Development Authority (DDA)
4. Vadodara Urban Development Authority (VUDA)

All the above mentioned District/Taluka Level government institutions/bodies work independently with their own set of agenda and priorities as directed by their respective offices at State level and planned by the Central Government.

3.1. District Collectorate

For efficient co-ordination and monitoring of the activities a District level Co-ordination Committee (DCC) meeting is held every month under the chairmanship of District collector. A list of members of District Co-ordination Committee is shown in Table 3.2.

Table 3.2: Members of District Co-ordination Committee

(i) Permanent Members

Sl. No.	Designation	Office
1	Collector	Collector office, Kothi , Vadodara
2	District Development Officer	Zilla Panchayat Vadodara
3	District Superintendent of police	Kothi building Vadodara
4	Executive Engineer (Irrigation)	Radhakrisna Building, Rajmahal Road
5	Executive Engineer (Irrigation)	Zilla Panchayat, Vadodara
6	Executive Engineer (R. & B)Rural	Kothi Vadodara
7	Executive Engineer (Irrigation)Div.-4	Kuber Bhavan ,E-Block,Vadodara
8	Executive Engineer (mechanical)	Radhakrisna Building, Rajmahel Road
9	Executive Engineer(City) R. & B	Kothi Vadodara
10	Executive Engineer (Zilla Panchayat) R. & B	Zilla Panchayat Vadodara
11	Executive Engineer (R. & B.)div.-2	Zilla Panchayat Vadodara
12	District Registrar (Sahakari Mandali)	Narmada Bhuvan, Vadodara
13	District Education Officer	Kothi Vadodara
14	District Primary Education Officer	Zilla Panchayat Vadodara
15	Joint Director of Information	Kothi Vadodara

16	District Backward Class Welfare officer	Narmada Bhuvan, Vadodara
17	District Social Welfare officer	Zilla Panchayat Vadodara
18	District Social Welfare officer (Vikasati Jati)	Narmada Bhuvan, Vadodara
19	District Family Welfare officer	Zilla Panchayat Vadodara
20	Deputy Police Commissioner	Narmada Bhuvan, Vadodara

(ii) Invited Members

S. No.	Designation	Office
1	Asst. Municipal Commissioner,	V.M.C.,Khanderao Market,Vadodara
2	City Engineer	V.M.C.,Khanderao Market,Vadodara
3	Civil Surgeon (Jamanabai Hospital)	Mandavi , Vadodara
4	District Planning Officer	Kuber Bhavan ,Vadodara
5	District Supply Officer	Collector office,Kothi ,Vadodara
6	General Manager (Zilla Udyog Kendra)	Narmada Bhavan, Vadodara
7	Deputy Director (Small Savings)	Kuber Bhavan ,Vadodara
8	Deputy Collector,(Land Reclamation)	Collector office, Kothi ,Vadodara
9	Special Land Acquisition Officer	Kuber Bhavan ,Vadodara
10	Deputy District Election Officer	Collector office,Kothi ,Vadodara
11	Deputy Collector, Vadodara	Narmada Bhuvan, Vadodara
12	Deputy Collector, Dabhoi	Dabhoi

Other Autonomous bodies such as the Gujarat Energy development Agency (GEDA), Gujarat Pollution Control Board (GPCB), Gujarat State Road Transport Corporation (GSRTC), Gujarat Water Supply and Sewerage Board (GWSSB), etc. are invited as and when necessary

The typical administrative linkages between most of the institutions at District and Taluka level are shown in Figure 3.1. Administratively all the agencies work independently and report to their respective offices at district level in case of Taluka Panchayat and at state level for District Panchayat. For efficient implementation at village level, all the departments merge at Taluka Panchayat. The Taluka Panchayat has various Departments to look after implementation of different activities in the Taluka. These include Animal Husbandry, Education, Building Construction, Sardar Awas Yojna, Co-operatives, Health, etc. To monitor the activities the Taluka Panchayat has an elected board of 31 persons. The teachers in the anganwadis and primary schools, and the Gram Sevaks are the link through which the information is passed to the villagers from various departments.

