

Summary report

Assessment of excreta and waste flow for 50 selected municipalities of Bangladesh



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This report is a brief assessment on
excreta flow and waste flow in 50
municipalities, highlighting the situation
of faecal waste and solid waste to
advocate for equitable and sustainable
sanitation solutions through CWIS
approach.

This study was
conducted by



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Executive summary

WaterAid advocates for the Citywide Inclusive Sanitation (CWIS) approach to achieve Sustainable Development Goal (SDG) 6, focusing on equitable and sustainable sanitation for all. The assessment of the city's service delivery system is a prerequisite for the CWIS approach. WaterAid conducted a comprehensive study in collaboration with the Municipal Association of Bangladesh (MAB) and Citywide Inclusive Sanitation-Faecal Sludge Management (CWIS-FSM) Support Cell of Department of Public Health Engineering (DPHE) to assess sanitation and waste management in fifty municipalities. The study utilised Excreta Flow Diagrams (SFDs) and Waste Flow Diagrams (WFDs) to evaluate the current state of faecal sludge and solid waste management, identify challenges, and facilitate Citywide Inclusive Sanitation (CWIS) solutions.

The methodology of the study utilises a two-fold approach, qualitative and quantitative, for data collection and analysis. Household surveys were conducted using structured questionnaires developed on the KOBO platform, focusing on Faecal Sludge Management (FSM) and Solid Waste Management (SWM); the sample size for collecting household data was determined based on Cochran's formula, which was around 400. Data analysis involved the use of KOBO toolbox for initial data quality assurance, followed by data validation and triangulation; the final analysis utilized GIS software for mapping and relevant platforms for developing the SFDs and WFDs.

The study uncovers that the average of safely managed sanitation in 50 municipalities is 19%, leaving an alarming 81% as unsafely managed. This situation can be attributed to several factors, including a widespread reliance on manual emptying methods, a general unwillingness to empty containment systems, the absence of Faecal Sludge Treatment Plants (FSTP), and inadequate transportation facilities for waste removal.

In the context of waste management, the average of unmanaged waste is 80%, with 18% being retained at disposal sites and only 2% undergoing any form of sorting for recovery, across the 50 municipality. The lack of formal sorting facilities at dumping sites, open exposure of dumping sites to the environment, absence of waste segregation at the household level, and the lack of initiatives for waste-to-energy conversion are key factors contributing to these statistics.

The study underscores the urgent need for comprehensive interventions in the 50 surveyed municipalities of Bangladesh, highlighting significant challenges in both sanitation and waste management.

1. Background

1.1 Introduction

Bangladesh has made remarkable progress in advancing access to water and sanitation services by increasing access to drinking water to 98% and reducing open defecation practices to almost zero by 2019 which has made its way of achieving Sustainable Development Goals (SDGs). World Health Organization (WHO) and UNICEF has declared Bangladesh as an open defecation free country (Joint Monitoring Program Progress Report, 2021).

Most urban residents rely on onsite sanitation facilities. In Bangladesh, Dhaka is the only city with a sewer system, to which only 20% of its population is connected. However, 12% use unimproved facilities and 30% rely on facilities which are shared by different households, or on public (fee- paying) facilities. Except for only 20% area of Dhaka city, all urban areas of Bangladesh are served with onsite sanitation system. This onsite sanitation system has no consideration for faecal sludge management. Unsafe disposal of faecal sludge in open ground or on open drains or water bodies like lakes and canals is very common practice in most of the urban areas. This causes environmental degradation posing threat to public health (Rahman et al., 2016).

Bangladesh is also struggling with managing the urban solid wastes. The amount of solid waste has been doubled in every 15 years in the last three decades. On an average, almost 55% of solid waste remains uncollected in city areas. Uncollected waste, particularly plastic and polyethylene items, end up in drainage systems and water bodies, clogging water flow in drains, polluting surface and groundwater, soil, and air. The responsibility of waste management lies with the respective urban local bodies, such as city corporations and Pourashava. But most of the city areas do not have any formal waste collection facility. Current waste management practices in Bangladesh are characterized by the inefficient practice of waste collection, costly removal and disposal mechanisms, shortage of lands for final disposal, absence of policy regarding recycling practices, and lack of proper awareness about environmental problems (Abedin & Jahiruddin, 2015). Citywide Inclusive Sanitation aims to evaluate the city's system for providing services. WaterAid has started the project "National and Bilateral WASH Advocacy (NaBWASHA) funded by Bill and Melinda Gate Foundation (BMGF)" with the goal of communicating CWIS solutions at the municipal level. By creating Excreta Flow Diagrams (SFD) and Waste Flow Diagrams (WFD) for fifty municipalities in Bangladesh, WaterAid primarily seeks to analyse the existing scenario of faecal sludge management (FSM) and solid waste management (SWM) practice. The study will also examine the capability and difficulties of providing sanitary services over the entire city.

Summary report

The overall objective of this assessment is to help to achieve the sustainable goals by ensure sanitation services, access sanitation value chain and present solid waste management practices.

Specific Objectives:

- To understand the existing capacity and resources of selected cities to ensure sanitation services.
- To assess the current sanitation value chain of selected cities which includes, containments, faecal sludge generation, emptying, transportation, treatment, and re-use.
- To assess the present practice of solid waste management in terms of waste generation, collection, transportation, treatment, and re-use.

1.3 Study area

The study has been carried out in fifty Pourashavas, listed and shown in the Figure 11, from all over Bangladesh. The target cities have been selected by WaterAid.

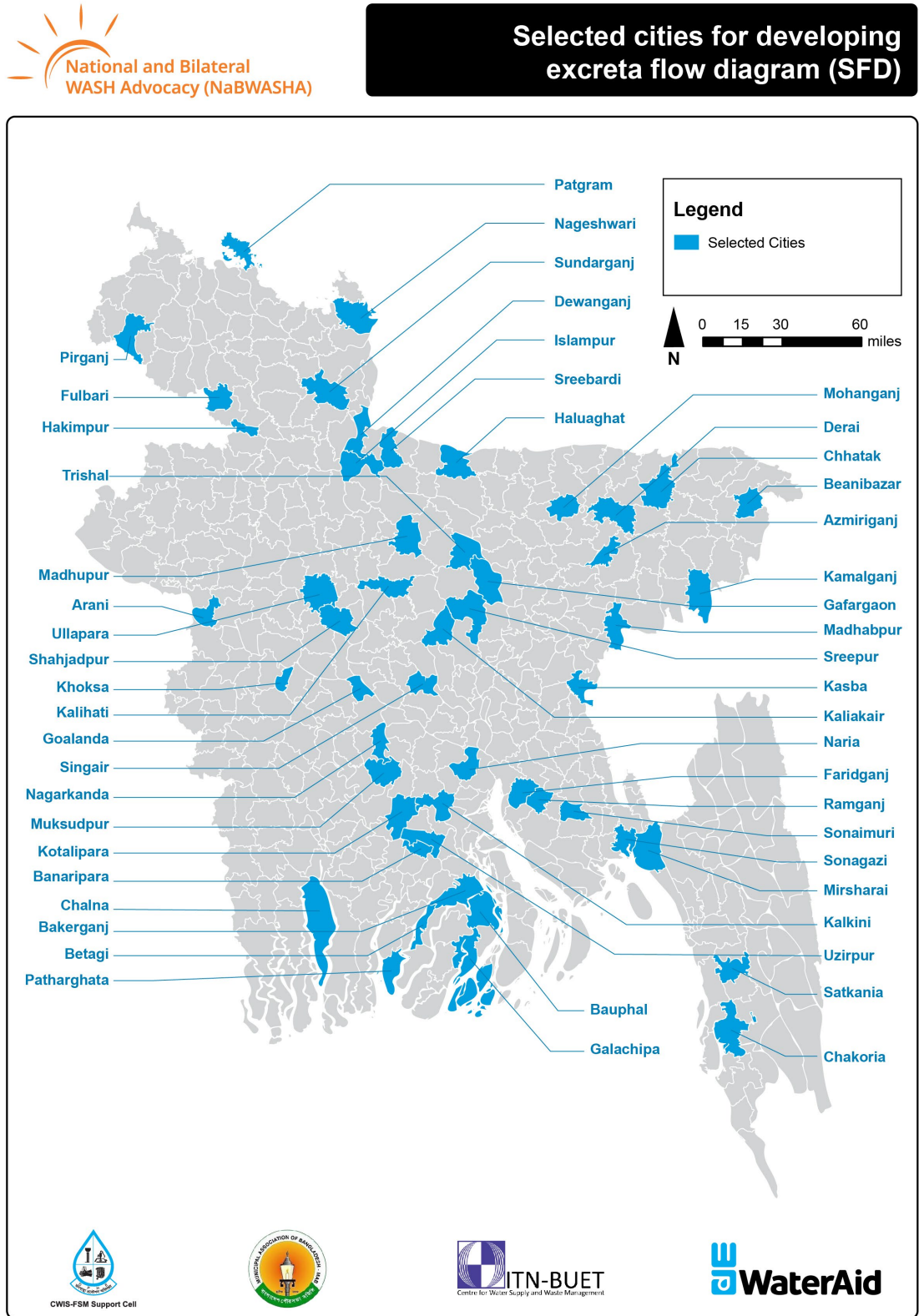


Figure 1.1 Map of Selected 50 Cities

2. Methodology

2.1 Data collection

Household data collection

Household surveys have been conducted in every ward of 50 municipalities with a minimum number of household sample size (based Cochran's formula which is a confidence level of 95 percent with a margin of error of 5 percent) using structured questionnaire developed at the KOBO platform based on Faecal Sludge Management (FSM) and Solid Waste Management (SWM).

Cochran's formula is considered especially appropriate in situations with large populations. Cochran's sample size formula for categorical data for an alpha level a priori at .05 (error of 5%)= $n_0 = (t)^2 * (p)(q) / (d)^2 = 384$

Polythene bag survey

The majority of households within a municipality tend to adopt similar practices and lifestyle habits. Consequently, a random sampling process was employed to select a sample of 50-70 households from each municipality. This selection method was based on the reasonable assumption that these chosen households would adequately represent the overall situation within their respective municipalities.

The fundamental idea is to give 50 households two distinct bin bags in two different colours for two days. Degradable waste was indicated by black, and recyclable waste by white. This system has provided two extremely vital information. The first is a general notion of the amount of waste produced by each household and other sites, and the second is to get the pictures of segregated wastes generated.

Key Informant Interview (KII)

Four Key informants' interviews have been conducted at each Pourashava using a semi-structured questionnaire with four designated key stakeholders-

1. Executive Engineer/ Town Planner/ Municipality Executive Officer,
2. Sanitary inspector,
3. Conservancy inspector and
4. DPHE Official

Focus Group Discussion (FGD)

Four Focus group discussions (FGDs) have been conducted-

1. At the municipality office with the Mayor and other city officials,
2. At educational institutions,
3. At hospitals or health complexes and
4. At public places like parks or market areas.
- 5.

Dumpsites and treatment plant visit

If the municipalities have dumpsites and treatment plant facilities, they have been visited and the data has been collected to verify the household data and understand the interactions between dumpsites and the environment.

Drone survey

Drone surveys have been conducted to get the existing scenario of solid waste dumping sites and solid waste collection systems. It helped to get existing information to plan for the future.



Figure 2.1: Snapshots from different data collection stages

2.2 Data triangulation

An expert team consisting of environment specialists and social experts revisited the households selected through random sampling in all the study areas to ensure accuracy and validate the primary data. They re-surveyed 50 households in each municipality and during the data processing and analysis stage, the acquired data were utilised to triangulate the field survey data.

2.3 Data analysis

Data collection was done in the form of structured and semi-structured questionnaires. For the household survey, the KOBO toolbox was selected as it ensures the quality of data collection while saving time and minimising errors in data entry. Moreover, it is convenient for data analysts and field supervisors to examine data in real-time. The dataset was transferred to Microsoft Excel for data triangulation, i.e., checking for any anomalies and making adjustments accordingly. Finally, the data was used to perform further analysis using Microsoft Excel and produce maps using GIS software.

2.4 SFD and WFD preparation

After completing the data analysis, the relevant parameters were input into the Sustainable Sanitation Alliance (SuSanA) platform to generate the Excreta Flow Diagrams (SFD) along with the SFD matrices. SFDs provide a systematic representation of how faecal sludge is managed, indicating the degree of safe or unsafe management at various stages, beginning from containment at the household level and extending to its treatment at a dedicated facility. The matrix-based visualization not only outlines the percentage of households utilizing different types of containment systems but also details the percentage of these households that regularly empty their respective containment units. Furthermore, it illustrates the proportion of sludge that successfully makes its way to the treatment plants, the fraction that undergoes treatment, and the portion that remains untreated. In addition to these components, SFDs also account for the inclusion of supernatant and wastewater within the overall management process.

The Waste Flow Diagram (WFD) has been prepared for the 50 municipalities following the manual developed by GIZ, the University of Leeds, Eawag, and Wasteaware. The Waste Flow Diagram (WFD) visually presents the movement of waste within each municipality. It encompasses various aspects, including the total household waste generation, the quantity officially collected by municipal authorities, informal collection, and both formal and informal waste sorting, as well as the volume of waste that remains unmanaged or is improperly disposed of in the environment. Separate diagrams were also produced for the generation and flow of plastic waste along each municipality.

3. Findings

3.1 Araihaazar Municipality

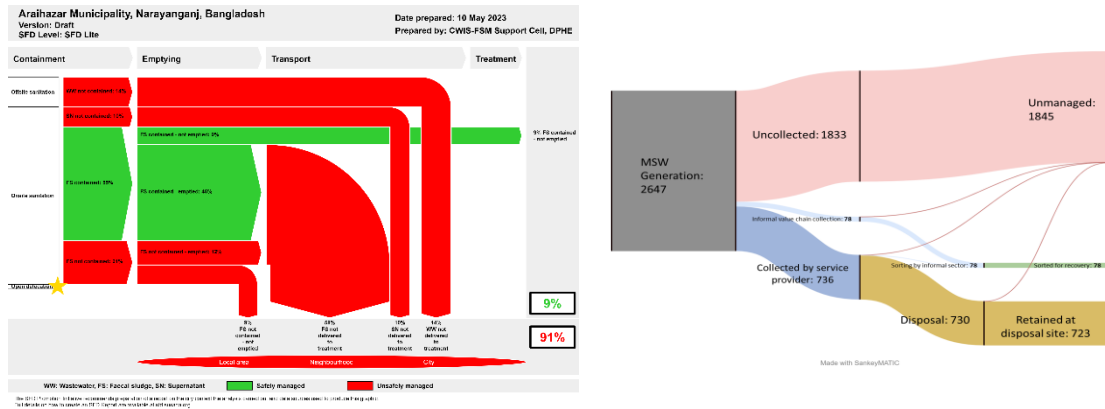


Figure 3.1 SFD and WFD of Araihaazar Municipality

91% of the fecal sludge in Araihaazar Municipality is unsafely managed whereas 9% is safely managed. There is no treatment plant in the municipality.

