SFD Report

Pandharpur
India

Final Report

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SFD Report Pandharpur, India, 2018

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Ecosan Services Foundation, Pune

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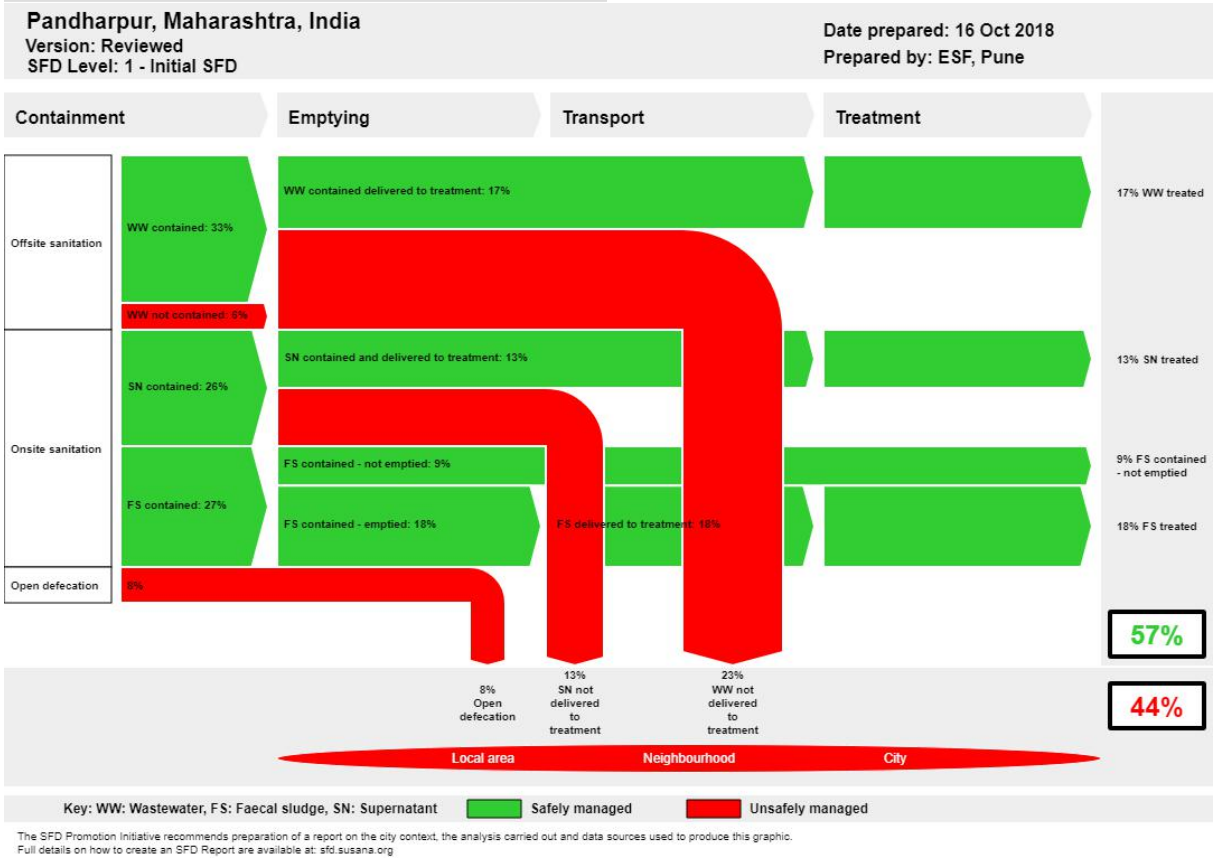
1. The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context, the analysis carried out and data sources used to produce this graphic.
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2. Diagram information

SFD Level:

This SFD – Level 1 – is a desk-based SFD report.

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Status:

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3. General city information

Pandharpur is situated in 17°40' north latitude and 75° 23' east longitude, 40 miles to the west of Sholapur. It is one of the most frequented places of pilgrimage not only in the State of Maharashtra but also in the India, and ranks first amongst the first in the State with an aggregate congregation of four to five lakhs (400.000 to 500,000 people). Pandharpur is a well-known pilgrimage town on the banks of Bhima River in Sholapur district, Maharashtra, India.

The population of Pandharpur, as per the Census of India, 2011 is 98,923, which has increased by 0.8% compound annual growth rate from the previous census (91,379 in 2001 Census). The floating population is around 10,000 to 40,000 (Census of India, 2011a).

The area of Pandharpur Municipal Council is 17km^2. The population density is 5,725 per km^2. There are 33 wards in the city. Among them, Pandharpur Ward No 10 is the most populous ward with a population of 5,004 and Pandharpur Ward No 05 is the least populous ward with a population of 2,053. Pandharpur town has approximately 19% of population residing in slums pockets.

4. Service outcomes

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows (Census of India, 2011):

Containment: 39% of Pandharpur is dependent on offsite sanitation. Population connected to sewer line is 33% and user interface discharging directly to open drain or ground is 6%. 53% of Pandharpur is dependent on onsite sanitation systems out of which 52% is dependent on septic tanks and 1% on pits. The majority of households are dependent on septic tanks which are generally not adhering to design prescribed by Bureau of Indian standards. The effluent from the septic tank flows into closed drains, i.e. sewers, or open drains. FS is contained as the septic tanks are connected to the centralised sewer. The size of the septic tanks depends upon the availability of space at the time of construction; there is no standard size.

Around 25% of the population depends on public toilets. The public toilets are connected to septic tanks and hence are incorporated in onsite systems.