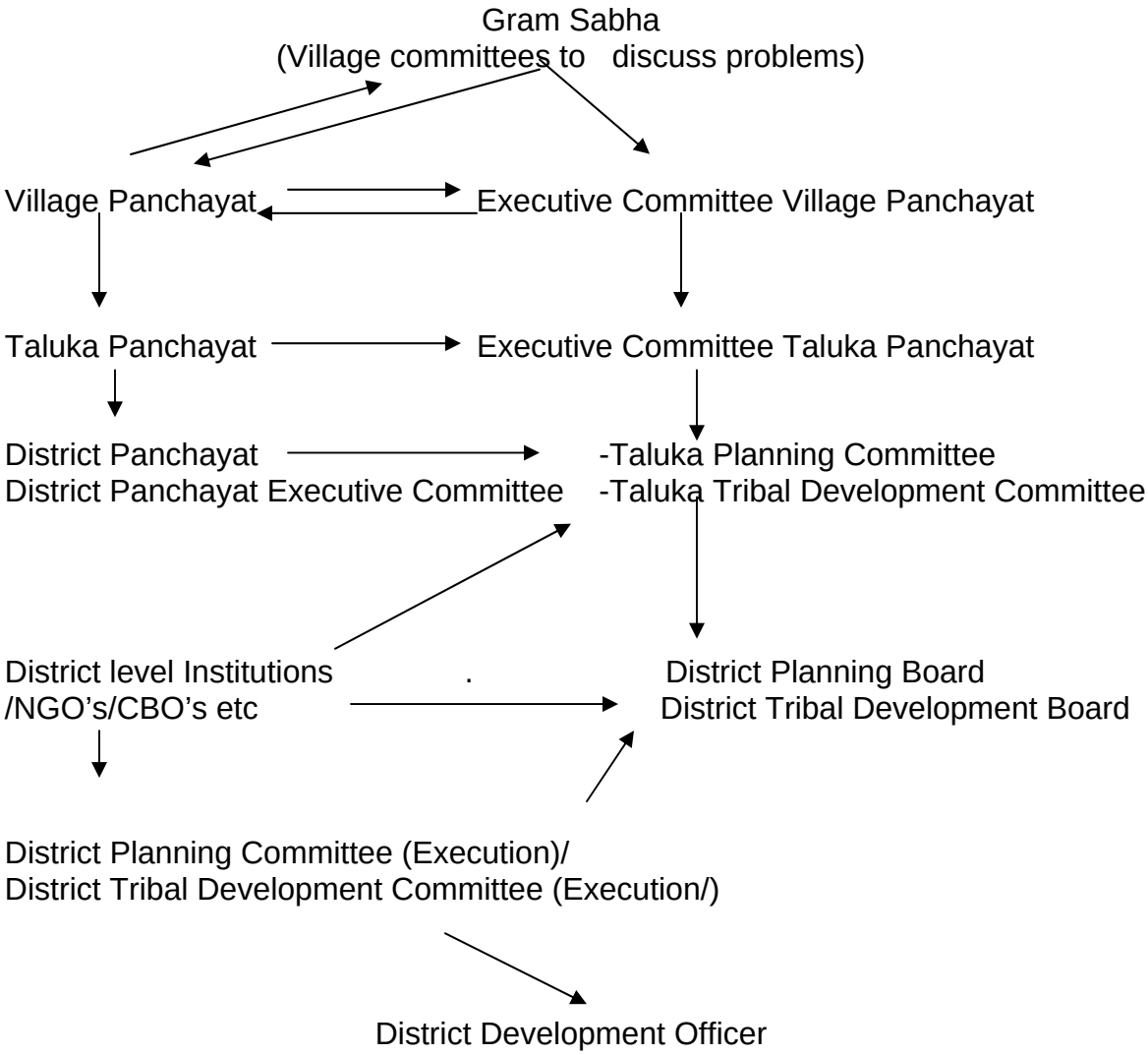

Figure 3.1: Linkage Among Institutions at Periurban Region

Typical organization structure, information flow and linkage with taluka panchayat are shown in Figure 3.2 taking the case of the District Agricultural Department.

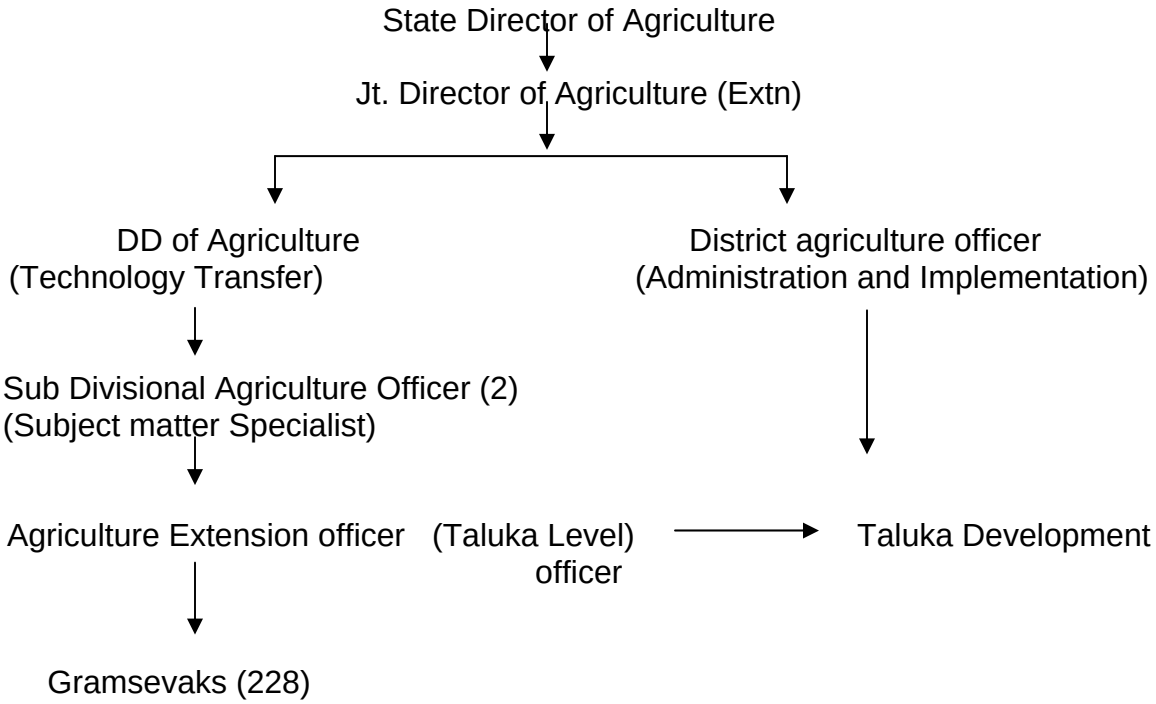

Figure 3.2: Organization Structure, Information Flow and Linkages of District Agricultural Department

As shown in Figure 3.2 the District Agriculture Officer is responsible for all the government schemes related to agricultural development. Apart from this, the DAO is also responsible for providing guidance and information on newer technology for which subject experts are nominated. The DAO has a team of gramsevaks (One gramsevak for 800 farmers). The gramsevak informs the farmers through village panchayat, meetings with farmers and gramsabha about various government policies, newer technologies etc. The gramsevaks is link between the district agriculture department and the farmers, the farmers inform about their problems regarding to ground water pollution and land degradation to DAO through the gramsevaks. The gramsevaks also informs the farmers regarding alternative crops, which can be grown in this land however no action is taken to reduce the pollution or froe recovery of land. Although the gramsevaks are appointed under the Department of Agriculture their activities are monitored by the Taluka Development Officer (TDO). Agriculture department co-ordinates with Horticulture department, Co-operative societies and Agriculture University in the Zonal technical meetings. The department also provides necessary data to Sardar Sarovar Project upon request

Similarly other departments at the District Panchayat, i.e. District Education Office, District Primary Education Office, District Statistical Office, District Animal Husbandry Office, District Primary Health office, etc. work in their respective

departments and are linked with their corresponding offices at the state and taluka level.

3.2. Vadodara Urban Development Authority (VUDA)

The VUDA is an autonomous body formed in 1978 under the Gujarat town planning and Urban Development Act 1976. The main objective of VUDA is to prepare master plan for the entire area for ensuring organized development. VUDA has divided its area in to 56 town-planning (TP) schemes of which 22 schemes are at various phases of approval process and 5 schemes are approved for implementation. The town planning schemes is prepared through a consultative process and opportunity is given to all the affected persons to represent their views and objections. The main focus in preparation of the TP schemes is to reduce the burden on infrastructure of the urban area by restricting the growth in periurban area in some cases and developing growth centers in some periurban areas in other cases. VUDA consciously develop facilities such as approach roads, community hall, water supply and sanitation facilities in periurban areas. As a norm VUDA does not issue certificate for any industrial development without GPCB's prior approval of the project's environmental compliance. In its housing projects, VUDA has included water harvesting as a prerequisite for plan approval.

Administratively, the Chief Executive Officer (CEO) of VUDA reports to the Ministry of Urban Development. The CEO is supported by a team of planners and engineers for design, engineering and construction. An administrative wing collects development charges and gives permissions to various agencies for site development. The main source of revenue for VUDA is developmental charges and a portion of the taxes collected by the Vadodara Municipal Corporation and village panchayats in VUDA Area.

