



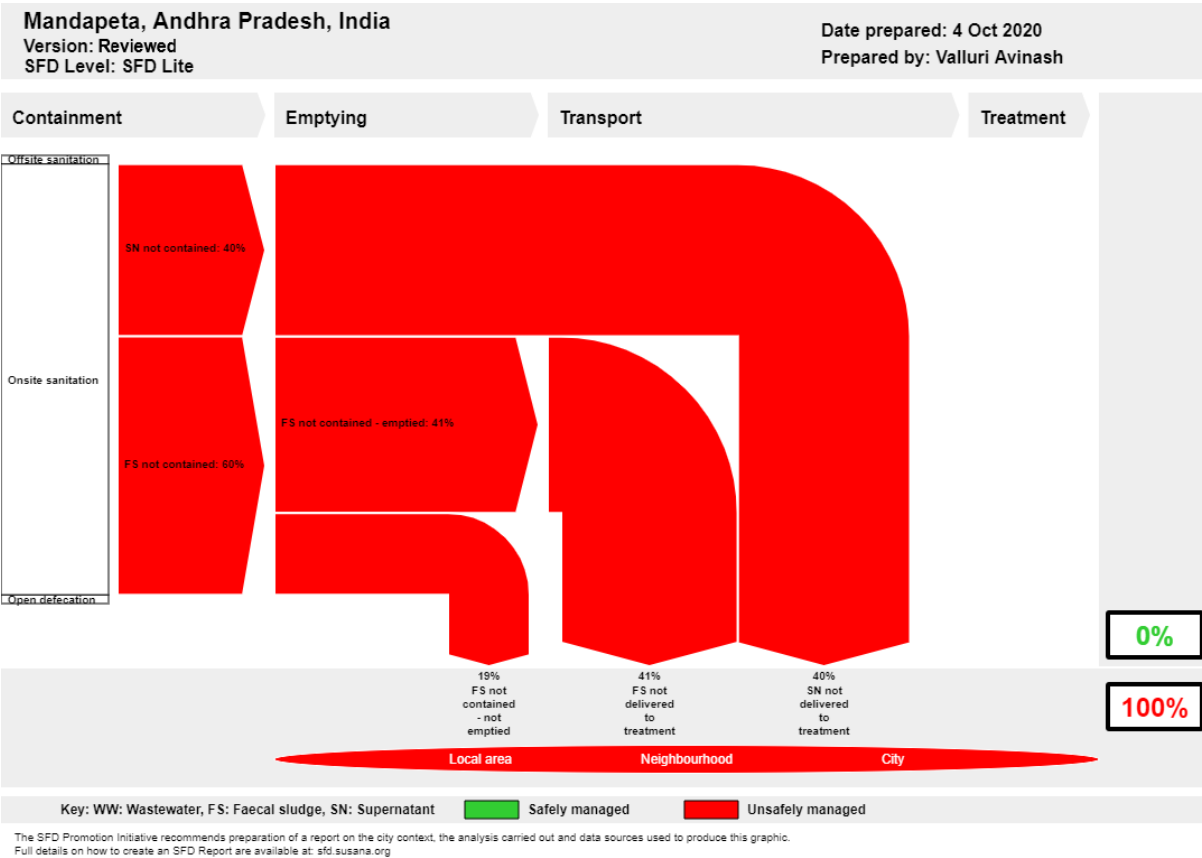
# Draft SFD Lite Report

## Mandapeta India

This SFD Lite Report was prepared by  
Centre for Science and Environment

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# 1 The SFD Graphic



## 2 SFD Lite information

### Produced by:

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- This report was compiled as part of the SFD Promotion Initiative by Bill and Mellinda Gates Foundation (BMGF). We would like to thank Shri T.Ram Kumar, Municipal commissioner, Mandapeta Municipality; Shri Muthyala Sathiraju Garu, Sanitary inspector, Mandapeta Municipality; P Ravi Kiran, Computer operator, Mandapeta Municipality and private emptiers for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions (FGDs)..