A total of 2,647 tonnes of municipal solid waste is generated every year, while 1,845 tonnes remain unmanaged. 75% of the households dispose of their household waste into the environment and 25% of the households use the collection service provided by the municipality. There is one formal dumpsite which is open to the environment.

3.2 Arani Municipality

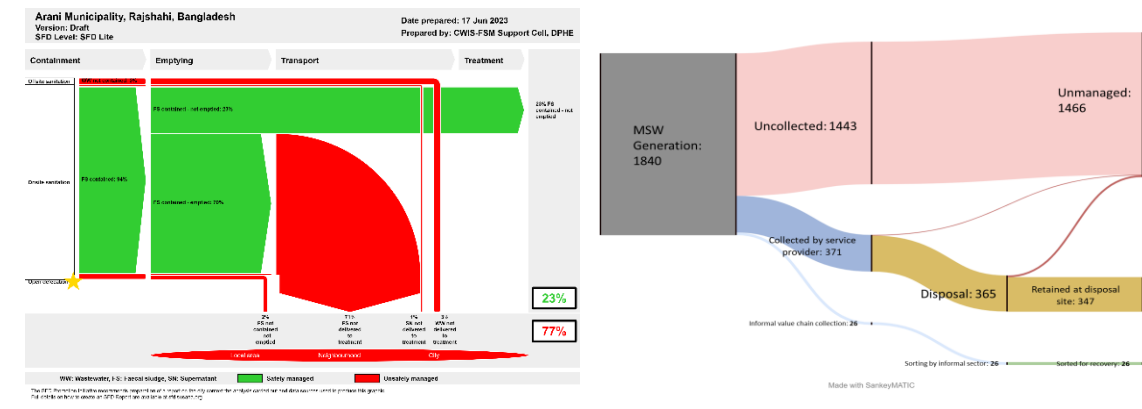


Figure 3.2 SFD and WFD of Arani Municipality

77% of the fecal sludge in Arani Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 1,840 tonnes of municipal solid waste is generated every year, while 1,466 tonnes remain unmanaged. 89.8% of the households dispose of their household waste into the environment and 10.2% of the households use dustbins for dumping their waste. There is one formal dumpsite which is open to the environment.

3.3 Banaripara Municipality

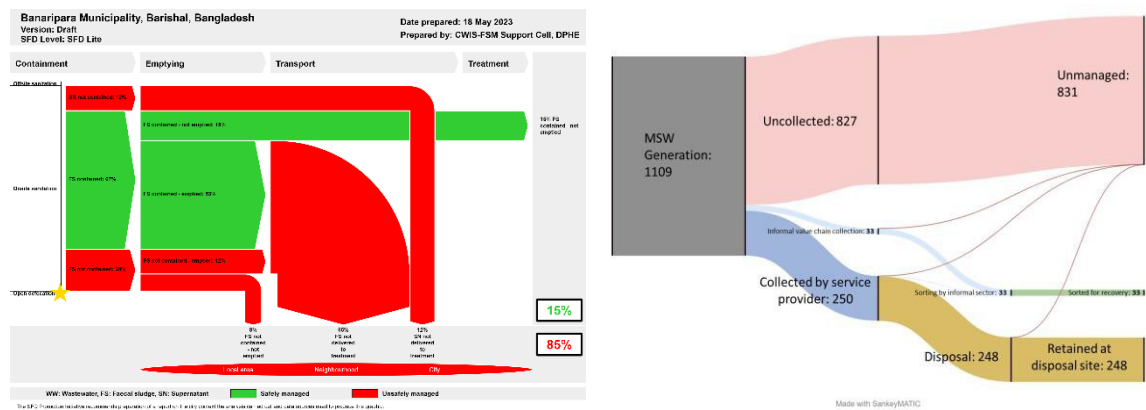


Figure 3.3 SFD and WFD of Banaripara Municipality

85% of the fecal sludge in Banaripara Municipality is unsafely managed whereas 15% is safely managed. There is no treatment plant in the municipality.

A total of 1,109 tonnes of municipal solid waste is generated every year, while 831 tonnes remain unmanaged. 86% of the households dispose of their household waste into the environment, 10% of the households use the collection service provided by the municipality and only 4% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.4 Banskhal Municipality

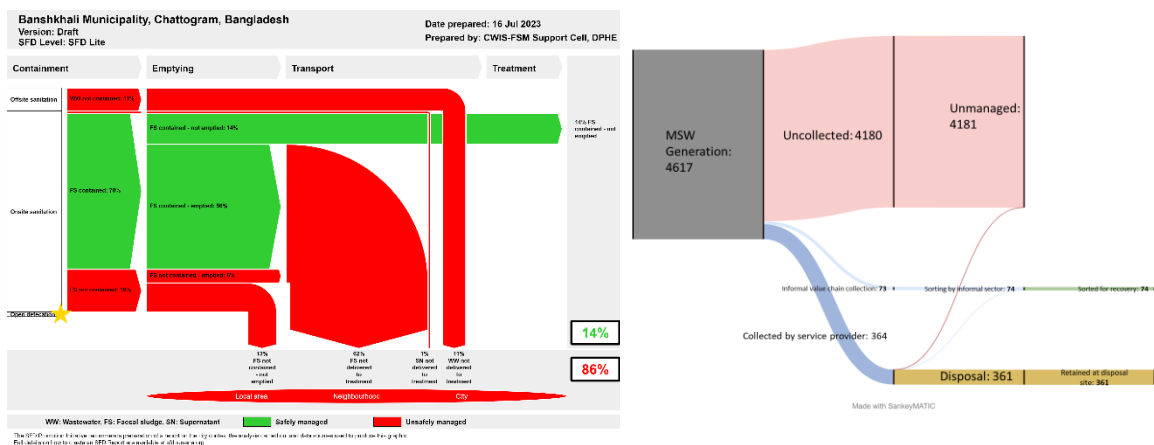


Figure 3.4 SFD and WFD of Banskhal Municipality

86% of the fecal sludge in Banskhal Municipality is unsafely managed whereas 14% is safely managed. There is no treatment plant in the municipality.

A total of 4,617 tonnes of municipal solid waste is generated every year, while 4,181 tonnes remain unmanaged. 99% of the households dispose of their household waste into the environment and only 1% of the households use dustbins for dumping their waste. There is one formal dumpsite that is open to the environment.

3.5 Bauphal Municipality

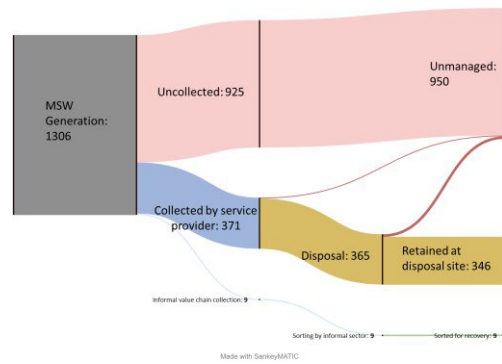
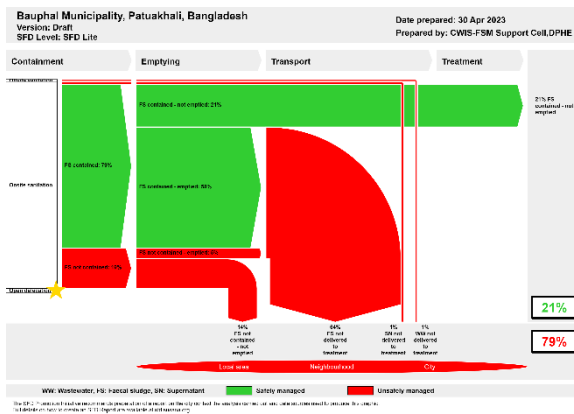


Figure 3.5 SFD and WFD of Bauphal Municipality

79% of the fecal sludge in Bauphal Municipality is unsafely managed whereas 21% is safely managed. There is no treatment plant in the municipality.

A total of 1,360 tonnes of municipal solid waste is generated every year, while 950 tonnes remain unmanaged. 78.25% of the households dispose of their household waste into the environment, 20% of the households use the collection service provided by the municipality and only 1.75% of the households use dustbins for dumping their waste. There is no formal dumpsite.

3.6 Beanibazar Municipality

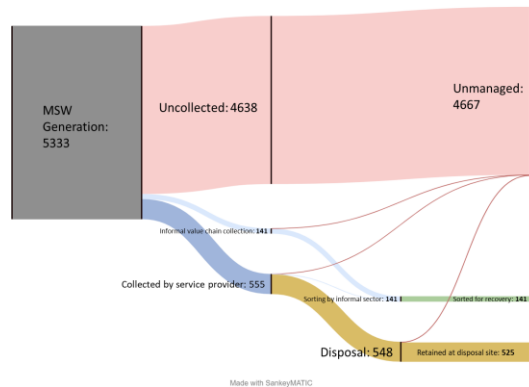
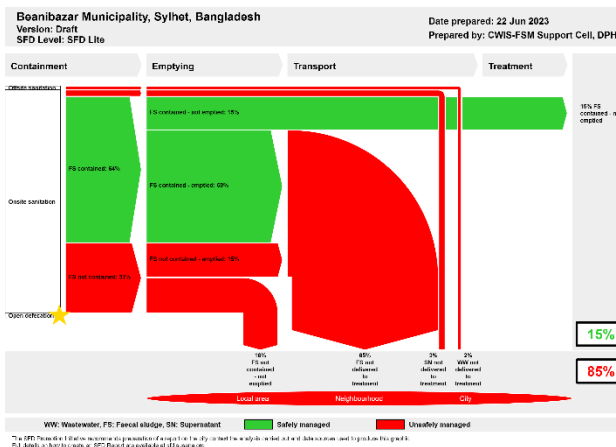


Figure 3.6 SFD and WFD of Beanibazar Municipality

85% of the fecal sludge in Beanibazar Municipality is unsafely managed whereas 15% is safely managed. There is no treatment plant in the municipality.

A total of 5,333 tonnes of municipal solid waste is generated every year, while 4,667 tonnes remain unmanaged. 97.8% of the households dispose of their household waste into the environment, 1.2% of the households use the collection service provided by the municipality and only 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.7 Betagi Municipality

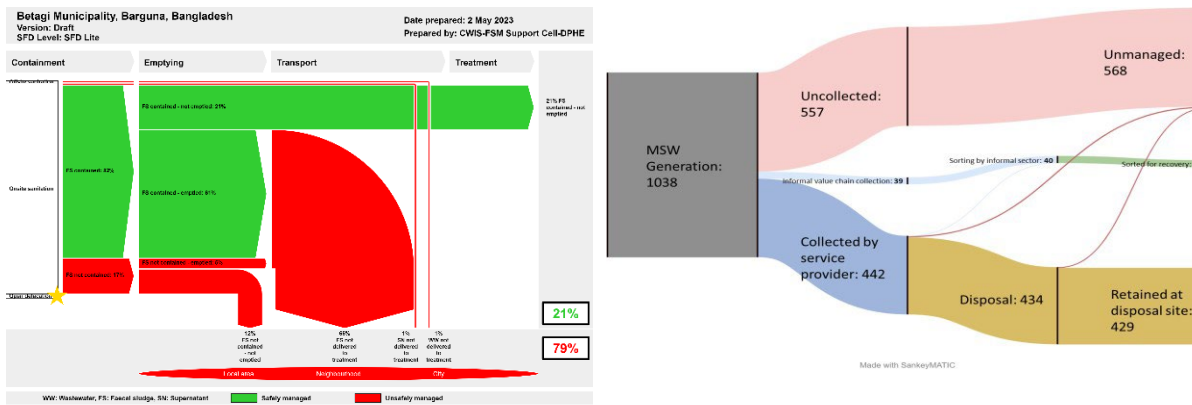


Figure 3.7 SFD and WFD of Betagi Municipality

79% of the fecal sludge in Betagi Municipality is unsafely managed whereas 21% is safely managed. There is no treatment plant in the municipality.

A total of 1,038 tonnes of municipal solid waste is generated every year, while 568 tonnes remain unmanaged. 54% of the households dispose of their household waste into the environment and 46% of the households use the collection service provided by the municipality. There is no formal dumpsite.

3.8 Bera Municipality

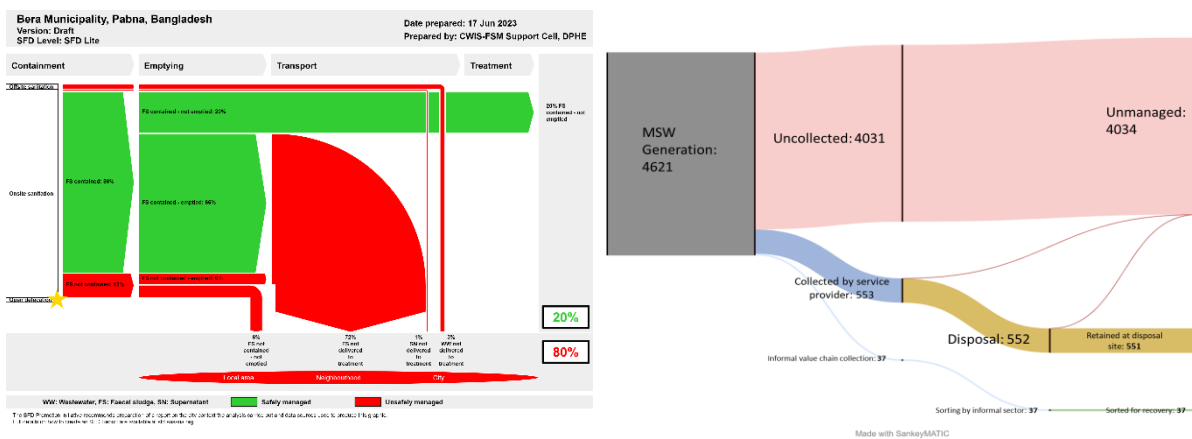


Figure 3.8 SFD and WFD of Bera Municipality

80% of the fecal sludge in Bera Municipality is unsafely managed whereas 20% is safely managed. There is no treatment plant in the municipality.

