

Summer Training
At
UNNATI ORGANIZATION
(May 10, 2021, to July 2, 2021)
A
Project Report On
Sludge Flow analysis of Onsite Sanitation System in Jodhpur Municipal Corporation

Submitted by
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(2020-2022)



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Rajasthan – 302029 July-
2021

CERTIFICATE

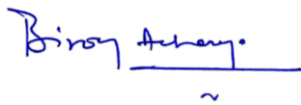
*It is to certify that **Dr. Manali Mathur**, Student of a School of Development Studies, IIHMR University, Jaipur, Rajasthan has successfully completed the summer training at the **UNNATI Organization Gujarat, Ahmedabad**.*

This is the Bonafide record of the work carried out by her under my supervision and Guidance during the summer training from May 10 to July 2, 2021.

Date: 02/07/2021

Place: Gujarat, Ahmedabad

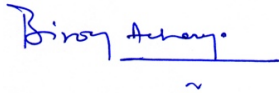
Signature of Faculty/Guide (Organization)

A handwritten signature in blue ink, reading "Binay Acharya", is written over a horizontal line. Below the line, there is a small blue mark resembling a tilde (~).

Director, UNNATI

July 22, 2021

It is to certify that Dr. Manali Mathur, student of School of Development Studies, IIHMR University, Jaipur, Rajasthan has successfully completed on-line summer internship at our institution during May 10 – July 2, 2021. She studied the ‘Sludge Flow Analysis of Onsite Sanitation System in Jodhpur Municipal Corporation’ and submitted the report.



Binoy Acharya
Director

ACKNOWLEDGEMENTS

The internship provided to me by UNNATI Organization was a great learning opportunity for me. It provided me the necessary exposure to professionals throughout my internship period. Even when the world is fighting with a pandemic today, I was honored to get an opportunity to work closely with wonderful people who mentored me and agreed to provide a necessary platform through online work from home summer training program even in testing times.

I would like to express my Gratitude & Respect to Binoy Acharya Sir (Unnati Organization), Swapani Ma'am (Unnati Organization), and Rahul Ghai Sir (Dean of School of Development Studies, IIHMR University) for their constant direction, instruction, inspiration & every single possible support in the overall preparation of this report.

I am grateful to Mr. Alok Mathur (Executive Engineer, JMC), Mr. Ankit Purohit (Assistant Engineer), Mr. Gautam Mathur (STP In-charge), Ranveer Ojha (Supervisor) for constant direction, support & valuable ideas during the time of Summer Training.

I would like to extend my heart felt gratitude towards my esteemed institution IIHMR, Jaipur for providing me with an opportunity and platform to help me further enhance my skills and gain much needed experience through Summer Internship on a Work from home basis.

The Placement Committee In charge, Anshul Goyal Sir, IIHMR University, and the entire placement committee for their relentless Hard work.

I would like to extend my heartfelt gratitude towards my Institutional Mentor Rahul Ghai Sir Dean-SDS, IIHMR University for always being available to clear my doubts and apprehensions and always guiding me the on right path.

I am deeply moved by the constant support provided by my co-interns and colleagues as it is due to their constant encouragement and insights, I was able to successfully complete my report. I am grateful to them for providing me with their honest opinions and criticisms wherever needed to enable me to perform better. They were also instrumental in providing new and illuminating ideas related to the project.

SUMMARY

This report addresses the situation of urban areas about the collection, treatment, and disposal of domestic wastes in urban cities with special reference to the city of Jodhpur in Rajasthan. Jodhpur is the second largest city in the state of Rajasthan. From medieval times Jodhpur city has had an a well-developed medieval rainwater harvesting and water management system that enabled the city located amidst arid region to survive extended periods of rainwater scarcity and drought.

However, as the city has grown in population and extended its limits as well as density there has emerged an problem of sewage disposal that is s improperly treated and disposed of in open drains that flow downstream and mix with bodies of water. Given the intensive use of groundwater in the city and its environs high volume of wastewater endangers the quality of the groundwater. It is very important to properly treat domestic wastewater by installing Sewage Treatment Plants (STP) with sufficient capacity to avoid contamination of groundwater and surface water, etc. In Jodhpur City, two STPs in Salawas are 50MLD of ASP technology capacity) and Nandari (20MLD the oxidation pond capacity) are in operation and another 50MLD STP is proposed in Salawas. The uncontrolled and unscientific landfilling of such wastes has resulted in an increasing number of incidents that pose a threat to human health, while surface and groundwater pollution creates more serious risks for humans Health.

The first part of this report looks at the demographic profile of the city of Jodhpur. The second part deals with SFD (Shit Flow Diagram), which explains how "excrement" flows through a city or community and shows the state of the urban sanitation. The third part of this report describes the condition of the sewage treatment plant in Jodhpur, how toilet waste is managed by the JMC (Jodhpur Municipal Corporation) and, about the situation of public toilets. The fourth part of this report describes the issues and challenges of public toilets, such a gender issues, mindset of people about public toilets. The last part of this report describes about the recommendations that how we can make people aware about sanitation and hygiene services.

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Key Terminology

Faecal sludge: Faecal sludge is the solid or sedimented content of pit latrines and septic tanks. Faecal sludge varies from sludge that occurs in municipal sewage treatment plants. The properties of fecal sludge can vary widely from household, city, and country.

Septage: Sewage wastes are the contents of Onsite septic tanks and include liquids, solids (sludge), and fats, oils, and fats (slag) that build up in septic tanks over time.

Sewage or Black water: The sewage produced by the toilets, which contains human excrement and feces, is known as sewage or sewage.

Septic Tank: An underground storage tank that purifies wastewater by combining solid sludge and anaerobic digestion. As a local sewage treatment system, the septic tank consists of two or more chambers, in which the sanitary flow is stopped to ensure that the sludge settles and ferments at the same time.

Desludging: The removal of sludge from septic tanks/decomposition tanks, sewage tanks or other pretreatment plants is called sludge removal and is usually mechanically (using vacuum suction pumps).

