Sustainable Development Strategy for Satellite Town (Case Study: Sanand)

Janki Patel[1], Falguni shukal[2], Labdhi sheth[3]
[1]*Janki Patel, ME in Infrastructure engineering, LDRP institute of technology & research*
[2]*Flaguni shukal, AUDA employee*
[3]*Labdhi sheth, assistant professor, LDRP institute of technology & research*

Abstract- **This study deals with the sustainable development of satellite town sanand. sustainable development goals can be defined as better Life style of city residents and using natural resources and available facilities without compromising future needs according to forecasting of population. there are various parameters need to be focused such as water supply, sewerage system, solid waste management, storm water collection, group water quality, transportation facilities available within city and its connectivity to other cities of state. it is important to select proper strategy for development of various basic facilities. sanand is the most highlighted city because of their industrial growth which will influence on employment accompanied by increasing population in these city. AUDA is working on five growth center which include 5 small towns located surrounding Ahmedabad 1.Kalol 2. Sanand 3. Dahegam 4. Mehemdabad 5. Bareja. Among all of them sanand is recently developing town which require more attention. Case Study of Sanand: Sanand is located at about 24 km from Ahmedabad city on Ahmedabad -Viramgam highway. Population of city increased by 195.8% in last decade. According to census 2011, population of city is 608 persons per km2. It has geographical area about 158 km2.Sanand has gained importance mainly owing to various company situated over there. There is Tata motors, Ford, Hitachi. There are also other industries like cedilla health care which manufacture generic medicine. Sanand has trade corridors and special economic zones which invite international investments and increase national growth. There is availability of GSRTC (GUJARAT STATE ROAD TRANSPORT CORPRATION) for transportation between sanand various cities and AMTS (AHEMDABAD MASS TRANSIT SYSTEM) for transportation between Ahmedabad and sanand. There are almost 153 buses are routing between Ahmedabad and sanand in one day. Sanad-Viramgam has an operational broad gauge railway network connecting it to major industrial centers located in Gujarat. The city is connected by highway to mundra port. It connected with Ahmedabad and Kutch by state highway 17 part of national highway 8, part of recently completed 4- lane GOLDEN QUDRILATERAL highway.**

Index Terms- sustainable development, satellite town, growth center, solid waste, traffic congestion.

I. INTRODUCTION

The concept of satellite town has been emerged to help the metropolitan city in solving the human settlement and absorbs its industrial growth which put enormous pressure on infrastructure and service delivery of metropolitan city. The Satellite city is a smaller municipality in the vicinity of metropolitan parent city and can be planned within the natural growth pattern of parent city. It is intended to stop urban sprawl, provide an alternate business center and also provide high speed transport linkages between the it and Parent City. It has been observed that migration in the metropolitan city is owing to employment opportunities, trade opportunities and specialized services such as education, health, entertainment and recreation. The people residing in satellite town can use specialized services of metropolitan city situated in its vicinity through strong transport linkages. The satellite town/city is defined as follows: "A Satellite Town is a self-contained and limited in size, built in the vicinity of a large metropolitan city to house and employ those who would otherwise create a demand for expansion of the existing settlement in metropolitan city, but dependent on the parent-city to a certain extent for major and specialized services" The Satellite city differ from mere suburbs and subdivisions in that it has municipal governments distinct from that of the parent metropolitan city and employment bases sufficient to support its residential populations. The

Satellite city also experience cross- commuting with parent metropolitan city.

A. AIM

This study aims at creating economically productive, efficient, equitable and responsive cities in an integrated framework with focus on economic and social infrastructure, basic services to urban poor, urban sector reforms and strengthening Municipal Government and their functioning.

B. OBJECTIVE

There are four objectives of sustainable development that include social progress and equality, environmental protection, conservation of natural resources and stable economic growth.

The objectives of this study as follows:

- To develop urban infrastructure facilities such as transport, drinking water, sewerage, drainage and solid waste management etc. at satellite towns to reduce pressure on million plus agglomeration.
- To enhance the sustainability of urban infrastructure facility such as water tank, landfill site, space for recreational purpose, rain water harvesting, drainage, improving road condition, better connectivity with mother city and other cities of state, affordable housing etc.

C. SCOPE

- Providing drinking water to consumers by efficient water supply system.
- Reducing harmful impacts of unscientific disposal of municipal solid waste on public health, environment and quality of life.
- Reducing resource consumption and effectively managing wastes.
- Providing efficient sewerage system to exclude waste water from domestic and industrial connections.
- Providing strategy for improvement in ground water quality.
- Reducing traffic congestion by providing efficient mode of transport system.
- Connecting satellite town and mother city and other cities of state and improving road condition for comfortable transportation.

II. DATA COLLECTION

1 Justification of Case Study of Sanand

Sanand is located at about 24 km from Ahmedabad city on the Ahmedabad-viramgam highway. The city is included under Ahmedabad Development Authority (AUDA) jurisdictional area, which is responsible for planning and development in the area. Sanand has gained importance as it lies on the major trade corridors and Nano Town due to the Tata's Nano plant. The state owned 5000 acres of land in and around sanand for future use by industries. GIDC has planned a dedicated women industrial park over an area of 18.3 hectares at GIDC sanand industrial estate, Ahmedabad.