3.3. The District Rural Development Authority (DRDA)

The DRDA is an autonomous body formed by the Ministry of Rural Development in 1980 for social development, poverty alleviation and infrastructure development of rural areas. Its scope of work in Vadodara includes implementation and monitoring of various government schemes like Swarna Jayanti Gram Swarojgar Yojna (SGSY), Jawahar Gram Samruddhi Yogna (JGSY), Rojgar Khatri Yojna (RKY), Gokul Gram Yojna (GGY), Indira Awas Yojna (IAY), Water Shed Management Programmes (WSMP), etc. Most of the schemes are earmarked for the economic empowerment of the weaker sections, including women. Although provision of water supply and watershed managements fall in its purview, it has no power to intervene in case of pollution of natural resources or for its control.

The DRDA is headed by a Project Director. DRDA has a pool of staff for implementation of different projects at district and Taluka level. The Gram Sevaks works as an extension officer of DRDA at village level. For co-ordination of its activities, the DRDA has a governing body chaired by the District

Development Officer. The Governing Body consists of heads of line departments, TDO, elected bodies of Taluka Panchayat and District Panchayat, Member of Parliament, representatives from lead banks and Co-operatives. The Governing body meets at least once in a Quarter to provide direction to DRDA's activities.

3.4. District Planning Office (DPO)

The district planning office was set up in 1980 to act as the nodal agency for preparing integrated development plan for the district. The State Planning Board, headed by Chief Secretary and with membership of secretaries of all the departments and elected representative of the state, oversees the activities of DPO. A District Planning Board (DPB), chaired by a minister-in-charge and with membership of elected representatives for parliament and legislative assembly, municipal corporation and lead bank.

3.5. Gujarat Electricity Board (GEB)

Gujarat Electricity Board (GEB) was established in 1960 under section 5 of the Electricity (Supply) Act 1948. GEB is engaged in generation, transmission and distribution of electricity in the state of Gujarat, including periurban areas. The demand-supply gap considering state's own generation capacity was nearly 27% of the unrestricted demand in November 2003. The main brunt of the demand supply gap is faced by rural and periurban population. Although all the periurban areas have access to electricity, still a significant number of houses do not have electricity services, primarily because of their poor economic condition.

The reliability of electricity supply in periurban area is far from satisfactory. It is evident from the fact that the electricity supply is characterized by frequent and long interruptions of services, large voltage fluctuations and service is delivered not when needed but when available. There is hardly any system of collecting data for measuring service reliability in periurban areas.

Often it is difficult to segregate periurban electricity consumption on the basis of its use in agricultural, commercial, domestic and industrial. In the absence of appropriate metering system, often the consumption is allocated to various categories. Considering the large gap between cost of supply and revenue received, prima-facie it is not surprising why quality of electricity service to periurban area (agriculture and domestic) is so poor. However, key issues one needs to address are the linkage between the price of electricity and the quality of service; and reliability of the agricultural consumption data.

The general perception in GEB is that the subsidized electricity to agriculture and domestic segment is the cause of poor financial health, poor maintenance of distribution infrastructure and lower rate of capacity addition by the companies; and irrational increase in demand for electricity from the consumers. Moderate energy use density in the periurban area does not always make an economic sense for the distribution companies to improve the physical infrastructure. Long distance distribution lines leads to higher distribution loss and low reliability of supply.

Periurban consumers perceive that the distribution companies lack accountability, do not treat the consumers equally, often harass and put unfair blame on the consumers and charge a tariff higher than the quality of electricity deserves. Under such situation it is worth while to explore the possibility of alternate institutional mechanism to meet the electricity needs of periurban consumers effectively and efficiently.

The transaction cost of managing periurban distribution in a centralized manner, government or private owned, is extremely high. The problem was well articulated by Dr. V. Kurien nearly a decade ago.

> "We Indians have a dual Code of Conduct. Stealing from Government and from the Electricity Board is well within our Code of Conduct. That is perfectly honorable. But stealing from your neighbor – that is not allowed. Our Code of Conduct will not permit that. I cannot pluck the other fellow's mangoes. I cannot cut the other fellow's paddy. That is not done."

Thus, an institution of the people, managed by their supervision, will be the best solution for effectively undertaking electricity distribution in periurban areas.

3.6. Gujarat Pollution Control Board (GPCB)

The Regional Office of GPCB at Vadodara is in charge of monitoring Industrial Compliances as per Environment Protection Act, 1986 in Vadodara, Kheda and Anand Districts. Apart from this their duties also includes inspection of complaints regarding industrial pollution received by the department or as directed by the District Collector and reporting the same to the head office at Gandhinagar. The GPCB is also responsible to assist the execution of task of Central Pollution Control Board. The Regional Officer is assisted by a team of environment engineers for monitoring the industries. These engineers are allotted work based on the priority of the work by the Regional officer. The regional office of GPCB is well-equipped with a laboratory to monitor air quality at selected industrial locations.

GPCB's mandate is not to monitor the quality of Natural Resources in villages adjoining the industries/city sumotto. However, if a complaint is received regarding natural resources being affected by industrial pollution, then the same can be investigated and normally a report is forwarded to the head office. In case of setting up of a new industry the Environmental Impact Assessment (EIA) report is translated into local language and forwarded to all the villages that are likely to be affected by the new venture. A notice regarding the public hearing of the case is given in all the news papers.

GPCB is invited for District Coordination Committee Meeting, chaired by the district collector as and when necessary. Normally their opinion is sought in case of complaints regarding industrial pollution in adjoining villages. Apart from the Collectorate the GPCB has to co-ordinate with the Factory Inspectorate, Zilla

Udhog Kendra, Gujarat Industrial Development Corporation (GIDC) and GEB. An official form GPCB is also nominated in Gram Sabha of villages affected with Industrial pollution upon invitation from the Gram Panchayat.

The GPCB is now given additional responsibility of monitoring Municipal Solid Waste Management and Bio- Medical Waste Handling also. To take up this responsibility effectively, the Regional Office needs to have appropriate training, assistance, and additional staff.

3.7. Gujarat Water Supply and Sewerage Board (GWSSB)

The Gujarat Water Supply and Sewerage Board was set up with an aim to provide water and Sanitation facilities in the Rural and periurban areas. It functions under the Secretary of Water and Sanitation. The GWSSB is presently focusing on water supply only. It is primarily responsible for the planning and provision of Water Supply in no-source villages and improving quality of water supply in villages having incomplete or partially complete water supply system.

The Vadodara Office of GWSSB is responsible for planning and execution of Water Supply system in rural areas of Vadodara and Narmada District. Because of availability of trained technical staff, GWSSB is also given additional work of execution of water supply work by DDO and the DRDA and charges a token amount for administrative overheads.