A total of 4,621 tonnes of municipal solid waste is generated every year, while 4,034 tonnes remain unmanaged. 97.28% of the households dispose of their household waste into the environment, 2.22% of the households use the collection service provided by the municipality and only 0.49% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.9 Chakaria Municipality

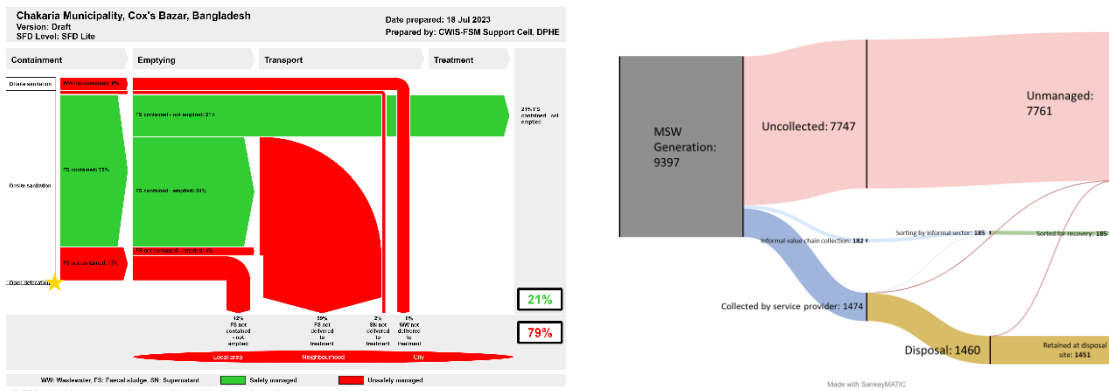


Figure 3.9 SFD and WFD of Chakaria Municipality

79% of the fecal sludge in Chakaria Municipality is unsafely managed whereas 21% is safely managed. There is no treatment plant in the municipality.

A total of 7,747 tonnes of municipal solid waste is generated every year, while 7,761 tonnes remain unmanaged. 92.2% of the households dispose of their household waste into the environment and 7.8% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.10 Charghat Municipality

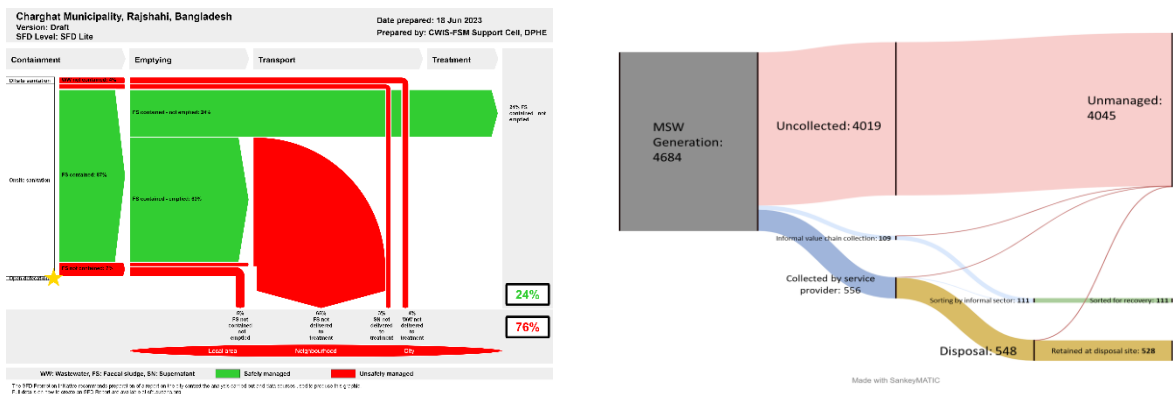


Figure 3.10 SFD and WFD of Charghat Municipality

76% of the fecal sludge in Charghat Municipality is unsafely managed whereas 24% is safely managed. There is no treatment plant in the municipality.

A total of 4,684 tonnes of municipal solid waste is generated every year, while 4,045 tonnes remain unmanaged. 95.1% of the households dispose of their household waste into the environment, 1.5% of the households use the collection service provided by the municipality and 3.5% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.11 Chhatak Municipality

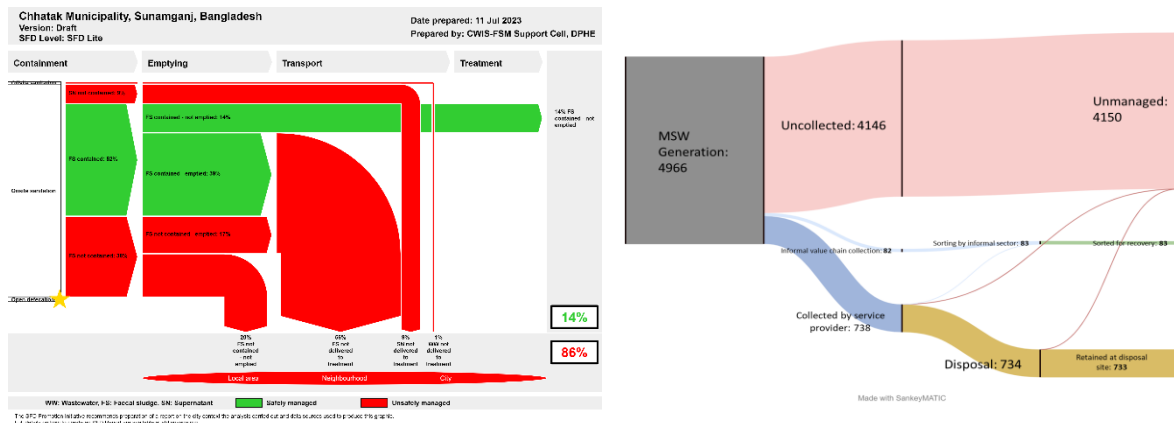


Figure 3.11 SFD and WFD of Chhatak Municipality

86% of the fecal sludge in Chhatak Municipality is unsafely managed whereas 14% is safely managed. There is no treatment plant in the municipality.

A total of 4,966 tonnes of municipal solid waste is generated every year, while 4,150 tonnes remain unmanaged. 94.57% of the households dispose of their household waste into the environment and 5.43% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.12 Chhaddagram Municipality

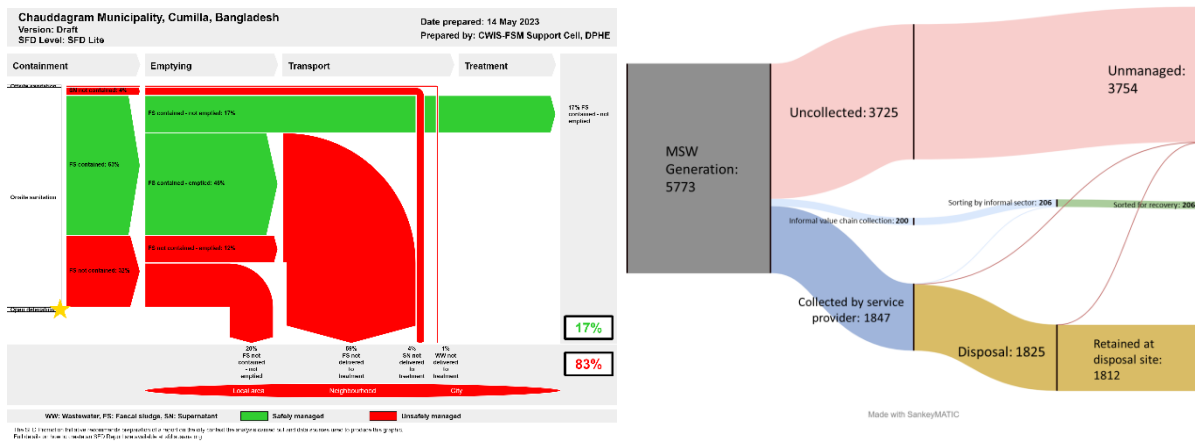


Figure 3.12 SFD and WFD of Chhaddagram Municipality

83% of the fecal sludge in Chhaddagram Municipality is unsafely managed whereas 17% is safely managed. There is no treatment plant in the municipality.

A total of 5773 tonnes of municipal solid waste is generated every year, while 3754 tonnes remain unmanaged. 76% of the households dispose of their household waste into the environment and 1% of the households use dustbins for dumping their waste. The remaining 22% of the households use van service provided by the municipality. There is one formal dumpsite which is open to the environment.

3.13 Daudkandi Municipality

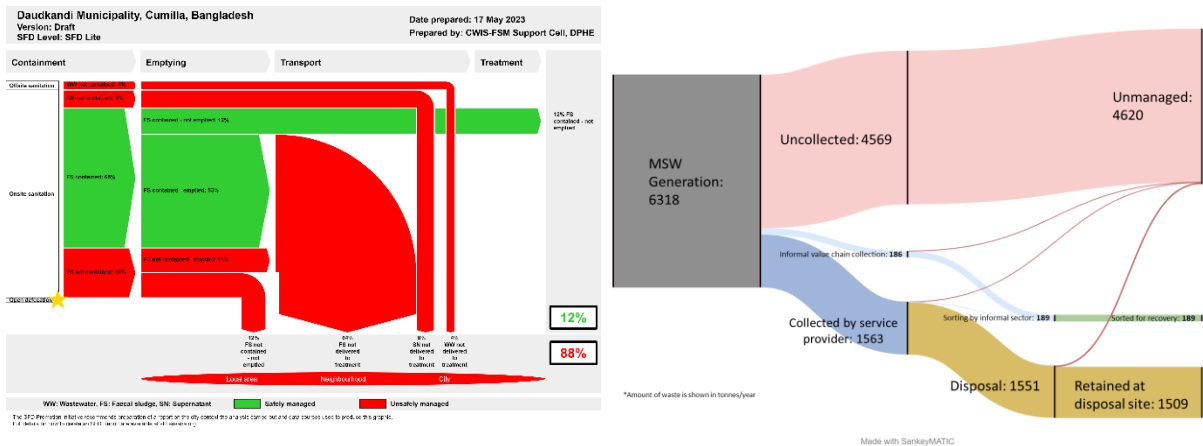


Figure 3.13 SFD and WFD of Daudkandi Municipality

88% of the fecal sludge in Daudkandi Municipality is unsafely managed whereas 12% is safely managed. There is no treatment plant in the municipality.

A total of 6,318 tonnes of municipal solid waste is generated every year, while 4,620 tonnes remain unmanaged. 80% of the households dispose of their household waste into the environment and the remaining 20% of the households use van service provided by the municipality. There are two formal dumpsites which is open to the environment.

3.14 Debidwar Municipality

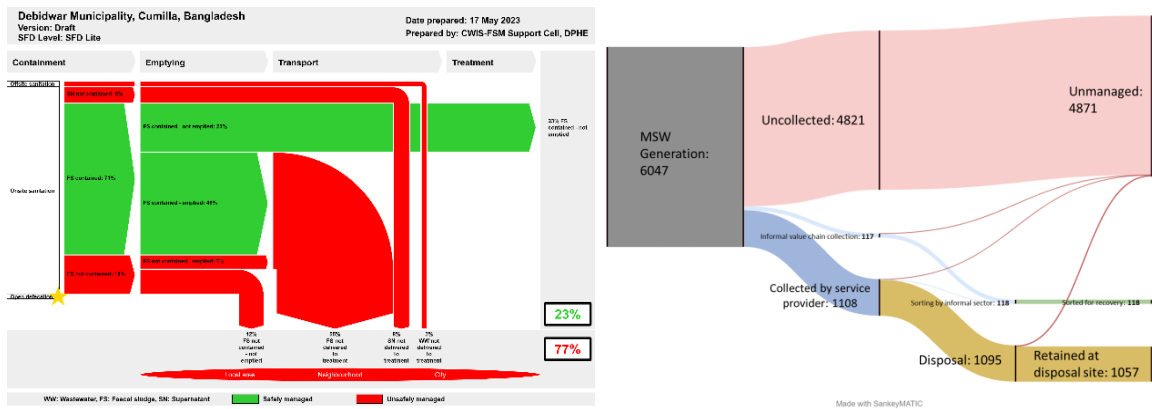


Figure 3.14 SFD and WFD of Debidwar Municipality

77% of the fecal sludge in Debidwar Municipality is unsafely managed whereas 23 % is safely managed. There is no treatment plant in the municipality.

A total of 6,047 tonnes of municipal solid waste is generated every year, while 4,871 tonnes remain unmanaged. 90% of the households dispose of their household waste into the environment and 10% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.15 Dewanganj Municipality

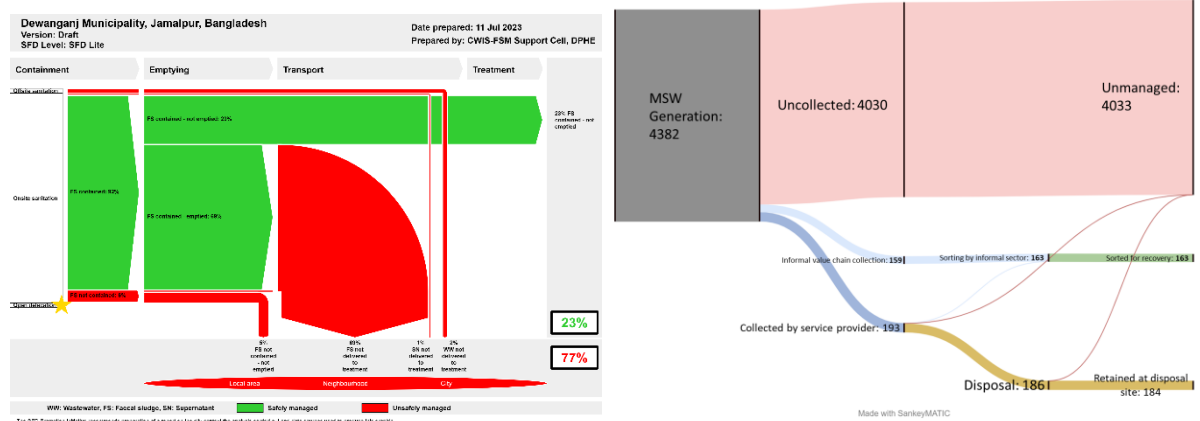


Figure 3.15 SFD and WFD of Dewanganj Municipality

77% of the fecal sludge in Dewanganj Municipality is unsafely managed whereas 23 % is safely managed. There is no treatment plant in the municipality.

A total of 4,382 tonnes of municipal solid waste is generated every year, while 4,033 tonnes remain unmanaged. 99.2% of the households dispose of their household waste into the environment and only 0.8% of the households use dustbins for dumping their waste. There is one formal dumpsite which is open to the environment.