### Collaborating partners:

- Centre for Science & Environment, New Delhi, India
- Mandapeta Municipality, Mandapeta, Andhra Pradesh

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### 3 General city information

Mandapeta was originally called "Mandavyapuram", which came from Sage Mandukya. Mandapeta is a second-grade municipality established on October 1<sup>st</sup>, 1958 in East Godavari District in the Indian state of Andhra Pradesh. It is located at mean elevation of about 15.48 msl at 16.520 N, 81.560 E. According to the 2011 census, the population of the town was 56,063 and total number of households was 15444 and spread across an area of 21.65 sq. km. The current population<sup>1</sup> of the town is 63004 and total no. of households (HH) is 17681 with population growth rate of 1.1 which is divided into 30 election wards.. The municipal boundary and current population is used for preparation of SFD. As per the slum survey, there are 20 notified slums in Mandapeta with a total population of 20,153.<sup>2</sup> The slum pockets are scattered in different localities of the town, mainly in the outskirts of the town.

**Table 1: Population data of Mandapeta town for the years 1991-2020.**

Year	Population	Growth rate	Source
1991	42,453		Census, 1991
2001	47,115	1.0	Census, 2001
2011	56,063	1.6	Census, 2011
2020	63,004	1.1	(Mandapeta Municipality, 2019-2020) (KII-1, 2020)

The main soil type of town is alluvial (clay, loamy) soil<sup>3</sup>. Mandapeta in general, has a tropical climate, winters last from November to February, while summers last from March to June. The annual rainfall is 1,133.4 mm, most of it received during the South-West monsoon in the months of July to September<sup>4</sup>. The groundwater table in pre-monsoon is 2-6 mbgl (meter below ground level) and post-monsoon is <2 mbgl (meter below ground level)<sup>5</sup>. There is significant risk of ground water contamination.

The water supplied in the town is predominantly through groundwater<sup>6</sup>. Municipality manages a protected water supply scheme which ensures water supply in the town. The total water supply in the town is 5.95 MLD with per capita water supply of 135 LPCD. The total distribution pipeline is 48 km serving 2,475 household connections and 407 public taps<sup>7</sup>. The rest of the population in the town depends on individual bore wells, hand pumps, and private watersupply tankers (Mandapeta Municipality 2019-2020).

<sup>1</sup> Mandapeta Municipality, (2019-2020).

<sup>2</sup> Mandapeta Municipality, (2019-2020).

<sup>3</sup> Mandapeta Municipality, (2019-2020).

<sup>4</sup> HBEG, 2019

<sup>5</sup> CGWB, 2016-17.

<sup>6</sup> Mandapeta Municipality, (2019-2020)

<sup>7</sup> Mandapeta Municipality, (2019-2020).

## 4 Service outcomes

Mandapeta, Andhra Pradesh, India, 4 Oct 2020. SFD Level: SFD Lite

Population: 63004

Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

System label	Pop	F3	F4	F5	S4e	S5e
<b>System description</b>	Proportion of population using this type of system	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
<b>T1A2C6</b> Septic tank connected to open drain or storm sewer	57.0	80.0	0.0	0.0	0.0	0.0
<b>T1A3C6</b> Fully lined tank (sealed) connected to an open drain or storm sewer	23.0	80.0	0.0	0.0	0.0	0.0
<b>T2A5C10</b> Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	20.0	90.0	0.0	0.0		

**Table 2: SFD Matrix for Mandapeta**

Overview of sanitation technologies used for different sanitation systems through the sanitation service chain is as follows:

### Offsite Systems

According to Census 2011, there was a sewerage network in the city which covered about 6%<sup>8</sup> of the population, but the field-based study revealed that neither there is any functional sewerage network in the town nor any kind of sewage treatment plant (Field observation, KII-1, 2020)

### On-site Sanitation Systems

**Containment:** Based on sample household surveys, KIIs and FGDs with relevant stakeholders, it was concluded that 100% population is dependent on the On-site Sanitation Systems (OSS). The prevalent OSS in the city are septic tanks connected to open drain (T1A2C6, 57%), fully lined tank (sealed) connected to open drain (T1A3C6, 23%) and lined pit with semipermeable walls with open bottom no outlet or over flow where there is significant risk of ground water pollution (T2A5C10, 20%).



