SFD Lite Report

Rangamati Municipality Bangladesh

This SFD Lite Report was prepared by
CWIS-FSM Support Cell, DPHE

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1 The SFD Graphic

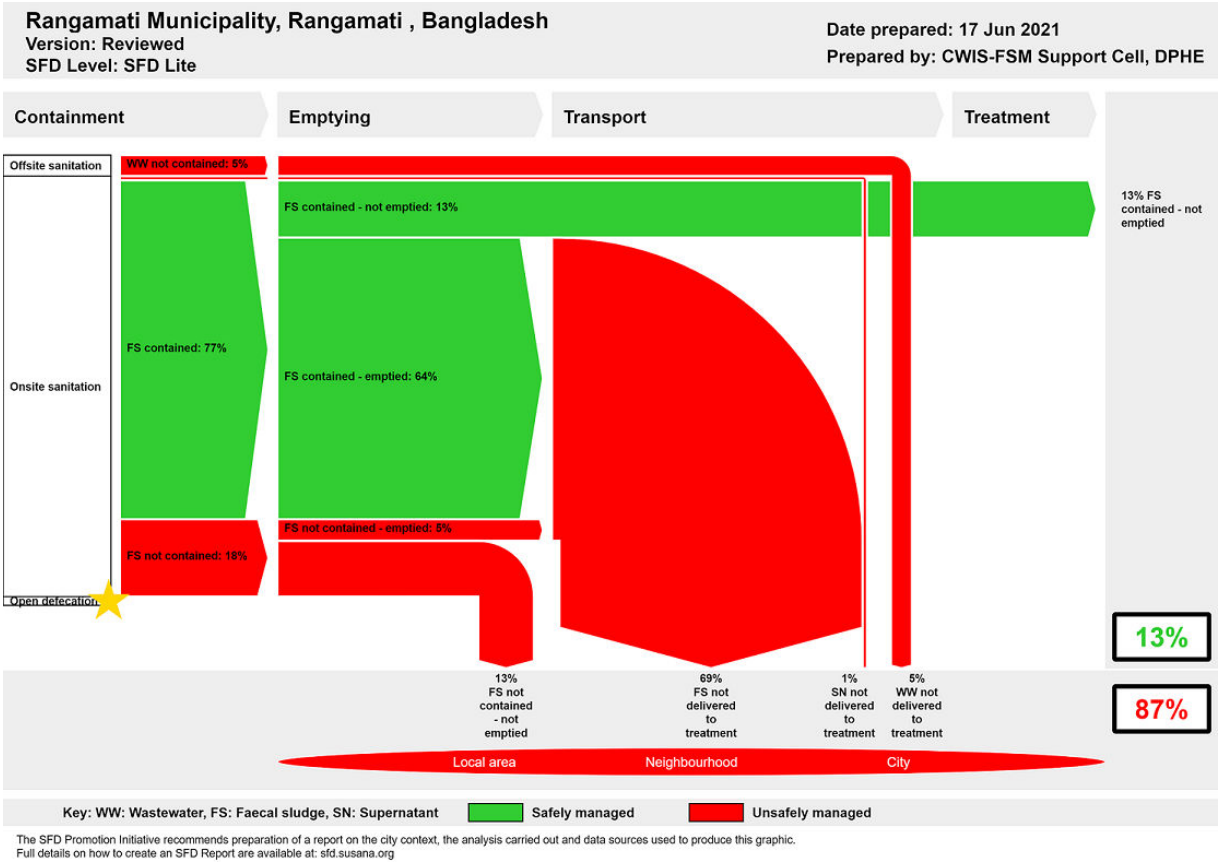

Figure 1: SFD Graphic for Rangamati municipality.

2 SFD Lite information

Produced by:

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- This report was compiled as part of the Baseline Survey of the 61 Town project of DPHE. We would like to thank Mr. Akbar Hossain Chowdhury, Mayor, Rangamati Municipality, Mr. Md. Atiqur Rahman, Executive Engineer, Mr. Subarna Chakma, Town Planner and Mr. Md. Moinul Islam, Administrative Officer, Rangamati Municipality for providing all the required primary and secondary data and cooperating for Key Informant Interviews (KIIs) & Focused Group Discussions (FGDs). This report would not have been possible to produce without the constant support of the Mayor, Municipality, who helped in conducting sample surveys and FGDs in the field.
- We also acknowledge the support of Centre for Science and Environment, India for the promotion of SFD in Bangladesh.

