SFD Lite Report

Bangalore

India

This SFD Lite Report was prepared by:
Eawag and CDD Society

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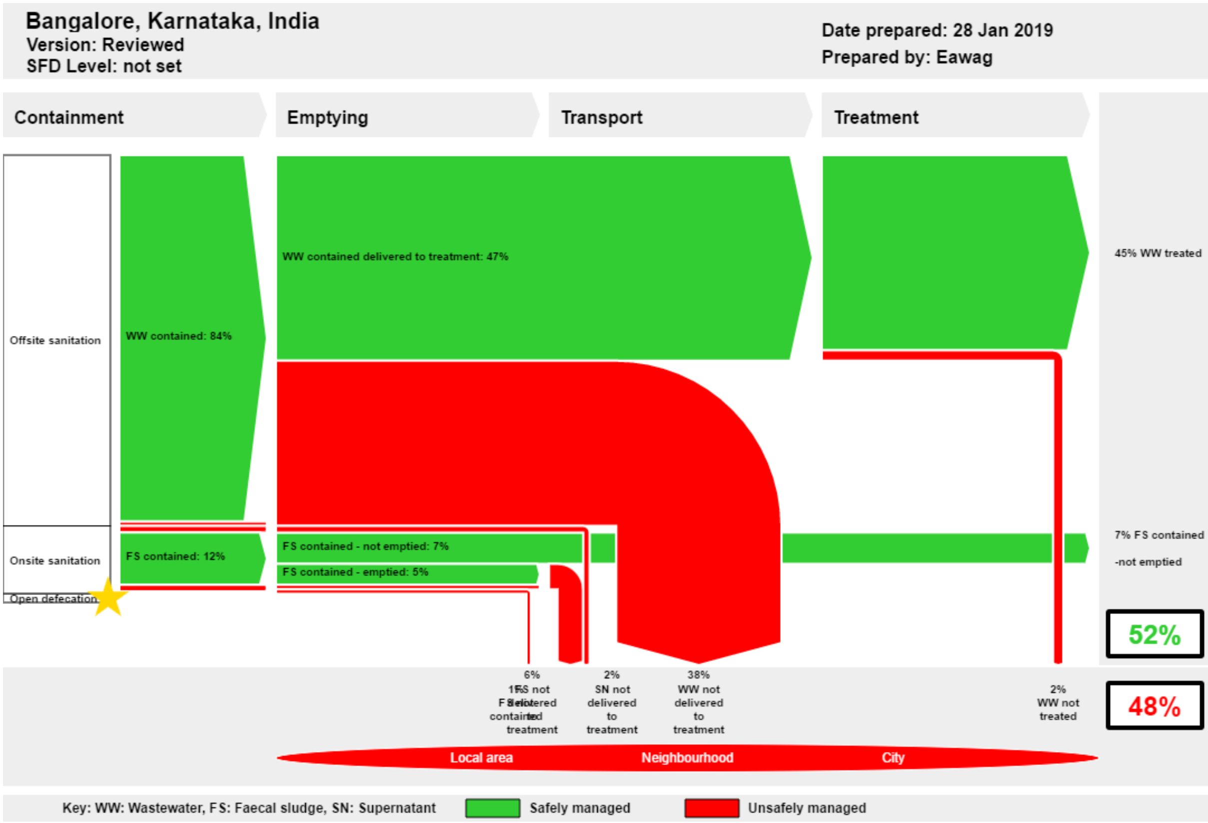
1. The SFD Graphic



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.
Full details on how to create an SFD Report are available at: sfd.susana.org

2. SFD Lite information

Produced by:

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- This report was compiled as part of the SFD Promotion Initiative within the Citywide Inclusive Sanitation project funded by Eawag - Swiss Federal Institute of Aquatic Science and Technology Switzerland. We would like to thank Mr. Ravindra (BWSSB), Dr. Viswanath (Biome Environmental Solutions) and many other officials from the Government of Karnataka, for giving the time to interview them, and providing all the required secondary data.