**Figure 1: Cement Rings used for lined pits**

<sup>8</sup> District Census Handbook 2011 for Mandapeta

The general size of septic tanks varies from 6 -12 ft \* 3 - 8 ft \* 4 - 10 ft, (Field observation; KII-4, 2020) depending upon the household size, income level etc. The size of pits is 8-12 ft in depth (Field observation; KII-7, 2020). These pits are mostly found in low income groups (LIG) and slum areas (Field observation; KII-5, 2020). The septic tanks are two or three chambered with proper partition walls including plastered bottom whereas the FLT's are single chambered with impermeable walls & sealed vaults.

*Community Toilets/Public Toilets:* There are 1 public toilet and 10 community toilets across the town which are constructed under Swachh Bharath mission (SBM,2016). About 353 households which do not have individual toilet facility due to low income settlement and insufficient space are mostly dependent on community toilets (Field observation; KII-6, 2020). Separate toilet facilities are provided for men and women in all community toilets (Field observation; KII-1, 2020). These community toilets are well maintained by co-operative society (Field observation; KII-6, 2020). Community toilets and public toilets are connected to septic tanks whose outlet is connected to open drain (Field observation; KII-5, 2020). The average size of septic tanks in community toilet and public toilets is 4 x 3 x 3 m.



**Figure 2: Community toilet (left) and Septic tank in community toilet (Right)**

Mandapeta Town has achieved ODF (Open Defecation Free) status on October 2<sup>nd</sup>,2016 and renewed on January 21<sup>st</sup>, 2020 (ODF, 2020). However, during field visit, it was observed that even while having individual toilets or accessibility to community toilets, people still prefer to defecate in open is more like a behavioural issue (Field observation; KII-1, 2020).

*Emptying:* The town is dependent on privately operated mechanised desludging service for emptying of faecal sludge (FS) from OSS which are registered under Mandapeta municipality (KII-1, 2020). There are 2 truck-mounted vacuum tankers of 5000 litres each (FGD-2, 2020). The emptying frequency for households varies from 5 to 10 years (demand based) depending upon the nature and the size of containment system (Field observation; FGD- 2, 2020). While for public and community toilets, the emptying is done once in every 1-2 years (KII-5, 2020). These vacuum tankers are equipped with 100 feet long hose to facilitate effortless desludging activity in narrow or congested lanes (FGD-2, 2020). The private emptiers usually charge between INR 1800 (24.73USD) – INR 2200 (30.22 USD) per trip based on the size of containment and service area (FGD-2, 2020). The mechanical emptying service is carried out by 3 people (1 driver + 2 helpers) and it takes about 1 hour for completing one trip of 5-7 km (FGD-2, 2020).





**Figure 3: Emptying process in household through private truck mounted vacuum tanker**

The private emptiers are not provided with Personal Protective Equipments (PPEs) (FGD-2, 2020). There are no instances of manual scavenging found in the city (Field observation, KII-2, 2020)

*Transportation:* The emptied faecal sludge is transported through truck mounted vacuum tankers in around 2 trips per day (FGD2, 2020). The emptied faecal sludge is discharged into the drainage canal where open drains and storm water drains end (Field observation; KII-3, 2020). The drainage canal travels 33 km in mid way, receiving wastewater from surrounding towns and villages and without any pre-treatment, ends up near Coringa wildlife sanctuary and Mangroove forest near the mouth of River Godavari (Field observation; KII-9, 2020). Therefore, variable F4 & S4e is considered 0% in SFD matrix.