Collaborating partners:

- DevCon, Tiller, and Rangamati municipality played vital roles in collecting and sharing data, and producing this SFD graphic and SFD lite report.

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3 General city information

Rangamati Hill District is a district in south-eastern Bangladesh. It is a part of the Chittagong Division and the town of Rangamati serves as the headquarters of the district. By area, Rangamati is the largest district in the country. Rangamati is one of the 53 district-level Municipalities in the country.

Table 1: City profile.

Population parameters	
Estimated population, 2020	113,085
Households, 2020	23,154
Area, sq. km	64.76
Total roads, km	108.60
Total drains, km	60.29

According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the Rangamati city population was 84,000. The urban population growth in Bangladesh is 3.5% per year. Considering 10% floating population, such as farmers and traders, comes to the city every day, the present (2020) population is estimated to be around 113,085 (Table 1).

The municipality covers an area of 64.76 square kilometres. At present, the municipality has 108.60 km of road out of which 56.92 km is bituminous road, 22.17 km is Cement Concrete (CC) road, 2 km is Herring-Bone-Bond (HBB) road, 1.00 km is Brick Flat Soling (BFS) road, and 26.51 km is earthen road. The city has about 60.29 km of drain which includes 3.0 km of brick drain, 21.69 km of Reinforced Cement Concrete (RCC) and 35.7 km of the earthen drain.

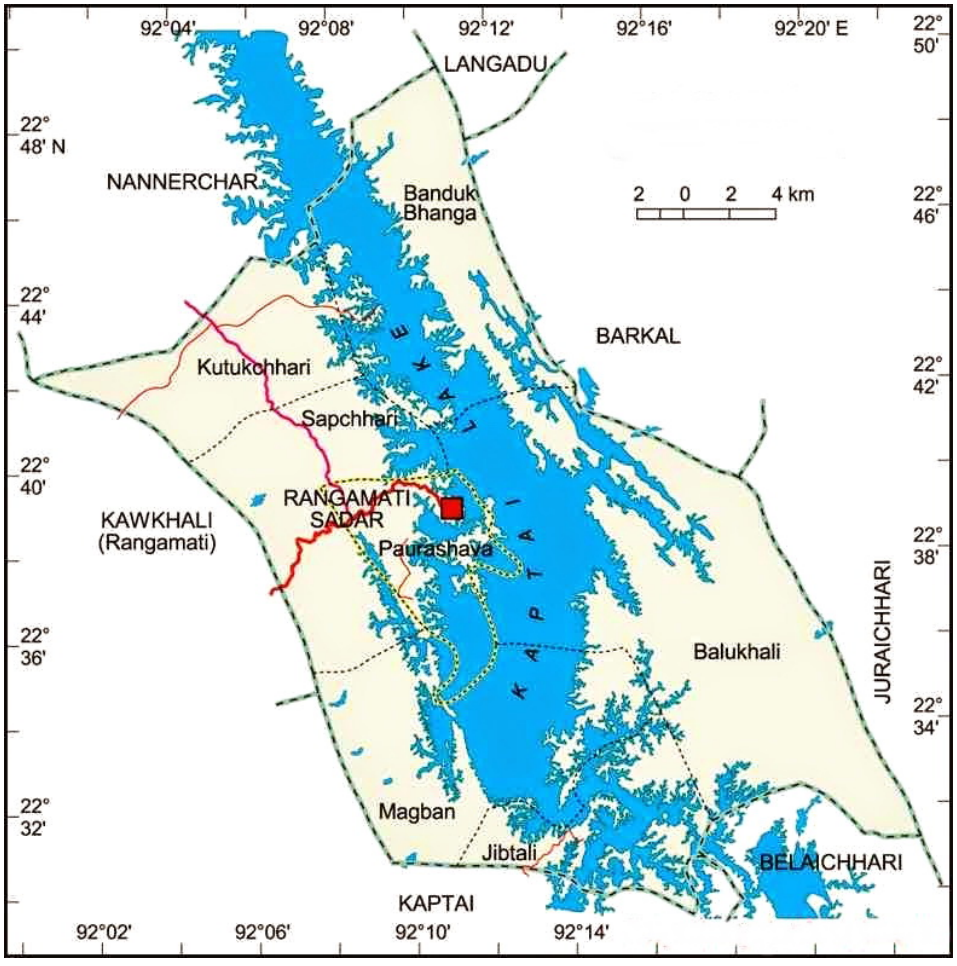

Figure 2: Rangamati municipality (Paurashava) Sadar Upazila Boundary Map.