Emptying: PMC is responsible for septage management. In Pandharpur, emptying services are managed and regulated by the municipal council. PMC has owned 4 vacuum trucks with a capacity of 3,000 litre each. Citizens are required to contact PMC and have to pay INR 800 to INR 1,000 (USD 11-14) as emptying fees to avail the service.

Transportation: Septage is transported by truck-mounted vacuum tankers to the sewage treatment plant. Sewage is either conveyed through sewer lines or open drains.

Treatment: Pandharpur is operating 1 sewage treatment plant of 15.5 Millions litres per Day (MLD) capacity. One more treatment plant of 12 MLD is under construction. Sewage treatment plant (STP) is operational. The overall 25 MLD of wastewater is generated but only 12.5 MLD are treated. Septage is treated into the STP as well. The treated septage is sold among the farmers (PMC, 2018e).

It is very difficult to determine the percentage of effluent and septage generated from tanks, hence to reduce the maximum error, the FS in tanks has been assumed to be 50%. Out of the excreta generated from onsite systems, 27% is FS and 26% is SN. The 26% of SN is composed of: SN contained, delivered to treatment and treated (13%), and SN contained, not delivered to treatment and not treated since it is discharged to Bhima River (13%).

As per census 2011 data, the total FS contained is 27%, out of which only 70% is emptied. The FS not emptied (9%) is considered as safely managed. Moreover, all the FS which is emptied (18%) is delivered to treatment and treated at the STP. It can be concluded that excreta of 44% of the population are not being managed safely in Pandharpur and 57% of the total excreta generated are safely managed.

5. Service delivery context

In 2008, the Ministry of Urban Development (MoUD) issued the National Urban Sanitation Policy (NUSP). The policy aims to: raise awareness, promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe confinement, transport, treatment and disposal of human excreta and liquid wastes. The NUSP mandates states to develop state urban sanitation strategies and work with cities to develop City Sanitation Plans (CSPs). Furthermore, it explicitly states that cities and states must issue policies and technical solutions that address onsite sanitation, including the safe confinement of faecal sludge (FS) (USAID, 2010).

The objectives of NUSP are to be realized through CSPs and state sanitation strategies. As of now there are very few cities which have finalized their CSPs, and those plans are also not implemented. This remains a major drawback in implementation of NUSP.

The advisory note on Septage management in urban India, issued by MoUD in 2013, recommends supplementing CSPs with Septage Management Sub-Plan (SMP). Still Septage management in India is not prominent due to lack of knowledge, consideration of Septage management as an interim solution, lack of sufficient funding and many other socio-political issues.

There are no specific legal provisions relating to septage management, but there are a number of provisions relating to sanitation services and environmental regulations, which majorly stems from, The Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Acts. Municipal acts and regulations usually refer to management of solid and liquid wastes but may not provide detailed rules for septage management (MoUD, 2013). Despite of no specific provisions for septage management, Pandharpur Municipal Council (PMC) provides emptying services at affordable prices,

disposing septage in the Sewage Treatment Plant (STP).

6. Overview of stakeholders

The 74th Constitutional Amendment Act of 1992 reformed the sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to Urban Local Bodies (ULBs). This transfer has resulted in a variety of implementation models, as well as lack of clarity in allocation of roles and responsibilities between state and local agencies, which sometimes results in large gaps in implementation (USAID, 2010).

The following stakeholders are responsible for sanitation service delivery in Pandharpur.

Table1: Key stakeholders in Pandharpur

Key stakeholders	Institutions/ Organizations
Public Institutions	Pandharpur Municipal Council (PMC) Maharashtra Jeevan Pradhikaran (MJP) State Pollution Control Board (SPCB)

PMC is responsible for planning, designing, construction, operation and maintenance of sewerage network.

Public health and sanitation is delivered by PMC through the health department of the council. Septage management is also the responsibility of the same department of PMC.

7. Credibility of data

Data have been used from two key sources: Census of India, 2011 and Action Plan Open Defecation Free (ODF) sustainability, Pandharpur, 2017. The data were cross-checked by Key Informant Interviews (KIIs).

Data on containment were available in Census. Data on emptying and transport were collected by KIIs.

Some of the issues and challenges are listed below:

- The adequate data were not available from PMC.
- Reports like CSP were not given for study purpose.
- Data were available at different time lines.
- Limited data on reuse.

Assumptions followed for preparing SFDs:

- Data provided by Census, 2011 are correct.
- Septic tanks and sewer connections on ground are as per septic tanks and sewer connections defined in Census.
- Volume of waste water generated is 80% of water supplied.

8. Process of SFD development

Data were collected through secondary sources. City was visited to conduct KIIs with relevant stakeholders, to fill in the gaps in data and to cross-check the data collected.

To start with, a relationship between sanitation technologies defined in Census of India and the ones defined in project was established.

The data were fed into the Graphic Generator to calculate the excreta flow in terms of percentage of population.

Excreta of 44% of the population are not managed safely, as there is not enough quantity of infrastructure present, hence 57% of excreta generated are managed safely.

Limitations of SFD:

The SFD graphic is dependent on secondary data and true picture of the city may differ.

The data available are at different timelines, for example data on containment are from Census of India, 2011, and data on emptying and transportation are collected through KIIs conducted in 2018.

9. List of data sources

Census of India. 2011. House listing and housing data: Households by availability of type of latrine facility. [Online]. Available from: http://www.censusindia.gov.in/DigitalLibrary/TablesSeries2001.aspx

Census of India. 2011a. District Census Handbook, Solapur.

MoUD. 2013. Draft Report: Rapid Baseline Assessment – Solapur City, Capacity Building for Urban Development: Ministry of Urban Development (MOUD), Government of India.