III. WATER SUPPLY

Planning for water supply in Sanand town needs to take care of sustainable water management practices. The context of current culture and practices must be weighed together in Technological, Environmental, Economic and Social factors for sustainable solutions. This chapter tries to analyze the current situation, identify gaps in the system and develop strategies for the same.

A. Present Scenario

- The present source of water supply for Sanand is town is ground water through tube wells about 17 in nos. Currently around 4 MLD of water is being supplied from ground water.
- A scheme based on Narmada Canal near Telav Village is planned by GWSSB.

Sr no.	Bore name	Bore size	Pumping level (In feet)	Motor HP	Pump (stage)	Column pipe (dia)	Cabel's size (In mm)
1	Lakshmana bore	10	440	62	9	4	25
2	Boring bore	10	440	62	8	4	25
3	Shankarwadi bore	12 x 8	170	62	6	4	25
4	Thakkarbapa chhatralay bore	8	440	62	9	4	25
5	Mamlatdar kacheri bore	8/10	340	62	7	4	25
6	Siddhnath bore – 1	10	270	62	6	4	25
7	Siddhnath bore – 2	10	430	62	8	4	25
8	Nanushah bore	10	260	62	8	4	25
9	Madhavnagar bore	8/10	350	52	8	4	25
10	Narmada vasahat 1	10	440	62	8	4	25
11	Narmada vasahat 2	10	450	62	8	4	25
12	Vadnagar bore	8/10	400	40	8	4	25
13	Laypura bore	8	430	30	9	3	10
14	Bhavaninagar bore	8	390	30	7	3	10
15	Harekrishna society bore	8/10	330	52	7	4	25
16	Umiya park bore	10	440	62	9	4	25
17	Gathiya bore	8/10	270	62	7	4	25

Table 1. Details of bore well

- The present allocation for Sanand town is 6.5 Mld. Currently about 6.5 MLD is being supplied

through this source. Remaining water is supplied to Sanand Town through Tube well having depth of 250 m. with pumping machinery

- There are 3 ESR in use with total storage capacity of 36 lacs lit. There are 17 wells which provides 9 MLD and 7 sumps with capacity of 43 lacs lit. Recently available
- quantity of water is 11.9 MLD for present population of 41530.

Table 2. Details of Overhead water tank

Sr .no	Name	ESR capacity (lakh L)	Remarks
1	Narmada vasahat	12	In use
2	Shankarwadi	14	In use
3	Siddhnath mahadev	10	In use
4	Bramani temple	20	Not in use
5	Madhav nagar	4	Not in use
6	Balidev temple	5	Not in use

Existing Issues

- Inadequate allocation at source considering population projection for the next 30 years.
- Ground water quality is not acceptable and hence if ground water source needs to be exploited proper investigation to be carried out to ensure adequate quality and quantity of ground water availability.
- Inadequate treatment and transmission capacity from source to the various distribution stations.
- Inadequate storage capacities –both underground and overhead.
- Inefficient Distribution Network.

IV. SOLID WASTE MANAGEMENT

The city of sanand and disposes about 17 tons per day. Current per capita per day waste generation for the city is 0.2 kg/ capita/ day. The waste is collected on a door to door collection basis every day and dumped without treatment near Madhavnagar in sanand city.

Municipal Solid Waste Disposal site is near Madhavnagar (survey no. 142, 144, 2151) with a total area - 41,988 sq. m. The total waste disposed of per day is 17 tons per day. Dumping site is nearby roadside of SH 135.

This is lower than the waste that is generated, and in future needs to be included in strategies. No treatment facilities exist, but can be brought into picture with partnership investments of private players.

Table 3. Details of landfill site

Survey no.	*Area (sq. km)*
142	*16592*
144	*14366*
2152	*11028*
Total	*41986*

FIGURE 1.DUMPING SITE OF SANAND

Note the total construction waste for the town is the biggest contributor, and is a revenue generation opportunity. It is estimated that by 2030 the waste generated will be 31.5 tonnes per day. In view of the above the population of the town is estimated to increase by three times hence it's necessary to look into practices for both collection and treatment. Sanand is still to make an organized effort towards solid waste management and in view of this it will be a good idea to look into the private sector to raise the standards of health, sanitation and urban environment keeping pace with the rapid urbanization and growing population in the Satellite town to Ahmedabad.

Existing Issues

- No segregation of waste in the current practice.
- There is a lack of scientific disposal site of for waste.
- Location of waste site is neared to state highway so it will cause nuisance of breeds and fly and unaesthetic view
- There is also problem of leachate.
- Location of waste site is close to the canal and hence there is a need for a sanitary landfill site.

V. STORM WATER DRAINAGE

Out of the total area of Sanand of about 40.42 sq. km, about 12.5 sq. km area is likely to develop as an urban area in the next 40 years with a projected population of 2, 00,000.