The GWSSB has prepared the general norms for providing drinking water such as

- Standpost: 40 lpcd
- For House Connection: 70 lpcd
- Underground drainage: 140lpcd
- For every 100 population: One hand pump or Stand post

The RRWSS

In 1997/98 GWSSB started a comprehensive rural water supply scheme (RRWSS) with financial assistance equally shared by the Government of India and the Gujarat State Government, at a total; cost of Rs 5 crore. The main aim of the scheme is to provide water at 40 Lpcd level. The two initiatives cover 42 villages under Fajalpur scheme and 5 villages under the Khatambe-Shakarpura scheme with ground water as the source.

The responsibility of the GWSSB is to develop the source, main pipeline, installation of the pumps and ESR. The development of the distribution lines is undertaken by the engineering department of the Taluka Panchayat. Any small maintenance job is taken up by the GPs themselves; and, any major maintenance works are contracted or carried out by the TPs engineering department. The details are as follows;

- **RRWSS5:** popularly called Khatamba-Shankarpura scheme include Ankol, Tatarpura, Shankarpura, Khatamba and Joban Tekri.

- **RRWSS 42** : popularly called the Fajalpur scheme and these presently include Dashrath, Karodiya, Asoj, Vasana, Kotaria, Fajalpur, **Sherkhi,** Mahanpura, Padmala, Sokhada, Ankodiya, **Angadh**, Ranoli, Bajwa, Kotna, Sankarda, Koyali, Chhani, Sisva, Nandesari, Ajod, Ampad, Dodka, Khanpur, Vora-Gamdi, Chikodara, Kotali, Sukhlipur, Vadodara. Although these scheme covers 42 villages, only 30 villages mentioned above fall in the VUDA limits Phase of the Project.

First of all, a baseline survey is carried out by the Board. The objective of the baseline survey is to arrive at a proper basis for project implementation, monitoring, evaluation and feedback of these schemes. The project managed in three phase: survey, proposal and land acquisition. Activities under each phase is described below.

Survey phase activities include a detailed study of demographic feature, road and transport links, electricity link, commercial establishment, land and water resources, village industries, existing water supply, scheme, livestock, and current level of water utilization.

Proposal phase activities include preparation and submission of proposal to the GOI for the fund procurement. The funds are provided by the GOI to GOG and the GOG releases in turn to the GWSSB.

Land acquisition and construction phase activities take about one to one and half year and involve acquisition of land from the collector. It also takes into account the procurement of materials for construction purpose and actual construction.

3.8. Gujarat Energy Development Agency (GEDA)

Gujarat Energy Development Agency is an autonomous body working with an aim of popularizing Renewal Energy Sources. Implementation of government schemes of subsidy in Improved Smokeless Chula, Solar Cooker, Gobar Gas plant, solar photovoltaic lights, Solar thermal, etc. is one of their prime activities. GEDA also undertakes research and Development of renewal energy sources. Some periurban residents have taken advantage of the subsidy provided by GEDA to adopt renewable energy technologies. As a matter of policy GEDA tries to address issues of equity, sustainability, poverty alleviation and quality of life improvement.

With a view of harnessing energy based on the rural local resources (Human and Animal wastes) a centrally sponsored scheme was developed to provide energy at a cheaper rate and provide cleaner surroundings. Although there is no shortage of inputs to run the plants, structural and technical problems related to the construction and maintenance are reported to be responsible for closing down or under utilization of the plants. 688 units were developed in 105 rural settlements of VUDA out of which only 142 (20.6%) are working.

Most of the integrated biogas energy system created by GEDA have failed because of lack of transparency, inadequate participation of members, weak linkage with promotion agents, especially during feasibility, design and engineering and installation phases. Infrastructure support in the form of spare parts in nearby market places and training to operating personnel often do not come through.

It was observed that good local leadership is a prerequisite for success. Before the installation of the project there should be a felt need for the energy project either through self-awareness or through the active support of promotion agents. All the members should have a clear understanding of benefits and costs and their expected roles. There should be enough critical mass in the form of share capital and revenue generation so that the project is financially self-sufficient (after considering subsidy, if any). Besides being independent, the general body and the management committee should be actively involved in the rural energy system. Besides providing good service to its member the rural energy system to be effective and efficient should widen its service with time.

3.9. Gujarat State Road Transport Corporation

Catering to the burgeoning cities, which are being filled up by immigrants coming to cities from villages and outside, the need for an effective transportation system becomes inevitable. Gujarat State Road Transport Corporation[5] was established in 1960 with the objective of providing an efficient, economical and properly co-ordinated road transport system in the State. However due to increased average cost per employee, the establishment cost as a percentage to operating revenue increased from 43 to 55 during the year 1994 - 95 to 1998-99. During this period the corporation has also paid extra cost for deployment of crew as schedules were not designed keeping in view the 8 hours of duty per crew per day. The corporation has also lost revenue on cancellation of scheduled kilometers due to mechanical failures, paucity of crew and buses and incurred additional expenditure of Rs.18.14 crore due to non-achievement of targets fixed for consumption of diesel and engine oil.

3.10. Gujarat State Road Development Corporation Limited

Gujarat State Road Development Corporation Ltd[6] (GSRDC) is a corporation established by the Government of Gujarat and was incorporated in 1999 as a limited company under the Companies Act,1956. It was established to implement the plans laid down in Gujarat Infrastructure Agenda – Vision 2010. The major objectives of the Corporation are to undertake the development of bridges and roads, commercially develop and exploit land along side the roads/ bridges, undertake feasibility studies and raise financial resources form banks, Institutions, mutual funds, individuals.

3.11. Gujarat Infrastructure Development Board

[5] http://cag.nic.in/reports/gujarat/rep_2000/comm_overview.pdf
[6] www.gsrdc.com

Gujarat Infrastructure Development Board[7] (GIDB) was set up in 1995 to facilitate higher flow of funds into infrastructure sector and to ensure coordination among various government agencies. GIDB itself does not develop infrastructure services but acts as a catalyst for their development. It focuses on overall planning, coordination between various sector specific departments, project preparation by conducting pre-feasibility and feasibility studies through reputed consultants, selection of developers through international competitive bidding, monitoring progress of projects, and building capacity of human resources and organizations in infrastructure sectors.

The Board is headed by the Chief Minister of the State. Most of the Ministers connected with infrastructure and industrial development and top officials of the concerned department are also represented on the Board. The Board has an Executive Committee, headed by the Minister of Industries and is supported by a technical secretariat, comprising technically qualified personnel, equipped with specialized knowledge in various sectors.

3.12. Effluent Channel Project Limited

Effluent Channel Project Limited (EPCL) is incorporated under the Companies Act, 1956 in the year 1999. The Board of EPCL comprises of representatives of large industrial units like IPCL, IOCL, GSFC and is chaired by the representative of GIDC. Effluent Channel Project is a major anti pollution measure and the first effluent disposal channel for safe disposal of treated industrial waste on co-operative basis.