PMC. 2018e. STP operator at Pandharpur Municipal Council (AMC). September 2018.

USAID. 2010. A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and

Vietnam. Bangkok: United States Agency for International Development (USAID).

Pandharpur, India, 2018

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Abbreviations

BIS	Bureau of Indian Standard
CSP	City Sanitation plan
CSE	Centre for Science and Environment
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
FS	Faecal Sludge
GoM	Government of Maharashtra
MJP	Maharashtra Jeevan Pradhikaran
HH	Household
MPCB	Maharashtra Pollution Control Board
MTPVD	Maharashtra Town Planning and Valuation Department
MHADA	Maharashtra Housing and Area Development Authority
MOUD	Ministry of Urban Development
NIUA	National Institute of Urban Affairs
PHED	Public Health and Engineering Department
PMC	Pandharpur Municipal Council
SLB	Service Level Benchmarks
SMC	Solapur Municipal Corporation
SN	Supernatant
STP	Sewage Treatment plant
SWM	Solid Waste Management
USAID	United States Agency for International Department
UDD	Urban Development Department
WSSD	Water Supply and Sanitation Department
WW	Wastewater

1 City context

The city of Pandharpur, situated in 17°40' north latitude and 75° 23' east longitude, forty miles to the west of Solapur, is one of the most frequented places of pilgrimage not only in the State of Maharashtra but also in the India, and ranks first amongst the first in the State with an aggregate congregation of four to five lakhs (400,000 to 500,000 people). Pandharpur is a well-known pilgrimage town on the banks of Bhima River in Solapur district, Maharashtra, India. It is a major holy place in Maharashtra and it is also called South Kashi. It is famous for the Lord Vitthal temple situated on the bank of Bhima river. Bhima river is also known as Chandrabhaga as it takes shape like crescent moon near the town. There are 4 *yatra's* (wari- gathering of pilgrims/devotees) per year, of which Ashadhi and Kartiki are the main *yatra's*. Devotees comes from all over Maharashtra. They usually come walking hundreds of miles, all the way from their home town (Census of India, 2011a).

The economy of Pandharpur is primarily based on textile industry. Sugar cane, Kumkum and *agarbatti* are also manufactured in Pandharpur (Census of India, 2011a).

Table 1: Population growth rate

Census Year	Population	Growth rate (%)
1971	53638	
1981	*64338*	16.63
1991	*79902*	19.47
2001	*91379*	12.55
2011	*98923*	7.52

The population of Pandharpur, as per the Census of India, 2011 is 98,923 which has increased by 0.8% compound annual growth rate (Table 1) from the previous census (91,379 in 2001 Census). The floating population is around 10,000 to 40,000 people.

The area of Pandharpur Municipal Council is 17km^2 (Figure 1). The population density is 5,725 per km^2. There are 33 wards in the city. Among them, Pandharpur Ward No 10 is the most populous ward with a population of 5,004 and Pandharpur Ward No 05 is the least populous ward with population of 2,053. Pandhapur town has approximately 19% of population residing in slums pockets (PAS, 2014).

The climate of Pandharpur town is generally dry. The temperature varies from mean maximum of 41^{0}C during May to mean minimum of 15^{0}C in the month of December. The average rainfall is about 657.5mm.

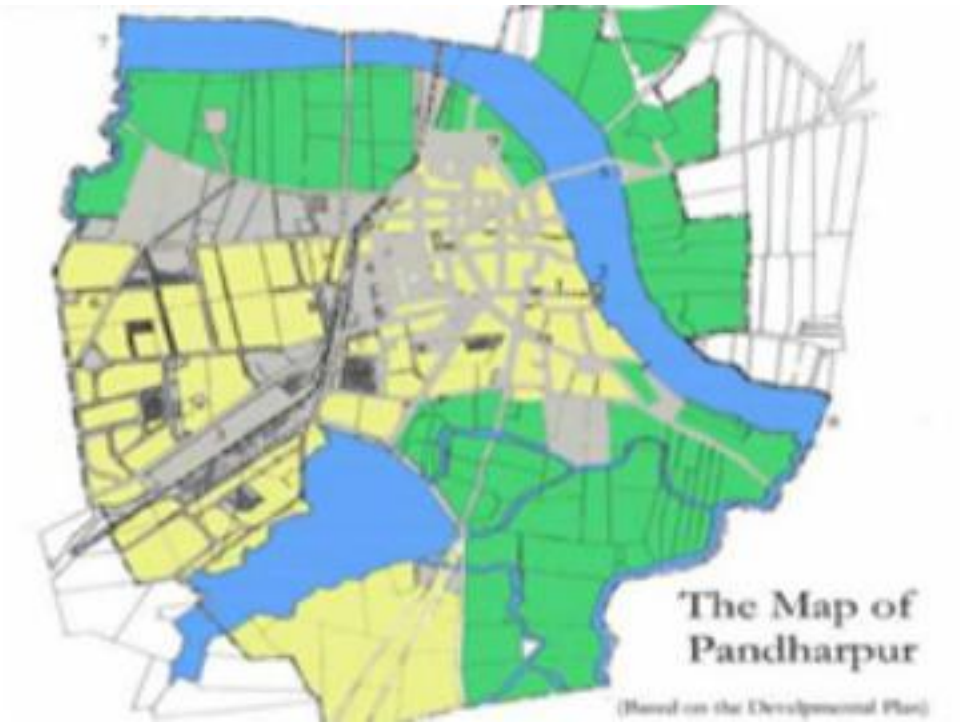

Figure 1: Ward map of Pandharpur

2 Service outcomes

Service outcome analysis is based on secondary sources. Two key sources of data are: Census of India, 2011, and Action Plan of Open Defecation Free (ODF) sustainability, Pandharpur. The data are cross-checked and updated by Key Informant Interviews (KIIs). Data on containment are available in Census. Data on emptying, transport and treatment are collected by KII. The sewage treatment plant is in working condition.