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3. General city information

Bangalore, the capital city of Karnataka is the third largest city and the fifth largest metropolitan area in India and is fast growing. It is a centre for education, IT and biotechnology, advanced health care and is home to many more Multi National Corporations (MNCs) which attract people to the city (BWSSB, 2019a). Bangalore is located on the watershed of two principal river basins, Arkavathi to the west and South Pennar to the east (BWSSB, 2019a). It is located at 12.97°N 77.56°E and covers an area of 741 sq km (GoK, 2007). The Bangalore Water Supply and Sewerage Board (BWSSB) is responsible for providing water supply to Bruhat Bangalore Mahanagara Palike (BBMP), the corporation's area of 800 sq km (BWSSB, 2019b) It is one of the first water supply and sanitation utilities in India with jurisdiction Bangalore core area of 245 sq km. Eight Urban Local Bodies comprise an area of 330 sq km (7 City Municipal Corporations and 1 Town Municipal Corporation and 110 Villages of 225 sq km) (BWSSB, 2019b).

As per Census 2011, the population of Bangalore City was about 8.5 million (BWSSB, 2019b) and the current population 12.34 million (extrapolated from Table 1). The population density is 4,381 persons per sq km (ORGCC, 2019). Numbers of households (HHs) within municipal boundary were 2,101,831 (BBMP, 2019). Our study area comes under the boundary of BBMP which comprises of a total of 198 administrative wards (BBMPa, 2019). Bangalore has a tropical savanna climate with distinct wet and dry seasons.

Table 1: Population growth rate.

Census Year	Population	Increased Population	Growth rate (%)
1971	1,654,000		
1981	2,922,000	1,268,000	76.7
1991	4,130,000	1,208,000	41.3
2001	5,101,000	971,000	23.5
2011	8,425,970	3,324,970	65.2
2021	14,173,181	5,747,211	68

Due to its high elevation, Bangalore usually enjoys a more moderate climate throughout the year, although occasional heat waves can make summer somewhat uncomfortable (TH, 2005). The mean annual temperature is 24°C and it ranges from about 13°C in winter to about 36°C in summer. The average annual rainfall is about 900 mm (BWSSP, 2017).

The topology of Bangalore is generally flat, though the western parts of the city are hilly. The highest point is Vidyaranyapura Doddabettahalli, which is 962 metres and is situated to the north-west of the city (CES, 2012). Bangalore is known as the "Garden City of India" because of its greenery, broad streets and the presence of many public parks, such as Lal Bagh and Cubbon Park (Abram and Edwards, 2003).

4. Service outcomes

Table 2 shows the SFD Matrix and the data used to prepare the SFD Graphic. Overall, the SFD Graphic depicts that 52% of excreta is safely managed while 48% is discharged untreated to the environment.

Wastewater generated by 38% of the total population of the city does not reach the treatment plants. Out of this 38%, 37% is attributed to system T1A1C2 and 1% attributed to system T1A1C6. Wastewater generated by 2% of the total population of the city gets delivered to treatment plants but still remains untreated.

SN that goes into open drains is assumed to be 2%, which is attributed to 1% of the population using fully lined tanks and 1% of the population using septic tanks. FS contained is 12%, which is attributed to 6% of the population dependent on unlined pits and 6% dependent on lined pits with semi-permeable walls with open bottom. 5% of the FS is contained - emptied, but not delivered to treatment and 7% of the FS is contained and not emptied but considered to be safely managed since it originates from systems located in areas of low risk of groundwater contamination. Only 1% of FS is not contained - not emptied and considered unsafely managed.

Table 2: SFD Matrix.

Bangalore, Karnataka, India, 28 Jan 2019. SFD Level: not set
Population: 9621551
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

System label	Pop	W4a	W5a	W4b	W5b	W4c	W5c	F3	F4	F5	S4e	S5e
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 sewer system, which is delivered to decentralised treatment plants	Proportion of wastewater delivered to decentralised 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 open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	76.0	52.0	95.0									
T1A1C4 Toilet discharges directly to a decentralised foul/separate sewer	8.0			95.0	95.0							
T1A1C6 Toilet discharges directly to open drain or storm sewer	1.0					0.0	0.0					
T1A2C6 Septic tank connected to open drain or storm sewer	1.0							70.0	0.0	0.0	0.0	0.0
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	2.0							70.0	0.0	0.0	0.0	0.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	6.0							80.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	6.0							80.0	0.0	0.0		

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows:

4.1. Offsite sanitation systems

The sewerage network serves approximately 84% of the total population of the city and 1% of the population of the city discharges wastewater directly into open drain or storm sewer (KII1, 2019); while the remaining 15% population is majorly dependent on onsite sanitation systems (OSS). There is no open defecation (OD) (KII2, 2019).