There are 31 large and medium industrial units in the industrial complexes near Vadodara. IPCL, Gujarat refinery, GSFC, Gujarat Alkalies and Chemicals Limited are some of the industrial units. During early 1980s, major State and Central Government Complexes, Nandesari Estate of GIDC and medium scale industries of Petro Chemical Complex were facing the problem of disposal of treated effluent.

Effluent is discharged by about 300 industries. Channel of Brick Masonary conduit is provided from take off point at Dhanora up to the disposal point in the Gulf of Cambay at

Accused Acting Like a Judge…

Region of Ekalbara, Luna, Sevasi, Sherkhi through which the channel passes has been badly affected. Elements like copper, lead, mercury, cadmium and iron content in water are much in excess of the permissible limits. Looking at the severity, Supreme Court has asked the administration to provide clean water to the residents. Yet, no concrete effort has been made by eth authorities (Express News Service, 2004).

The Committee formed to address the complaints of villages of excessive pollution comprises of representatives from GIDC, GPCB, NIA, Shiva Pharmachem, Sterling Gelatine and eth Collector's Office and does not included any representatives from the many affected villages. Environmentalist claim that the committee functioning is not transparent and the villagers say that it's like making an accused the judge

[7] http://www.gidb.org/

Sarod. The channel is provided with 139 Cross Drainage works to ensure no hindrance to the traffic of 29 villages that are located along the alignment of the channel. ECP has a laboratory that monitors on regular basis the effluent from individual industries, combined effluent at every 10 km and effluent at the discharge point.

3.13. Gujarat Industrial Development Corporation

Gujarat Industrial Development Corporation[8] (GIDC) came into existence in 1962, under the Gujarat Industrial Development Act, 1962, with the objective of encouraging and facilitating rapid and systematic development of industries, zones, industrial belts, business trade zones in all areas to the state. GIDC provides all the basic infrastructure facilities to the industries, develops industrial estates at strategic locations all over the State, offers basic amenities in industrial estates, develops functional estates to fulfill specific needs of certain industries and checks environmental degradation by resorting to specific measures.

Industrial areas are generally located away from urban areas. GIDC recognizes this need to provide social infrastructure and offers a variety of ready-made dwellings, units and modules to meet housing needs of units within its industrial estates[9]. GIDC also assists private and charitable institutions in the development of hospitals, schools and dispensaries. Provision is also made for shopping centers and recreation facilities like clubs, theatres, community parks and gardens.

The state government nominates all the directors of the Board. GIDC has a dedicated team of more than 2500 people operating from 75 field offices service the multifarious needs and requirements of all investors situated at over 160 development estates.

4. Case Study of Village

In this section case study of three villages such as Serkhi, Angadh and Alamgir are presented.

4.1. Serkhi Village Case Study

Sherkhi is a medium size village located about 10 km on the western side of Vadodara City. The main road connecting Vadodara with Anand is approximately 2 km from Sherkhi. The village was selected for detailed study considering:

- the impact of industrial pollution in the village
- the acquisition of land by builders
- The influence of urban life styles on the residents, and
- the acute livelihood problem and maintenance of natural resources

[8] www.gidc.gov.in
[9] http://www.asiatradehub.com/india/state_gujrat4.asp

Sherkhi Village is physically dived into four segments such as Moti Sherkhi, Nani Sherkhi, Bhimpura and Jasapura with approximately 200-250 families in each part. It is predominantly an agricultural village. The village used to be the fruit and vegetable basket of the city of Vadodara a decade ago. However, due to industrial pollution the production of fruits and vegetables has reduced substantially.

Due to poverty majority of the medium and small farmers were forced to sell their land, and today they work as laborers for tilling others land. The proximity of the village to city has attracted a number of wealthy persons to acquire land for constructing resorts and farmhouses.

Demographic details

Out of about 2300 households in the village approximately 20% belong to scheduled castes and scheduled tribes. The population of the village is approximately 9000. The decadal population growth in 1991 was 17.5% and it declined to 14.8% in 2001. There is a decline in sex ratio with the number of female per 1000 male declining from 1145 in 1981 through 1099 in 1991 to 1045 in 2001. Both male and female literacy level in 2001 stood at 90%. There are 58% pucca and 42% Kuchcha houses in the village. About 2500 cattles are there in the village, contributing to dairy as a key economic activity.

Demographic Details of Sherkhi

Description	1991	1981	1971
Area of village (ha)	1235.04	1235.04	1235.04
Total population	6648	6669	5431
Total main workers	2576	2098	1863
Type of workers (% of main workers)			
• Cultivators	15	44	42.6
• Agricultural labourers	56	36	47.9
• Livestock, etc.	6.7	-	0.6
• Quarrying	0	-	0.3
• Industry	12.9	0.8	4.9
• Construction	3.3	-	0.2
• Trade and commerce	2.2	-	1.1
• Transportation	1.2	-	0.3
• Other services	2.4	19.3	2.3
Marginal workers	0	252	-
Non-workers	4072	4319	3568
No of household	1086	1089	951
Educational institution	Primary schools (4)	Primary schools (4)	Primary school

Medical	Primary health sub-center, Family planning center, Registered private practitioner, and Community health worker (3)	Primary health sub-center, Family planning center and Community health worker (3)	-
Description	**1991**	**1981**	**1971**
Drinking water	Tube well, well, tank, river	Tube well, well, tank, river	well, tank, river
Post and telegraph	Post office	Post office	Post office
Communication	Bus service	Bus service	Bus service
Approach to village	Pucca road	Kuchcha road	Kuchcha road
Distance from nearest town (km)	8	8	13
Power supply	Electricity for all purposes	Electricity for all purposes	Electricity for all purposes
Land use (ha) • Irrigated from well and tubewell with electricity • Unirrigated • Culturable waste • Area not available for cultivation	 259 638.87 223.49 113.68	 116 858 232.04 29	 880 20 232.04 90

Source: Census 1991, Series 7 Gujarat, District Census Handbook, Vadodara District, Parts XII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1981, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts XIII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1971, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts X A&B, Village and Town Directory, Village and Townwise Primary Census Abstract

Energy use

80 % of the village is now having individual electricity connection, but the affordability is low. At village level all the main roads have street lights but they are switched on only during festivals and weddings in the village as the village panchayat can not afford to pay the bills if the street lights are switched on a daily basis. The power supply is very irregular and the villagers receive electricity for 10-15 hrs a day with power disruption in day and night in alternate weeks.

For cooking energy, 80% households still use kerosene or fire wood. Only 20 % houses use LPG. Few families rearing cattle also use dung cakes. On an average, a family spends Rs 200 per month to buy fuel wood from open market. 10 houses had constructed bio gas plants in 1999 with subsidy from GEDA. Only three are operational now. There are 25 to 30 diesel engine driven pump sets for irrigation. They lift water from a depth of 200 to 250 ft.