2.1 Overview

This section presents the range of sanitation technologies/infrastructure, methods, and services designed to support the management of FS and Waste Water (WW) through the sanitation service chain in Pandharpur. The details on quantitative estimations are presented in Table 2 below and following sections.

Table 2: Sanitation technologies and contribution of excreta in terms of percentage of population

Sr. No	Sanitation technologies and systems as defined by:		SFD reference variables	Percentage of population
	Census of India	SFD promotion initiative		
1	Piped sewer system	User interface discharges directly to the centralized separate sewer	T1A1C1	33%
2	Other system	User interface discharges directly to open ground	T1A1C8	1%
3	Septic tank	Septic tank is connected to the centralized combined sewer	T1A2C1	28%
4	Pit latrine with slab	Lined pit with semi-permeable walls and open bottom, no outlet or overflow (low risk of ground water pollution)	T1A5C10	1%
5	Night soil disposed into open ground	Use interface discharges directly to open drain or storm drain	T1A1C6	4%
6	Service latrine	User interface discharged directly to 'don't know where'	T1A1C9	1%
7	Public latrine	Septic tank connected to centralised combined sewer	T1A2C1	24%
8	Open defecation	Open defecation	T1B11C7 TO C9	8%

Figure 2 shows the SFD Selection Grid for the city.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B	T1A1C1				Significant risk of GW pollution Low risk of GW pollution	T1A1C6		T1A1C8	T1A1C9	Not Applicable
Septic tank	T1A2C1				Significant risk of GW pollution Low risk of GW pollution					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution T1A5C10
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable						T1B11 C7 TO C9			Not Applicable

Figure 2: SFD Selection Grid

2.1.1 Sanitation facilities

This section presents existing sanitation facilities apart from household toilets.

Public toilets: In Pandharpur, around 19% of the population live in the slum areas and most of them rely on either public toilets or community toilets. Pandharpur is an important pilgrim centre. The census data recorded that 25% of Households (HHs) in Pandharpur rely on public toilets. On an average, 20-25 *lakh* (2,000,000-2,500,000) pilgrims visit Pandharpur annually. On normal days, about 12,000 to 30,000 pilgrims visit Pandharpur daily. However, on Thursdays and weekends, this figure goes to as high as 40,000. On the two annual events of Ashadhi and Kartiki Ekadashi, as many as 5 to 10 *lakh* (500,000 to 1,000,000) pilgrims visit Pandharpur. These toilets are connected to septic tanks (PMC, 2017). To cater the population, there are total of 1,499 public seats are available. These are situated near parking lots, *Takli* lake area, *que* line, and public places (PMC, 2018b).

Community toilets: The people residing in the slums depend on community toilets. At present, there are around 450 seats available. These toilets are connected to septic tanks (PMC, 2018b). Due to the lack of data on excreta generated from institutions, industrial areas, restaurants and hotels, these establishments have not been taken into consideration for the production of the SFD, whereas excreta from public toilets and residential areas are considered for this study.

For the production of this SFD report, floating population was not considered.

2.1.2 Containment

As per census, there are 19,902 residential properties out of which 66.77% of the households have individual toilets and the rest rely on Public/Community toilets (CT) or practice open defecation. Percentage of open defecation is as higher as 8%, mostly observed in slum areas. Nearly 52% households are dependent on onsite sanitation system. Only 33% households are directly connected to the sewers. 25% of the population is dependent on public toilets which are connected to septic tanks. 4% of toilets are directly connected to the open drains (Census of India, 2011). Different types of septic tanks have been observed in town. The tanks are made of concrete rings placed one on another, fully plastered tanks, tanks with only brickwork (not plastered). The effluent from the septic tank flows into closed, underground and open drains. It is observed that size, location, and design of on-site systems is prerogative of local masons and is majorly dependent on space available. The septic tanks constructed are generally not adhering to design prescribed by the BIS (PMC, 2018a) but they were modelled as septic tanks in the Graphic Generator because of lack of knowledge of local residents about their sanitation system at individual household level and because that was the closest and best option for the purpose of this SFD report.

2.1.3 Emptying

In Pandharpur, emptying services are managed and regulated by the municipal council. PMC owns 4 vacuum trucks with a capacity of 3,000 litre each (PMC, 2018b). Citizens are required to contact PMC and have to pay INR 800 to INR 1,000 (USD 11-14) as emptying fees to avail the service. Emptying is done within three days of submitting the application. On average, 15 septic tanks are emptied in a day. Revenue from septage emptying is approximately INR 360,000 to 400,000 (USD 5,029 to 5,588) (PMC, 2018a).

It is observed that no safety precautions are taken by persons who empty the septic tanks (PMC, 2018d).

2.1.4 Transportation

Septage is transported by truck-mounted vacuum tankers to the sewage treatment plant (STP). Sewage is either conveyed through sewer lines or open drains (PMC, 2018c).

2.1.5 Treatment and disposal

Pandharpur is operating one sewage treatment plant of 15.5 MLD capacity. One more treatment plant of 12 MLD is under construction. Sewage treatment plant is operational. An overall of 25 MLD of wastewater (WW) is generated but only 12.5 MLD of WW is treated. Centralized sewage treatment plant of Pandharpur has mechanical process unit with clarifier followed by sequential batch reactor process which finally goes for tertiary treatment by aeration.