Faecal Sludge Treatment Plants (FSTPs): An independent sewage sludge and septic tank waste treatment plant recovers solid and liquid components in accordance with the prescribed standards for safe disposal and reuse. **OSS:** On-site Sanitation

SBM: Swachh Bharat Mission

WASH: Water, Sanitation and Hygiene

SECTION -1 ABOUT THE ORGANIZATION

UNNATI – Organization for Development Education is a voluntary non-profit organization registered- Under the Societies Registration Act (1860) in 1990. The purpose is to encourage social presence and democratic governance so that vulnerable sectors of society can participate in the overall concept of growth and decision making efficiently and conclusively. It is a problem-based, scheduled education agency that works with grassroots cooperatives, NGOs, selected local government and government in western India. The most important tools are collaborative research, public education, advocacy, direct local mobilization, and multiple interest groups.

Presently, all the events are organized around the following centers-

- Social Inclusion and Empowerment
- Civic Leadership Governance and Social Accountability
- Social Determinants of Disaster Risk Reduction Inclusion

Social Inclusion and Empowerment

Social Inclusion and Empowerment aims to refer to the principles of social justice between civil society people and government organizations involved in social growth. Together with grassroots organizations, effort on the problem of the rights of Dalits, women, and people with disabilities. In partnership with grassroots organizations and Dalit community leaders, they are operational in 248 villages in western Rajasthan (Jodhpur, Barmer, Jaisalmer) for eleven years.

Civic Leadership Governance and Social Accountability

Strengthening citizen action to promote social responsibility is a strategy. In eight Taluqs in Gujarat and a neighborhood in Rajasthan, approximately 500 civic leaders were skilled on the role of citizens in public contribution, local governance, and social justice. Executives receive training on the relevance of citizenship and governance, decentralization, mobilizing communities to assume social responsibility through social audits, recommendations, and monitoring of basic services.

Social Accountability

The empowered citizen can hold state institutions accountable. Involving citizen leaders in good governance have proven to be an effective method of social accountability. Approximately 650 citizen leaders from Seven blocks in two districts of Gujarat are trained in Citizen Reporting (CRC), Right to Information Camps (RTI) and the National Rural Employment Guarantee Program (NREGS) and monitoring basic services.

Social Determinants of Disaster Risk Reduction

The social determinants of disaster risk reduction (DRR) programs are designed to promote community. practice and examine disaster risk decrease issues to foster a safety culture at all levels. Our work is mainly concentrated in the desert areas of Rajasthan and the Kutch region of Gujarat. Play a broader education and advocacy role at the state and national levels. As part of the risk reduction procedure, minor and normal water storage reservoirs have been built for vulnerable Dalit families.

Mason training courses are held regularly to promote safe construction technology. In Jodhpur and Badmer forums for building tradesmen were promoted. These craftsmen deal with the production of stabilized floor blocks and iron cement gutters for roof construction. A small laboratory has been set up on our workplace campus in Jodhpur to carry out soil and building material tests. The knowledge gained from field experience is combined and dispersed in printed and electric form for a broader exchange via a Knowledge Resource Center.

Vision- Create an inclusive society where all investors, especially disadvantaged groups, have full participation, and have access to and fair control of services, resources, and organizations.

Mission- Promotion of social inclusion and democratic governance so that so that helpless areas of civil society, Dalits, tribes, females, and people with disabilities, are enabled to participate efficiently and conclusively in the overall progress, decisions.

Values- Transparency – Maintain the trust of our Multiple sponsors and groups. Truthful, open, and moral in all we do, acting always with honesty.

OBJECTIVE

For the eight-week internship programme, I was to work with UNNATI Organization. The main purpose of the internship is to develop a sense of the working environment, to carry out work and to engage in the workplace.. This would help me pave the way for both my academic and personal growth.

My report is on Faecal Sludge and Septage Management of Onsite Sanitation System. In FSSM Rajasthan report underlines that ‘a truck load of faecal sludge discarded into the environment is equal of 5,000 people practicing open defecation’. Given the highly concentrated nature of faecal sludge and septage when compared to sewage which is more diluted in nature.

The general objective of proper faecal sludge and septage management is to protect public health and the environment from the disturbance and effects of faecal material. To study collection, transportation, and processing of sludge for disposal. To analysis of household level practices, preferences, and aspirations of sludge management.

Global Report on WASH in health care facilities Explains their Specific objectives-

- Status of the WASH services and the needs in the area.
- Gaps in the emergency WASH response provided to affected populations. .

According to Climate Resilient WASH Report 2020, “Access to water and sanitation takes on particular importance for women and girls given them traditional role as stewards of water, their sexual and reproductive health necessities, and their role in caring for children. In this context, gender-cantered WASH programming supports women to take on management roles and contribute to decision making”.

- Learning Objective from this report is about basic concept related with water, sanitation, and hygiene.
- Sanitation with a major emphasis on Community led sanitation, on site sanitation and sanitation on emergency.

SECTION -2 SUMMER TRAINING REPORT

I- Background

Demographic Profile of the City

Jodhpur is the second largest town within the Indian kingdom of Rajasthan and the second biggest metropolis inside the kingdom. It used to be the capital of the princely state of Jodhpur. Jodhpur was traditionally the capital of the kingdom of Marwar and is now part of Rajasthan. Jodhpur is a famous tourist destination with numerous palaces, forts and temples embedded in the stark landscape.



1.1 Population of Jodhpur

To know the exact population of Jodhpur in 2020, we have to get the population of the last 5 years, they are as follows:

- 2015 – 1.56 million
- 2016- 1.63 million
- 2017 – 1.728 million
- 2018 – 1.8056 million
- 2019 – 1.86872 million

<https://www.google.com/maps/place/Jodhpur,+Rajasthan/>

<https://en.wikipedia.org/wiki/Jodhpur>

<https://indiapopulation2020.in/population-of-jodhpur-2020.html>

Jodhpur's current metro area population is 1,510,000 in 2021, a 2.58 percent increase from 2020. Jodhpur's metro area population in 2020 was 1,472,000, a 2.65 percent increase from 2019. Jodhpur's metro area population in 2019 was 1,434,000, a 2.65 percent increase from 2018.

