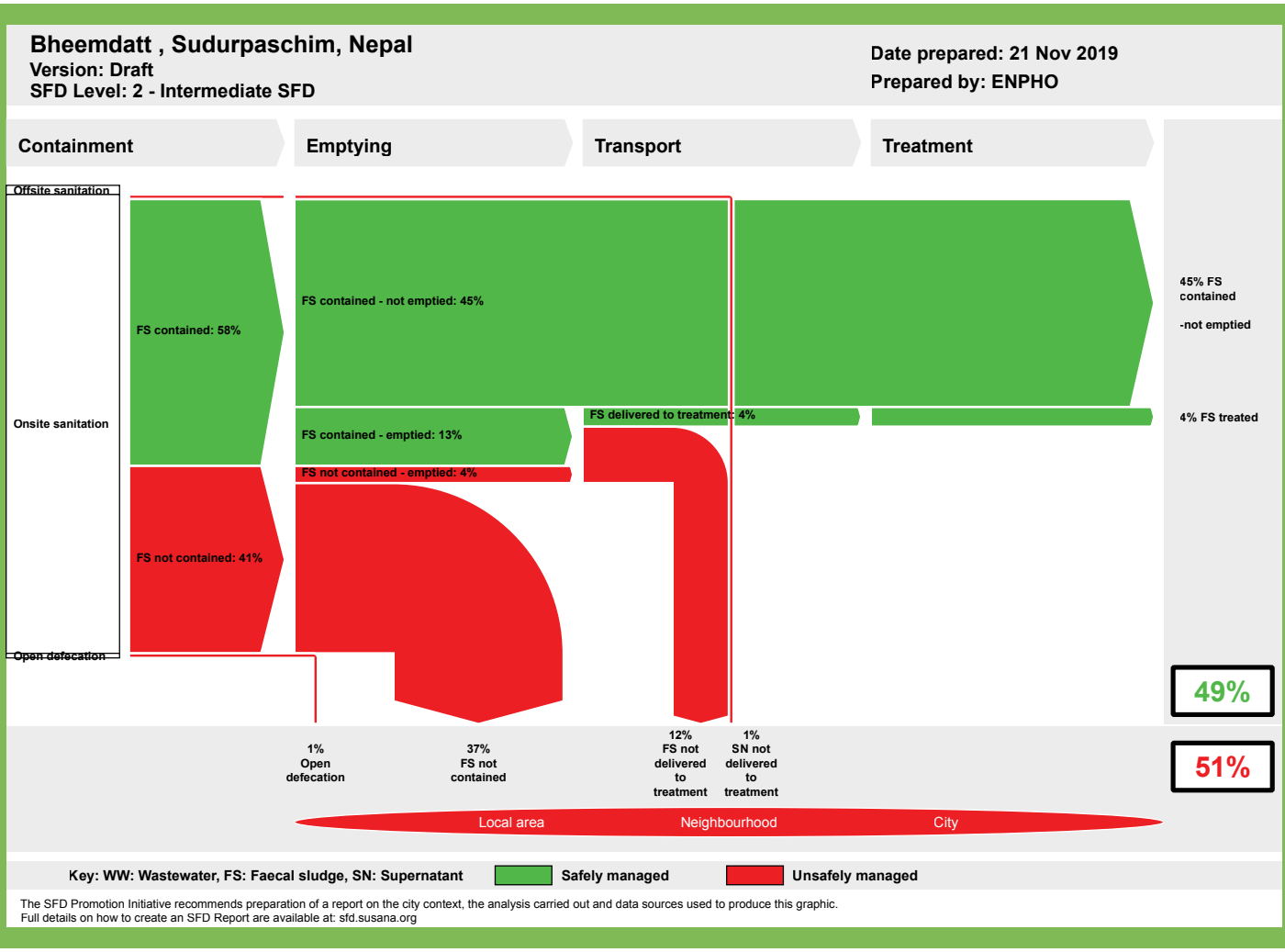
Shit Flow Diagram (SFD)
Report of Bheemdatt Municipality, Nepal



Final Report
2019

Shit Flow Diagram (SFD) Report of Bheemdatt Municipality, Nepal.
Final Report, 2019

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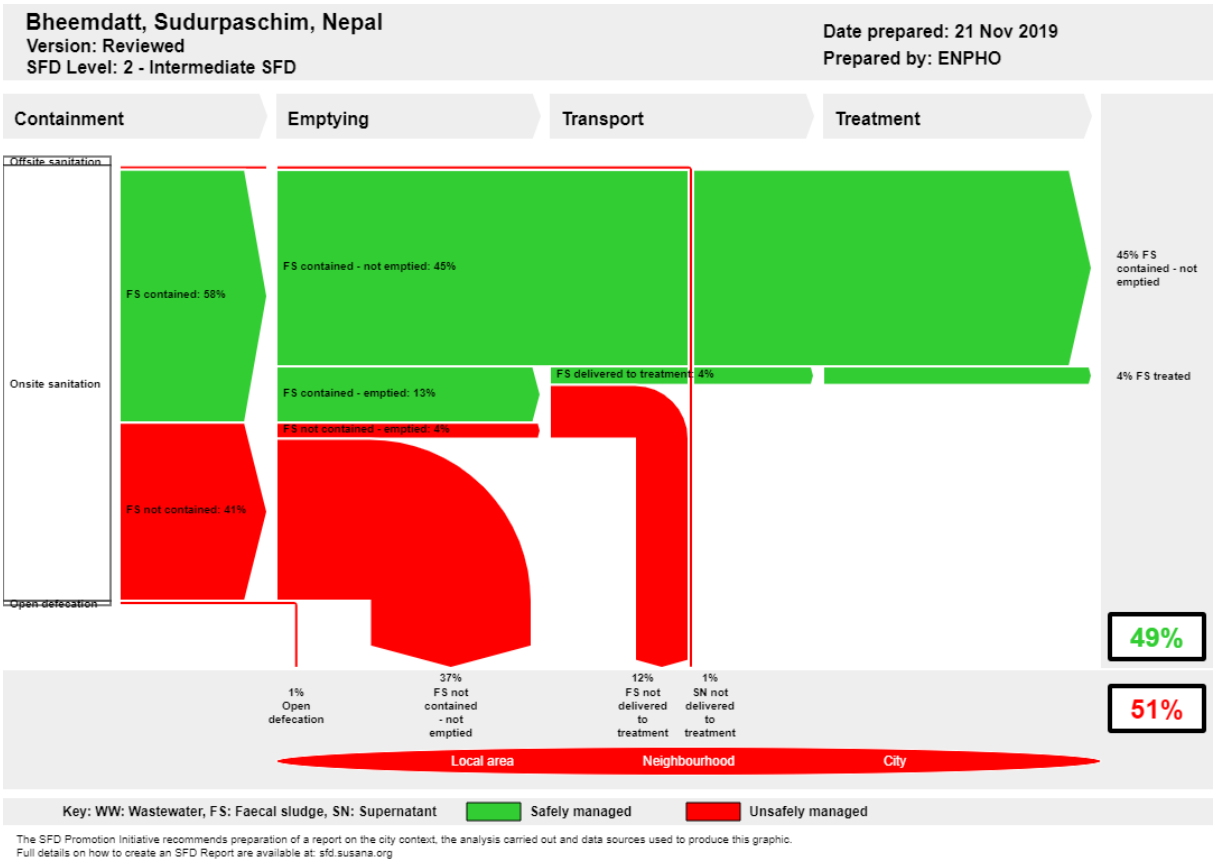
1. The Diagram



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. Diagram information

Desk or field based:

Intermediate. Level 2 report.