All septage collected by the vacuum trucks is delivered to treatment and treated at the STP. Septage is being treated by mixing it with sewage at the treatment plant as a co-treatment. Solids are separated and dried in drying beds, producing a soil conditioner which is sold among the farmers (PMC, 2018e).

Figure 3: Pandharpur STP Plant

2.2 SFD Matrix

Table 3: SFD matrix

Pandharpur, Maharashtra, India, 16 Oct 2018. SFD Level: 1 - Initial SFD
Population: 98923
Proportion of tanks: septic tanks: 50%, fully lined tanks: 100%, lined, open bottom tanks: 100%

System label	Pop	W4a	W5a	W4c	W5c	F3	F4	F5	S4d	S5d
System 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 wastewater in open sewer or storm drain system, which is delivered to treatment plants	Proportion of wastewater delivered to 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
T1A1C1 Toilet discharges directly to a centralised combined sewer	33.0	50.0	100.0							
T1A1C6 Toilet discharges directly to open drain or storm sewer	4.0			0.0	0.0					
T1A1C8 Toilet discharges directly to open ground	1.0									
T1A1C9 Toilet discharges directly to 'don't know where'	1.0									
T1A2C1 Septic tank connected to a centralised combined sewer	52.0					70.0	100.0	100.0	50.0	100.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	1.0					0.0	0.0	0.0		
T1B11 C7 TO C9 Open defecation	8.0									

2.2.1 SFD matrix explanation

According to census of India, 2011, 39% of Pandharpur is dependent on offsite sanitation: population connected to sewer line is 33% (T1A1C1) and user interface discharging directly to open drain or ground is 6% (T1A1C6 + T1A1C8 + T1A1C9).

53% of Pandharpur is dependent on onsite sanitation systems out of which 52% is dependent on septic tanks and 1% on pits. The public toilets are connected to septic tanks and hence are incorporated in onsite systems. The septic tanks are connected to the centralised sewer. Proportion of FS which is emptied from septic tanks was assumed to be 70% (Census of India, 2011). No emptying of pits is carried out (variable F3 is set to 0%).

Variables W4a and S4d are set to 50%. This means that 50% of the wastewater and SN from the sewer system is delivered to treatment. The other 50% of SN is not delivered to treatment and is dumped untreated into Bhima River before reaching the treatment plant.

The sewage treatment plant treats 12.5 MLD of WW. Total 25 MLD of WW is generated out of which 50% gets treated. Treatment efficiency is set to 100% (Variables W5a, F5 and S5d are set to 100%).

2.3 SFD Graphic

The SFD graphic shows that 44% of the excreta is unsafely managed and 57% is safely managed (Figure 4).

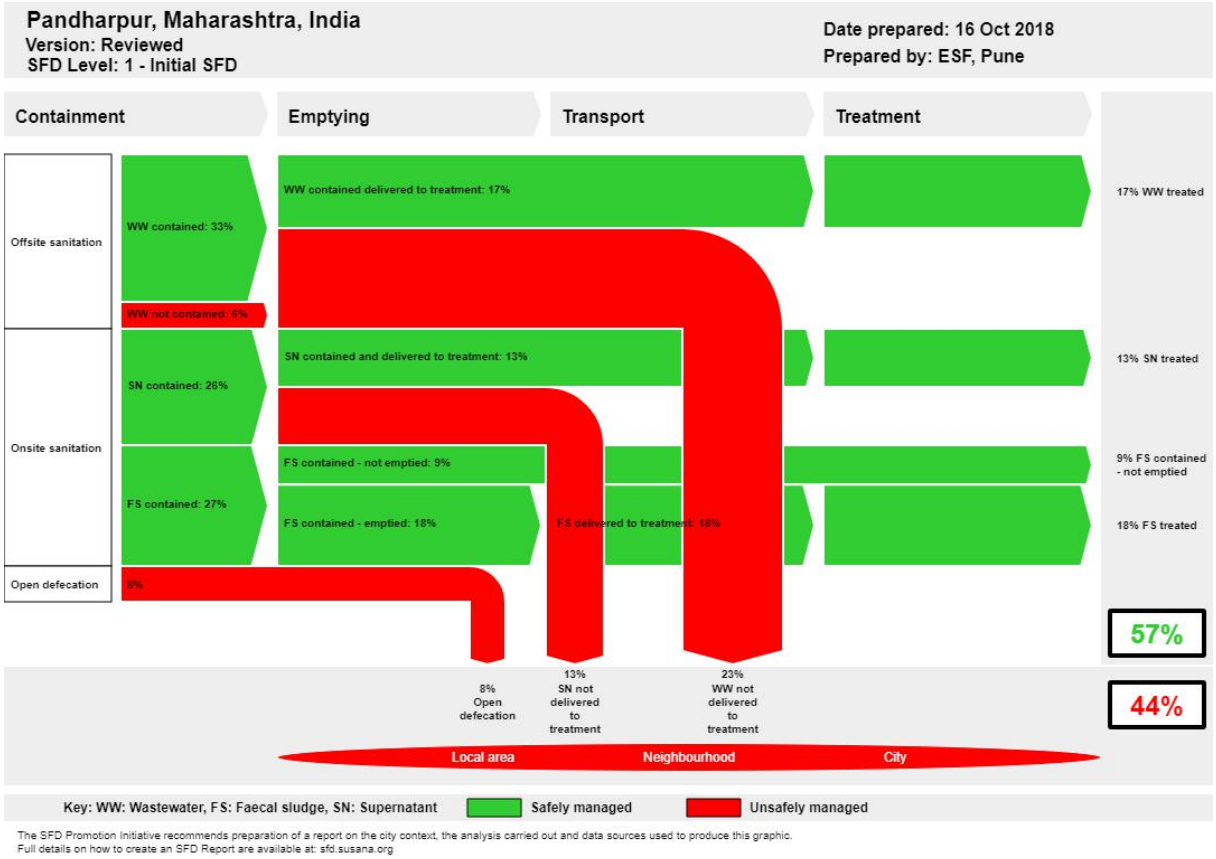

Figure 4 : SFD Graphic

Half the 33% of the WW contained is delivered to treatment, out of which, 100% is treated. This results in 17% of the total wastewater generated in the city being treated at the treatment plant and a total of 23% of wastewater not delivered to treatment. Out of this 23%, there is a 6% of wastewater not contained and not delivered to treatment that originates from toilets discharging directly to open drains, open ground and to 'don't know where'.