**Figure 4 : Wastewater & supernatant flowing in storm water drain**

*Treatment/Disposal:* There is no Faecal sludge treatment plant (FSTP) and Sewage treatment plant (STP) in the town. Therefore in the absence of such provision, the private emptier discharge the faecal sludge in open drains, nullahs etc. Since there is no proper treatment of emptied faecal sludge, F5 & S5e is considered 0% in SFD matrix. Municipality has given a proposal for FSTP in Veerabhadrapuram area in upcoming years (KII-1, 2020).



**Figure 5: Storm water drains ending up in the drainage canal near Mandapeta- Alamuru road**

## 5 Data and assumptions

Census 2011 was considered as the baseline and the data for all the stages of sanitation chain were updated based on the data collected from field through KII, FGDs, observations, secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD for Mandapeta.

- 50% of the contents of Septic tanks and Fully lined tank is Faecal sludge
- Volume of wastewater generated is 80% of water supplied.
- The proportion of Septic tanks & fully lined tanks emptied is considered 80% assuming 9 years as the threshold, based on the size of the tank and no. of people dependent on that system. So, households getting their systems emptied in less than 9 years are considered to be using their system with emptying and those who are taking more than 9 years are considered as good as not emptying their systems. The proportion of Lined pits with semi permeable walls and open bottom emptied is considered 90% assuming the average emptying frequency of 1-2 years.