Transportation

In the name of public transport, only one bus is made available to Sherkhi in a day. The bus service is not dependable. Although the scheduled time for the bus in the morning is at 8:00 AM, it arrives at any time between 8:00 to 11:00 AM. The villagers use bicycle, rickshaw and scooter as private mode of transport. The number of two wheelers is increasing day by day. Today Sherkhi has about 400 scooters compared to 100 scooters in 1981. Approximately 12 jeeps ply daily from this route with 12-15 trips a day per jeep from nearby main road at a distance of 2-3 kms from the main village. The villagers either walk down this road or travel by private rickshaws to avail facilities of this private Jeeps. Due to expensive transportation and long distance between nearest secondary school and Sherkhi, majority of the girl child drop-out of school after primary schooling.

Water supply and sanitation

Sherkhi village was dependent on a tube well till 1997-99 when GWSSB provided it with water supply from Fajalpur French Well under 42 village schemes. This water is available in 10 stand post to the entire population of 9000. The Panchayat has constructed a under ground sump near its present distribution tank and awaiting permission from GWSSB to connect the mains from 42 village scheme.

Till 1995 the villagers used to draw water from a tube well and each house hold had a piped water supply with absolutely no drinking water problem. But after 1995 due to establishment of Nandesari Industrial estate the quality of ground water deteriorated to such an extent that the villagers sarcastically refer their water as “Slightly Lighter Coca Cola”.

Today every house hold has to fetch drinking water from Stand posts on an average 500 meter from their houses. For other domestic use they consume red coloured polluted water. Most of the houses do not have sewerage facility and the water from kitchen etc. is allowed to flow on streets. Today only 30 % families have individual toilet units, in contrast to 10% in 1981.

Pollution

The effluent from Nandesari Industrial estate and major industries in the North of Vadodara is collected after primary treatment in a common channel and discharged in the sea near Bharuch. The common channel passes through Sherkhi village. Villagers use this water for irrigation purpose. They do not complain about the channel, but they believe that the effluents are pumped in ground by bore wells, which has affected the ground water of the village. Numbers of representations have been made through local TV, newspapers, to the collector office, GPCB etc. but no steps have been taken so far to redress the pollution related problem.

Few villagers complained of irritation in eye and skin, kidney stones, and increase in number of cancer patients. Villagers indicated the sharp decline in biodiversity in the ravines of Mahi river.

Migration

There is very little or no migration either from Sherkhi village or into the village. In few houses children go out to the city due to economic reasons, but their families continue to stay in the village. Few farm houses have come up, but people rarely stay there.

Occupation and income

Sherkhi is an economically backward village, majority of the villagers are working as laborers in adjoining farm, and few villagers have also travel to city to work as casual laborers at construction sites. Majority of the youngsters are unemployed. Due to cultural influence of the city they are not willing to work as agriculture labourers. About 50% of females work in the farms. Since Sherkhi village is predominantly of Darbar community, the women have a very little say in village level issues.

Overall the yield per acre has gone down substantially in spite of use of fertilizers, pesticides and hybrid seeds. The farmers of the village complained that because of pollution the trees do bear flowers but do not mature to give fruits. Most of the horticultural crops are failing since last 10 years. Majority of the farmers use effluent and polluted water for irrigation purpose thinking that the effluent contains rich nutrients. Because of decline in yield, almost 100% increase in land allocation is made to cereals while the amount of land allocation to tobacco has remained same and that for vegetables declined during 1981 and 1991.

There are about 15 large farmers (>10 acre), 35 medium farmers, 870 small and marginal farmers (<5 acre) and 50 land less farmers in the village. There is a continuous decline in the size of land holdings over the years.

4.2. Angadh Village Case study

Anagdh is a village of having approximately 2000 families spread over an area of 11.37 Sq kms. Its revenue land spreads up to Nadesari Industrial Estate. Angadh was selected for the study owing to its proximity of the Industrial Giants like IPCL, IOCL, GIPCL etc. on one side and the main surface water source of Mahi river on the west. The river Mini Mahi which is frequently in lime light because of its polluted water also passes through the village.

Many villagers have sold their land during the process of Industrialization few did get permanent employment in adjoining industries but majority of the land losers are now reduced to daily wagers in adjoining industries. The residents have observed the decline in flora and fauna in the area over last few years.

Demographic details

The approximate population of the village is approximately 15428 in 2001. The decadal population growth in 1991 was 14.4% and it increased to 40.7% in 2001. The village has about 30% scheduled caste and scheduled tribe population. There is an improvement in sex ratio with the number of female per 1000 male increasing from 893 in 1981 through 931 in 1991 to 940 in 2001. The male literacy is at 55% with significantly lower female literacy.

Demographic Details of Anagadh

Description	1991	1981	1971
Area of village (ha)	1136.6	1136.6	1136.6
Total population	10968	9591	6847
Total main workers	3066	2960	1998
Type of workers (% of main workers)			
• Cultivators	23.7	37.4	58
• Agricultural labourers	24.7	23	18.8
• Livestock, etc.	3.5	-	2.9
• Quarrying	0	-	2.2
• Industry	35.7	2.4	7
• Construction	1	-	2.3
• Trade and commerce	4.3	-	3.5
• Transportation	1.5	-	1
• Other services	5.4	40.8	4.5
Marginal workers	185	320	-
Non-workers	7717	6203	4849
No of household	2032	1512	1154
Educational institution	Primary schools (6) High school (1) Adult literacy center (1)	Primary schools (2)	Primary school
Medical	Maternity and child welfare center, Primary health sub-center, Dispensary, Family planning center, Registered private practitioner (2) and Community health worker	Primary health sub-center, Dispensary, Family planning center, Registered private practitioner (2) and Community health worker (9)	Dispensary
Drinking water	Tube well, well, river	Tube well, well, river, tank	Well, river, tank

Post and telegraph	Post office and telephone	Post office and telephone	Post office
Communication	Bus service, Navigable waterway	Bus service	Bus service
Approach to village	Pucca road and kachcha road	Pucca road	Kachcha road
Distance from nearest town (km)	6	6	4
Power supply	Electricity for all purposes	Electricity for all purposes	Electricity for all purposes
Land use (ha)			
• Irrigated from well and tubewell with electricity	364.74	200	77.6
• Unirrigated	394.36	663	558
• Culturable waste	78	78	50
• Area not available for cultivation	299.5	169	438

Source: Census 1991, Series 7 Gujarat, District Census Handbook, Vadodara District, Parts XII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1981, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts XIII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1971, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts X A&B, Village and Town Directory, Village and Townwise Primary Census Abstract

Energy

All the households have electricity connection. However, reliability and availability of electricity is poor. 50% of the households use LPG for cooking. Proportion of household using fuel wood, dung cake and kerosene for cooking are respectively 20%, 15% and 15%. Only one house has a biogas plant.