It is very difficult to determine the percentage of effluent and septage generated from tanks, hence to reduce the maximum error it has been assumed to be 50%. Out of the excreta generated from onsite systems, 27% is FS and 26% is SN. The 26% of SN is composed of: SN contained, delivered to treatment and treated (13%) and SN contained, not delivered to treatment and not treated since it is discharged to Bhima River (13%).

As per census 2011 data, the total FS contained is 27%, out of which only 70% is emptied. The FS not emptied (9%) is considered as safely managed. Moreover, all the FS which is emptied (18%) is delivered to the treatment and treated at the STP.

3 Service delivery context description/analysis

3.1 Policy, legislation and regulation

3.1.1 Policies, legislations and regulations at national level

In 2008, the Ministry of Urban Development (MOUD) issued the National Urban Sanitation Policy (NUSP). The policy aims to: raise awareness; promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe confinement, transport, treatment and disposal of human excreta and liquid wastes. The NUSP mandates states to develop state urban sanitation strategies and work with cities to develop City Sanitation Plans (CSPs). NUSP specifically highlights the importance of safe and hygienic facilities with proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.) and proper operation and maintenance (O&M) of all sanitary facilities. Furthermore, it explicitly states that cities and states must issue policies and technical solutions that address onsite sanitation, including the safe confinement of faecal sludge (USAID, 2010). The objectives of NUSP are to be realized through CSPs and state sanitation strategies. As of now there are very few cities that, have finalized their CSPs, and those plans that have be developed have not been implemented. This remains a major drawback in the implementation of the NUSP.

The advisory note on septage management in urban India, issued by MOUD in 2013, recommends supplementing CSPs with a Septage Management Sub-Plan (SMP), prepared and implemented by cities. Septage here broadly refers to not only FS removed from septic tanks but also that removed from pit latrines and similar on-site systems. This advisory provides reference to Central Public Health & Environmental Engineering Organisation (CPHEEO) guidelines, Bureau of Indian Standard (BIS) standards, and other resources that users of this advisory may refer, for details while preparing their SMP (MoUD, 2013a). The advisory clearly discusses the techno- managerial and socio- economic aspects of septage management in India and provides guidelines for Urban Local Bodies (ULBs) to plan and implement SMP.

There are no specific legal provisions relating to septage management, but there is a number of provisions relating to sanitation services and environmental regulations. These mostly stem from, The Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Act, 1974. It also applies to households and cities with regard to disposing wastes into the environment. ULBs/ utilities also have to comply with discharge norms for effluent released from sewage treatment plants and to pay water cess under the Water Cess Act, 1977. The ULB is responsible for ensuring the safe handling and disposal of septage generated within its boundaries, for complying with the Water Act and for meeting all state permit requirements and regulations (CSE, 2010). Municipal acts and regulations usually refer to management of solid and liquid wastes but may not provide detailed rules for septage management (MoUD, 2013a).

The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act is enacted in 2013. This act prohibits employment of manual scavengers and insanitary latrines - Laying strong emphasis on rehabilitation of manual scavengers. This act has become instrumental in eradicating manual scavenging in India.

3.1.2 Policies, legislations and regulations at state level and ULB level

According to Constitution of India, water and sanitation is a state subject. Statutory powers are conferred to the state for making laws on water and sanitation. There is no specific state sanitation policy for Maharashtra, but the state follows the approach advocated in the NUSP. Maharashtra adopted the guiding principles of NUSP in its, Sujal Nirmal Abhiyan (SNA), vision statement for the urban water supply and sanitation sector. SNA prescribes certain measures, mainly addressing community/public latrines, but falls short of addressing the entire FSM chain (PAS, 2013).

In May 2008, water supply and sanitation department (WSSD) of Maharashtra issued a Government Resolution (GR) which has guidelines for constructing toilets. The GR stated that every city should follow standards prescribed by the National Building Code, 2005. The Urban Development Department, GoM, issued a GR encouraging cities to develop plans to recycle and reuse at least 20 percent of waste water generated (PAS, 2013).

Each Municipal council is entitled to make its own by-laws for various aspects of city governance, and Building By-Laws is one of them. The state has provided Model Building By-Laws to guide ULBs to develop their own laws. Model By-Law describes septic tanks as the most common method of collecting faecal matter and also sullage (if no drains are available) and it has to be designed according to Indian Standards code. It also provides the details of septic tank design and construction (PAS, 2013).

Toilets, bathrooms and kitchens are part of a building and are governed by Building By-Laws. The regulatory guidelines and process is well laid out in the Municipal Acts. As per *Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965*, the Municipal Corporation/Council is responsible for issuing permits for construction of new buildings and/or repairs/renovation of old buildings (PAS, 2013).