The old fragment of Bangalore City is located in the centre of town and consists of a very high population, remainder of the town that has developed around the core area and it is systematically planned with households connected to sewerage network. Approximately 76% of the total population of the city are connected to sewerage network (T1A1C2), out of which 8% (T1A1C4) of the population of the city is served by small scale decentralized sewage treatment plants (Eawag, 2019). According to Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs), 1% of the total population of the city which belonged of the village part of city were discharging the wastewater from toilets directly into open drain or storm sewer (T1A1C6).

Small Scale Sanitation Systems (SSS)

The newly developed areas of Bangalore– greater Bangalore, with multi-storied apartment complexes and gated communities, are relying completely on private tankers and groundwater through bore wells in the absence of BWSSB piped water supply, and site-specific STPs, in the absence of drains (TA, 2019). The population of these apartments dependent on small scale STP Decentralised STPs (KII5, 2019). In Bangalore, the rough estimate is that about 10% of the total population is dependent on small scale sewage plants or on-site sewage treatment plants (Figure 1). The city of Bangalore in India provides an excellent opportunity to evaluate such systems. In 2004, in an effort to curb the alarming levels of pollution in its water bodies due to untreated sewage disposal, the environmental regulatory agency mandated apartment complexes above a 20,000 sq km of build up area, to install STPs and in Bangalore, the by-laws mandate 100% reuse of their treated wastewater. This has resulted in the installation of more than 2,500 SSS systems till date in the city (Kuttuvaa et al., 2018).

Figure 1. Examples of small scale sewage treatment plants.

4.1.1. Transport

Sewage is conveyed to Sewage Treatment Plants (STPs) through sewers which are occasionally pumped through Sewage Pumping Stations (SPSs). For effective planning, implementation and maintenance of sanitation services across the Bangalore City, Karnataka (Bruhat Bangalore Mahanagar Palike) BBMP has divided the whole city into 8 zones (BBMP, 2019b). The state government issued a notification to merge the areas under existing Bangalore Mahanagara Palike with seven City Municipal Council (CMC)'s, one Town Municipal Council (TMC) and 110 villages around the city to form a single administrative body, Bruhat Bangalore Mahanagara Palike (BBMP, 2019b). Majority of the areas have sewerage network that already has been constructed by BWSSB. The remaining part of Bangalore (110 villages), which are not served by sewerage network, will be incrementally sewered by BWSSB (KII4, 2019). Core and CMC area are the mandated areas of BWSSB, and the sanitation services in these areas are planned for a centralized sewerage system.

Laying of sewerage network in 110 villages was commenced under BWSSB and is still in development phase. STPs which are maintained by BWSSB also serve only the core and CMC area (KII1 and KII2) while peri-urban regions are not served entirely yet. Faecal sludge and septage are conveyed through truck-mounted vacuum tankers and it is often discharged into the main drains which are present within the city boundary (Figure 2). Initially, there was co-treatment done in the STPs of Bangalore, but was discontinued by BWSSB since monitoring of the faecal sludge deposited in the STPs was very difficult and there was a high risk of industrial effluents being brought along. The supernatant generated from the septic tank connected to open drains and wastewater from toilets is, in some cases, directly transported through lined open drains. These drains are not intercepted or tapped. All the drains eventually get discharged in the Cauvery River or into local lakes. This has also resulted in heavy pollution of lakes, with cases that have resulted in foaming (HT, 2017).

Figure 2. Different view of the main drain in Bangalore.