Table -1 Jodhpur City Population 2011

Description	
City	Jodhpur
Government	Municipal Corporation
Urban Agglomeration	Jodhpur Metropolitan
State	Rajasthan

Jodhpur City	Total	Male	Female
City out Growths	1,056,191	555,371	500,820
City Population	1,033,756	543,120	490,636
Literates	729,012	414,138	314,874
Children (0-6)	131,656	69,649	62,007
Average Literacy (%)	80.81%	87.47%	73.46%
Sex Ratio	903		
Child Sex ratio	890		

<https://www.census2011.co.in/census/city/80-jodhpur.html>

1.2 Climate

During the dry season Jodhpur is hot and semi-arid, but from the end of June to September it has a short rainy season. The average rainfall varies widely, although around 362 mm. Temperatures between March and October are extremely high, except when there is monsoon rain. High temperatures often exceed 40 °C in April, May, and June. The average temperatures during the monsoon season are less than 40 °C.

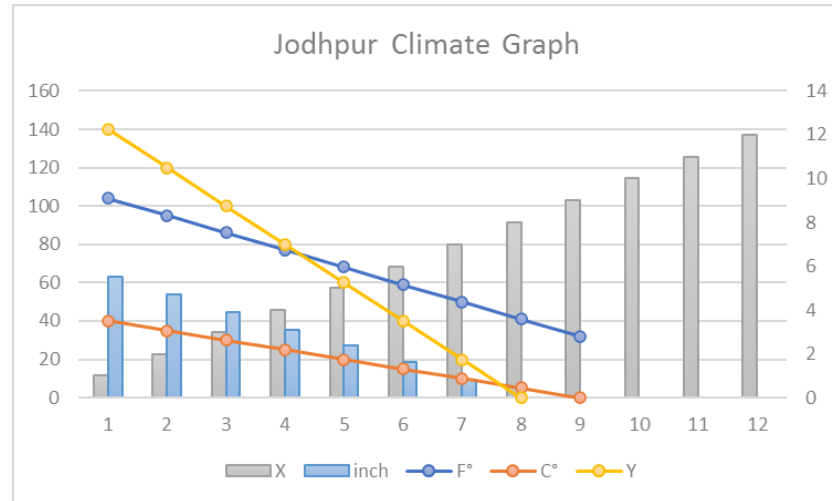


Fig.1.1

1.3 Geographical status

Jodhpur only received 24 mm, but it received 1,178 mm in the flood year of the year 1917. (46.4 in). The river Jojari, a tributary of the river Luni, flows from Banad to Salawas in the city of Jodhpur. A Riverfront project for this 35-kilometre-long river flowing into the urban zone of Jodhpur under the Namami Ganga Ministry of Jal Shakti project was approved, and is being planned, before the project became part of a Jodhpur development authority in January 2021.

It is in the central part of the western part of the state, with a total area of 22,850 square kilometers, and is one of the largest areas in Rajasthan. The Jodhpur area is between 26°C and 27°C, 37 minutes north latitude, 55 minutes east longitude and 73°C 52 minutes. It borders Nagar to the east, Jaisalmer to the west, Balmer to the north, and Pali to the south. It has been between the north and south of the area. It is 197 kilometers long from east to west, about 208 kilometers. It is located at an altitude of 250-300 meters above sea level in the Jodhpur area.

1.4 Zones

Jodhpur is alienated into three areas, namely the Pal area, the Jhalamand area, and the Punjla area.

1.5 Jodhpur Metropolitan Areas

Jodhpur, Kuri Bhagtasani, Mandor Ind. Area, Nandri, Pal Village, and Sangariya.

1.6 Water resources

In the north of Jodhpur City is Balsamand Jheel. The Kailana and Ummed Sagar water reservoirs are significant. Two natural springs, Beri Ganga and Ban Ganga, are in the district. The main tanks, maintained by the irrigation department, include Soorpura and Golejor Bandhs, Pichiyak (Jaswant Sagar) and Birai Tank.

1.7 Nadis

In Jodhpur, the 25 Nadis. In the city there are five of them and out there are 20. Jodhnadi, built in the year 1458, is the oldest registered Nadi. People, destruction of water catchment and development. Six nadis were completely lost, including some of the oldest ones like Raniji ki nadi and Pritaro nadi (about 450 years old). Most of Jodhpur's old villages had nadis. The accessibility of Nadi water varied between two months and a year since the rain.

1.8 Lakes

Jodhpur is home to 5 large lakes in an extra or much less herbal environment on the outskirts of town. The oldest, built in AD 1126, is Balsamand. This lake can hold about seven hundred million cubic feet (m cu ft) of waters at a certain time in combination with four opposites, such as Lalsagar, Kaailana, Takhatsagar or Umedsagar, which can help approximately 800,000 people for 8 months.

1.9 Baoris

Jodhpur is a baori town or a stepwells network. Baoris can preserve water, which is lower than wells and older than various cities' water bodies, for the long-term because of the almost negligible evaporation of water. The SDS studied 45 baoris, 16 inside and 29 outside the city.

1.10 Jodhpur Development Authority

Established for planning, coordinating, and monitoring the orderly, and rapid expansion of the Jodhpur region Current projects multi-zone sewer laying work Delivery, laying, connecting,

testing, and commissioning of the RCC sewer system and all factory accessories, PVCU pipes, including culverts, land connections, and road reintegration, etc.

1.11 Water Supply Component

The planned water supply for the city of Jodhpur dates to 1886 and has been enlarged many times over. Currently, the city receives water from the Rajiv Gandhi Elevation Canal (RGLC).



Fig.1.2 J Jodhpur River Map



Fig.1.3Jojari River Flow

The RGLC is stored in two tanks called Kailana. and Takhat Sagar. There are three main water supply zones in the city based on water treatment plants in Kailana, Chopasani, and Jhalamand. The total amount of water supply is ld. 141 million, of which approx. 18 million is supplied to industry and other household purposes.

Presently water delivery to Jodhpur town is met total with the aid of using IGNP canal and partly from groundwater reasserts from the location around Jodhpur town precisely Rampura-Teori Manai Manklao and Doli-Pal location. At gift water in a lake, Kailana is specially provided with the aid of using a raised canal. Input from the raised canal to Kailana lake is 0.21 million cubic meters in line with day. The recommended intensity of the lake is set at 18 meters, which has the possible of around five million cubic meters of water. Present water expenditure from the lake is 0.18 million cubic meters in line with the day while it turned into approximately 0.08 million cubic meters before than the feeding with the aid of using raise canal.