Produced by:

Municipal Association Nepal (MuAN).

Collaborating partners:

Municipal Association Nepal (MuAN), United Cities of Local Government Asia Pacific (UCLG aspac).

Status:

Final SFD report.

Date of production:

26/09/2019

3. General city information

Bheemdatt municipality is located in Kanchanpur District of Sudur Paschim Pradesh, Nepal. The municipality covers an area of 171.63 square kilometres. It is home to 62,050 people as per census 2011. The municipality is divided into 19 wards.

The municipality is located at geographical coordinates of 28° 59' 15.02" N, 80° 9' 57.78" E, in Terai Plain. It has a nearly flat gentle slope terrain. Alluvial/loam, soft soil and calcareous beds together with colluvium deposits and thin soil layer mixed with gravels are predominant in the area. It has a subtropical climate with an average minimum and maximum temperatures during summer fluctuating between 35° C and 43° C and in winter season it is found in the range of 5° C to 19° C. The average annual rainfall in the region is 2,377 mm.

4. Service outcomes

The municipality has been declared Open Defecation Free Zone on November 2017. The municipality has a stormwater drain in core urban areas but lacks municipal sewer thus all the households with toilet rely on onsite sanitation system. The overview of different sanitation technologies across the sanitation value chain in the municipality is briefly explained in the section.

Containment: A septic tank consisting of double-chambered fully lined walls and bottom with overflow pipe for discharge of effluent is constructed in minimal numbers of households. A rectangular tank with fully lined walls and bottom was preferred in the households located in urban clusters while tanks with impermeable walls and open bottom have been installed in households at peri-urban and newly settled areas. Whereas, in rural settlement lined pits with semi-permeable walls and open bottom either twin or single pits were used for storage of the faecal sludge.

Majority of institutions were established and operated in the core urban area of the municipality. Most of these institutions have connected the toilet into either fully lined tank or lined tank with semi-permeable walls, while government educational institutes and offices have installed septic tanks. Whereas institutions in a rural area have connected toilets to lined pits with semi-permeable walls and open bottom.

The major source of drinking water in the municipality is groundwater. Almost 87.5% of the population rely on groundwater while remaining have tapped surface sources of water. Mahendranagar Water Supply and Sanitation User's Organization distributes drinking water in urban cluster of ward number 3, 6, 7 and 8. Majority of households in remaining wards depend on hand pumps. The lateral distance between hand pumps and containment is close enough to get groundwater contamination. Also, the depth of shallow groundwater table is very low. Thus risk towards pollution of groundwater is high.

Emptying and Transportation: Both traditional manual scavenging and mechanical emptying practices are observed. Unpredictably, it was revealed that only 19.79% of households have emptied their containments at least once after the installation while remaining containments have never been emptied. This indicates towards high rate of seepages in the area. Emptying and transportation services have been provided by private entrepreneur.

Treatment and Disposal/ End Use: The municipality does not have a faecal sludge treatment plant. The private desludging entrepreneur disposes FS into barren farmlands.

5. Service delivery context

Access to drinking water and sanitation has been defined as fundamental rights of every citizen by the constitution of Nepal. In order to respect, protect and implement the rights of citizen embedded in the constitution, the Goverment of Nepal (GON) has billed the Water Supply and Sanitation Law 2018 which has emphasized in a right to quality sanitation services and prohibited direct discharge of wastewater and sewage into water bodies or public places. At local government, Bheemdatt municipality has endorsed local health and sanitation procedure 2018 which emphasized in the formation of standards for individual, household and communal sanitation and effective implementation.

Several policies have been in placed to accomplish the sanitation need of people. Particularly, the National Sanitation and Hygiene Master Plan (NSHMP) 2011 has proved as an important strategic document for all stakeholders to develop uniform programs and implementation mechanism at all level. It strengthens institutional set up with the formation of water and sanitation coordination committee at every tier of government to actively engage into sanitation campaign. The document adopted sanitation facilities as improved, basic and limited in line with WHO/UNICEF guideline. The sanitation campaign throughout the country was focused to achieve universal access to improved sanitation.

The draft Sector Development Plan (SDP) has envisioned the delineation of roles and responsibility of federal, provincial and local government in an aim to initiate sustainability of Open Defecation Free (ODF) outcomes from sanitation campaign and way forward to post ODF. It mainly emphasized sector convergence, institutional and legal reforms, and capacity development of the service providers. Together, with a commitment to Sustainable Development Goal (SDG) and promulgation of Total Sanitation Guideline 2017, it assists the service provider with clear indicators and targets to be achieved. The latest outcome, specifically to manage Faecal Sludge Management (FSM) in the country is the Institutional and Regulatory Framework for Faecal Sludge Management. The framework

envisaged featuring of FSM on national policies through the federal government and issuing policy directives at the local level along with enhancing the capacity of the service providers. The overall planning, implementation and regulating of FSM service chain have been authorized to local government. In this regard, the local government can develop a partnership with either private sector or water and sanitation user committee for effective service delivery. However, the local government has yet to develop rules and regulations, and standards to effectively deliver services across the sanitation value chain.

6. Overview of stakeholders

Based on the regulatory framework for FSM, the major stakeholders for effective and sustaining service delivery are as presented in Table 1.

Table 1 Overview of Stakeholders.

Key Stakeholders	Institutions / Organizations /
Public Institutions at Federal Government	National Planning Commission, Ministry of Water Supply and Sanitation, Ministry of Environment and Population, Ministry of Federal Affairs and General Administration, Department of Water Supply and Sewerage, Department of Environment, Local Government (Municipal Council)
Public Institutions at local Government	Municipality Drinking-Water Supply and Sanitation User's Committee
Non-governmental Organizations	Environment and Public Health Organization (ENPHO)
Private Sector	Mahendra Safai Sewa
Development Partners, Donors	MuAN, BMGF,UCLG ASPAC

7. Credibility of data

The major data were collected from random household sampling. Altogether, 379 households and 209 institutions were surveyed from all the wards of the municipality. The primary data on emptying and transportation were validated with KII from private entrepreneurs and sanitation section of the municipality. Also, the chairperson from Mahendranagar Water Supply and Sanitation User's Organization was interviewed to understand situation of drinking water and quality issues. The overall data and findings were shared with the stakeholders of municipality and validated through sharing program.

Major limitation during the collection of data was the types of containments whether they were lined or unlined, which was based upon the responses from the respondent.

8. Process of SFD development

The data on the sanitation situation is collected through a household survey (ENPHO, 2019). The community mobilizers from the sub-metropolitan were mobilized after providing the orientation on sanitation technologies, objectives of the survey and using mobile application for the survey. Also, KIIs were conducted with officers form the municipality, water supply system, town development committee and private emptying entrepreneurs to understand the situation across the service delivery chain. For the production of SFD graphic, initially, a relationship between sanitation technology used in a questionnaire survey and SFD PI methodology was made. Then, data were fed in the graphic generator to produce the SFD graphic.