In the context of Bangladesh, the municipality area is hilly. The municipality is surrounded by Kaptai Lake on three sides (Figure 2). The municipality falls in Physiographic Unit Chittagong Hill Tracts. General soil types are mainly yellowish-brown to reddish-brown loams which grade into broken shale or sandstone at various depths (between 30-120 cm). The valley soil is mainly acid loams and clays subject to abnormal rainfall.

According to the Bangladesh Meteorological Department (BMD), the city area and surrounding area are experienced with tropical monsoon climate. It is characterized by warm, humid summers and cool, and dry winters. There is a meteorological station within the municipality. Weather data from this station is collected from 1981 to 2017. About 90% of the total annual rainfall occurs in the period May-October and the driest months of the years are November-March.

The maximum mean temperature observed is 30.5-33°C between April-August, with the minimum mean temperatures of between 14-16°C in January. The annual average rainfall is about 2,549 mm, according to BMD (1981-2017).

The municipality is surrounded by Kaptai Lake on three sides. According to the flood zoning map of Bangladesh (BMD, 2012), the city is in a flood-free zone (in the last 12 years no flooding event happens). However, the drainage network of the city is not adequate. Every year, many city areas face water logging during the monsoon for drainage congestion. There are some secondary drains caring stormwater and domestic wastewater to the outfalls of the rivers and canals.

The population density in the 9 Wards of the city is shown in Figure 3. The density is high in the north-east, ranging from 6,001 to 8,409 per sq. km. The population density in the north-south and west is lower, ranging from 3,17 to 1,500 per sq km.

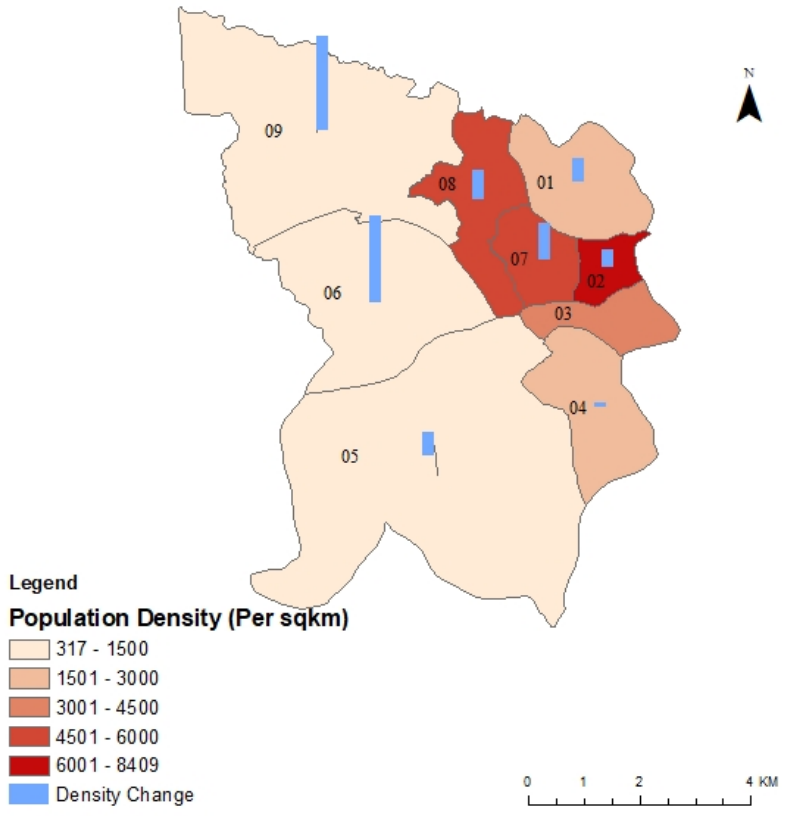

Figure 3: Population density in different Wards of Rangamati municipality.

4 Service outcomes

Rangamati Municipality, Rangamati , Bangladesh , 17 Jun 2021. SFD Level: SFD Lite
Population: 113085
Proportion of tanks: septic tanks: 94%, fully lined tanks: 0%, lined, open bottom tanks: 100%

Containment								
System type	Population	WW transport	WW treatment	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	W4c	W5c	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system (p)	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
T1A1C6 Toilet discharges directly to open drain or storm sewer	4.8	0.0	0.0					
T1A2C5 Septic tank connected to soak pit	12.5			38.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	3.5			36.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	8.8			36.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	2.3			36.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	5.0			0.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	59.9			100.0	0.0	0.0		
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	3.3			0.0	0.0	0.0		

Table 2: SFD Matrix for Rangamati municipality.