3.16 Gafargaon Municipality

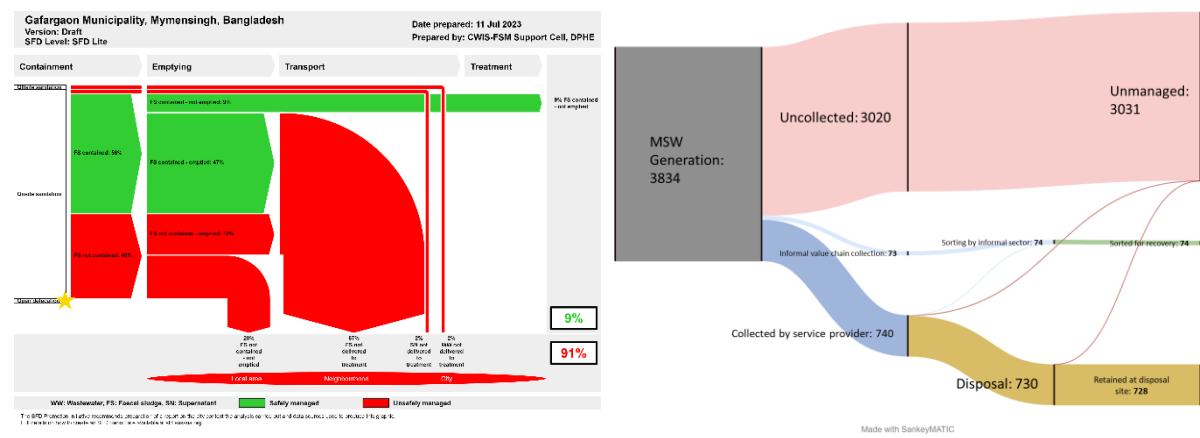


Figure 3.16 SFD and WFD of Gafargaon Municipality

91% of the fecal sludge in Gafargaon Municipality is unsafely managed whereas 9% is safely managed. There is no treatment plant in the municipality.

A total of 3,834 tonnes of municipal solid waste is generated every year, while 3,031 tonnes remain unmanaged. 89.8% of the households dispose of their household waste into the environment and 10.2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.17 Galachipa Municipality

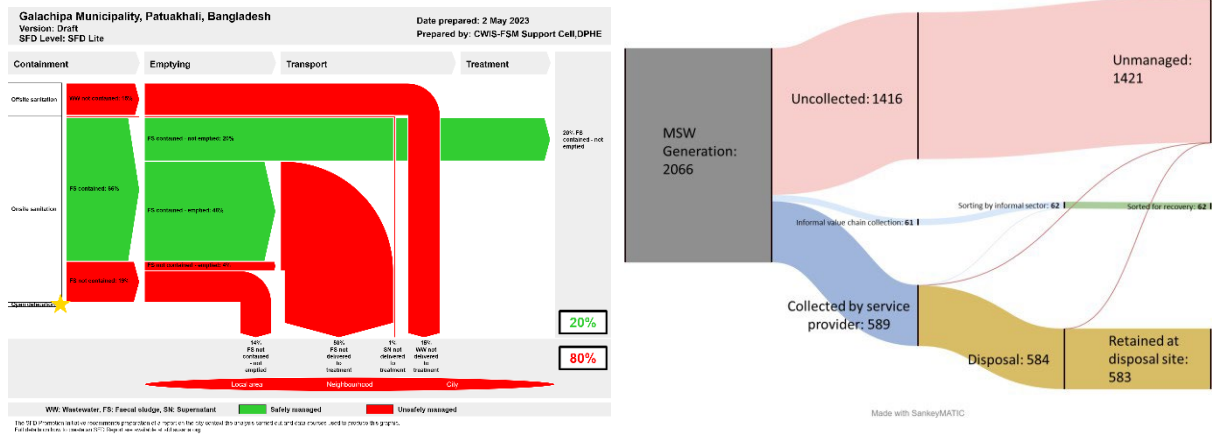


Figure 3.17 SFD and WFD of Galachipa Municipality

80% of the fecal sludge in Galachipa Municipality is unsafely managed whereas 20% is safely managed. There is no treatment plant in the municipality.

A total of 4,966 tonnes of municipal solid waste is generated every year, while 4,150 tonnes remain unmanaged. 73% of the households dispose of their household waste into the environment and 3% of the households use dustbins for dumping their waste. The remaining 24% of the households use van service provided by the municipality. There is no formal dumpsite.

3.18 Goalanda Municipality

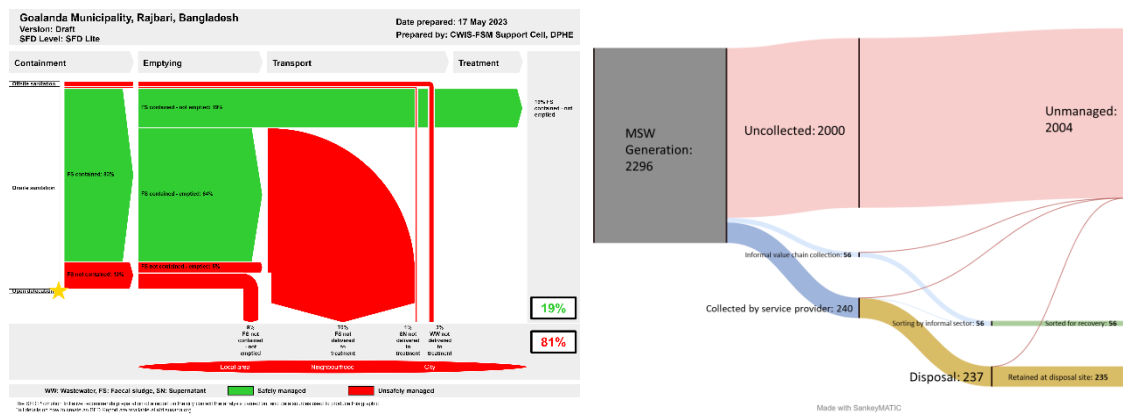


Figure 3.18 SFD and WFD of Goalanda Municipality

81% of the fecal sludge in Goalanda Municipality is unsafely managed whereas 19% is safely managed. There is no treatment plant in the municipality.

A total of 2,296 tonnes of municipal solid waste is generated every year, while 2,004 tonnes remain unmanaged. 97% of the households dispose of their household waste into the environment and 3% of the households use dustbins for dumping their waste. There are three formal dumpsites which are open to the environment.

3.19 Gopalpur (Lalpur) Municipality

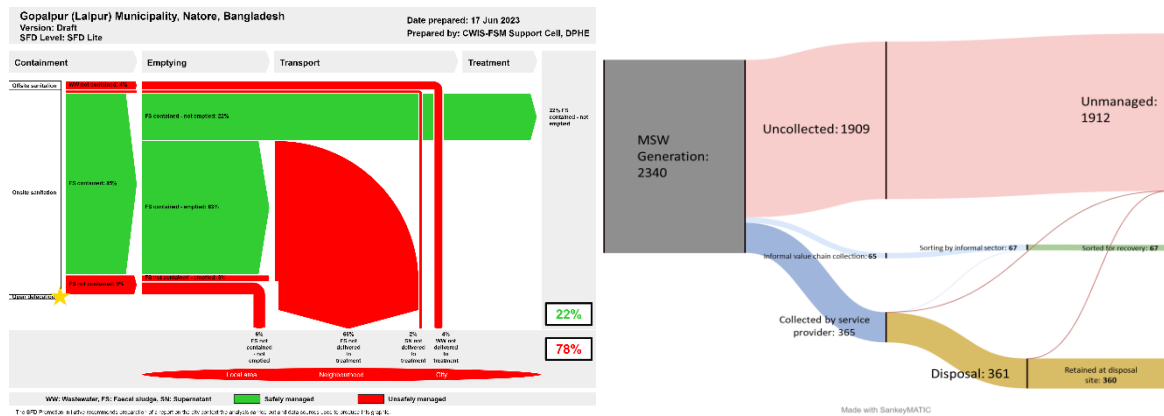


Figure 3.19 SFD and WFD of Gopalpur (Lalpur) Municipality

78% of the fecal sludge in Gopalpur (Lalpur) Municipality is unsafely managed whereas 22% is safely managed. There is no treatment plant in the municipality.

A total of 2,340 tonnes of municipal solid waste is generated every year, while 1,912 tonnes remain unmanaged. 89.7% of the households dispose of their household waste into the environment and 10.3% of the households use dustbins for dumping their waste. There is one formal dumpsite which is open to the environment.

3.20 Hakimpur Municipality

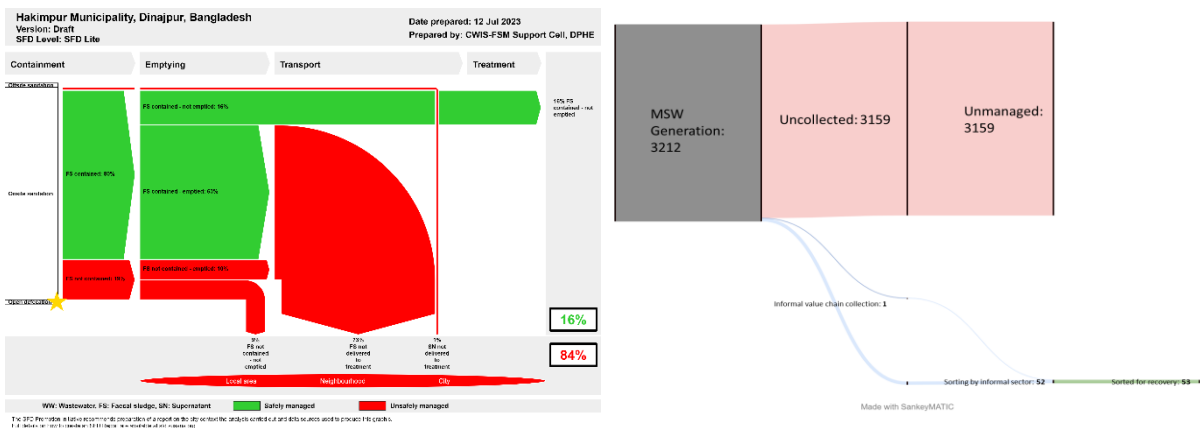


Figure 3.20 SFD and WFD of Hakimpur Municipality

84% of the fecal sludge in Hakimpur Municipality is unsafely managed whereas 16% is safely managed. There is no treatment plant in the municipality.

A total of 3,212 tonnes of municipal solid waste is generated every year, while 3,159 tonnes remain unmanaged. 99.3% of the households dispose of their household waste into the environment and 0.7% of the households use dustbins for dumping their waste. There is one formal dumpsite which is open to the environment.

3.21 Hajiganj Municipality

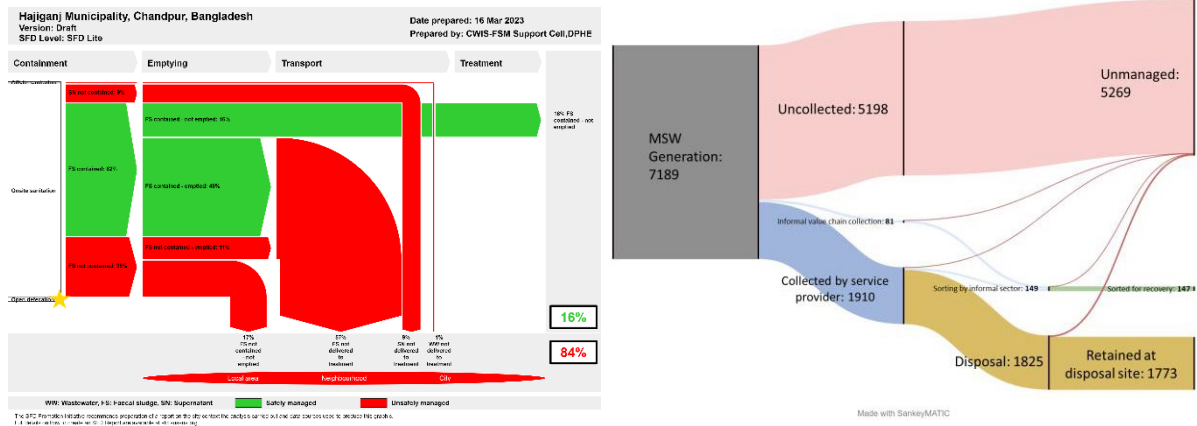


Figure 3.21 SFD and WFD of Hajiganj Municipality

84% of the fecal sludge in Hajiganj Municipality is unsafely managed whereas 16% is safely managed. There is no treatment plant in the municipality.

A total of 7,189 tonnes of municipal solid waste is generated every year, while 5,269 tonnes remain unmanaged. 81% of the households dispose of their household waste into the environment, 18% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There are four formal dumpsite which is open to the environment.

3.22 Ishwardi Municipality

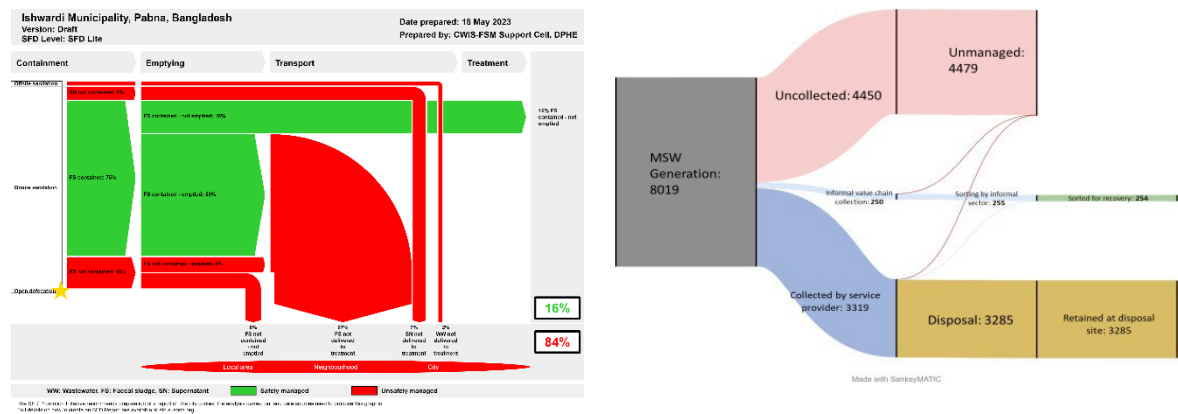


Figure 3.22 SFD and WFD of Ishwardi Municipality

84% of the fecal sludge in Ishwardi Municipality is unsafely managed whereas 16% is safely managed. There is no treatment plant in the municipality.