9. List of data sources

- Bheemdatt Municipality, 2016. *Profile of Bheemdatt Municipality,* s.l.: s.n.
- Bohara, M. S., 2015. Physico-chemical and Microbiological Analysis of Drinking Water Quality of Bhim Datta Municipality of Kanchanpur District, Nepal. *Ambit Journal of Microbiological Research,* Volume Vol 1(1), pp. 01- 07.
- ENPHO, 2019. *Sanitation Status of Bheemdatt Municipality,* s.l.: Environment and Public Health Organization.
- KII3, 2019. *Interview with Man Singh Bohara, Chairman of Mahendranagar Water Supply and Sanitation User's Organization* [Interview] 2019.
- KII4, 2019. *Interview with Mr Bikram Bhatarai: Proprietor of Mahendra Safai Sewa* [Interview] 2019.
- MOWS, 2017. *Institutional and Regulatory Framework for Faecal Sludge Management in Urban Areas of Nepal,* Kathmandu, Nepal: Ministry of Water Supply and Sanitation.

Bheemdatt, Nepal, 2019

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This Executive Summary and the SFD Report are available from: www.sfd.susana.org

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Abbreviations

BMGF	Bill and Melinda Gates Foundation
CBS	Central Bureau of Statistics
DWSS	Department of Water Supply and Sewerage
ENPHO	Environment and Public Health Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
GON	Government of Nepal
IRF	Institutional and Regulatory Framework
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
MOF	Ministry of Finance
MOFAGA	Ministry of Federal Affairs and General Administration
MOPPW	Ministry of Physical Planning and Works
MOWSS	Ministry of Water Supply and Sanitation
NPC	National Planning Commission
NPR	Nepalese Rupees
NRWSSSP	National Rural Water Supply and Sanitation Sector Policy
NSHMP	National Sanitation and Hygiene Master Plan
NUWSSSP	National Urban Water Supply and Sanitation Sector Policy
NWSC	Nepal Water Supply Corporation
ODF	Open Defecation Free
PPE	Personal Protective Equipment
PPP	Public Private Partnership
SDG	Sustainable Development Goal
SDP	Sector Development Plan
SFD	Shit Flow Diagram

SFD PI	Shit Flow Diagram Promotion Initiative
STWSSP	Small Town Water Supply and Sanitation Project
UCLG ASPAC	United Cities of Local Government Asia Pacific
UNCIEF	United Nations Children's Education Fund
USAID	United States
VDC	Village Development Committee
WASH	Water, Sanitation and Hygiene
WEDC	Water Engineering and Development Centre
WHO	World Health Organization
WSSDO	Water Supply and Sanitation District Office
WSUC	Water and Sanitation Users Committee

1 City context

Bheemdatt municipality is located in Kanchanpur District of Sudurpashchim Pradesh, Nepal. The municipality is named Bheemdatt in the honour of the revolutionary farmer leader Bhimdatt Pant after the reformation of the country as the Federal Republic of Nepal in 2008. The municipality is divided into 19 wards and covers an area of 171.63 square kilometres. The municipality is surrounded by Bedkot Municipality in the east, Dadeldhura District in the north, Shuklaphanta National Park in the south and Uttarakhand, India in the west as shown in Figure 1.

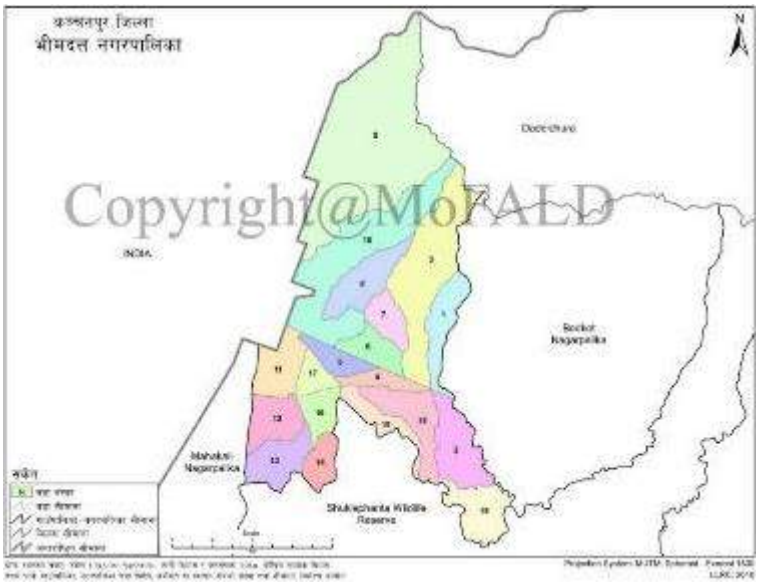

Figure 1: Map of Bheemdatt Municipality with wards boundary.

1.1 Population

During the census in 1991, the total population of the municipality was 62,050. The population was increased to 80,839 after a decade. As per municipal profile, the total population was 1,04,599 after the reformation of the municipality in 2015 (Bheemdatt Municipality, 2016). Rana-Tharus are indigenous residents while migrated populations from districts like Baitadi, Darchula and Dadeldhura have made a unique combination of ethnic groups within diverse groups.

1.2 Geography

The municipality is located in the Terai plain at the altitude of 91 to 108 m above mean sea level. Generally, this region is characterised by deposition of fine sediments like sand, silt and clay (Dhakal S, 2014). It has a nearly flat, gently sloping terrain with a boulder, hard formation and shallow water level. Alluvial or loam, soft soil and calcareous beds together with colluvium deposit and thin soil layer mixed with gravel are predominant in the area (ADB, 2015).

1.3 Climate

The region has sub-tropical climate. The average minimum and maximum temperatures during summer fluctuate between 35° C and 43° C and in winter season it is found in the range of 5° C to 19° C. The relative humidity is in the range of 84-87 %. The estimated average annual rainfall is approximately 2,377mm (ADB, 2015).

2 Service delivery context description

2.1 Policy, legislation and regulation

2.1.1 Policy

The constitution of Nepal 2015 has envisioned access to drinking water and sanitation as fundamental rights of the citizens that would be delivered and managed by federal, provincial and local governments in mutual coordination (GON, 2015). GON through its Ministry of Water Supply (MoWS) has billed Water Supply and Sanitation Law 2018 in its federal parliament to respect, protect, promote, fulfil and implement the provisions in the constitution. The billed law has entitled every citizen a right to quality sanitation services and prohibited the direct discharge of wastewater and sewage into water bodies or public places directly against the prescribed standard in section 38. Also, it has provision of imprisonment for term ranging from three months to one year or a fine of up to NPR 5,00,000 (US$ 4,390) or both to the offender (MoWS, 2018). Similarly on the basis article 221 of the constitution and section 102 of Local Government Operation Act 2017, Bheemdatt municipality has endorsed local health and sanitation procedure 2018. The procedure emphasized in the formation of standards for individual, household and communal sanitation and effective implementation. Particularly, it focused on mandatory provision for management of faecal sludge and space for solid waste management during construction of house (Bheemdatt Municipality, 2018).