4.1.2. Treatment and End use/Disposal

Bangalore City comprises of a total of 14 STPs with a combined treatment capacity of 721 MLD. The STPs are located in different zones. From data mentioned by BWSSB officials and a calculation based on population and average consumption of 130 litres per person per day, of which 80% is counted as wastewater generated (CPCB 2008), it is estimated that approximately 1,350 MLD is the total wastewater generated by the population living within the BWSSB boundary of Bangalore City. Wastewater reaching to the treatment plants is comparatively less than the quantity of wastewater generated (FGD1, 2019).

Bangalore Water Supply and Sewage Board (BWSSB) maintains different STPs of different capacities. Table 3 outlines the list of STPs and the technology associated with each STP.

Wastewater reaching the STPs is less if compared to the total wastewater generated because there is no interception of main drains taking place. 721 MLD of wastewater reaching through sewer lines gets treated, making the treatment efficiency to near about 95% (variable w5a = 95%). After the treatment, the effluent is discharged into the Cauvery River and the treated sludge is sometimes used by the farmers as soil conditioner for their agricultural lands.

Table 3: Details of Sewage Treatment Plants, Bangalore City.

S.No.	Location of the STP	AREA	Established capacity	Technology Used
1	K&C Valley	Core Area	218	Activated Sludge Process (ASP)
	K&C Valley	Core Area	30	Extended Aeration (EA)
2	VrishabhavathiValley	Core Area	180	Trickling Filter (TF) Tertiary Plant (A Part)
3	Hebbal	Core Area	60	ASP
4	Raja Canal	Core Area	40	EA
5	Madivara	Core Area	4	Upflow Anaerobic Sludge Blanket UASB+Oxidation Pond
6	Cubbon Park	Core Area	1.5	Membrane Bio-Reactor (MBR)
7	Labaugh	Core Area	1.5	EA
8	Kempbudhi (Iti Colony)	Core Area	1	EA
9	Mailasandra	R.R. Nagar CMC Dasarahalli CMC	75	EA
10	Kadabesanahalli	Mahadevpura CMC K.R. Purum CMC	50	EA
11	Nagasandra	Dasarahalli CMC	20	EA
12	K.R. Purum	K.R. Purum CMC	20	UASB
13	Yelahanka (Allasandara)	Yelahanka CMC	10	ASP+Filtration Tertiary Plant
13	Jakkur	Yelahanka CMC	10	UASB+EA

Figure 3. Two views of the STP of 75 MLD based on Extended Aeration process in Malasandhra maintained by BWSSB.

The wastewater which is not reaching the treatment plants and faecal sludge which is discharged by private emptiers into open drains increases the risk of groundwater contamination. With KIIs and field observations, it is assumed that the groundwater is at significant risk of getting polluted in several locations where this untreated discharge is currently taking place but the onsite sanitation systems of the city are located in areas of low risk of groundwater contamination as represented in the SFD Matrix and the SFD Graphic.

Table 4 describes the sanitation systems prevalent in the city, based on which the SFD Graphic has been developed. The details of population dependent on these sanitation systems has been provided in section 6.2. The description of these sanitation systems in city context have been provided in section 6.3.

Table 4: Sanitation technologies as per Census of India and corresponding terminology of SFD-PI.

	Sanitation technologies and systems as defined by:		SFD Reference variable
S. No.	**Census of India**	**SFD Promotion initiative**	
1	Piped sewer system	Toilet discharges directly to a centralised foul/separate sewer	T1A1C2
		Toilet discharges directly to a decentralised foul/separate sewer	T1A1C4
2	Night soil disposed into open drain	Toilet discharges directly to open drain or storm sewer	T1A1C6
3	Septic tank	Septic tank connected to open drain or storm sewer	T1A2C6
4		Fully lined tank (sealed) connected to an open drain or storm sewer	T1A3C6
5	Pit latrine with slab	Lined pit with semi permeable walls and open bottom with no outlet or overflow	T1A5C10
6	Unlined pit	Unlined pit no outlet or overflow	T1A6C10

4.2. Onsite sanitation systems

4.2.1. Containment

People residing in the 110 villages are majorly dependent on OSS such as septic tanks, fully lined tanks and soak pits. According to Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs), 1% of the total population of city which belonged to the village part of city were discharging the wastewater from toilets directly into open drain or storm sewer (T1A1C6), where as 6% of the total population have lined pits with semi-permeable walls and open bottom (T1A5C10) (KII3, 2019). Another 6% of the total population have unlined pits (T1A6C10).