A total of 8,019 tonnes of municipal solid waste is generated every year, while 4,479 tonnes remain unmanaged. 64% of the households dispose of their household waste into the environment, 31% of the households use van services provided by the municipality and 5% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.23 Islampur Municipality

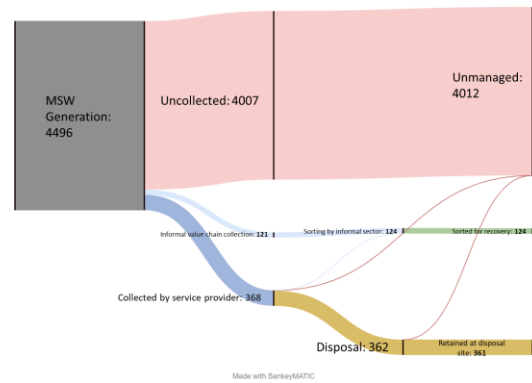
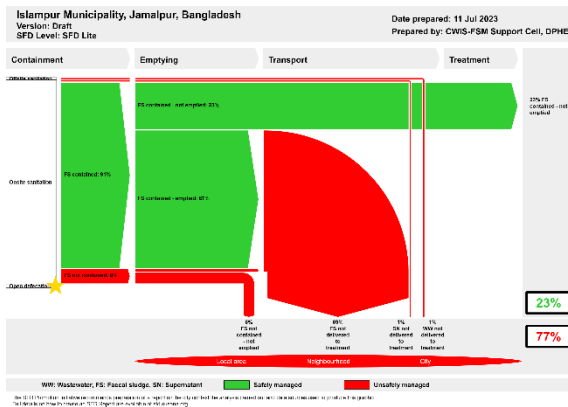


Figure 3.23 SFD and WFD of Islampur Municipality

77% of the fecal sludge in Islampur Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 4,496 tonnes of municipal solid waste is generated every year, while 4,012 tonnes remain unmanaged. 98.8% of the households dispose of their household waste into the environment, 1% of the households use van services provided by the municipality and 0.2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.24 Kalaroa Municipality

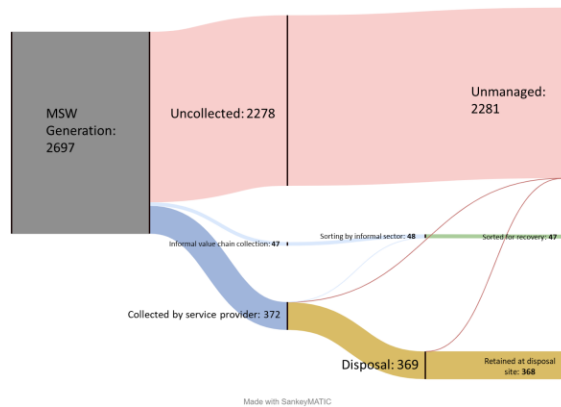
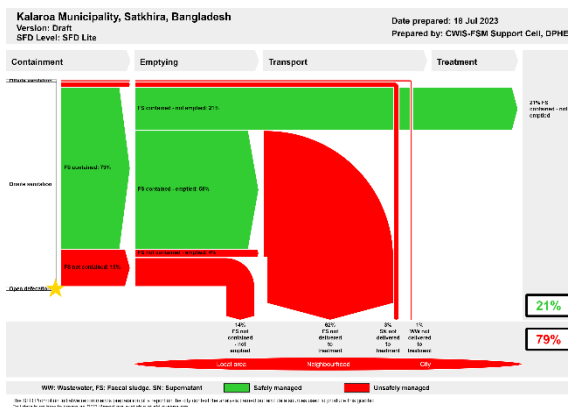


Figure 3.24 SFD and WFD of Kalaroa Municipality

79% of the fecal sludge in Kalaroa Municipality is unsafely managed whereas 21% is safely managed. There is no treatment plant in the municipality.

A total of 2,697 tonnes of municipal solid waste is generated every year, while 2,281 tonnes remain unmanaged. 96% of the households dispose of their household waste into the environment, 3% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.25 Kaliakair Municipality

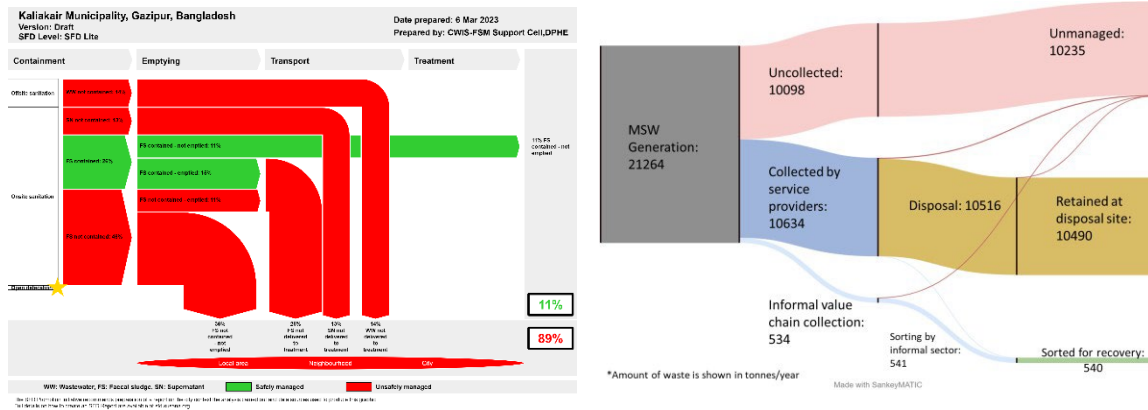


Figure 3.25 SFD and WFD of Kaliakair Municipality

89% of the fecal sludge in Kaliakair Municipality is unsafely managed whereas 11% is safely managed. There is no treatment plant in the municipality.

A total of 21,264 tonnes of municipal solid waste is generated every year, while 10,325 tonnes remain unmanaged. 46.65% of the households dispose of their household waste into the environment, 47.39% of the households use van services provided by the municipality and 6% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.26 Kalihati Municipality

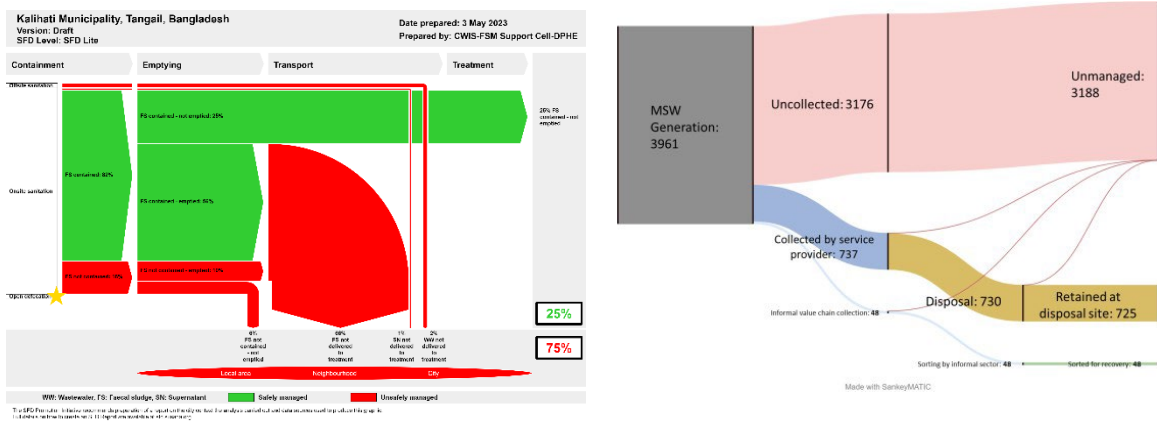


Figure 3.26 SFD and WFD of Kalihati Municipality

75% of the fecal sludge in Kalihati Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 3,961 tonnes of municipal solid waste is generated every year, while 3,188 tonnes remain unmanaged. 86% of the households dispose of their household waste into the environment, 12% of the households use van services provided by the municipality and 2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.27 Kalkini Municipality

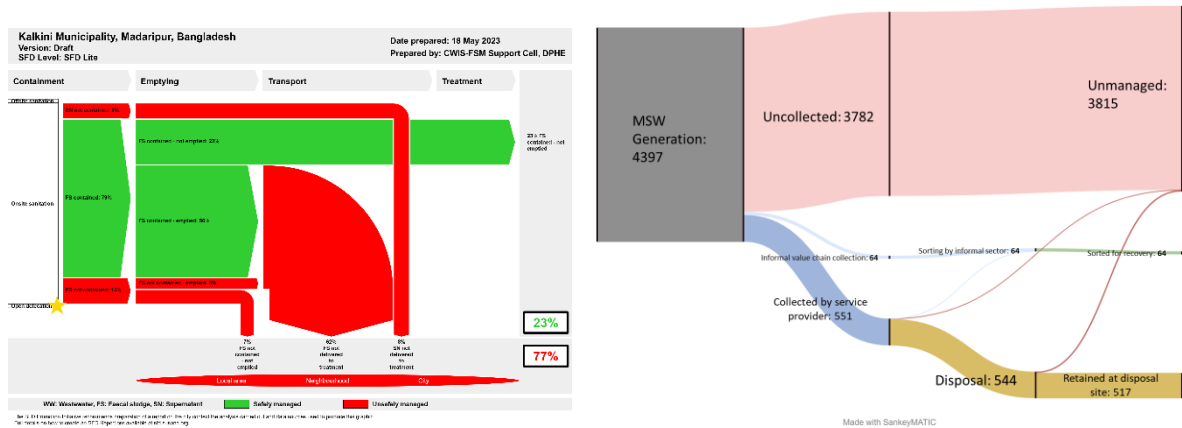


Figure 3.27 SFD and WFD of Kalkini Municipality

77% of the fecal sludge in Kalkini Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 3,782 tonnes of municipal solid waste is generated every year, while 3,815 tonnes remain unmanaged. 91% of the households dispose of their household waste into the environment and 9% of the households use van services provided by the municipality. There is no formal dumpsite.

3.28 Kamalganj Municipality

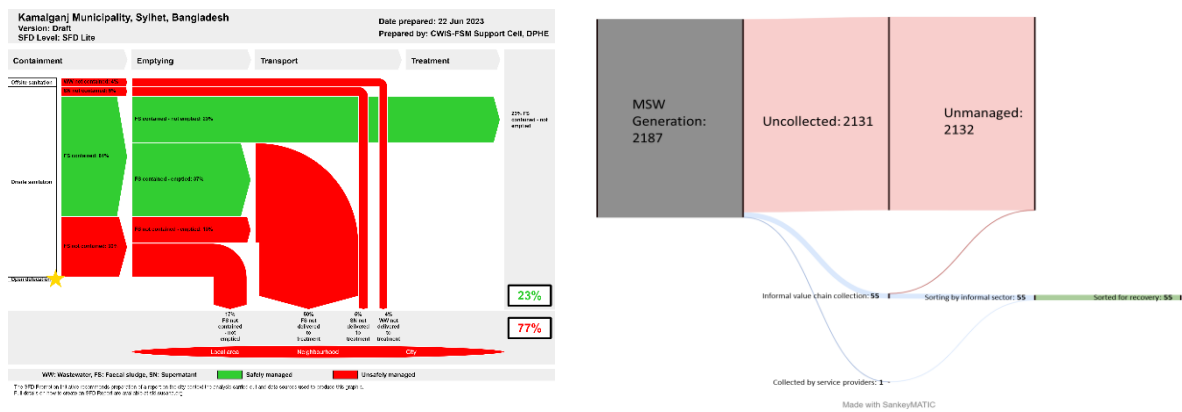


Figure 3.28 SFD and WFD of Kamalganj Municipality

77% of the fecal sludge in Kamalganj Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 2,187 tonnes of municipal solid waste is generated every year, while 2,132 tonnes remain unmanaged. 100% of the households dispose of their household waste into the environment. There is no formal dumpsite.

3.29 Karimganj Municipality

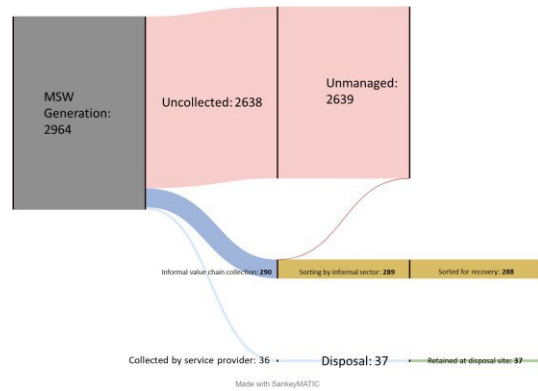
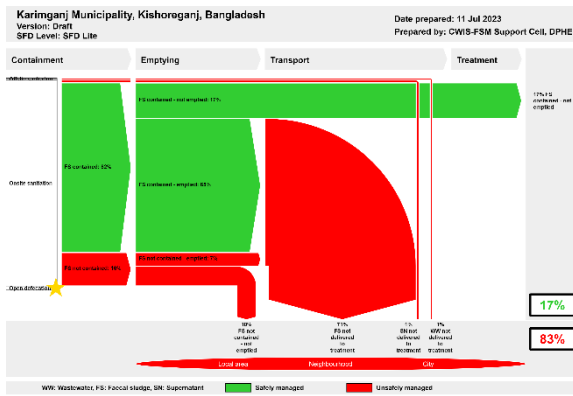


Figure 3.29 SFD and WFD of Karimganj Municipality

83% of the fecal sludge in Karimganj Municipality is unsafely managed whereas 13% is safely managed. There is no treatment plant in the municipality.

A total of 2,964 tonnes of municipal solid waste is generated every year, while 2,639 tonnes remain unmanaged. While 2639 tonnes remain unmanaged. 98.77% of the households dispose of their household waste into the environment and 1.23% of the households use van services provided by the municipality. There are three formal dumpsite which is open to the environment.