Beside current developments in laws and policies, earlier National Sanitation Policy (1994) was the first sanitation specific policy that provided guidelines for the planning and implementation of sanitation programs. An unofficial revised version was produced in 2002 however it was not ratified by GON. Instead, National Rural Water Supply and Sanitation Sector Policy (NRWSSSP) was approved in 2004 (WEDC, 2005). The policy was formulated to provide a basic level of water supply to all people such that development of water supply and sanitation services supports the social and economic development of the nation and improves the health status. It mainly focused on participatory approach and community leadership project development with emphasis given on optimization of local resources and installation of locally appropriate technology (DWSS, 2004). Similarly, the GON approved National Urban Water Supply and Sanitation Policy (NUWSSSP) in 2009. The policy uses Water and Sanitation Hygiene (WASH) services as a tool for poverty reduction. Output-Based Aid Approach was adopted for supporting the construction of household toilets along with cost recovery principles and decentralized waste management in urban areas (DWSS, 2009). A Unified National Water Supply and Sanitation Sector Policy (NWSSSP) was approved in 2014 by the GON to resolve existing inconsistent and incoherent in rural and urban sanitation policies. The NWSSSP aimed to grab many opportunities like new technologies and knowledge, and service delivery approaches emerged in the sector. Remarkably, NWSSSP was the first official document that recognized discharge of untreated wastewater and dumping of septic sludge heavily polluted into surface water sources in urban areas. Further, it pinpointed that densely located onsite sanitation facilities in urban and rural localities have been posing a risk of groundwater pollution. The policy set strategy to develop and enforce wastewater quality standards for discharging all kinds of wastewater into natural water bodies and agricultural lands. Reuse options with appropriate treatment were highly prioritized and

mandatory provisions were set for constructing onsite treatment facilities in hospitals, industries and commercial buildings (DWSS, 2014).

Based upon these policies, National Sanitation and Hygiene Master Plan (NSHMP) 2011 was formulated and implemented by the GON. Coordination among various stakeholders and local leadership was highly emphasized to develop participatory integrated sanitation programs. It basically focused on universal access to sanitation through the construction of household toilets and declaration of Open Defecation Free zones. It has set ODF as a basic indicator to universal access on improved sanitation with due consideration on sustainable changes in hygiene behaviours including proper use of toilet and waste management practices in the urban and rural areas. It provided strategic direction for all the concerned stakeholders to formulate an enabling environment for harmonizing the efforts of stakeholders, maintaining uniformity and standards and developing institutional arrangement at all levels of government (NPC, 2011). It strengthens institutional set up with the formation of water and sanitation coordination committee at every tier of government in a participatory approach. Also, it defined what sanitation facility should be promoted to achieve universal access to improved sanitation.

The national sanitation coverage after the implementation of NHSMP 2011 is 95.5% until March 2018 (MoWS, 2018). Thus, upon achieving good progress towards the sanitation coverage, the GON has drafted Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (SDP 2016-2030) in 2016 emphasizing sector convergence, institutional and legal reforms, capacity development of the sector institutions and establishing coordination and harmonization. The draft SDP has classified service system and delineated roles and responsibilities accordingly for effective and sustainable service delivery as shown in Annex 2.

Together, with a national commitment to pursuing and achieving the Sustainable Development Goals (SDGs) by 2030, National Planning Commission (NPC) formulated targets and indicators for coordinated efforts to achieve the goals in 2017. Similarly, Total Sanitation Guideline 2017 has envisioned sustaining ODF outcomes and initiating post-ODF activities through integrated water, sanitation and hygiene plan at every local level. It has set various indicators and remarkably redefined sanitation as management of services and facilities to safely dispose of/reuse faecal sludge, collection and treatment of solid waste and wastewater to establish the hygienic environment and promote public health (NPC, 2017).

All these above-mentioned policies and guideline states Faecal Sludge Management (FSM) as a component of the sanitation system. Lack of concrete policies, guidelines and indicators on FSM was felt in the sector for effective planning, implementation and service delivery. Thus, through in-depth discourses on FSM, Ministry of Water Supply and Sanitation (MOWSS) through its Department of Water Supply and Sewerage (DWSS) articulated and endorsed Institutional and Regulatory Framework for Faecal Sludge Management in Urban Areas of Nepal in 2017.

The main objective of the FSM framework is to define specific roles and responsibilities of key institutions for the effective management and regulation of FSM. It is framed upon existing laws such as Environmental Protection Act and Rules 1997, Self-Local Governance Act and Rules 1999, Environmental Standards on Effluent Discharge 2000, Nepal National Building Code 2003, and Land Acquisition Act amendment 2010 (MoWS, 2017). The framework primarily envisioned featuring FSM in the national policy and issuing policy directives into local government to incorporate FSM in their urban planning along with strengthening and

enhancing the capacity of the local government to deliver effective services. A local government has been endowed with overall responsibility to plan, implement and regulate the FSM services within its jurisdiction. The provision of the ability to engage the private sector and other relevant stakeholders such as Water and Sanitation Users Committee (WSUC) in the framework reflects a participatory approach that would help in sustaining the interventions.

2.1.2 Institutional roles

At the federal government, the National Planning Commission (NPC) is responsible for planning the national sanitation programs in coordination with the respective ministry. Department of Water Supply and Sewerage under Ministry of Water Supply and Sanitation (MOWS) is a lead authoritative agency for development and implementation of sanitation policy and programs. Earlier, the sanitation programs were implemented through its regional offices at the local level. The policies formulated had to be channelized through Ministry of Federal Affairs and General Administration (MOFAGA), a ministry at federal government accredited with the role of coordination, cooperation, facilitation and monitoring and evaluation of activities undertaken by local governments; regulation and management of the civil service in the country. The schematic diagram as shown in Figure 2 illustrates roles and responsibilities for effective management of faecal sludge at federal government.

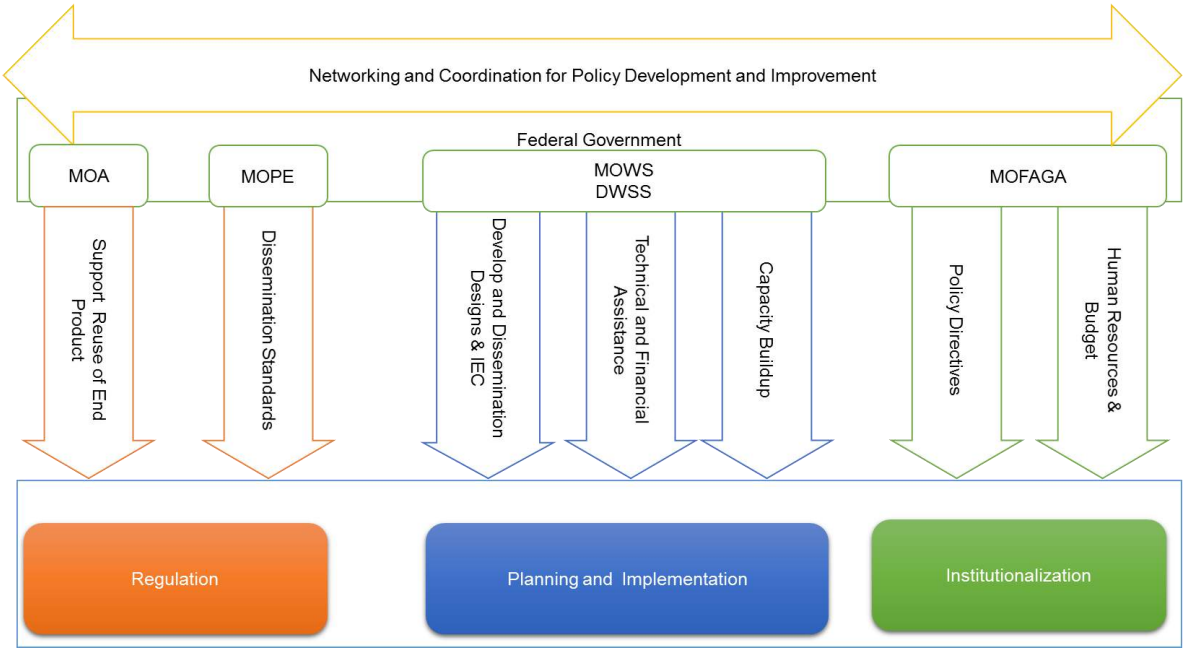

Figure 2: Institutional arrangements and their responsibility for FSM at the federal government.