The topography of Sanand town is such that ground levels are fairly even. The entire drainage of the area is toward Nal Sarovar. The city of Sanand has open storm water drains which carry the waste water from the kitchen and bathroom of the city and drain it into the three lakes without any treatment.

A Storm Water Disposal system has to be designed such using the Lakes of the area as detention water bodies with overflows in the natural drains towards Nal sarovar. The lakes have to be cleaned and developed properly such that no pollution enters the lake. Currently the Strom water drains are only located in the Gamtal area of the town and this needs to extend to the T.P. Scheme areas. Around 40 Km of road network will be developed in the TP Scheme areas and hence the main Storm water drainage lines need to be constructed alongside.

Existing Issues

This practice of disposal poses a big threat of contamination of water in the lakes. The issue is even more sensitive as water from these lakes drain into Nal Sarovar which is an eco-sensitive area and hence the city poses a threat to the migratory birds that come to Nal Sarovar every year. The disposal of water into the city lakes also effects the urban environment and since this water is used by nearby farmers for agriculture, this can lead to contamination of food and vegetables.

VI. SEWERAGE

There is no systematic sewerage system as well as sewage treatment and disposal system at all in Sanand town. Thus, the sewage from these areas of Sanand is being discharged into soak pits, septic tanks and open fields, which pollute the existing ground water table as well as the soil of this area.

The open drains near the village site, gives odors nuisance and have become mosquito – breeding areas, resulting into spreading of malaria as well as other water - borne diseases. The raw sewage seeped in the soil can find its way into leaky water supply mains, thus causing heavy risk to the health of people, living in the surrounding area.

The sewage further contaminates the water of canal, pond also. The untreated sewage discharged into open fields creates problems with crops and also field soil and also unhygienic conditions and nuisance for the people living in the area. Assuming that the waste water generated is 80% of water supplied the city currently produces around 9.2 MLD of sewage. This will increase as suggested in the table below.

Table 4. Details of waste water generated

Year	Population	Water supplied in MLD (@140Lpcd)	Waste generated in MLD
2018	41530	11.5	9.2
2025	100000	14	11.2
2040	200000	28	22.4

Existing issues

- Lack of a proper sewage system for the city
- Increase in the risk of contamination of groundwater sources.

Need for public toilets for the urban poor in the city.

VII. CONCLUSION

This study shows the existing situation of the satellite town, sanand which shows the need of considerable development in every basic facility of the town. The sustainable development strategy should be imparted in such a way so that it will not be harmful to environment as well as human health of the residents of the sanand town.

ACKNOWLEDGMENT

This is the place to admit that while there appears only one author on the cover, this work just as any other, is a product of the interaction with and support from many people. I am thankful to all of them for their help and support during my entire thesis work Among them, first I express my gratitude to my guide Prof. Labdhi Sheth her throughout guidance, advice and encouragement. I am thankful to my external guide Falguni Shukal for her precious time and knowledge. Her solid knowledge helped me to broaden my view and approach the problems. I am thankful to Sanand Nagarpalika and for giving their precious knowledge and meaningful opinion. I am thankful to all the Students of ME (Civil Infrastructure Engineering), LDRP Institute of

Technology & Research, Gandhinagar for their appreciable support in my study. Last but not the least; thanks to all my friends for their loving friendship and support. Special thanks to my college for giving me the invaluable knowledge.
Above all I am thankful to almighty God for everything.

REFERENCES

[1] Urban Sprawl And Growth Management – Drivers, Impacts And Responses In Selected European And US Cities
[2] Urban Growth Centers On The Periphery: Ad Hoc Policy Vision And Research Neglect
[3] The Role Of Industry In Satellite Towns Of Polish And French Metropolitan Areas – Case Study Of Myślenice And Issoire
[4] Analyzing The Environmental Benefits Of Industrial Symbiosis
[5] Urban Growth Centers On The Periphery: Ad Hoc Policy Vision And Research Neglect
[6] Economical Growth And Social Factors On Satellite City In Samarinda City East Kalimantan
[7] Sustainable Development Strategies For Satellite Towns In India (Case Study- Hajipur)
[8] Key Issues In Integrating New Town Development Into Urban Transportation Planning
[9] Strategies For The Recovery And Recycling Of Plastic Solid Waste (PSW): A Focus On Plastic Manufacturing Companies The Correlation Between Logistics Industry And Other Industries: An Evaluation Of The Empirical Evidence From China
[10] THE QUALITY OF LIFE OF RESIDENTS OF A SATELLITE DEGRADED CITY DISTRICT AS PART OF URBAN DEVELOPMENT POLICY
[11] Sustainable Development Strategy for the Global City: A Case Study of Sydney
[12] The Correlation between Logistics Industry and Other Industries: An Evaluation of the Empirical Evidence from China
[13] Design of combination of compost plant and landfill for municipal solid waste management of Guwahati city
[14] Cept portfolio
[15] Sanand nagarpalika
[16] Sanand city development plan