3.30 Laksham Municipality

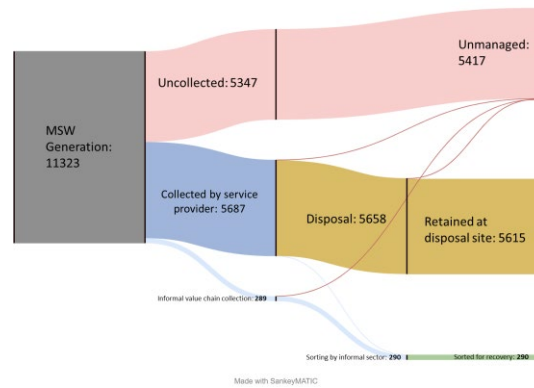
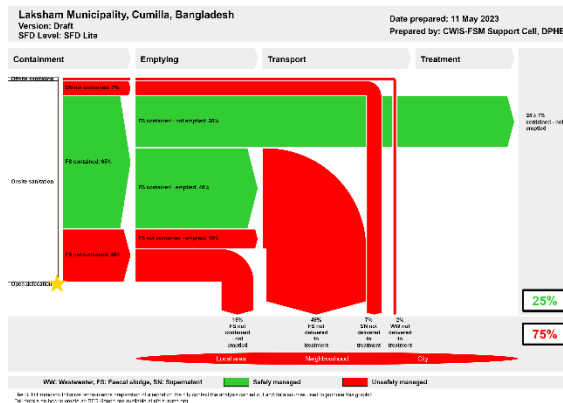


Figure 3.30 SFD and WFD of Laksham Municipality

75% of the fecal sludge in Laksham Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 11,323 tonnes of municipal solid waste is generated every year, while 5,417 tonnes remain unmanaged. 61% of the households dispose of their household waste into the environment, 38% of the households use van services provided by the municipality, and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.31 Manohardi Municipality

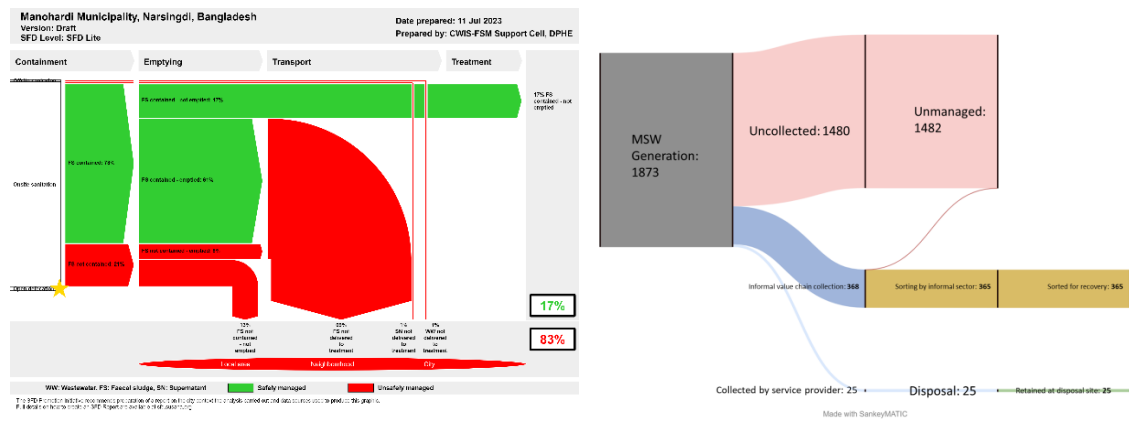


Figure 3.31 SFD and WFD of Manohardi Municipality

83% of the fecal sludge in Manohardi Municipality is unsafely managed whereas 17% is safely managed. There is no treatment plant in the municipality.

A total of 1,873 tonnes of municipal solid waste is generated every year, while 1,482 tonnes remain unmanaged. 84% of the households dispose of their household waste into the environment, 5% of the households use van services provided by the municipality, and 11% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.32 Muksudpur Municipality

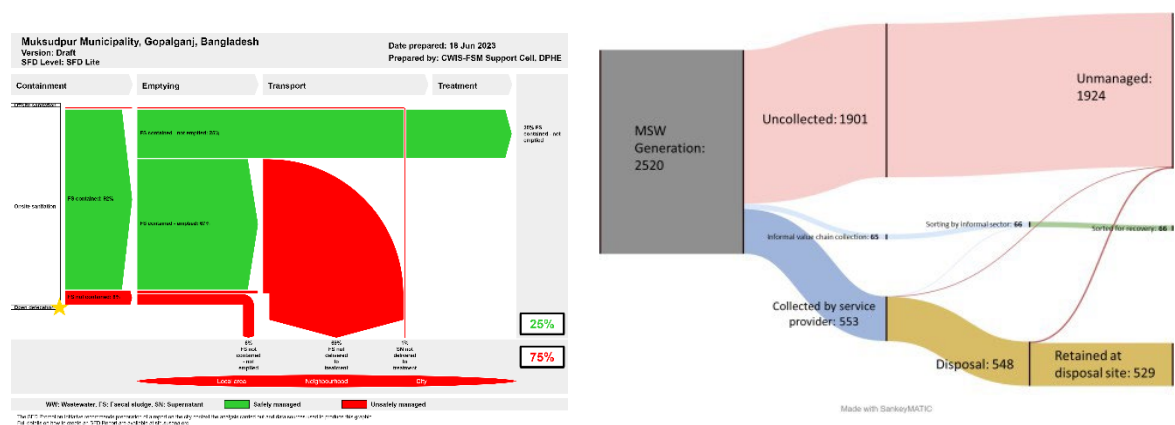


Figure 3.32 SFD and WFD of Muksudpur Municipality

75% of the fecal sludge in Muksudpur Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 2,520 tonnes of municipal solid waste is generated every year, while 1,924 tonnes remain unmanaged. 85% of the households dispose of their household waste into the environment and 15% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.33 Muktagachha Municipality

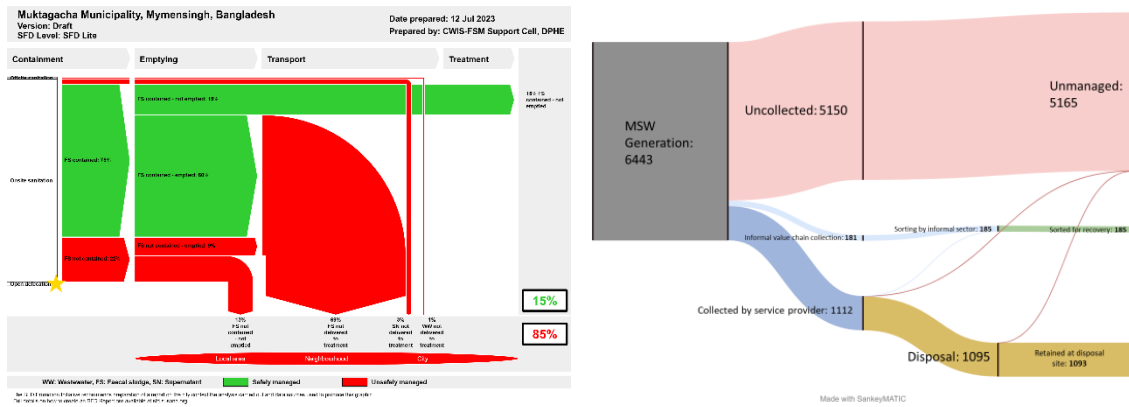


Figure 3.33 SFD and WFD of Muktagachha Municipality

85% of the fecal sludge in Muktagachha Municipality is unsafely managed whereas 15% is safely managed. There is no treatment plant in the municipality.

A total of 6,443 tonnes of municipal solid waste is generated every year, while 5,165 tonnes remain unmanaged. 94% of the households dispose of their household waste into the environment, 3% of the households use van services provided by the municipality and 3% of the households use dustbins for dumping their wastes. There are three formal dumpsite which is open to the environment.

3.34 Nabiganj Municipality

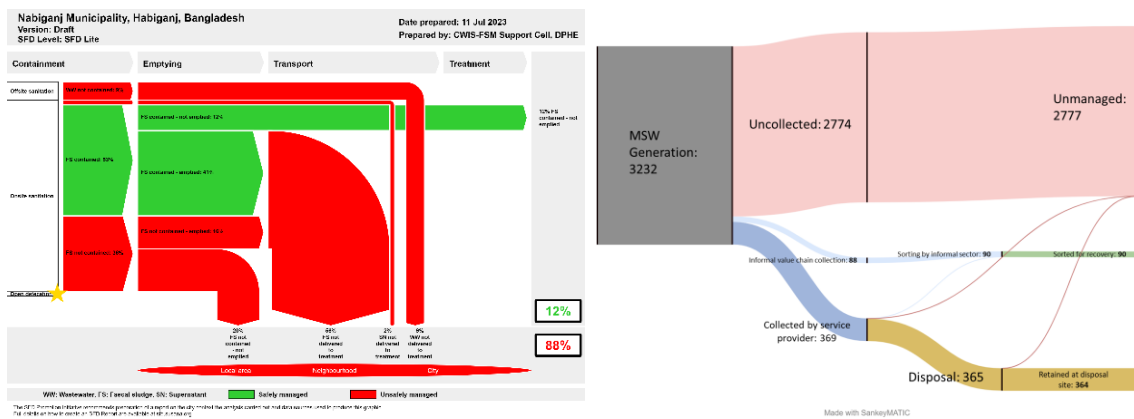


Figure 3.34 SFD and WFD of Nabiganj Municipality

88% of the fecal sludge in Nabiganj Municipality is unsafely managed whereas 12% is safely managed. There is no treatment plant in the municipality.

A total of 3,232 tonnes of municipal solid waste is generated every year, while 2,777 tonnes remain unmanaged. 91% of the households dispose of their household waste into the environment, 4% of the households use van services provided by the municipality and 5% of the households use dustbins for dumping their wastes. There are three formal dumpsites which are open to the environment.

3.35 Nagarkanda Municipality

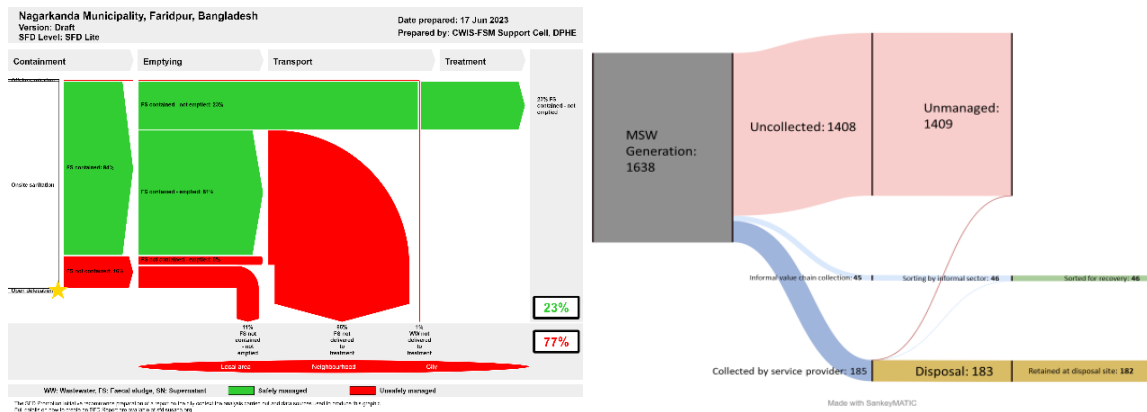


Figure 3.35 SFD and WFD of Nagarkanda Municipality

77% of the fecal sludge in Nagarkanda Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 1,638 tonnes of municipal solid waste is generated every year, while 1,409 tonnes remain unmanaged. 98% of the households dispose of their household waste into the environment and 2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.36 Nageshwari Municipality

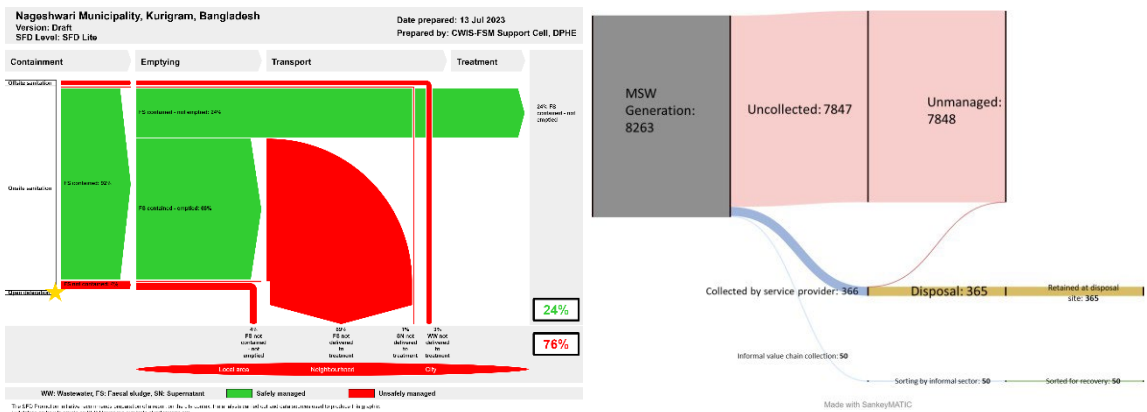


Figure 3.36 SFD and WFD of Nageshwari Municipality

76% of the fecal sludge in Nageshwari Municipality is unsafely managed whereas 24% is safely managed. There is no treatment plant in the municipality.

A total of 8,263 tonnes of municipal solid waste is generated every year, while 7,848 tonnes remain unmanaged. 97% of the households dispose of their household waste into the environment, 2% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.37 Nangalkot Municipality

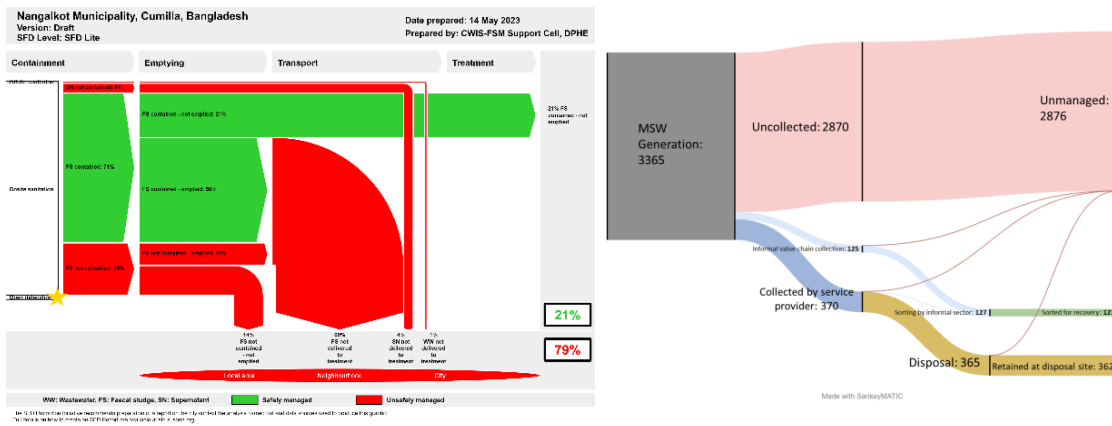


Figure 3.37 SFD and WFD of Nangalkot Municipality

79% of the fecal sludge in Nangalkot Municipality is unsafely managed whereas 21% is safely managed. There is no treatment plant in the municipality.