The outcome of the SFD graphic shows that only thirteen percent (13%) of the excreta flow is classified as safely managed, and the remaining eighty seven (87%) percent is classified as unsafely managed (Figure 1). The unsafely managed excreta originate from wastewater not delivered to treatment (5%), Faecal Sludge (FS) not contained - emptied but not delivered to treatment (69%), FS not contained - not emptied (13%) and 1% of Supernatant (SN) not delivered to treatment.

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

4.1 Offsite Systems

The city does not have a dedicated sewerage system. However, during field observation and HH survey, it was found that there is a certain area where toilets are directly connected to open drains or storm sewers. Similarly, a portion of septic tanks is directly connected to open drains or storm sewers. Therefore, T1A1C6 system is considered as 4.8% of the total population of the city to generate the SFD graphic. Similarly, the T1A2C6 system is considered as 3.5% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the wastewater in T1A1C6 and the supernatant in T1A2C6 are directly discharged into the river or the environment untreated.

4.2 On-site Sanitation Systems

The percentages presented in Table 2 and discussed in this section are based on data collected through household surveys, key informant interviews (KIIs), and Focus Group Discussions (FGDs) (Figure 4).

Figure 4: Household survey and consultations. Left: Household survey. Right: Consultation meeting.

Containment: Almost all the households (96.7%) in the city have their latrine which is connected to single pits, twin pits, or septic tanks. A portion of the septic tanks at the household level are fully lined tanks. However, very few of the latrines are environmentally safe. From the household survey, it is found that a quarter of the city population (27.07%) uses septic tanks as the containment system, 59.9% of the toilets have single pit systems, and 5% of people use double pits in the city. About 3.26% of people have an unlined pit and 4.76% do not have any type of containment and discharges directly to the environment (KII, FGDs, HH survey, 2020).

According to the type of connectivity and features of containment technologies, the discharging points of the toilets are categorized as: 12.5% population uses septic tanks connected to soak pits (T1A2C5), 3.5% population uses septic tanks connected to open drain (T1A2C6), 8.8% population uses septic tanks connected to water body (T1A2C7), 2.3% population uses septic tanks connected to open ground (T1A2C8), 5% population uses lined tanks with impermeable walls and open bottom with no outlet (T1A4C10), 3.3% population uses unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution (T2A6C10) and 59.9% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10). Thus, at the containment stage, the city's excreta of 77% of the population are contained. Figure 5 shows a couple of examples of these sanitation systems.

Figure 5: Toilet Pit and Pipe open to the Kaptai Lake, Rangamati.

Groundwater Pollution: The depth to groundwater in the city ranges from 6-7 m. The most common drinking water production technology is borehole with a hand pump or motorized pump. Nearly three-quarters of the households use their own tubewell fitted with the electric motor and 2.5% of the population use an own hand pump tubewell. Only a few households (11%) use supply water.

Lateral separation between sanitation facilities and water sources varies from one area to another. The main source of drinking water is tube well. Tube wells of different sizes and depths are generally used to pump water from the confined aquifers The tubewells are located far enough from the pits and septic tanks. According to a survey report on 'Hydrogeological screening, slug test and geophysical logging on observation well units', conducted by the Department of Public Health Engineering (DPHE), drinking water is collected from the confined aquifer (25m – 200m) through pumps. Therefore, considering all these factors, it is considered that there is not any significant risk of groundwater contamination in the city.

Emptying: Around 62% of septic tanks are never desludged and the outlets of such septic tanks are mostly connected to drains and open environments. Only a small portion (4.51%) are connected to soak pits. We have considered the tank or pit as emptied if it has been emptied at least once in the last 5-10 years. In Rangamati municipality, 38% of the septic tanks are desludged within 5-10 years. Desludging of the septic tanks or pits is mostly (95%) done by private sweepers. Only in a few households, desludging is done by municipal sweepers (1.7%), family members (2.66%), and private agencies (1%). Around 95% of this withdrawal is done manually using a bucket and rope for several reasons. This method highly risks the health and safety of the workers. A negligible number (5%) use electric pumps – these reflect the use of the higher level of technologies by some of the workers. The municipal authority has one Vacutag, a mechanical collection tanker, which is providing recently the mechanical emptying service in this municipality.