1.12 Water treatment plant

The city is supplied with water from the Kailana Jodhpur water treatment plant. The water treatment plant has a capacity of 120 MLD. The water basis is Kailana Lake, 8 km away. This plant runs for 22 hours and 150 MLD water is treated and delivered to the city. The city's daily water supply is 300 lakhs gallons in the summer or winter and 285,290 lakhs gallons in the monsoon time. The system is conventional and contains of several sewage treatment plants, and rapid filters, chemical flash mixers, pure water sump, and pump +house.



Fig.1.4 Kailana Lake

Table -2 Sailable Features of Kailana and Takhat Sagar

S No.	Feature	Kailana	Takhat Sagar
1	Consumption Period	1872 AD	1932 AD
2	Type of Dam	Earthen	Earthen
3	Location – Latitude, Longitude	26°18’ 73°01’	26°18’ 73°01’
4	Catchment Area	42km ²	42km ²
5	Submergence Area	0.78km ²	-
6	Maximum Depth	17.6m	21.3m
7	Source of Water	Rainwater and canal	Water from Kailana

<https://www.google.com/maps/place/Kaylana+Lake/>

<https://www.google.com/maps/place/Water+Treatment+Plant,+Takhat+Sagar,>

1.13 Informal Settlements

The total population of the slums in Jodhpur is 2, 65, 443. The total numbers of households in slums are 46,364. The total numbers of houses are 43376 out of which 29845 (68.8%) houses are pucca houses, 8337 (19.2%) are semi pucca houses and remaining 5194 (12.0%) houses are Kachha houses.

Sewage Water Overflow

There are some spots in Inner city such as Tripolia Bazar, Umaid Chowk, Navchowkia area, some part of Kamla Nehru Nagar, near Khet Singh Ka Bungalow, where sewerage line overflows every day. This is also a major reason for the roads being damaged for a year here. In Tripolia market, the sewerage line remained clogged throughout the day and the polluted water kept flowing on the roads, due to which there have been many feet deep pits here. In such a situation, even walking on foot has become difficult.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Mission was launched by Prime Minister of India Narendra Modi in June 2015, to improve the sewerage system in the urban area, improve the drainage system and other development works. Under this, a budget of 100 crores was given to Jodhpur city. Out of this, 37 crores have been spent on improving the sewerage system. The remaining amount is being used for construction of drainage system and drain. An average of one crore is spent on sewerage every month. An average amount of one crore is spent on the sewerage system by the Municipal Corporation. In the last one month, more than 8 tenders have been placed in different wards of the city to develop sewerage system and to improve the old system. More than 3 crores will be spent on these. It also includes annual maintenance of several sewerage lines.

Open Defecation –

Jodhpur has got ODF certification, but some areas of the city still have open defecation. There are no toilets in some places, and people have to solve problems every day. There are toilets in some places, but people do not know enough about them because they do not understand the importance of toilets in their lives. This is undeniable. Maintaining a clean environment is essential to good health. All humans and animals because it is completely dependent on the atmosphere. Of course, there are many toilets built by the government, but if people do not know enough about their use, they are useless. Some people refuse to build toilets at home. Because they are used to going out. People seem to be bad at building toilets in houses. They are superstitious of many things, so they think that toilets should not be built at home. On the contrary, most people tend to go out, even if they have toilets both inside and outside their homes.

1.14 Jodhpur Municipal Cooperation -

The municipal body consists of 65 elected members who represent their regions (65 geographic city units). The company's 65 directly elected members include 4 former members (1 MP, 3 MPs, namely Sardarpura, Soorsagar, City) and 3 elected members who represent their regions (65 geographic city units). Selected sewage, drainage and rainwater pipe networks operated by their own municipal utilities.

II- SFD JODHPUR

Information about SFD -

A feces flow diagram (or shit flow diagram, SFD) is a tool to easily understand and communicate how feces "flow" through a city or town. An associated report describes the background of the city or town's service delivery. SFDs are a useful tool to aid urban sanitation planning by imagining the status of urban sanitation to the destination of the excreta.

2.1 SFD Lite Information

Produced by: Manali Mathur

I would like to thank Mr. Alok Mathur, Executive Engineer (Sewage Dept.) (Jodhpur Municipal Corporation (JMC); Mr. Ankit Purohit, (Assistant Engineer), Mr. Khetaram (Desludging Operator), Mr. Gautam Mathur (Plant in-charge STP); Mr. Ranveer Ojha (Public toilet Supervisor).