Ministry of Physical Infrastructure and Development is entitled with authority for water supply and sanitation programs at the provincial government. The draft SDP has envisioned the role of the provincial government as roles of regulation and surveillance on small scale sanitation systems implemented by the local government whereas it is responsible to undertake implementation program of medium to mega-scale sanitation interventions in coordination with federal and local government.

The Constitution of Nepal 2015 and Local Government Operation Act 2017 enabled local government to implement sanitation interventions to enhance public health and living standards. Generally, local government, in coordination and partnership with Water and Sanitation User Committee (WSUC) and developing agencies, has been implementing water supply and sanitation programs. The IRF for FSM has delineated the roles and responsibility of local government across all sanitation values chain as presented in Figure 3.

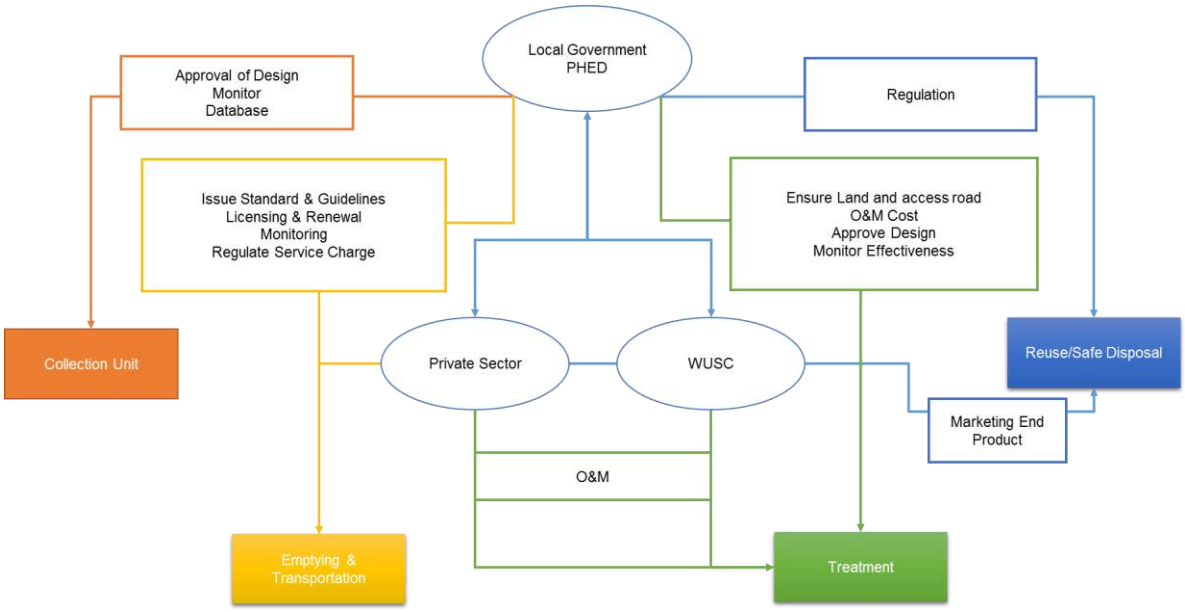

Figure 3: Roles and responsibility of local government (municipality) for FSM.

2.1.3 Service provision

Urban Water Supply and Sanitation Policy 2009 has emphasized the Public-Private Partnership (PPP) in water supply and sanitation to improve service delivery (MOPPW, 2009). Also, Public-Private Partnership Policy 2015 encourages private sector investment in development and operation of public infrastructure services for comprehensive socio-economic development. The policy has aimed to remedy challenges such as structuring of projects, land acquisition, coordination and approval, payments to private sectors and approval for environment impact (MOF, 2015).

Similarly, Drinking Water Rules 1998 has envisioned the formation of water users committee for effective service delivery of water supply and sanitation in the community. In line with this provision, Small Town Water Supply and Sanitation Users Association were formed through the implementation of Small Town Water Supply and Sanitation Project (STWSSP) in the municipality.

Specifically, in sanitation service chain, desludging services have been providing private entrepreneur in Bheemdatt Municipality. *Mahendra Safaai Sewa,* registered as private firm in Inland Revenue Office and Bheemdatt Municipality, has been providing desludging service since 2017. The firm owns a tractor and two sets of tanks each 3,000-litre and 6,000-litre capacities with locally assembled suction pump. Each tank is assembled in the tractor according to the size of containment that has to be desludged. Bheemdatt municipality and

Belkot municipality, a neighbouring municipality constitute the service area. The owner revealed that demand from core urban clusters is lower than expected and he assumed consequences of illegal discharge of FS from containments into storm water drain. Additionally, lack of awareness on unsafe practices of manual desludging and insufficient marketing was seen for low demand (KII4, 2019).

2.1.4 Service standards

The sanitation service standards have proposed in the draft Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (2016-2030). It has classified sanitation services as high, medium and basic on the basis of knowledge and facilities in place. The sanitation service levels with indicators are shown in Table 1. However, FSM specific standards have yet to be developed and implemented.

Table 1: Sanitation service level and its components.

S.N.	Service Components	Service Level		
		High	Medium	Basic
1	Health and Hygiene Education	✓	✓	✓
2	Household Latrine	✓	✓	✓
3	Public and School Toilets	✓	✓	✓
4	Septic tank sludge collection, transport, treatment and disposal	✓	✓	✓
5	Surface drains for collection, transmission and disposal of greywater	✓	✓	✓
6	Small-bore sewer collection for toilet and septic tank effluent, low-cost treatment and disposal		✓	
7	Sanitary sewers for wastewater collection, transmission, non-conventional treatment and disposal	✓		
8	Sanitary sewers for wastewater collection, transmission of conventional treatment and disposal	✓		
9	Limited solid waste collection and safe disposal	✓	✓	✓

Source: MoWSS, 2017

3 Service Outcomes

3.1 Overview

The municipality was declared Open Defecation Free (ODF) Zone on November 2017. Almost 50% of the toilets were constructed during the ODF Campaign. Despite successful campaign, still 0.5% of households do not own a toilet (ENPHO, 2019). Storm water drains were developed in main urban clusters and onsite sanitation technologies were promoted. Thus, all the households rely on onsite sanitation system.

3.1.1 Household Level Sanitation System

A septic tank, consisting of double-chambered fully lined walls and bottom with overflow pipe for discharge of effluent is constructed in minimal number of households. Households in urban, peri-urban and new settlements preferred a rectangular tank with impermeable walls either fully lined or open bottom. Whereas, in rural settlement, lined pits with semi-permeable walls and open bottom in the form of twin or single pits were used for storage of the faecal sludge. Similarly, anaerobic biogas digester designed for the integrated treatment of human faeces, animal manure and organic waste at household were installed in few rural agrarian clusters.