Transportation

Public Transport facility provided by GSRTC is limited to 6 buses per day that are irregular. However, the villagers use private buses at a distance of 2-3 kms from the village that is meant for transportation of industrial staff. Normally the villagers have to walk down till that distance or in case of emergency they use auto rickshaws. Villagers face a lot of problem during rainy season as the road connecting them with adjoining industrial area crossing river Mini Mahi. The flow of water is very high in this portion during monsoon. Over the years there is a sharp increase in number of private vehicles (two wheelers) due to lack of proper public transport system.

Number of gasoline fuelled two wheelers and four wheelers have increased significantly over the years.

Water supply and sanitation

The main source of drinking water in Angadh was a tube well constructed in 1983 but with industries the ground water became polluted and the water from the tube well became unfit for drinking around 1990. Later on Angadh was provided drinking water from a French well at Mahi River from Fajalpur by GWSSB under 42 village scheme. Even this water has very high total hardness leading to problems of indigestion. The villagers have to pay Rs. 14 annually per family to GWSSB for maintenance of the main lines. VP has to arrange for internal distribution. The amount of water supply in different parts of the village is uneven due to improper distribution system. The VP can not afford to pay the energy bills for pumping of the water. Hence they have not paid the energy bills or amounts due to GWSSB.

The Power supply in the village is also not very dependable, the villagers are provided with 3 Phase power supply for 8 hr. in Day and night time in Alternate weeks and hence residents are given water supply at 3:00 am in the morning. This also adversely affects health of the women.

75% of the households do not have septic latrines and all the households have only open sewerage system.

Pollution

Because of close proximity to industrial area particularly Nandesari industrial estate visible impact of pollution is seen in all its ground and surface water and forest. Air pollution is a serious problem. Particularly in winter the pollution is so intense that it is suffocating. There is a sharp increase in persons with respiratory diseases. The wild life is severely affected due to pollution in Mini Mahi river. The villagers complain of boils and other skin diseases if one steps in the water of Mini Mahi by mistake. Records of GPCB show that the Ph of Mini Mahi at midnights reaches up to 2 due to illegal release of untreated effluents in the Mini Mahi river.

The overall yield/Acre of land has decreased substantially. Angadh used to produce lots of mangoes in past but now the flowers on Mango tree do not mature to fruits because of Pollution.

Migration

The migration of local residents out of village is very negligible. The reason for the same seems to be social rather than economical. The village is dominated by Darbar community which prefers to stay together. The sense of security by living within their own community is also one of the major factors which do not encourage migration of villagers out of village**.**

Occupation and income related data

As per ORG Survey in 1999 the village has 3713 animals. The number of live stock is decreasing due to lack of pasture lands. There is no place left for grazing of animals. According to the villagers yield per Acre has reduced to 1/5 the from what they used to yield earlier in spite of using hybrid seeds now.

Earlier more than 90 % of residents of Angadh were in to farming but now the land holdings of framers and its yield is decreasing as a result the villagers have to turn to other occupations. Today 60 % of villagers work as daily wagers in adjoining industries, Many have also diverted to construction work. The villagers had sold their lands to industries in anticipation of jobs in the industries but only 20 % of villager shave got permanent jobs in the industries. On one hand the income level has decreased whereas on the other side their overheads have increased as the services (such as telephone) are charged as per industrial zones and not rural.

The village has about 33 large, 232 medium, 300 small and rest marginal/landless farmers. About 65% of the families are of low income category (Rs 18000 to Rs 25000 per year).

4.3. Alamgir Village Case Study

Alamgir is a small village with about 150 families and area of 1.51 square km located on the south of Vadodara on the national highway number 8. Alamgir is an exceptional village wherein one can not see any adverse affect of urbanization. In contrast, they have gained from the better infrastructure facilities. The land holding of the farmers in Alamgir has not changed whereas in all the villages surrounding Alamgir at least 25-30 % land is sold to developers from the city. The village represents a periurban area in the West and the South West of the city that are not affected by pollution of industries.

People of Alamgir, because of access to highway could approach markets in adjoining cities to sell their agricultural products. Apart from that the villagers could also easily access adjoining industries in GIDC Makarpura and GIDC POR for employment. The Highway also opened up other employment opportunities like Petrol Pumps, Hotels etc. Hence although the village is very small and very close to city the villagers could preserve their land from the clutches of developers.

Demographic details

Out of 160 households in the village about 18% belong to scheduled caste and scheduled tribe population. The population of the village is approximately 850 in 2001. The decadal population growth in 1991 was 35.7% and it decreased to 16% in 2001. The number of female per 1000 male moved from 949 in 1981 through 919 in 1991 to 945 in 2001. The male and female literacy are 65% and 45% respectively. The village has 55% pucca houses. The bovine population stood at 415.

Demographic Details of Alamgir

Description	1991	1981	1971
Area of village (ha)	150.78	150.78	150.78
Total population	733	540	424
Total main workers	285	218	167
Type of workers (% of main workers)			
• Cultivators	12.3	23	33.5
• Agricultural labourers	11.9	40	41.3
• Livestock, etc.	14	-	1.8
• Quarrying	0	-	0.6
• Industry	28.8	1.8	15
• Construction	1.5	-	0
• Trade and commerce	14	-	0
• Transportation	4.2	-	1.2
• Other services	13	35.3	6.6
Marginal workers	92	2	-
Non-workers	356	320	257
No of household	150	110	91
Educational institution	Primary	Primary	Primary
Medical	Community health worker	Community health worker	
Drinking water	Tap, well, tank	Tap, well, tank	Tap, well, tank
Post and telegraph	Post office and telephone	Post office and telephone	
Communication	Bus service	Bus service	Bus service
Approach to village	Pucca road	Pucca road	Pucca road
Distance from nearest town (km)	14	14	14
Power supply	Electricity for all purposes	Electricity for all purposes	Electricity for domestic use
Land use (ha)			
• Irrigated from well with electricity	11.07	30	1
• Unirrigated	118.2	100.78	129
• Culturable waste	7.45	20	10
• Area not available for cultivation	14.06	-	9

Source: Census 1991, Series 7 Gujarat, District Census Handbook, Vadodara District, Parts XII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1981, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts XIII A&B, Village and Town Directory, Village and Townwise Primary Census Abstract
Census 1971, Series 5 Gujarat, District Census Handbook, Vadodara District, Parts X A&B, Village and Town Directory, Village and Townwise Primary Census Abstract

Energy

90% households have electricity connection. However, reliability and availability of electricity is poor. 20% of the households use LPG for cooking. Proportion of household using fuel wood, dung cake and kerosene for cooking are respectively 40%, 15% and 25%. Three biogas plants are operation from the four installed in 1999. Fuel wood is purchased from market at Rs 2.kg. Poor households have to travel 1.5 to 2 km to collect firewood. There are 12 diesel engine driven pumpsets for irrigation. The water level is at 100-150 ft depth.