2.2 SFD Graphic

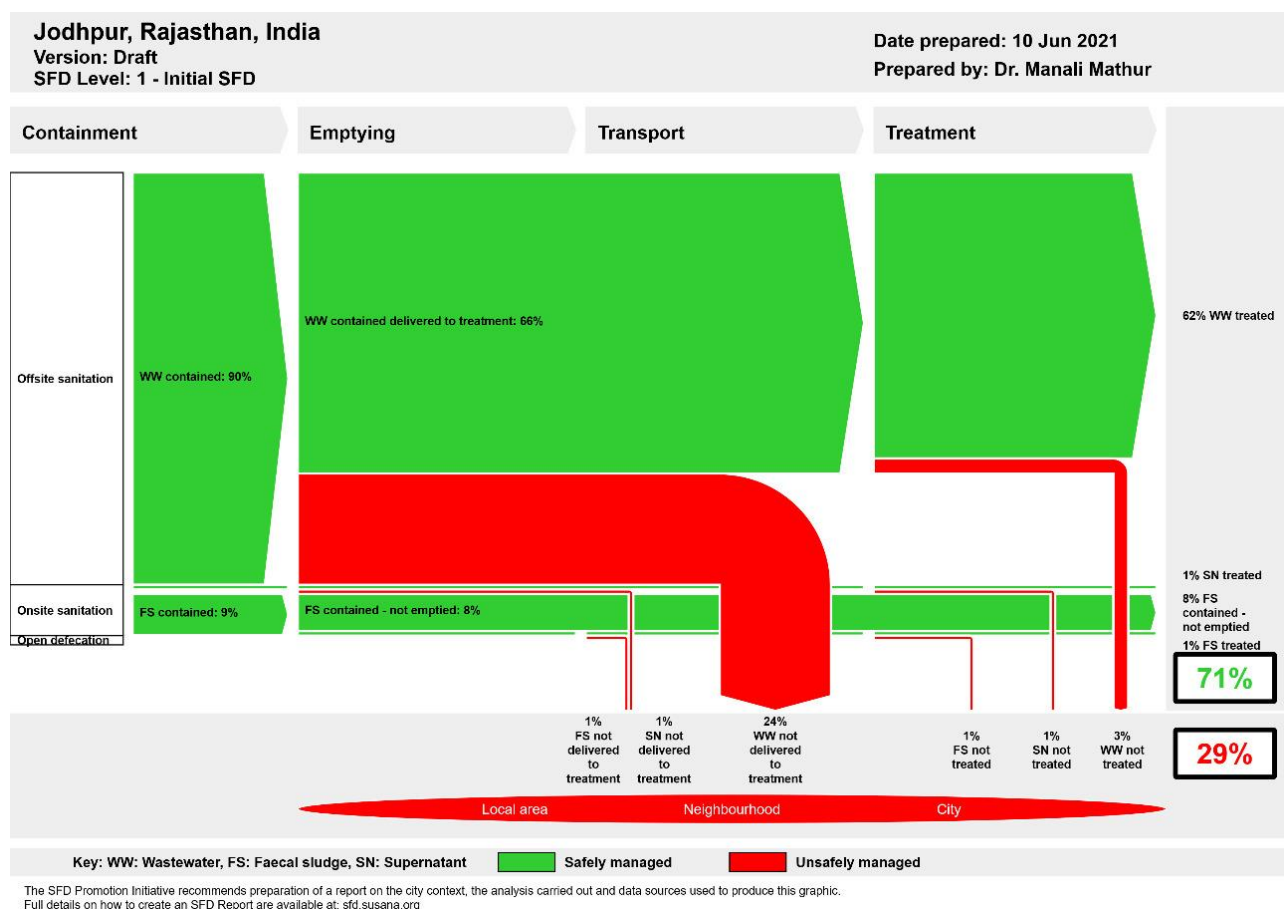


Fig.2.1

III - Outcomes

Jodhpur, Rajasthan, India, 10 Jun 2021. SFD Level: 1 - Initial SFD

Population: 1510000

Proportion of tanks: septic tanks: 5%, fully lined tanks: 90%, lined, open bottom tanks: 0%

Containment								
System type	Population	Transport	Treatment	Emptying	Transport	Treatment	Transport	Treatment
	Pop	W4a	W5a	F3	F4	F5	S4d	S5d
System label and description	Proportion of population using this type of system	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in sewer system, which is delivered to treatment plants	Proportion of supernatant in sewer system that is delivered to treatment plants, which is treated
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	90.0	73.0	95.0					
T1A3C4 Fully lined tank (sealed) connected to a decentralised foul/separate sewer	10.0			10.0	69.0	60.0	35.0	22.0

Fig 3.1 SFD Chart

3.1 Offsite System

The sewerage network has been connected throughout the city within the administrative boundaries of Jodhpur by many state sewerage network authorities. Currently, Jodhpur Nagar Nigam is answerable for providing the sewage system. 90% (T1A1C2) of the urban population can be found. There are some villages around Jodhpur, there are 10% of the urban population (T1A1C4), households have their privies connected directly to open drains. According to the current scenario, 70% of the population's wastewater reaches the STPs (W4a, S4d) considers the blockages and leaks of the old sewers in the storm sewers and the river. The wastewater and supernatant treated in the STPs are treated at 90% (W5a and S5d); the other two STPs at 50MLD and 20MLD are proposed for remediation plans that contest the quality of the treated water required for its safe disposal in the Jojari River.

STATUS OF SEWAGE TREATMENT PLANTS (STP)

Three sewer treatment plants, namely Salawas 50 MLD STP Phase I, Salawas 50 MLD STP Phase II, and Nandri 20 MLD STP, are currently being processed by Jodhpur. The campus is the like of 50 MLD STP Phase I and Phase II, located 20 kilometers from the town of Salawas and the campus of 20 MLD STP are 22 kilometers from the town, in Nandri.

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Detailed information of STP Salawas, Jodhpur		
1.	Name / Location of STP	Sewage Treatment Plant Salawas, Jodhpur (Rajasthan)
2.	Process of Sewage Treatment	Activated Sludge Process
3.	Flow sheet of STP (to be attached)	----
4.	Designed Capacity / day	50 MLD
5.	Actual Treatment	35-40 MLD
6.	Raw Sewage Characteristics	CPCB Report
	pH	7.69
	TSS	336 mg/l
	COD	428 mg/l
	BOD	200 mg/l
	NH ₃ -N	3.57 mg/l
	Total Nitrogen	19.04 mg/l
	Fecal Coli form	2000
	Total Coli form	1000
7.	Primary Settling Tank	
	Primary Settling Tank Volume M ³	2358.51 M3
	Settling Surface Area M ²	1126.4 M2
	Weir Length (m)	202.74 M
	Retention Period	1 Hr 46 Min
	PST outlet TSS, BOD, COD (mg/l)	TSS 212 mg/l, BOD 103 mg/l, COD 190 mg/l respectively
	Under flow Solids concentration mg/l or %	
	Actual Primary Sludge Production rate	254 M3/Day
	Availability of Mechanical Scraper	2 Nos
8.	Aeration Tank	
	Aeration Tank Volume M ³	10081 M3
	Retention period	4:30 Hr
	Mixed Liquor MLSS & MLVSS mg / l	3540 mg/l & 2194 mg/l
	Aeration Capacity KW or HP	2641 Nm3/hr (Each blower)
	Ratted Aeration Capacity Kg / KW hr	12254.34 M3
9.	Secondary Settling Tank	
	Secondary Settling Tank Volume m ³	02 Nos , 3492.46 M3 (Each tank)
	Settling Surface Area m ²	1152 M2
10.	A. Activated Sludge Process	
	Waste Sludge generation (Flow rate m ³ / hr multiplied by hr / day)	357 M3/Day
	Waste Sludge Solids (TSS) concentration mg/l	4567 mg/l
	ASP outlet TSS, BOD	
	BOD	17 mg/l
	NH ₃ -N	0.34 mg/l
	Total Nitrogen	2.8 mg/l
	Fecal Coli form	10
	Total Coli form	5.0
12.	Sludge Thickener	
	Volume m ³	864.1 M3
	Thickening surface m ²	220.76 M3
	Underflow Solids Concentration mg/L	-
	Actual thickened sludge production Rate (Flow rate)	295 M3/Day
13.	Sludge Digesters	
	Digester Volume m ³	6601 M3
	Thickening Sludge BOD mg/L	20000-25000 mg/l
	COD mg/L	140000-19000 mg/l
	Actual digester sludge production rate	194.34 M3/hr.
14.	Biogas produced, if any and its composition	400-500 M3
15.	Operational status of gas utilization	Gas burn through flare tower
16.	Power generation , if any	No
17.	Point of treated sewage disposal (river / lake / irrigation / land and disposal / pisciculture / aquaculture / any other)	Treated sewage are discharge through drain from premises, auction and using by the farmers for agriculture purposes.
18.	Bypass arrangement of STPS, if any	Yes but not in used
19.	Method of Sludge disposal and status (Satisfactory / Unsatisfactory)	Satisfactory, sludge are disposed on Keru Solid Waste Plant
20.	Operation and maintenance of STP	Satisfactory
21.	Agency for operation and maintenance of Sewage Treatment Plant	Nagar Nigam, Jodhpur
22.	Operation through Sub Contractor	M/s UEM India Pvt. Limited, Noida
23.	Power requirement	450 KV
24.	Status of power availability for uninterrupted and continuous running of STP	DG Set
25.	Standby arrangement for power, if any	DG Set
26.	Status of skilled / Trained Manpower	22 persons including operation maintenance and laboratory chemist
27.	Annual expenditure on O & M & STP	4.32 Cr
28.	Consent from SPCB	Applied but not obtained
29.	Volume of industrial waste being mixed in sewage , if any	5-8 MLD
30.	Status of maintenance of Log Books	Maintained