## 6 Context Adapted SFD graphic

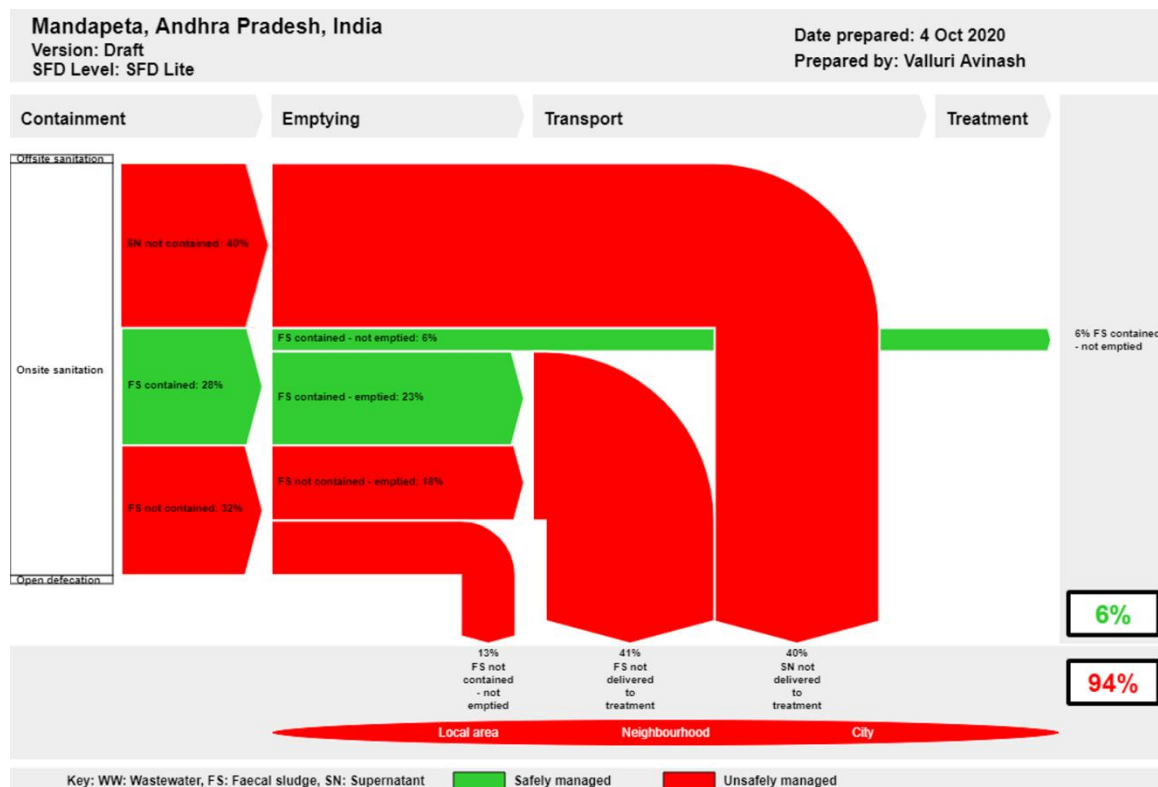


Figure 6: Context adapted SFD Graphic for Tinsukia

The only difference suggested in the context adapted SFD Graphic is at containment stage for correctly designed septic tanks, though connected to open drains. With an earlier assumption of 50% of the proportion of the content of the septic tank which is solid FS, generated and collected inside the septic tanks. 50% of the content is supernatant which attributes to be 40% of the population flows through

open drains hence, not contained. The solid FS collected in the septic tank is considered to be contained and hence 28% of FS is contained (represented green in colour at containment stage). Followed by this, 23% FS contained is emptied, remaining 6% is FS remains in the tank which is contained and never emptied. The supernatant generated from the septic tank connected to open drain is not contained and hence considered to be unsafely managed (represented red in colour). Overall, excreta of 94% population is not managed according to the context adapted SFD.

## 7. List of data sources

- (HBEG, 2019), Hand book of statistics, East Godavari district, 2019, Accessed on August 22, 2020  
<https://core.ap.gov.in/CMDASHBOARD/Download/Publications/DHB/East%20Godavari%20-%202019.pdf>
- (Census,2011), Census of India, 2011. Houselisting and housing data: Households by availability of type of latrine facility Accessed on August 22, 2020.  
<https://censusindia.gov.in/DigitalLibrary/MFTTableSeries.aspx>
- (Mandapeta Municipality, 2019-20). Reports procured from Mandapeta Municipality.
- (SS, 2020), Swachh Survekshan rankings, 2020 Accessed on August 23, 2020  
<https://www.swachhsurvekshan2020.org/Scores/Index/802956>
- (ODF, 2020), Swachh certificate for Open defecation free status.  
<http://sbmodf.in/?metric=ALL&state=andhra%20pradesh&city=mandapeta>
- (CGWB 2016-17), Aquifer Mapping and Management of Ground water resources East Godavari, West Godavari and Krishna Districts , Andhra Pradesh. Central Ground Water Board.

### Key Informant Interviews (KII)

- KII-1, 2020; Interview with Sri Muthyala Sathiraju, Sanitary inspector, Mandapeta Municipality
- KII-2, 2020: Interview with Sri G Sriram Krishna, Headmaster, Mandapeta Municipality.
- KII-3, 2020: Interview with Mr Srinivasa Rao, Farmer, Mandapeta.
- KII-4, 2020; Interview with Mr Chinna, Mason, Mandapeta.
- KII-5, 2020; Interview with Mr Bhaskar Rao, Municipality worker, Mandapeta Municipality.
- KII-6, 2020; Interview with Mr Ram Krishna, Mason, Mandapeta.
- KII-7, 2020; Interview with Mr Durga rao, Mason, Mandapeta.
- KII-8, 2020; Interview with Mr Raghu Narayana, Student, Yanam, Puducherry.

### Focus group discussions

- FGD-1, 2020; Focussed Group Discussion with Masons
- FGD-2, 2020; Focussed Group Discussion with Private emptiers

### Field Observations

- Survey of Public toilet (1 nos) and community toilets (10 nos).
- Visit to Drainage canal Mandapeta - Alamuru road.
- Visit to approximate 48 households covering Slums, Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG) spread throughout the town
- Visit to current FS discharge locations



## SFD Promotion Initiative



SFD Mandapeta, India, 2020

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