A total of 3,365 tonnes of municipal solid waste is generated every year, while 2,876 tonnes remain unmanaged. 94% of the households dispose of their household waste into the environment, 5% of the households use van services provided by the municipality and 0.2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.38 Paikgachha Municipality

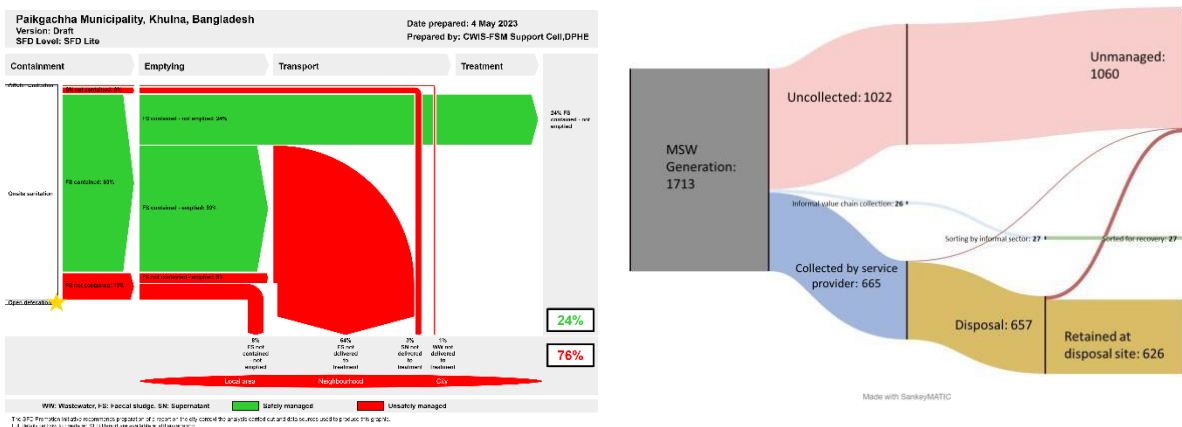


Figure 3.38 SFD and WFD of Paikgachha Municipality

76% of the fecal sludge in Paikgachha Municipality is unsafely managed whereas 24% is safely managed. There is no treatment plant in the municipality.

A total of 1,713 tonnes of municipal solid waste is generated every year, while 1,060 tonnes remain unmanaged. 57% of the households dispose of their household waste into the environment, 33% of the households use van services provided by the municipality and 10% of the households use dustbins for dumping their wastes. There is no formal dumpsite.

3.39 Patgram Municipality

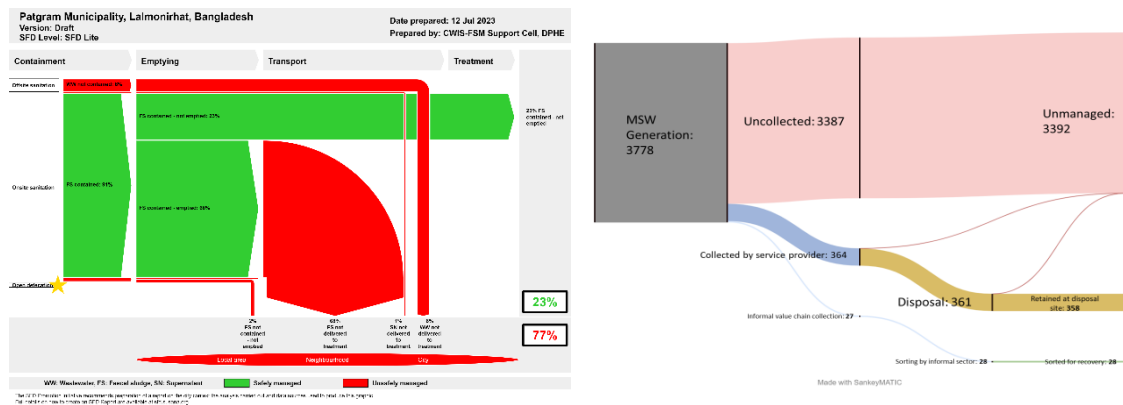


Figure 3.39 SFD and WFD of Patgram Municipality

77% of the fecal sludge in Patgram Municipality is unsafely managed whereas 23% is safely managed. There is no treatment plant in the municipality.

A total of 3,778 tonnes of municipal solid waste is generated every year, while 3,392 tonnes remain unmanaged. 95% of the households dispose of their household waste into the environment, 2% of the households use van services provided by the municipality and 3% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.40 Raipura Municipality

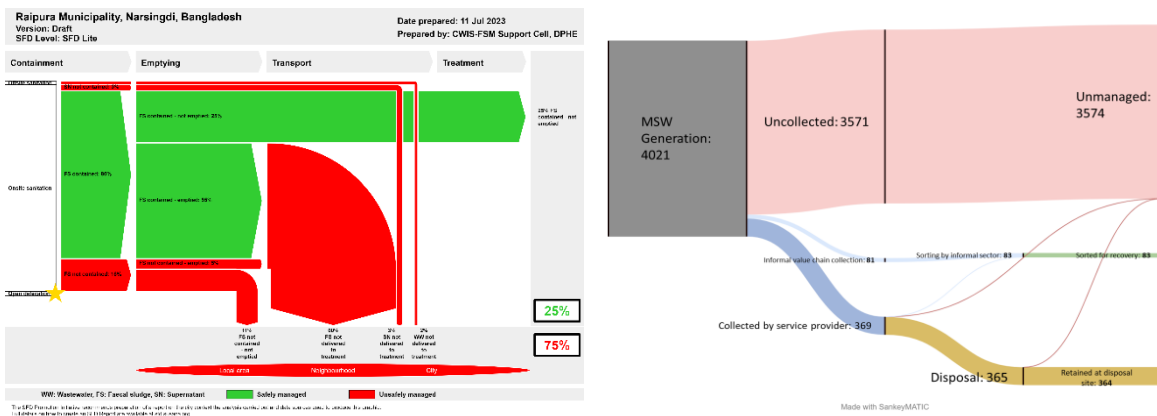


Figure 3.40 SFD and WFD of Raipura Municipality

75% of the fecal sludge in Raipura Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 4,021 tonnes of municipal solid waste is generated every year, while 3,574 tonnes remain unmanaged. 93% of the households dispose of their household waste into the environment and 7% of the households use van services provided by the municipality. There is one formal dumpsite which is open to the environment.

3.41 Rangunia Municipality

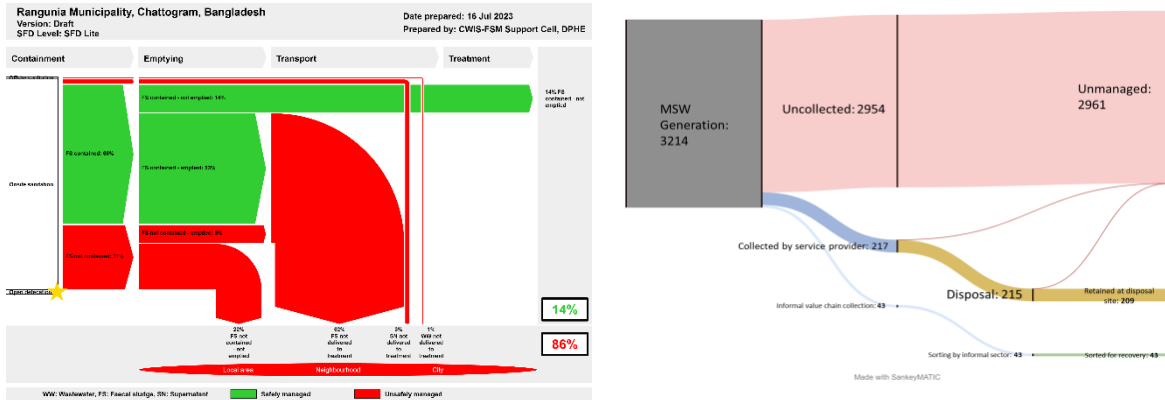


Figure 3.41 SFD and WFD of Rangunia Municipality

86% of the fecal sludge in Rangunia Municipality is unsafely managed whereas 14% is safely managed. There is no treatment plant in the municipality.

A total of 3,214 tonnes of municipal solid waste is generated every year, while 2,961 tonnes remain unmanaged. 98% of the households dispose of their household waste into the environment and 2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.42 Satkania Municipality

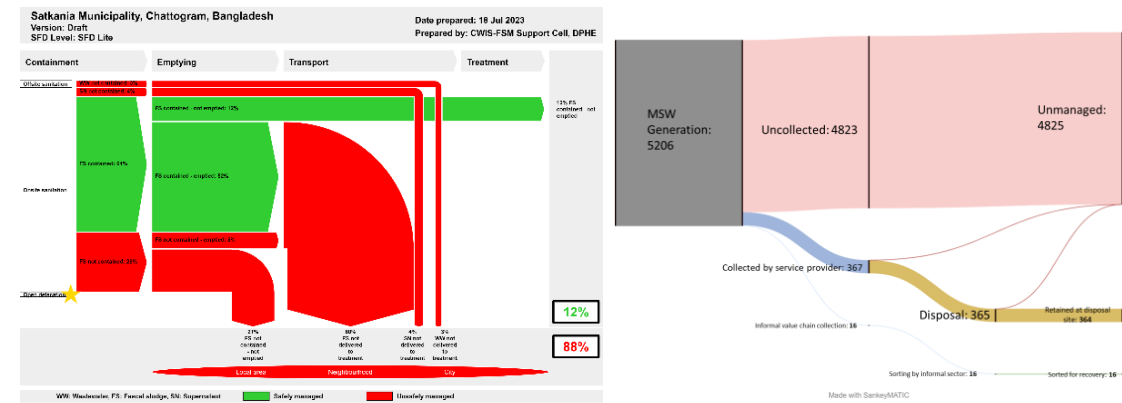


Figure 3.42 SFD and WFD of Satkania Municipality

88% of the fecal sludge in Satkania Municipality is unsafely managed whereas 12% is safely managed. There is no treatment plant in the municipality.

A total of 5,206 tonnes of municipal solid waste is generated every year, while 4,825 tonnes remain unmanaged. 97% of the households dispose of their household waste into the environment and 3% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.43 Shahjadpur Municipality

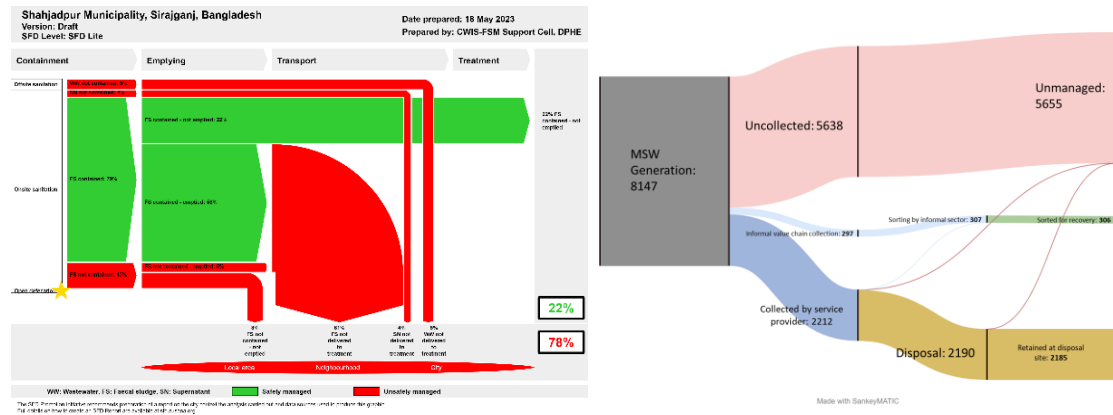


Figure 3.43 SFD and WFD of Shahjadpur Municipality

78% of the fecal sludge in Shahjadpur Municipality is unsafely managed whereas 22% is safely managed. There is no treatment plant in the municipality.

A total of 8,147 tonnes of municipal solid waste is generated every year, while 5,655 tonnes remain unmanaged. 76% of the households dispose of their household waste into the environment, 22% of the households use van services provided by the municipality and 2% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.44 Shibchar Municipality

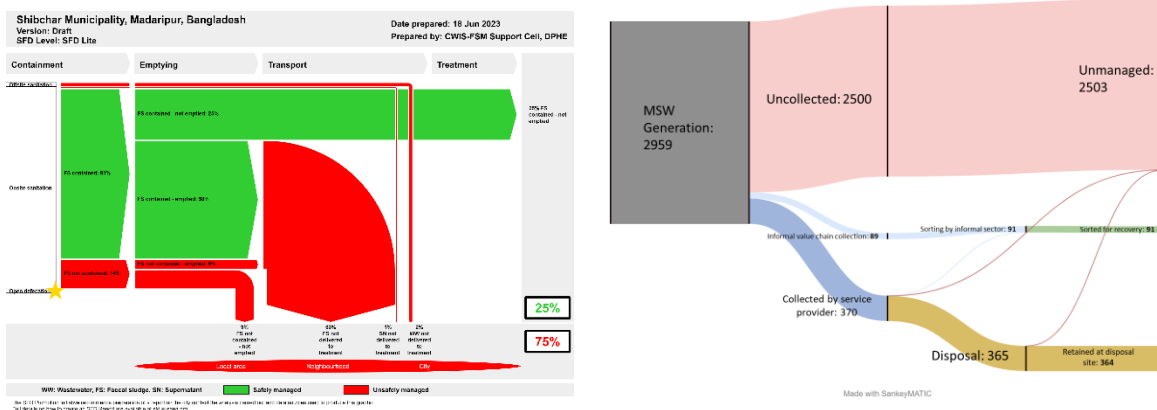


Figure 3.44 SFD and WFD of Shibchar Municipality

75% of the fecal sludge in Shibchar Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 2,959 tonnes of municipal solid waste is generated every year, while 2,503 tonnes remain unmanaged. 94% of the households dispose of their household waste into the environment, 5% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.45 Singair Municipality

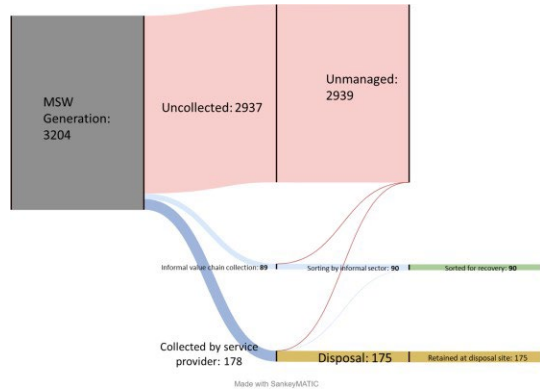
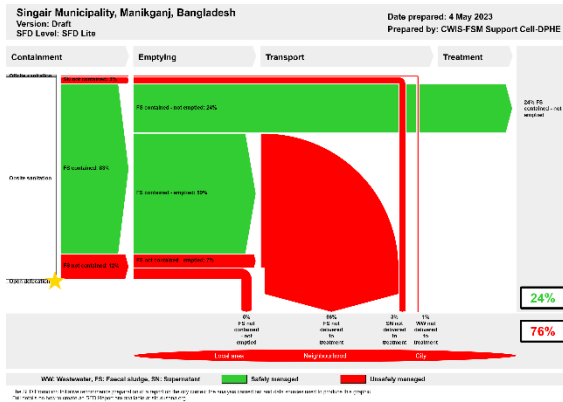


Figure 3.45 SFD and WFD of Singair Municipality

76% of the fecal sludge in Singair Municipality is unsafely managed whereas 24% is safely managed. There is no treatment plant in the municipality.