STP Nandri

Stabilization of Waste 20 MLD STP technology-based tank treatment has been instructed for sewage treatment in Nandri village. 18MLD against the designed 20MLD capacity is currently operating.

1.	Name / Location of STP	20 MLD STP Nandri, Jodhpur
2.	Process of Sewage Treatment	WASTE STABILIZATION PONDS
3.	Flow sheet of STP (to be attached)	---
4.	Designed Capacity / day	20 MLD
5.	Actual Treatment	15-18 MLD (AVG)
6.	Raw Sewage Characteristics	CPCB Report
	pH	7.32
	TSS	460 mg/l
	COD	972 mg/l
	BOD	636 mg/l
	NH ₃ -N	5.38 mg/l
	Total Nitrogen	64.96 mg/l
	Fecal Coli form	TNTC
	Total Coli form	TNTC
	Anaerobic pond	3 nos, 92m x 51m x 6m Retention period: 1 day
	Facultative pond	2 nos, 350m x 150m x 3m Retention period: 5 days
7.	Primary Settling Tank	Not Applicable
8.	Aeration Tank	Not Applicable
9.	Secondary Settling Tank	Not Applicable
10.	A. Activated Sludge Process	Not Applicable
	B. UASB	Not Applicable
11.	Final Effluent Quantity	CPCB Report
	pH	6.68
	TSS	34 mg/l
	COD	59 mg/l
	BOD	16 mg/l
	NH ₃ -N	0.34 mg/l
	Total Nitrogen	3.36 mg/l
	Fecal Coli form	1000
	Total Coli form	500
12.	Sludge Thickener	Not Applicable
13.	Sludge Digesters	Not Applicable
14.	Biogas produced, if any and its composition	Not Applicable
15.	Operational status of gas utilization	Not Applicable
16.	Power generation, if any	Not Applicable
17.	Point of treated sewage disposal (river / lake / irrigation / land and disposal / pisciculture / aquaculture / any other)	Auction for agriculture purposes
18.	Bypass arrangement of STPS, if any	By pass Channel
19.	Method of Sludge disposal and status	Auction and use for agriculture
21.	Agency for operation and maintenance of Sewage Treatment Plant	Nagar Nigam, Jodhpur
22.	Operation through Sub Contractor, if any	M/s Steel Engineers Ltd, Delhi
23.	Power requirement	8 KVA
24.	Status of power availability for uninterrupted and continuous running of STP	Power supply from state electricity board
25.	Standby arrangement for power, if any	No
26.	Status of skilled / Trained Manpower	5 Nos Trained manpower
27.	Annual expenditure on O & M & STP	17.4 LACS
28.	Consent from State Pollution Control Board / Pollution Control Committee or Not	Applied but not obtained
29.	Volume of industrial waste being mixed in sewage, if any	No
30.	Status of maintenance of Log Books	log book was maintained
31.	Status of Laboratory facility	Satisfactory

One more STP of 50 MLD capacity at Salawas (Phase II) (adjacent to existing plant), total treatment capacity of sewage wastewater will become 120 MLD. and as per Municipal Corporation, another 40 MLD capacity STP is planned at Basni Benda area in Jodhpur.



Fig.3.2 Inlet Chamber

Treatment Units- Primary Sludge Thickener

Sludge collected in the primary sludge sump on the bottom of the primary clarifier passed through a pump installed in the main pump house to the primary thickener.

Secondary Sludge Thickener:

The loop at the bottom of a secondary clarifier is collected in the system of RAS (Return Activated Sludge) and transported with additional submergeable pumps to the secondary thickener. This system works according to the same principle as the pre-thickener and is up to 4% reliable for the sludge.



Fig. 3.3 Primary and Secondary Clarifier



Fig.3.4 Sludge thickener of STP



Fig. 3.5 Salawas STP Phase -II

This thickened loop from the two thickeners is collected in a thickener loam bucket and measured with a loam density meter in accordance with its density. The sludges in the digester are processed with the exclusion of oxygen by an anaerobic oxidation process. The sludge is digested in this unit to stabilize.

Fig.3.6 Collection of sludge coming from Centrifuge.



Combined Sewerage System –

The same canal is intended to carry domestic sewage, industrial waste as well as surface and rainwater. The automatic discharge takes place through the water. This is the easiest method of collecting and economizing house plumbing. The pumping and treatment costs would increase due to a large amount of wastewater to be handled.