3.1.2 Institutional Level Sanitation System

Altogether, 209 institutions operated in own or rented buildings were surveyed in the municipality (types of institution surveyed provided in Annex 1). Figure 4 shows the types and location of these institutions. Most of them were established and operated in the core urban area.

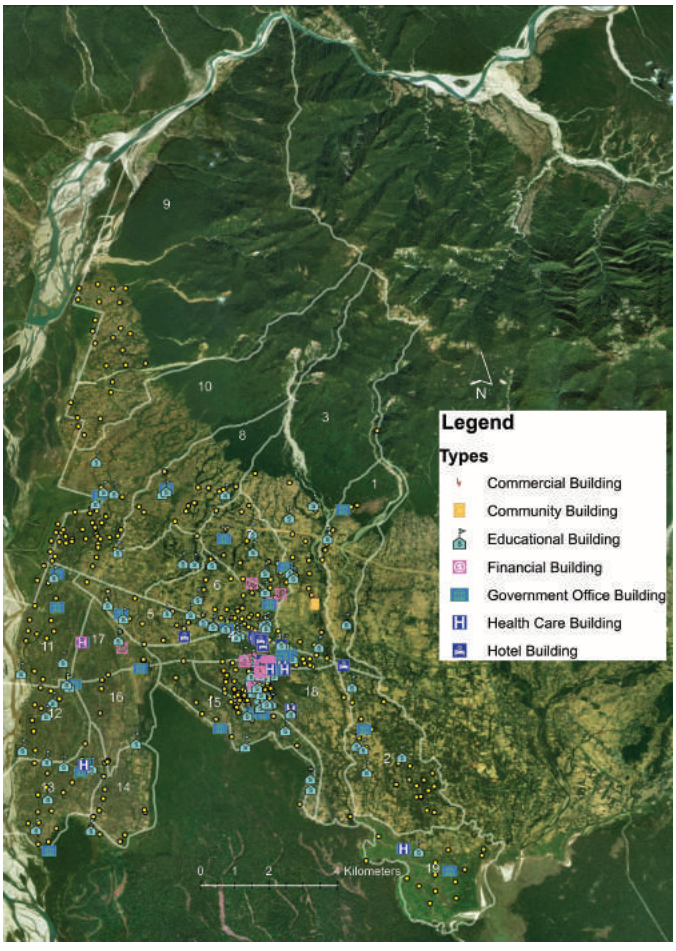

Figure 4: Types of institutions surveyed and location of households surveyed.

Majority of toilets in the institutions were connected to a rectangular tank with impermeable walls either lined or unlined bottom. Approximately, 10.5% institutions had installed a septic tank. Among these, 50% and 18% were installed in government educational institutions and office buildings, respectively. Whereas 7% of institutions in rural areas had connected toilets into lined pits with semi-permeable walls and open bottom.

Hence, with references to these data on households and the institutional survey, overall sanitation technologies selected for the preparation of SFD graphic in SFD selection grid in the municipality is shown in Figure 5.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					Significant risk of GW pollution T1A2C5	T1A2C6		T1A2C8		
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	T2A4C5 T1A4C5	T1A4C6		T1A4C8		T2A4C10 T1A4C10
Lined pit with semi-permeable walls and open bottom	Not Applicable									T2A5C10 T1A5C10
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded								T1B9 C1 TO C10		
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded								T1B10 C7 TO C9		
No toilet. Open defecation	Not Applicable								T1B11 C7 TO C9	Not Applicable

Figure 5: SFD selection grid for Bheemdatt Municipality.

3.2 SFD Matrix

SFD matrix with descriptions on sanitation technologies, proportion of population using each technology, proportion of faecal sludge being emptied, transported and treated in Bheemdatt Municipality is shown in Figure 6.

Bheemdatt , Sudurpaschim, Nepal, 21 Nov 2019. SFD Level: 2 - Intermediate SFD
Population: 104599
Proportion of tanks: septic tanks: 90%, fully lined tanks: 100%, lined, open bottom tanks: 96%

System label	Pop	F3	F4	F5	S4e	S5e
System description	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
T1A2C5 Septic tank connected to soak pit	2.0	45.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	1.0	0.0	0.0	0.0	0.0	0.0
T1A2C8 Septic tank connected to open ground	2.0	0.0	0.0	0.0		
T1A3C10 Fully lined tank (sealed), no outlet or overflow	41.0	26.0	40.0	100.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	7.0	16.0	0.0	0.0		
T1A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit	5.0	0.0	0.0	0.0		
T1A4C6 Lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer	4.0	0.0	0.0	0.0	0.0	0.0
T1A4C8 Lined tank with impermeable walls and open bottom, connected to open ground	1.0	17.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	3.0	9.0	0.0	0.0		
T1B10 C7 TO C9 Containment (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - connected to water bodies, or open ground or 'don't know where'	1.0	0.0	0.0	0.0		
T1B11 C7 TO C9 Open defecation	1.0					
T1B9 C1 TO C10 Toilet failed, damaged, collapsed or flooded, connected to sewer, soak pit, open drain or storm sewer, water body, open ground or 'don't know where'	1.0					
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	10.0	19.0	0.0	0.0		
T2A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit, where there is a 'significant risk' of groundwater pollution	14.0	0.0	0.0	0.0		
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	7.0	26.0	0.0	0.0		

Figure 6: SFD matrix of Bheemdatt Municipality.

3.2.1 SFD Matrix Explanation

A septic tank connected to soak pit (T1A2C5) and open ground (T1A2C8) were used by each 2% of the population. Similarly, 1% of the population with septic tank has connected effluent to storm water drain (T1A2C6). Thus, total portion of FS from septic tank is considered as 90%, as the septic tank connected to storm water drain (T1A2C6) generates approximately 50% of FS and rest flows with supernatant. Further, the technology was assumed effective and discharged effluent has low risk to the groundwater pollution.

A fully lined (sealed) tank with no outlet or overflow (T1A3C10) effective for safe storage of the FS, as shown in Figure 7, is used by 41% of the population. Among these, 4.5% of the population used anaerobic biogas digester effective for management of faecal sludge.

Figure 7: A fully lined tank under construction.

Similarly, an equal number of the population used lined tank with impermeable walls and open bottoms. The technology possesses risk of groundwater pollution due to seepage, determined by permeability of soil, depth of groundwater level and lateral space of the water source from it. On the basis of analysis of these factors, as explained in risk assessment of groundwater, the proportion of population using lined tank with impermeable walls and open bottom connected to various sinks are as follows:

i. No outlet or overflow (T1A4C10) without significant risk to groundwater pollution was 7%.

ii. No outlet or overflow with significant risk to groundwater pollution (T2A4C10) was 10%.

iii. Connected to soak pit as shown in Figure 8 without significant risk to groundwater pollution (T1A4C5) was 5%.

iv. Connected to soak pit with a significant risk of groundwater pollution (T2A4C5) was 14%.

v. Connected to an open drain without significant risk to groundwater contamination (T1A4C6) was 4% and

vi. Connected to open ground without significant risk to groundwater (T1A4C8) is 1%, here open grounds refers to farmland.

Figure 8 : A soak pit constructed to discharge effluents.