Any kind of lined tanks (with outlet) connected to toilets are locally called septic tanks irrespective of whether it adheres to the design specifications prescribed by Bureau of Indian Standards (BIS) or not. Although the standards for such septic tanks are made mandatory, it is hardly followed due to lack of monitoring. The size of the containments is usually decided on the basis of space availability and affordability of the households. It was observed during KIIs that the containments are usually soak pits itself, and households which have big drains flowing in their vicinity, like the village areas, skip building containments and were found to discharge wastewater from the toilet directly to such drains (T1A2C6, 1% and T1A3C6, 2%) (KII4, 2019).

4.2.2. Emptying

Emptying frequency differs widely across the city, depending upon the type of OSS and the size of household. During field survey, it was found that the new construction which is happening across the city is usually equipped with pits which have low emptying frequency (once in 8-10 years). It is reported that the average emptying frequency is to be 8-10 years (KII3, 2019). There are over 500 private emptying service trucks that operate in Bangalore. The truck-mounted emptying vehicles of varied capacity between 4,000-6,000 litres operate with 2-3 trips per day on an average, and at times there is no work as well.

The reason mentioned by private emptiers for the inconsistency in number of trips is the constantly high competition between private emptiers, and those with lowest service fee get the job. Private emptiers promote their business through internet, business cards and even through informal advertising by writing on walls and sticking fliers on concrete electric poles.

The charges for emptying the containment range between 1,200-1,500 INR (22-29 USD) and additional fees are charged in case extra piping is required for the households that are farther from the assembling point of the vehicles. It also depends on the difficulty of emptying and the nature of work. Generally, 2-3 persons (including driver) can sum up the work within 1.5 - 2.0 hours.

4.2.3. Transport

Faecal sludge is discharged by private emptiers into open drains.

4.2.4. Treatment and End use/Disposal

There is no treatment of the FS collected since it is discharged directly into the main drain, reaching the Cauvery River, untreated.

4.3. Open defecation

There is no open defecation reported. At present, the BBMP has declared all the 198 wards to be Open Defecation Free (ODF).

5. Data and assumptions

The availability and accessibility of data:

- Two key sources of data are used; Census of India (2011) and published documents of relevant departments. Most of the data are then updated by Key Informant Interviews (KIIs), Focused Group Discussions (FGDs) and field observations.
- Data on containment are available in census. Data on emptying and transport are collected by KIIs. However, most of the data are qualitative.
- Data regarding the households connected to sewerage network is availed from BWSSB and BBMP.

Data insufficiency and non-availability:

- No data available on how many septic tanks are connected to open drains and how many fully lined tanks are connected to open drains.
- No data for how much supernatant is discharging from households to sewers and open drains.
- Accuracy is low since there is a discrepancy observed between census data and actual ground situation.

Assumptions followed for preparation of SFD:

- Data provided by census for the population are correct.
- Data provided by census on average number of persons per household are correct.
- Volume of wastewater generated is 80% of water supplied.

Assumptions of the variables used:

Offsite sanitation systems:

- 85% of the total population of Bangalore City is having offsite sanitation system where 76% of the population have their toilets connected to the centralized sewer system (T1A1C2) with the transport efficiency assumed to be 52% (variable w4a set to 52%).
- The sewer system is connected to the Intermediate Pumping Station (IPS) or the Main Pumping Station (MPS) which finally pumps the sewage in different STPs according to their command area. According to official of BWSSB, these STPs have an overall treatment efficiency of 95% (variable w5a set to 95%).
- 8% of the population has their toilets connected to the decentralized foul/ separate sewer system (T1A1C4). It is also assumed that these small scale STPs have a transport efficiency of 95% (variable w4b set to 95%) and a 95% treatment efficiency (variable w5b set to 95%).
- 1% of the total population do not have any type of containments and discharges the wastewater directly into the open drain or storm sewer (T1A1C6). No interception or tapping of big or small drains takes place in the city so wastewater generated by this 1% of the population goes directly into the main drain and ultimately into the Cauvery River, untreated (variables w4c and w5c both set to 0%).