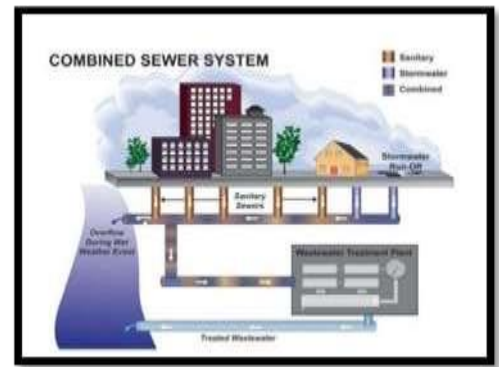


Fig.3.7

Separate System-

Domestic sewage and industrial waste are transported in one sewer system, while rain and surface water transported in a different sewer system. There is no risk of creek contamination as storm overflows should not be provided, is treated, disposal, or processing plants can be designed economically. The maintenance costs for two systems are higher than for one.

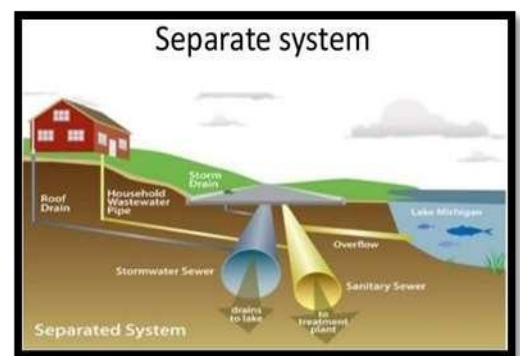


Fig.3.8

Centralized Water Treatment System-

For housing, commercial, and industrial purposes, a central water treatment system can deal with large amounts of water at high rates. It contains the development of water sources, the construction of important infrastructures, the implementation of automated monitoring and control systems and operators on site.

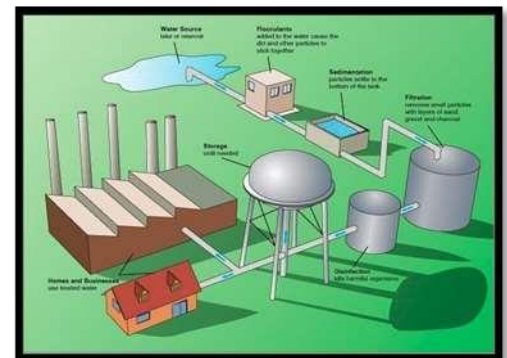


Fig.3.9

Open Drains -

An open channel system, also called a natural drainage system, consists of an open channel or drainage belt. These systems are usually not lined, but they work best when covered with concrete, brick, or mortar. The district serves as the urban area. The problems associated with open-air sewage are extensive and are reported to be related to exposure to agrochemicals, feces, and water-borne diseases.



Fig. 3.10 Open drains near Basani



Fig. 3.11 Open drains at AIIMS Road

3.2 On-Site Sanitation System- Community / Public toilets –

Around 305,607 individual domestic latrines (IHHL) 27 were made available to households as part of the Swachh Bharat Mission (SBM). Some installations approx. 400 toilets and urinals, 372 prefabricated toilets at 95 different locations. There are 29 public toilets, 17 communal toilets, all operated by Sulabh International. Urinals are connected directly to the central/separate sewage system, while communal toilets and public toilets are connected to septic tanks and their outlet is connected. As a public toilet owner said, the average size of septic tanks in the communal toilet is 3 x 3 x 3 m, and in public ones Toilets 1.2 x 2.4 x 3.0m. The general size of septic tanks varies from 6 12 feet * 4 8 feet * 10 feet depending on household size, income level, etc. Septic tanks are two to three chambered with appropriate partitions, including the plastered floor.

Jodhpur was declared a city with no open defecation (ODF ++) under Swachh Survekshan on December 31, 2018, and no cases of open defecation were observed during field visits.

Under Swachhta Survekshan 2020, this geotagging process was introduced to make public toilets easier for the public via Google mapping. The Municipal Corporation was doing this process for the last two years.



Fig.3.12 Public Toilet at Devnagar Circle



Fig.3.13 Public Toilet at Paota Circle

Although ODF is in rural and urban areas, toilet use is an area where Rajasthan is looking to improve its performance. A study by the Center for Policy Research Studies (CPR) looked at nine grams of panchayats in early 2018 and found that 38 percent of the population in those nine-gram panchayats practiced open defecation.

The reasons for this ranged from not using the toilets to not using them for fear of burdens from maintenance costs. A lack of awareness of the construction and use of toilets was identified as the main reason why more than a third of people in the villages surveyed continued to defecate outdoors.

Emptying

To apply for a septic tank or sewer cleaning service, the applicant must visit the Nagar Nigam in their area. The applicant should contact the Hygiene Inspector of the Ministry of Public Health, which is regulated by the Nagar Nigam. Get the relevant application form from the official and in full. The respective clerk checks the information submitted and instructs the respective contractor as well as the schedule for cleaning the sewer system or the septic tank. The tractor-mounted vacuum tanker is used for emptying in narrow and congested lanes by private operators or JMC.

Transportation

The emptied faecal sludge is transported with truck / tractor-mounted vacuum tankers. Around 12 trips per day are made with tractor-mounted vacuum tankers and 45 trips with truck tankers. Wastewater flowing down the drain just before the CETP. CETP does not have a pipeline system for the disposal of treated wastewater in the Jojari River.

The main cause of the pollution of the Jojari River is the diversion of the river by the RIICO drain. Jodhpur currently has a landfill in Keru village and rejected waste from the processing

Also behind the factory premises, the plant is dumped, where for a long-time non-scientific dumping continues to be carried on. Because of that, it is estimated that 300-350 MTDs of solid waste will be produced by road sweeping and waste disposal in the city, and heavy metals from waste may end up in soil. The processing plant accepts only 100 MTD and sends the rest to the dumping site.

The concreted and plastic bins were very dirty, overflowing and broken in many parts of the cities. Often, people throw waste out of the containers. There has been thick black smoke in many places in the morning, spreading throughout many places.