Whereas, single pit and twin pits, considered as a lined pit with semi-permeable walls and open bottom were predominately installed in the rural areas of the municipality in wards 9, 15, and 18.

It was revealed that 3% of the population used lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) has a low risk of groundwater pollution. While 7% of the population with the same technology (T2A5C10) has a significant risk of groundwater pollution. Also, still 1% of population rely on open defecation in nearby forest, rivers or open lands (T1B11 C7 TO C9). The portion of FS accumulated from lined tank with semi-permeable walls and all pits was assumed to be 96% since only minimal amount of FS from lined tank with semi-permeable walls is connected to open drain. The proportion of toilets that failed, damaged, collapsed or flooded (T1B9 C1 TO C10) was estimated to be 1% and the proportion of containments (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) that failed, damaged, collapsed or flooded (T1B10 C7 TO C9) was estimated to be 1%, as well. The distribution of various types of sanitation technologies in households is shown in Figure 9.

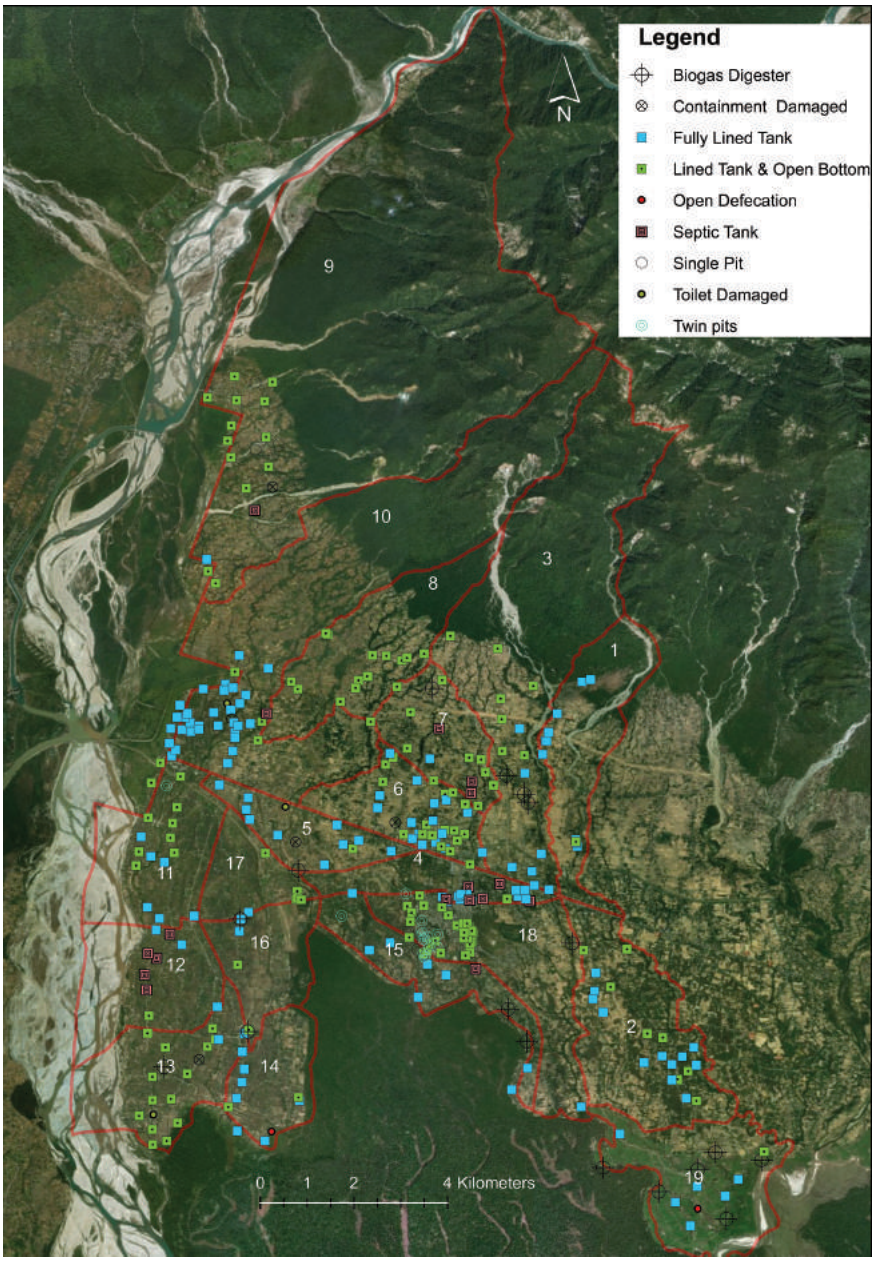

Figure 9: Various types of household onsite sanitation installed in the municipality.

3.2.2 Risk of Groundwater Pollution

The risk of groundwater pollution is assessed according to the following explained criteria.

1. Sources of drinking water and water production

The major source of drinking water in the municipality is groundwater. Almost 87.5% of the population rely on the groundwater while remaining have tapped surface sources of water. Water supply intervention in the municipality was initiated back in 1973 by the DWSS under the grant support of Indian Cooperation Mission (ICM). A tube well along with treatment facilities, service reservoir, distribution system and connection were developed. The capacity of the system was enhanced through construction of another tube well in 1987. Similarly, to meet the high demand of water supply both in terms of quality and quantity, the government

of Nepal in 1992 constructed two deep tube wells, treatment facilities, elevated reservoir and extension of transmission main and distribution pipeline supported by Japan International Cooperation Agency (JICA). The system was handed over to Nepal Water Supply Corporation (NWSC) for operation and maintenance from Water Supply and Sanitation District Office (WSSDO) in 1999. As per case study carried out by ITN-BUET in 2006, the system served 15,000 people through connection of 1,313 private taps and 27 public taps(ITN-BUET, 2006). Currently, Mahendranagar Water Supply and Sanitation User's Organization is the main agency for delivering drinking water in the municipality. The system was upgraded under Enhance Functionality in Small Town Water Supply and Sanitation Sector Project funded by ADB in 2015. Currently, the system has connected 2,250 households located in ward number 3, 7, 8 and partial households in ward number 6. The system consists of three boreholes with approximately 90 metre deep for extracting 12 to 18 litres per second (lps) of groundwater. It consists of filtration and chlorination unit for treatment and 450 cubic metres overhead reservoir tank (KII3, 2019). The microbiological parameter of the raw water from all the sources was within the NDWQS tested during 2014 (ADB, 2015).

2. The vulnerability of the aquifer and lateral spacing between sanitation systems and groundwater source

41% of households installing lined tank with impermeable walls and open bottom rely on hand pumps for drinking water as shown in Figure 10. Similarly, 10% of households using lined pits with semi-permeable walls and open bottoms use hand pumps for drinking water. The lateral spacing between the containments and hand pumps is as shown in Table 2.

Figure 10: Hand pump, a major source of drinking water, installed in a nearby toilet.

Table 2: Lateral spacing of source of drinking water and containments.

S.N.	Types of Containment	Lateral distance between hand pump and containment					
		0 – 5 ft. (0-1.52m)	5 – 10 ft. (1.52-3.04m)	10 – 15 ft. (3.04-4.57m)	15 – 20 ft. (4.57-6.09m)	20 – 25 ft. (6.09-7.62m)	More than 25 ft. (7.62m)
1	Lined tanks with impermeable walls and open bottom	17.8%	29%	32.5%	10.4%	6.5%	3.7%
2	Lined pits with semi-permeable walls and open bottom	6.2%	18.7%	37.5%	6.2%%	3%	9.4%

Similarly, the depth of shallow groundwater extracted by hand pumps is shown in Table 3.