According to the Act, a person intending to construct a building should submit a plan with information on drain pipes, privies, water closets, cesspools, etc. along with house plan. The chief officer, after due inspection grants permission for construction. The owner/occupier of a building can be fined if he is causing nuisance by discharging any wastewater, cesspool water etc in to open drains/streets/open plots. The development control rules of many cities mandate that effluent from septic tanks should be properly treated before disposing into open drains or water body (GoM, 1965).

The chief officer is responsible for fixing the timings and planning routes for removal and transportation of septage. The emptier can be fined if improper vehicle is used for emptying, disposing septage in water body or anywhere which causes nuisance. However, the act lacks specifications for vehicles, approval mechanisms of licenses to emptiers (GoM, 1965).

3.1.3 Institutional roles

The MoUD is the nodal Ministry for policy formulation and guidance for the urban water supply and sewerage sector. The Ministry's responsibilities include broad policy formulation, institutional and legal frameworks, setting standards and norms, monitoring, promotion of new strategies, coordination and support to State Programmes through institutional expertise

and finance. The Ministry is also responsible for managing international sources of finance. The Central Public Health and Environmental Engineering Organization (CPHEEO), created in 1953, is the technical wing of the MoUD, which advises the Ministry in all technical matters and collaborates with the State Agencies about water supply and sanitation activities. CPHEEO plays a critical role in externally funded and special programmes. CPHEEO also plays a central role in setting design standards and norms for urban water supply and sanitation (Planning Commission, 2002).

The 74th Constitutional Amendment Act of 1992 reformed the sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to Urban Local Bodies (ULBs). This transfer has resulted in a variety of implementation models, as well as lack of clarity in allocation of roles and responsibilities between state and local agencies, which sometimes leave large gaps in implementation (USAID, 2010).

Management and delivery of urban basic services in Maharashtra is governed by various institutions. The following are the institutions responsible for policy making, service provision and regulation of urban services.

1. Urban Development Department (UDD)
2. Water supply and sanitation Department (WSSD)
3. Maharashtra Jeevan Pradhikaran (MJP)
4. Maharashtra Pollution Control Board (MPCB)
5. Maharashtra Town Planning and Valuation Department (MTPVD)
6. Maharashtra Housing and Area Development Authority (MHADA)
7. Solapur Municipal Corporation
8. Pandharpur Municipal Council (PMC)

The following Table 4 provides roles and responsibilities of various institutions:

Table 4: Institutional roles and responsibilities

Institution	Roles and responsibilities
Urban Development Department (UDD)	Allocation of budget, regular monitoring and functioning of ULBs. Approval of municipal budgets, funding of CSPs and other proposals.
Water supply and sanitation Department (WSSD)	Preparation of state urban sanitation strategies, policy, guidelines, schemes.
Maharshtra Jeevan Pradhikaran (MJP)	Key financing vehicle. Plans and constructs urban Infrastructure. However, it is not involved in management of onsite sanitation systems.
Maharashtra Pollution Control Board (MPCB)	Advises state on pollution related standards and policies. Monitoring of treatment plants. Key regulator for pollution related issues.
Maharashtra Town Planning and Valuation Department (MTPVD)	Development of regional and city development plans.
Maharashtra Housing and Area Development Authority (MHADA)	Implements low cost housing projects, slum improvement projects.
Solapur Municipal Corporation (SMC)	Reporting and auditing Municipal Councils under Pune division.
Pandharpur Municipal Council (PMC)	Planning, designing, implementation, operation and maintenance (O&M) of urban infrastructure. Development control. Overall management of the civic services in the city. Responsible for septage emptying, transportation and disposal.

Several institutions are involved in management of sanitation activities with varying roles. While most of the state level institutions are responsible for policy setting, oversight and monitoring, SMC and PMC are responsible for actual implementation.

3.1.4 Service provision

Institutional arrangements for water supply and sanitation in Indian cities vary greatly. Typically, a state-level agency is in charge of planning and investment, while the local government (Urban Local Bodies) is in charge of operation and maintenance (NIUA, 2005). Some of the larger cities have developed municipal water and sanitation utilities that are legally and financially separated from the local government. However, these utilities remain weak in terms of financial capacity. In spite of decentralization, ULBs remain dependent on capital subsidies from state governments. Tariffs are also set by state governments, which often subsidise operating costs (Planning Commission, 2002a).

Public health and sanitation is delivered by PMC through the health department of the Council. Septage management is also the responsibility of the same department of PMC. The department is headed by Health officer and is supported by one Sanitary Inspectors.

3.1.5 Service standards

1. Service Level Benchmarks (SLB), 2008: Issued by the Ministry of Urban Development in 2008, It seeks to (i) identify a minimum set of standard performance parameters for the water and sanitation sector that are commonly understood and used by all stakeholders across the country; (ii) define a common minimum framework for monitoring and reporting on these indicators and (iii) set out guidelines on how to operationalize this framework in a phased manner. SLB refers to improving service through better provision and delivery. It evaluates the performance of ULBs in providing urban services.
2. General Standards for Discharge of Environmental Pollutants Part-A: Effluents-The Environment (Protection) Rules, 1986 (Schedule VI): Issued by Central Pollution Control Board (CPCB), a statutory organisation constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974.
3. Manual on Sewerage & Sewage Treatment, Second Edition, 2013: This manual has been developed by Central Public Health and Environmental Engineering Organization (CPHEEO). It provides detailed design and guidelines for various technologies of wastewater management.
4. Code of Practice for Installation of Septic Tanks, 1985: Issued by Bureau of Indian standards. It is a national standards setting body of India. The code specifies standards and design consideration for installation of septic tanks.