Fig.3.14 Sludge Thickener

Fig.3.15 Water Treated

Treatment/Disposal:

The Nagar Nigam has three designated STPs (STP-Salawas-Jodhpur-Phase I, STP-Salawas Jodhpur Phase II, STP-Nandari-Jodhpur) for the treatment of sewage and fecal sludge, which work at full capacity. The wastewater is collected from allocated tankers and used to irrigate public parks and roadside plantations, while the rest is discharged into the Jojari River. Currently, 120 MLD purified water from three sewage treatment plants is directed to Jojari. An additional 30 MLD of water is essential, for which the construction of 6 STPs for 49 MLD of treated water is recommended.

The treated wastewater is reused for agriculture, with annual income of Rs 40 lakh for the Jodhpur Municipal Corporation and fertilising sludge generated during the process. AIIMS, IIT, engineering colleges, medical colleges, nursing schools, etc. students are often visited by STP to train themselves.

IV- CHALLENGES

1.The toilet is stocked with toilet rolls, hand sanitizer, or tissues, which are essential for maintaining basic hygiene. Toilets are not being restored properly, most of the time they have old equipment, flushing not working, cabin door is not in place, etc.

2.We can find people do not pay and skip paying just ₹ 2 or ₹ 5, and This affects the staff community as it is they who keep the place clean.

3.Inner City – The natural flow of rainwater is outwards through the city. Due to the slope here, the water coming out from the streets of the city rapidly, so once it rains, there is a situation of water logging on the roads. The only possible reason for the growing ground water is the trapping of discarded domestic wastewater, this is compounded by the fact that the strata below the city of Jodhpur is of impervious material and bowl shaped, which is not allowing water to percolate below into the pervious part of the Earth.



Fig.4.1: Cross-section of the ground in the greater Jodhpur area – the main city is located on the bowl on the right-hand side

4. Most houses did not contain garbage, with the garbage dumped at or out on the streets, 5.9 percent had no toilet rooms and these residents practiced open field defecation, with 0.1 percent relying on common toilets intended for the family's group, 1.3 percent relying on dry pits and 3 percent relying on public toilet facilities. There was no easy access to sanitary facilities for 10 per cent of houses in the town.

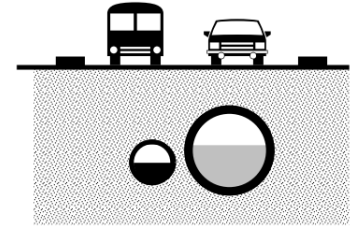
5. Toilets, Too Far Apart—A major problem facing the residents in the slums is that there is a considerable distance from the toilets of most homes. It is a problem because residents can have to use the toilet every day. As men take care of their 'call for nature' by urinating openly and going to the bathrooms for defecation. On the other hand, women have difficulties accessing the facilities for either purpose.

6. From the numerous reports of industries in and around Jodhpur region, it was found that there are different kinds of metal ions such as cadmium, chromium, zinc, copper etc are found in wastewater disposed from textile in Jojari River which causes much harmful and ill effect on humans as well as plants and animals and environment too.

V- RECOMMENDATIONS

1. Sewer system cleaning and maintenance.
2. Reduce leakage and inflow by rebuilding systems and repairing defective or leaking supply lines.
3. People should know that if they do not use the toilets, water, food, and the soil will get polluted which can lead to diarrhea and other serious health diseases. For the protection of one's health, all should use toilets for prevention of germs breeding in the environment. Toilets are not only used for good health but also for one's privacy, comfort, safety, and cleanliness.
4. Community participation can be achieved through public hearings, reports, social surveys, workshops, and public gatherings.
5. Prevent street sweepers from burning leaves and other trash and instruct them to remove all trash in public trash bins/area only.
6. Encourage social clubs to sponsor many wastes management events in the city and create a program each week or month. District committees must use public participation in offices to keep their districts litter-free and clean.
7. Electro chemical technique -In electro oxidation, the main reagent that is used here is electron (clean reagent) where it removes the organic matter in textile wastewater without generating any secondary pollutants and there is no need for adding extra reagent.
8. Lay separate wastewater pipelines from the next treatment plant from each home; recycle the treated water. Carry water and sludge in another set of pipelines or channels to a treatment plant to detoxify the same, but not waste water and sludge (discharge from domestic sinks, showers, or baths, and not toilet excreta or liquid). The wastewater and sludge are currently shipped to the sewage treatment plant; sludge mixing (which requires lower treatment levels) and sewage are wasteful (which requires much higher level of treatment).

Fig.5.1 Separating at the household level the Sewage and Sludge collected from the city of Jodhpur and carrying them in different pipelines to the respective treatment plants.



9. Make underground tunnels, at least 3-4 in diameter, from the center of the city to the Jojri River outlying spots. In comparison with the town center of Jodhpur, the Jojari River is about 20-30m lower, with water being trapped into the impervious bowl-shaped strata underneath. This makes it easier to drain water from the earth or drain the water throughout the tunnel and no electricity is needed to pull water from the soil.
10. Water can be collected in tunnels, if not recycled for irrigation or other purposes before it can be transferred to the Jojari River. The costs of manufacturing the tunnels can be recovered from saved money by stopping water pumping from the ground in about 10-12 years' time. The tunnel solution will also eliminate water obstruction, which is repeated in Jodhpur City when there is rain for a long period of time (of up to 2 hours).

VI- CONCLUSION

This is a study of sanitation situations which, in terms of hygiene and human health, are very important. Finally, this study shows that household and microenvironmental health situations are excellent in Jodhpur City, and their effect is that disease prevalence is low in the city. The households' ability to provide better toilet facilities is extremely important because they are directly linked to hygiene and human health in urban areas of India. If no toilet facilities are available the person must make open defecation and contact with the vector of disease (e.g., fly, mosquitoes) is always possible.

Decentralized, small-scale waste treatment plants efficiently clean and reuse wastewater from houses, campuses, and residential areas. Innovation is needed in choosing a suitable technological option from those promoted and included in awareness campaigns. In Jodhpur, the wastewater has to be treated before it is disposed off in the Jojari River. Jodhpur is a textile hub and a very big exporter of cloth and textile product worldwide. With the help of above steps and precautions, we can make our cities and industries safer, better, powerful, and proper.

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