Transportation

All the GSRTC buses coming from Bombay side touch the village hence public transport is not a problem, The villager's travel to markets in adjoining city for agricultural supply. About 30 % villagers travel upto 6-8 Kms to GIDC Por and Makarpura GIDC. The entire village has RCC roads and water logging is not a problem even during rainy season. 40% of households have motor cycle.

Water supply and sanitation

The Terrain of Alamgir has a Steep slope towards the highway; hence the water supply is available through Gravity even from the underground sump. Source of Drinking water in Alamgir was a Tube well and 10 open wells in the city. The water of tube well was salty. In 1997 GWSSB provided the village with drinking water along with five other villages under the Khatambe -Shakarpura scheme with ground water as the source. Today the villagers are supplied with drinking water one every three days by an over head tank for 30 minutes. On remaining days, salty water is provided from underground sump by gravity for domestic use.

For Sanitation 60 % of village use covered channels, the water from same is diverted to wastelands in adjoining areas. 10 % house holds have soak pits and more than 60 % families have toilets.

Pollution

The village is unaffected by any type of Industrial pollution , Negligible air pollution is felt because of proximity to highway, Noise pollution due to highway is a big concern. 15 Acres of forest Area is located around Alamgir.

Migration

The migration of local residents out of village is very negligible due to availability of employment in adjoining industries and miscellaneous business related to highway like petrol pumps, hotels etc. About 15% of population have migrated (temporarily) in to the village as it is near to adjoining industrial areas. 5 families have migrated out of city in communal riots in 2001.

Occupation and income

There has been significant change in occupation pattern. Most of the people have moved from primary agricultural activities to secondary and tertiary sector. Approximately 25% workforce is engaged in agriculture and 10% in livestock. Rest are in manufacturing and service business. Important service businesses are construction, transportation and trading. Hotels and petrol filling stations have come into the village.

Farmers practice tube-well irrigation and the yield has increased due to fertilizers and hybrid seeds. The farmers will be further benefited by Narmada Branch Canal water for irrigation. Most of the farmers (about 66%) have small land holdings and 65% belong to low income category.

5. Concluding Remarks

Periurban areas of Vadodara are highly affected by industrial activity and consequent pollution. In the northern and western parts of the city, the villagers had high hopes of getting good jobs and overall development of the villages because of the industrialization. On the contrary, now they feel that industrialization has adversely affected their livelihoods. More than 60% villages in the North and West are facing problems of land and ground water pollution. In North East, air pollution is one of the biggest problems Most of the land-losers failed to get permanent employment in industries. For land owners, their yield has decreased, the horticultural crops failing year after year due to polluted air, water and soil. On the other hand their cost of living has gone up due to proximity to city. City's influence on social life styles has put an adverse effect. Their medical expenses have gone up due to air and water pollution. For survival many youngsters have to move to neighboring city for employment, that are far and few.

For villages which are not affected by industrial pollution there are two clear scenarios. Villages which have better access i.e. those near high ways flourished as they could reach easily better markets in adjoining cities and earn more through sale of agricultural produce. Additionally, better access to cities also opened up other employment opportunities to these villagers and hence helped them retain their land holdings. Whereas farmers whose land was far from main roads were forced to sell land to developers either for economic compulsion or for perceived belief that they can start an enterprise from large financial receivable. In reality, most of them spent their money on social functions and failed businesses. Presently unemployment is a serious problem in the periurban Vadodara.

All the development interventions appear to have a short-term agenda. For example, recent availability of Narmada water for irrigation and ground water charging, unless judiciously managed, can aggravate the existing high salinity level of top soil. Sardar Sarovar Nigam Limited's (SSNL) program of awareness building on this issue is a welcome step. Unless it is handled in an integrated manner more people will lose their livelihood security.

The Panchayati raj system followed in the state of Gujarat has well developed administrative structures and systems of operational procedures for participation and decentralization. There is scope for the empowerment of villagers for taking decision on various development activities. Functionaries of Panchayati Raj Institutions (PRIs) are careful in following procedures in letter but not in spirit. For example, gramsabha is managed to pass a resolution to allow an industrial site in the revenue boundary of village without properly deliberating various implications. Based on the case studies and the discussions with the stakeholders, following issues with reference to sustainable natural resource management in the periurban region merit attention.

Quality of data

The data on natural resource endowment, quality of services and the expectations of people are almost nonexistent. There is no clear responsibility and accountability for collecting and providing relevant data to various stakeholders. There is duplication of work by different agencies for same base data. Often overloading teachers for collecting primary data may not be the most effective way to approach the problem. In the absence of right to reliable and relevant information the entire planning process cannot be very effective.

Issues relating to the identification of data need, method of collecting, processing and disseminating information, human resource development, ensuring reliability, timeliness and relevance of data/information and employee commitment need to be addressed.

Accessibility of staff of various institutions to periurban areas is another important factor to be considered.

Lack of institution for management and conservation of Natural Resources

There is no single institution that comprehensively addresses the issue of sustainable natural resource management in the periurban region. The Collectorate, the District Planning Board and the District Coordination Committee can take such comprehensive exercise, but considering their system of operation it is unlikely to have an effective output.

The primary agenda of all the government institutions engaged in rural development and development planning is implementation of various schemes as directed by their respective departments from the central government/state government. The primary development concerns do include gender, equity and empowerment but as far as natural resources are concerned it is not a priority of any of the Government institutions.

The Central Pollution Control Board as a reactive strategy has mapped the effects of pollution on ecology. The Gujarat Pollution Control Board is the prime body to monitor the compliance and control industrial pollution. But their control is more on industrial compliances and approval of EIA of new plants. The GPCB

does not have any control on recovery or stopping further pollution of land and water which is already polluted except for reporting it to their state body on receipt of the complaint. The GPCB is helpless once the pollution is out of the industrial premises and if no definite source of pollution can be proved. Many villages have complained regarding polluted land and water to Collector of Vadodara and pollution control board. Unfortunately there is no specific department to look into such issues and hence the villagers are the silent sufferers. In case of villages having powerful leaders, they could take advantage of such situations and get heavy compensations in out of court settlements like Chhani in Vadodara. But still most of the villagers are the sufferers. “Polluters to pay” principle is yet to be implemented.

There is definitely a need to have institutions with clear responsibility and accountability to look into issues of getting right information at the right time and mitigate the impact of pollution on land, water and air for having a sustainable livelihood of villages.

References

Express News Service, (2004). “Composition of Panel on Pollution has Villagers Fuming”, *The Indian Express*, August 31.

Life in Baroda in the 90s, Baroda Citizens Council, March 1990, pp. 12.