4 Stakeholder engagement

4.1 Key informant interviews

The relevant departments were contacted through e-mail, letter, call. The purpose of the SFD study and depth of data required was conveyed through introductory letter to respective departments. Overall, 6 KIIs were conducted with different stakeholders like government functionaries, private emptiers, etc. Limited documents were available on web hence the visit to city also helped in collecting data, including unpublished reports. The KIIs and data collected helped in understanding the existing situation and upcoming development plans in the sanitation sector. Due to limitation of desk-based study all the key stakeholders engaged in sanitation services could not be interviewed in person.

One to one interviews were conducted with the following persons:

- Mr. Abhijit Bapad, CO, PMC
- Mr. Sangram B Gaikwad, health officer, PMC
- Mr. Kunal Degulkar,Jr. Engineer PMC
- Mr. Dinesh shastri, Municipal architect, PMC
- Mr. Navnath Todkar, Sanitaory Inspector,PMC
- Mr. Sujit, STP operator, PMC

Validation and update of the information were done through the interviews.

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6 References

BIS. 1986.Code of Practice for Installation of Septic Tanks – Part 1 Design criteria and construction: Bureau of Indian Standards (BIS).

Census of India. 2011. House listing and housing data: Households by availability of type of latrine facility. [Online]. Available from: http://www.censusindia.gov.in/DigitalLibrary/TablesSeries2001.aspx

Census of India. 2011a.District Census Handbook, Solapur.

CGWB. 2007. Manual on artificial recharge of ground water: Central Ground Water Board (CGWB), Ministry of Water Resources, Government of India.

CGWB. 2011. Contamination of ground water by sewage: Central Ground Water Board (CGWB), Ministry of Water Resources, Government of India.

CSE. 2011. Policy Paper on Septage Management in India. New Delhi: Centre for Science and Environment (CSE).

CPCB. 1986.The Environment (Protection) Rules, 1986.Schedule 6: Central Pollution Control Board (CPCB), Government of India.

CPHEEO. 2013.Manual on Sewerage & Sewage Treatment. Second Edition: Central Public Health and Environmental Engineering Organization (CPHEEO).

GoM. 1965.The Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965: Government of Maharashtra (GoM).

MoUD. 2013. Draft Report: Rapid Baseline Assessment – Solapur City, Capacity Building for Urban Development: Ministry of Urban Development (MOUD), Government of India.

MoUD. 2013a. Advisory Note: Septage Management in Urban India. New Delhi: Ministry of Urban Development, Government of India.

NIUA. 2005. Status of Water Supply, Sanitation and Solid Waste Management. New Delhi: National Institute of Urban Affairs (NIUA).

PAS. 2013. Faecal sludge and Sullage Management in Urban Maharashtra- Analysis of Institutional Arrangements and Regulations. Ahmedabad: Performance Assessment System, Cept University.

PAS.2014. Annual Performance Assessment Report of Urban Water supply and Sanitation – Maharashtra.

Planning Commission. 2002. India Assessment 2002 – Water supply and Sanitation: Government of India.

Planning Commission. 2002a. Tenth Five Year Plan- 2002 to 2007.Vol 2: Government of India.

PMC.2017. Action plan of open defecation free(ODF) sustainability.

PMC. 2018. Interview with chief officer at Pandharpur Municipal Council (PMC). August 2018.

PMC. 2018a. Interview with health officer at Pandharpur Municipal Council (PMC). August 2018.

PMC. 2018b. Interview with Engineer at Pandharpur Municipal Council (PMC). August 2018.

PMC. 2018c. Interview with Municipal architect at Pandharpur Municipal Council (PMC). September 2018.

PMC. 2018d. Interview with Sanitary inspector at Pandharpur Municipal Council (PMC). September 2018.

PMC. 2018e. STP operator at Pandharpur Municipal Council (AMC). September 2018.

USAID. 2010. A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam. Bangkok: United States Agency for International Development (USAID).

7 Appendix

7.1 Stakeholder identification

Table 5: Stakeholder identification

No.	Stakeholder group	In Pandharpur context
1	City council / Municipal authority / Utility	Pandharpur Municipal Council
2	Ministry in charge of urban sanitation and sewerage	Urban Development Department, GoM
3	Ministry in charge of urban solid waste	Urban Development Department, GoM
4	Ministries in charge of urban planning finance and economic development.	Urban Development Department, GoM
	Ministries in charge of environmental protection/	Directorate of Environment, GoM
	Ministries in charge of health	Public Health Department, GoM
5	Service provider for construction of onsite sanitation technologies	Local masons
6	Service provider for emptying and transport of faecal sludge	Pandharpur Municipal Council
7	Service provider for operation and maintenance of treatment infrastructure	Pandharpur Municipal Council
8	Market participants practising end-use of faecal sludge end products	Pandharpur Municipal Council
9	Service provider for disposal of faecal sludge	Pandharpur Municipal Council

7.2 Tracking of engagement

Table 6: Tracking of engagement

Name of organisation	**Name of the contact person**	**Designation**	**Date of engagement**	**Purpose of engagement**
Pandharpur Municipal Council	Mr. Abhijit Bapat	Chief officer	13.08.18 14.08.18	Introduction & KII
Pandharpur Municipal Council	Mr. Sangram B Gaikwad	Health officer	14.08.18	KII
Pandharpur Municipal Council	Mr. Dinesh Shastri,	Municipal architect	13.08.18	KII & Data collection
Pandharpur Municipal Council	Mr Navnath Todkar	Sanitary inspector	13.08.18 14.08.18	KII & Data collection
Pandharpur Municipal Council	Mr. Kunal Degulkar	Jr. Engineer	14.08.18	KII
Pandharpur Municipal Council	Mr. Sujit,	STP operator	13.08.18	KII & data collection