Onsite sanitation systems:

- 15% of the total population of Bangalore City is having OSS, out of which 1% of the total population of the city is having septic tanks with the outlet connected to open drain or storm sewer (T1A2C6), 2% of the total population of the city is having fully lined tanks with the outlet connected to open drain (T1A3C6), 6% of the total population is having lined pits with semi-permeable walls and open bottom without any outlet or overflow (T1A5C10) and 6% of the total population is having unlined pits with no outlet or overflow (T1A6C10).

- There is no clear differentiation between the volume of effluent and solid FS generated from septic tanks and fully lined tanks, hence to reduce the maximum error, it is assumed to be 50% each.
- It is assumed that 70% of the population (dependent on septic tanks and fully lined tanks (sealed) connected to open drains) gets their system emptied when full (F3) and all FS collected remains untreated (variables F4 and F5 set to 0%).
- According to KII with two truck operators, it is also assumed that 80% of the population (dependent on onsite systems) gets their system emptied when full. There is a marginal difference between emptying frequency of septic tanks and pit systems, with the latter emptying more frequently (KII6, 2019).

6. List of data sources

Below is the list of all data sources used for the production of the SFD Lite report.

Reports and literature

- Abram, David; Edwards, Nick (2003). South India (illustrated ed.). Rough Guides. p. 204. ISBN 978-1-84353-103-6.
- BBMP, 2019a. Bruhat Bengaluru Mahanagara Palike.http://bbmp.gov.in/home
- BBMP, 2019b. Bruhat Bangalore Mahanagar Palike. http://bbmp.gov.in/about-us http://bbmp.gov.in/documents/10180/460906/BBMPR_ward_master_BBMP+Restructuring+03-08-2015.pdf
- BWSSB, 2019a. Bangalore Water Supply and Sewerage Board. https://bwssb.gov.in
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- TA, 2019. http://www.thealternative.in/lifestyle/sewage-is-a-much-bigger-problem-than-water-supply-in-bangalore/
- TH, 2005. "Rise in temperature 'unusual' for Bangalore". The Hindu. Chennai, India. 18 May 2005. Retrieved 2 July 2007.

Key informant interviews

- KII1, 2019. KII with BWSSB officials.
- KII2, 2019. KII with BWSSB officials.
- KII3, 2019. KII with Mr. Vishwanath (Biome).
- KII4, 2019. Interview with Mr. Ravindra (BWSSB).
- KII5, 2019. KII with Mr. Swami in Kengeri town.
- KII6, 2019. KII with Cleaning Service A.

Focus group discussions

- FGD1, 2019. FGD with Members of BWSSB, Bangalore City.

6.1. Tracking stakeholder engagement

S. No. 1	Name Of Organization	Designation	Date of En-Engagement	Purpose of Engagement
1	CDD	Researcher Project Officer Engineer	8-1-2019	KII
2	BWSSB	Retried officers	8-01-2019	KII
3	BWSSB	Technical assistance CEE officers Junior Engineer	9-07-2019	KII
4	STP	Assistant Town Planner	10-01-2019	KII
5	BWSSB	Technical officer	11-01-2019	KII
6	Environmental Biome	Director	12-01-2019	KII

6.2. Data source and data assumption

Sanitation Systems	Census of India, 2011	Final percentages used in graphic generator	Remarks
Piped sewer system	79.3	84	This percentage is derived from the data available on the website of BBMP and BWSSB plan got from its website. It is also verified through KII 2 and 5.
Night soil disposed into open drain	0.2	1	BWSSB, KII with officers of BWSSB and field observation.
Other system	0.8	0	No such cases found.
Septic tank connected to open drain or storm sewer	1.6	1	On ground, the systems were not found to be well-designed septic tanks. Thus, they have been sub-divided based on the field observations. These percentages have been decided in accordance with KIIs
Fully lined tank (sealed) connected to an open drain or storm sewer	6	2	
Lined tank with semi permeable walls and open bottom, no outlet or overflow	4	6	BWSSB and field observation.
Unlined pit no outlet or overflow, general situation	4.6	6	Based on KII 1, 2 and 5.
Service latrine	0.4	0	No such cases found.
Public latrine	1.5	N/A	Since the city has 84% coverage of piped sewer systems, it has been assumed the same for public latrines as well. The remaining have been incorporated in 'septic tank connected to open drain'. This is also in line with the FGD conducted with BWSSB officials.
Open defecation	1.6	0	Under SBM construction of IHHL, Community Toilets (CTs) and Public Toilets (PTs) are going on a good pace. Till now, 70% of construction has already been done. This percentage is derived from the data we got from SBM website and approved by the concerned members.