Transportation: The sludge withdrawn from the septic tanks and latrine pits by the cleaners is disposed of in various places. Few portions of sludge (24%) are disposed of in the open environment like a drain and water bodies. Less than three quarter (64%) is disposed in a dug hole and covered with soil – as this is similar to trenching treatment method, only this practice may be considered as safe disposal. 12% of emptied sludge is carried away by mechanical emptying machine, but discharged in the open environment.

Treatment/Disposal: Presently, there are no treatment facilities in the town.

4.3 Open Defecation:

From HH surveys, KIIs and FGDs, it is found that there is no practice of open defecation.

5 Data and assumptions

The baseline survey conducted in October 2020 contains detailed data on different stages of the sanitation value chain. The SFD graphic relied on this data, collected during sample household surveys, along with key informant interviews and focus group discussions. Finally, data from all these sources were triangulated to produce the SFD graphic.

The last census was carried out about 10 years ago. So, the actual population, household, and sanitation data are not updated yet. Most of the households with septic tanks do not know the actual type, size, and design desludging periods. Also, a large number of pit users are unaware of if they emptied their pits or not. Due to all these data gaps, some assumptions have been made to produce the SFD graphic.

Following assumptions were made for developing the SFD graphic for Rangamati municipality:

- ✓ The proportion of FS in septic tanks, fully line tanks, and line, open bottom tanks are considered 94%, 0%, and 100% respectively as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.
- ✓ According to the Census 2011, conducted by the Bangladesh Bureau of Statistics (BBS), the Rangamati city population was 84,000. The Urban population growth in Rangamati is considered as 3.5% and the present (2020) population is estimated to be around 113,085.
- ✓ There are around 5% of twin pit latrines in the containment system. So, it is assumed that all these twin pit containment technologies are defined as a lined tank with impermeable walls and open bottom (system T1A4C10, 5%).
- ✓ A lined tank with impermeable walls and open bottom, no outlet or overflow, is considered a double pit. Thus, variable F3 for system T1A4C10 is set to 0%.
- ✓ There are around 59.9% of single pit latrines in the containment system. So, it is assumed that all these single pit containment technologies are defined as a lined pit with impermeable walls and open bottom, no outlet or overflow (system T1A5C10, 59.9%).
- ✓ A lined pit with semi-permeable walls and open bottom, no outlet or overflow, is considered a single pit latrine. Thus, variable F3 for system T1A5C10 is set to 100%, assuming all pits are being emptied.
- ✓ Around 38% of HHs have emptied their soak pits of septic tanks with a desludging frequency of 0-10 years. Thus, variable F3 for system T1A2C5 is set to 38%.
- ✓ 36% of septic tanks connected to the environment emptied their pits with the desludging frequency of 1-10 years Thus, variable F3 for system T1A2C6, T1A2C7 and T1A2C8 is set to 36%.
- ✓ Unlined pits, no outlet or overflow (T2A6C10), were considered to be located in areas with a 'significant risk' of groundwater pollution since they are not constructed in a proper way. These systems are never emptied (variable F3 set to 0% and hence, variables F4 and F5 are also both set to 0%).
- ✓ Wastewater in T1A1C6 and the SN in T1A2C6 are directly discharged into the river or the environment untreated. Therefore, variables W4c, W5c, S4e and S5e were set to 0%.
- ✓ Since all the collected FS is disposed untreated into the environment, variables F4 and F5 for all systems are considered to be 0%.

6 List of Sources

Key Informant Interviews (KIIs)

- KII with Mayor, Rangamati Municipality.
- KII with Town planner, Rangamati Municipality.
- KII with Conservancy Inspector, Rangamati Municipality.
- KII with Councilor, Rangamati Municipality.
- Facilitators: Md. Mynul Islam Hemel, Field Coordinator, MD. Zakaria Salim, Junior Urban Planner, & Shohel Rana, Research Assistant, Tiller.

Figure 6: KIIs with different stakeholders in Rangamati.

Focus Group Discussions (FGDs)

- FSM sweepers.
- First Stage Collector for SWM.
- Slum-dwellers.

Figure 7: Focus Group Discussions in Rangamati.

Rangamati Municipality, Bangladesh, 2021

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