A total of 3,204 tonnes of municipal solid waste is generated every year, while 2,939 tonnes remain unmanaged. 96% of the households dispose of their household waste into the environment, 3% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.46 Sonaimuri Municipality

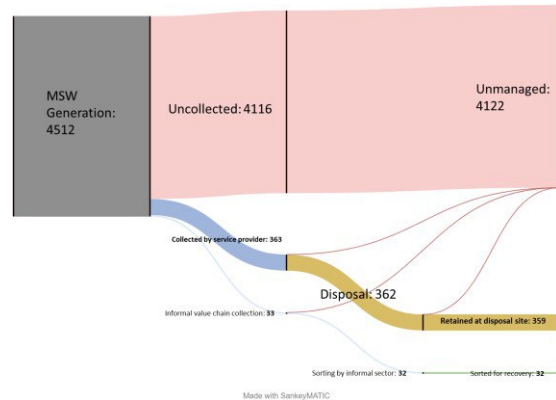
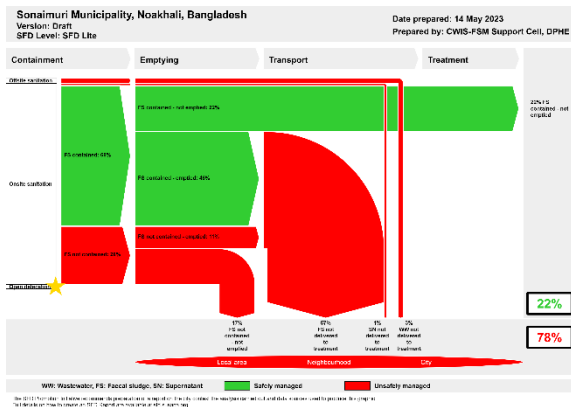


Figure 3.46 SFD and WFD of Sonaimuri Municipality

78% of the fecal sludge in Sonaimuri Municipality is unsafely managed whereas 22% is safely managed. There is no treatment plant in the municipality.

A total of 4,512 tonnes of municipal solid waste is generated every year, while 4,122 tonnes remain unmanaged. 94% of the households dispose of their household waste into the environment, 5% of the households use van services provided by the municipality and less than 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.47 Sonargaon Municipality

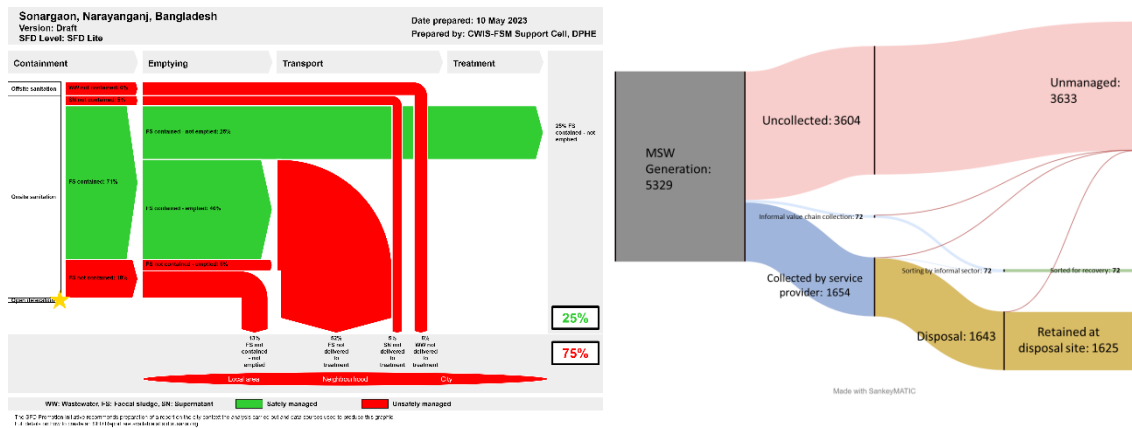


Figure 3.47 SFD and WFD of Sonargaon Municipality

75% of the fecal sludge in Sonargaon Municipality is unsafely managed whereas 25% is safely managed. There is no treatment plant in the municipality.

A total of 5,329 tonnes of municipal solid waste is generated every year, while 3,633 tonnes remain unmanaged. 71% of the households dispose of their household waste into the environment, 27% of the households use van services provided by the municipality and 1% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.48 Sreemangal Municipality

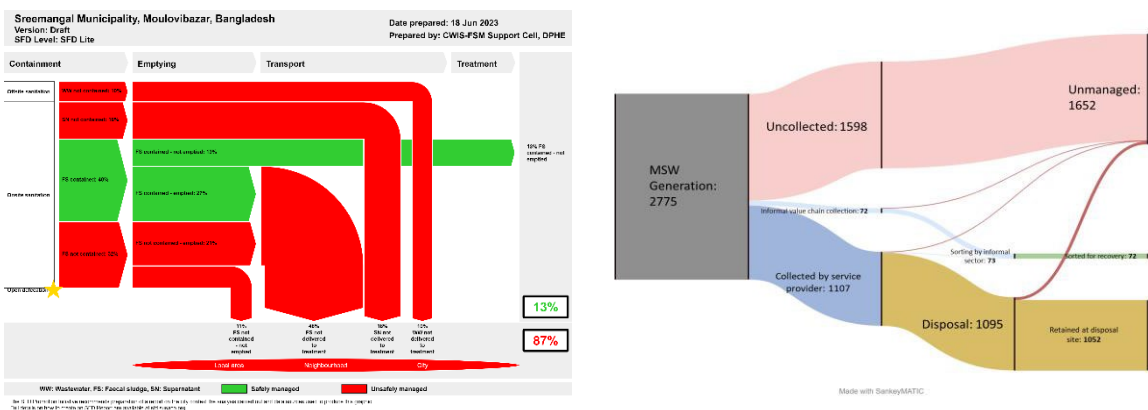


Figure 3.48 SFD and WFD of Sreemangal Municipality

87% of the fecal sludge in Sreemangal Municipality is unsafely managed whereas 13% is safely managed. There is no treatment plant in the municipality.

A total of 2,775 tonnes of municipal solid waste is generated every year, while 1,652 tonnes remain unmanaged. 63% of the households dispose of their household waste into the environment, 28% of the households use van services provided by the municipality and 9% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.49 Sreepur Municipality

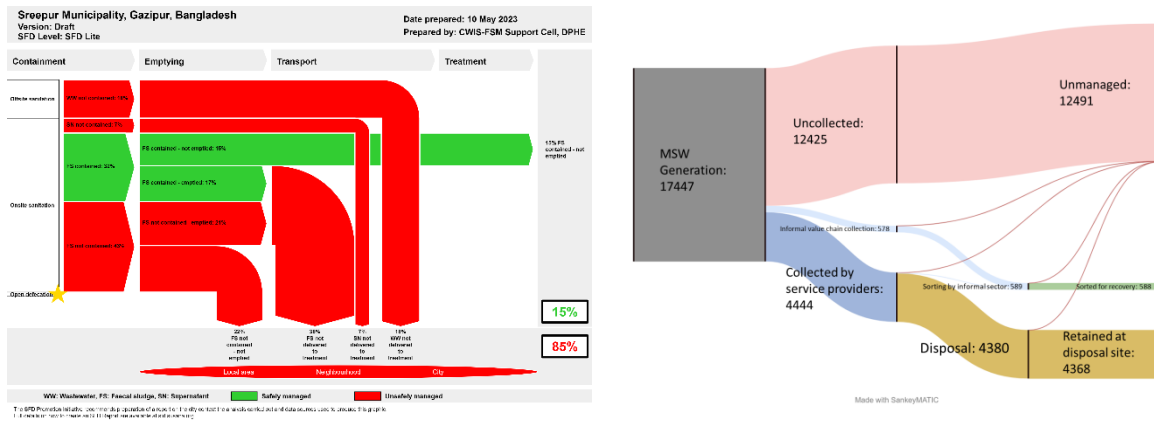


Figure 3.49 SFD and WFD of Sreepur Municipality

85% of the fecal sludge in Sreepur Municipality is unsafely managed whereas 15% is safely managed. There is no treatment plant in the municipality.

A total of 17,447 tonnes of municipal solid waste is generated every year, while 12,491 tonnes remain unmanaged. 70% of the households dispose of their household waste into the environment, 27% of the households use van services provided by the municipality and 3% of the households use dustbins for dumping their wastes. There is one formal dumpsite which is open to the environment.

3.50 Sundarganj Municipality

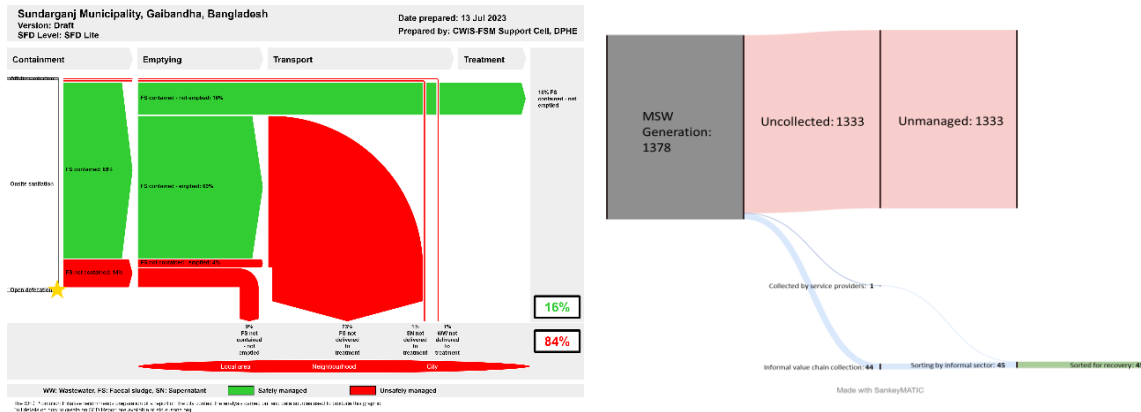


Figure 3.50 SFD and WFD of Sundarganj Municipality

84% of the fecal sludge in Sundarganj Municipality is unsafely managed whereas 16% is safely managed. There is no treatment plant in the municipality.

A total of 1,378 tonnes of municipal solid waste is generated every year, while 1,333 tonnes remain unmanaged. 100% of the households dispose of their household waste into the environment. There is one formal dumpsite which is open to the environment.

4. Challenges

A range of challenges emerged during the household survey conducted for the project. Some of the locals lacked sufficient knowledge about sanitation practices in their households, leading to inaccuracies in their responses. Some were also unwilling to participate, displaying reluctance to provide information or allow inspections. Language and communication barriers arose, particularly in areas where the primary language differed from that of the surveyors. Privacy concerns were paramount, with respondents worried about their personal information.

Cultural factors played a significant role, influencing respondents' willingness to participate and share information. Inconsistent responses posed another challenge, as some participants provided contradictory data, often due to recall bias or a lack of awareness about their own practices. Non-responsive behavior was observed, with certain households ignoring survey requests or avoiding interaction with surveyors, leading to incomplete data. The surveyors encountered difficulties in accessing septic tanks, as many were sealed or inaccessible, and lacked openings for inspection.

Moreover, the surveyors grappled with discrepancies in data related to waste production in households. Some families reported unusually high amounts of waste, often due to factors like guests during the survey period or a lack of understanding of the study's objectives. To address these issues, a meticulous process was required to discard abnormal findings and ensure data accuracy.

In sum, the household survey faced a multitude of challenges, both in terms of logistical and bureaucratic hurdles, and issues stemming from respondent behavior, cultural factors, and communication barriers. Addressing these challenges required a combination of careful planning, effective communication, and cultural sensitivity to ensure the success and accuracy of the project's research efforts.

5. Conclusion

The waste management situation in the 50 municipalities of Bangladesh covered in this project is a pressing concern that demands immediate action to address the significant environmental and health impacts. A huge volume of plastic waste generated is annually. There are no formal sorting processes and the informal sorting process leads to the retention of hundreds of tonnes of plastic waste at the disposal site, contributing to the total unmanaged waste every year.

Despite the transition to a more sophisticated waste management approach that views waste as a resource, the municipalities face challenges due to a lack of interest from local residents and inadequate facilities such as a lack of formal waste disposal sites, vehicles, containers or treatment plants. The assessment of waste flow diagrams indicates the lack of awareness of local people about the consequences of improper waste disposal on the environment. Secondly, the lack of community and municipal involvement in waste management facilities emphasises the necessity of promoting collaboration in order to find practical solutions.

The state of sanitation and waste management in the municipalities under study presents significant challenges. Lower-income households continue to have substandard toilet conditions, underscoring the need for improved sanitation infrastructure and services. Furthermore, a pervasive lack of awareness about sanitation and hygiene practices is evident among the population. Notably, septic tanks are mostly found in higher-income groups whereas single pits are still the most popular kind of sanitation, demonstrating discrepancies in access to proper sanitation facilities.

One of the most pressing concerns is the indiscriminate dumping of wastewater into water bodies and open drains, posing a grave threat to human health. The proliferation of disease-causing micro-organisms along these water bodies within the municipalities exacerbates the sanitation crisis. Emptying of sanitation systems is not frequent, and the absence of treatment facilities in all 50 municipalities underscores the urgency of the situation. Even if these systems were to be emptied, there is a glaring lack of safe management options, compounding the sanitation and waste management challenges faced by the municipalities.

With a focus on improving infrastructure, increasing awareness, and setting up suitable wastewater treatment facilities to protect public health and the environment, urgent interventions and comprehensive strategies are required to address the sanitation and waste management issues in the municipalities in light of the results obtained.



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