6.3. SFD Terminologies

System Type	Variables	Description (City context)	Percentage of population
Offsite	WW contained	Wastewater from offsite sanitation technology (T1A1C2) which is discharged directly to centralized foul/separate sewer and decentralized sewer (T1A1C4)	84
	WW not contained	Wastewater from offsite sanitation technology (T1A1C6) which is discharged directly to open storm water drain	1
	WW contained delivered to treatment	Wastewater from offsite sanitation technology (T1A1C2), which is delivered to STPs for treatment	47
	WW not delivered to treatment	Wastewater from offsite sanitation technology (T1A1C2 and T1A1C4) which represents transportation losses and (T1A1C6) which is from the not-intercepted open drains, that is not discharging to STPs	38
	WW treated	Wastewater from offsite sanitation technology (T1A1C2, T1A1C4) which gets treated at STPs	45
	WW not treated	Wastewater from offsite sanitation technology (T1A1C2 and T1A1C4) that is delivered to treatment but not treated.	2
Onsite	SN not contained	Supernatant from the onsite sanitation technology (T1A2C6 and T1A3C6), where the effluent is conveyed through open drain	2
	SN not delivered to treatment	Supernatant from the onsite sanitation technology (T1A2C6 and T1A3C6) discharging to open drains, which is not intercepted by sewerage system and thus not delivered to STPs.	2
	FS not contained	FS from the onsite sanitation technology (T1A2C6 and T1A3C6), which is not contained due to infiltration.	1
	FS contained not emptied	FS contained and not emptied represents the FS remaining in pits from systems T1A5C10 and T1A6C10.	7
	FS contained – emptied	FS emptied from the onsite sanitation technology (T1A5C10 and T1A6C10) using either motorized equipment or manual emptying.	5
	FS not delivered to treatment	Emptied FS, i.e. disposed in any low-lying area/drains and does not undergo any treatment.	6

6.4. Future Plans

Bangalore City is ever expanding and, in near future, its population could grow in exponential order because of migration, rapid urbanization and other various factors. Under Ground Drainage (UGD) facilities in Bangalore have been taking care of sanitation issues from long time, but still in many areas like the 110 newly added villages, the work of laying the sewers is still ongoing. Along with the expansion in UGD facilities, there is a need to construct more sewage treatment plants to enhance the wastewater treating capacity. Terrain of Bangalore offers challenges in certain areas and with obstacles in lying the sewer lines. Because of this, citizens have to maintain onsite sanitation systems for human waste disposal, arising the need of its proper emptying, transportation, treatment and disposal.

Faecal sludge treatment plants could act as a boon in those areas where lying of sewer line is not possible. Bangalore also has a lot of satellite towns and outgrowth where just laying UGD and constructing STPs would not be able to provide a remedial solution for existing sanitation condition. For example, Devenhalli town and municipal council located in outskirts of Bangalore, has came up with an installation of FSTP of 12 Kilo Litres per day (KLD) for proper human waste disposal. The project is running successfully till date.

Given Bangalore’s plans of building new STPs to cater to new demands, and the existing rate of new small-scale treatment plants coming up, there will be considerable increase in the safe management of wastewater, with results improving up to 20%. However, the way to reach 100% safe management would require a mix of fixing leaky sewers, plugging illegal connections to storm water drainage that lead to lakes, increasing treatment capacity of STPs, regular monitoring of the many small scale treatment plants, and finally systematising faecal sludge management by treating the FS at FSTPs or with co-treatment at existing STPs.

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