Table 3: A description on depth of shallow ground water table and installed onsite sanitation technology.

S.N.	Types of Containment	Depth of groundwater					
		Less than 20 ft. (<6.09m)	20 - 40 ft. (6.09 - 12.19m)	40 – 60 ft. (12.19-18.28m)	60 – 80 ft. (18.28 - 24.38m)	More than 80 ft. (>24.38m)	Unknown
1	Lined tanks with impermeable walls and open bottom	23.5%	35%	9.5%	5.10%	11.5%	15.3%
2	Lined pits with semi-permeable walls and open bottom	0%	65.8%	18.4%	0%	0%	15.8%

The larger horizontal distance between a source of water and onsite sanitation system increases longer travel time and more pathogens die off or filtered out by the soil and constitute a lower risk. Similarly, deeper groundwater is perceived as being significantly less vulnerable to pollution than shallow wells due to longer travel time (SuSanA, 2015). Thus, on the basis of depth of groundwater extracted and lateral spacing of the source and containment, risk of groundwater pollution is high in 91% out of 41% of households (i.e. 37.3%) using a lined tank with open bottom as shown in Figure 11. Similarly, all households with major source of drinking water as groundwater extracted by hand pump using a lined pit with semi-permeable wall with open bottom are at risk to groundwater pollution. Thus, in an aggregate, 47.3% of households are at risk of consumption of contaminated water from onsite sanitation system. A similar result was obtained by Islam et.al (2016) in Bangladesh where groundwater with a lateral and vertical distance of 2 and 31 m from onsite sanitation technology was contaminated. The contamination was observed to lateral and vertical distances of 4.5 m and 40.5 m, respectively (Islam et al., 2016). The water quality analysis of 43 water samples from hand pumps in 2015 in the municipality showed presence of *E.coli* in 16% of samples and 68% of samples presented total coliform contamination (Bohara, 2015).

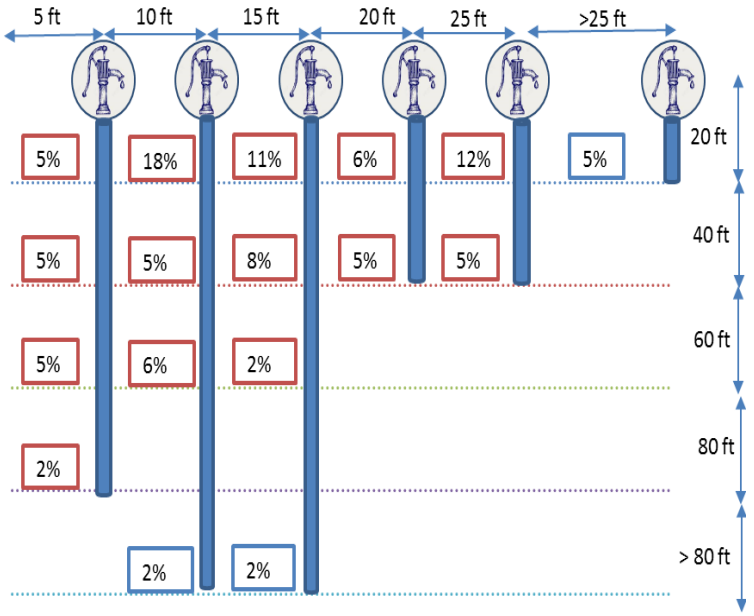

Figure 11: Description on household having lined tank and open bottom containment with groundwater as major source of drinking water.

3.2.3 Emptying of Faecal Sludge

Emptying is one of the major components of sanitation value chain. It ensures proper functioning of containment, basically for septic tank, which functions well until the volume of sludge is one-third of the total volume of the tank (L. Sassee, 1998). Also, in other containments, regular emptying prevents overflow of the sludge and blockages. However, anaerobic biogas digester has been designed in a way that treated slurry is automatically overflowed from the outlet chamber and used as manure. Thus, toilet connected to anaerobic biogas digester has been assumed as regularly emptied.

Both traditional manual scavenging and mechanical emptying of the containments were practised in the municipality. However, only 19.79% of containments have been emptied at least once since the installation. Among these, only 10% were mechanically emptied by desludging service provider. The types of sanitation technologies that have been emptied and the proportion of FS emptied is presented in Table 4.

Table 4: A descriptions on types of sanitation technology and emptied portion of FS.

S.N.	Sanitation Technologies	SFD Reference Variable	Emptied containment	Emptied Portion	Actual emptied portion of FS (VariableF3)
1	Septic tank connected to soak pit	T1A2C5	50%	90%	45%
2	Septic tank connected to open drain or storm sewer	T1A2C6	Never Emptied		0%
3	Septic tank connected to open ground	T1A2C8	Never Emptied		0%
4	Fully lined tank (sealed) no outlet or overflow	T1A3C10	29%	90%	26%
5	Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	18%	90%	16%
6	Lined tank with impermeable walls and open bottom connected to soak pit	T1A4C5	Never Emptied		0%
7	Lined tank with impermeable walls and open bottom connected to open drain or storm sewer	T1A4C6	Never Emptied		0%
8	Lined tank with impermeable walls and open bottom, connected to open ground	T1A4C8	19%	90%	17%
9	Lined pit with semi-permeable walls and open bottom, no outlet or overflow	T1A5C10	11.5%	80%	9%
10	Containment (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded –connected to water bodies, or open ground or “don’t know where”	T1B10C7 to C9	Never Emptied		0%
11	Lined tanked with impermeable walls and open bottom, no outlet or overflow, where there is a ‘significant risk’ of groundwater pollution	T2A4C10	21%	90%	19%
12	Lined tank with impermeable walls and open bottom connected to a soak pit, where there is a significant risk of groundwater pollution	T2A4C5	Never Emptied		0%
13	Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a significant risk of groundwater pollution	T2A5C10	32.5%	80%	26%

The value for the emptied portion of FS (last column in Table 4) was obtained with reference to household survey and KIIs with desludging service providers. It was revealed in manual emptying practises that the containments were emptied completely. In mechanical emptying, the portion of FS emptied is determined by amount of liquid present in the sludge and height of filter cap installed with suction hose to prevent blockages in it during pumping. Generally, lined tanks have higher volume of liquid (90% of FS), which is pumped out while in pits, due to high viscosity and lengthy-time for adding water and stirring, almost 25% to 30% is left in the containment. Thus, the portion of FS emptied from lined tanks and pits were estimated 90% and 80%, respectively with respect to both mechanical and manual emptying practises.

3.2.4 Treatment and Disposal/Reuse

The municipality does not have a treatment plant for faecal sludge and is unable to provide emptying services despite purchasing new sludge emptying tanks as shown in Figure 12. The collected FS by the private entrepreneur is disposed into barren farmlands. However, among 26% of emptied FS from fully lined tank, almost 40% is contributed from anaerobic biogas digester, considered regularly emptied and treated. Thus, portion of FS emptied and delivered to treatment plant (variable F4) and treated (variable F5) is assumed to be 40% and 100% respectively.

Figure 12: A newly purchased desludging vehicle by the Bheemdatt Municipality.

3.3 SFD Graphic

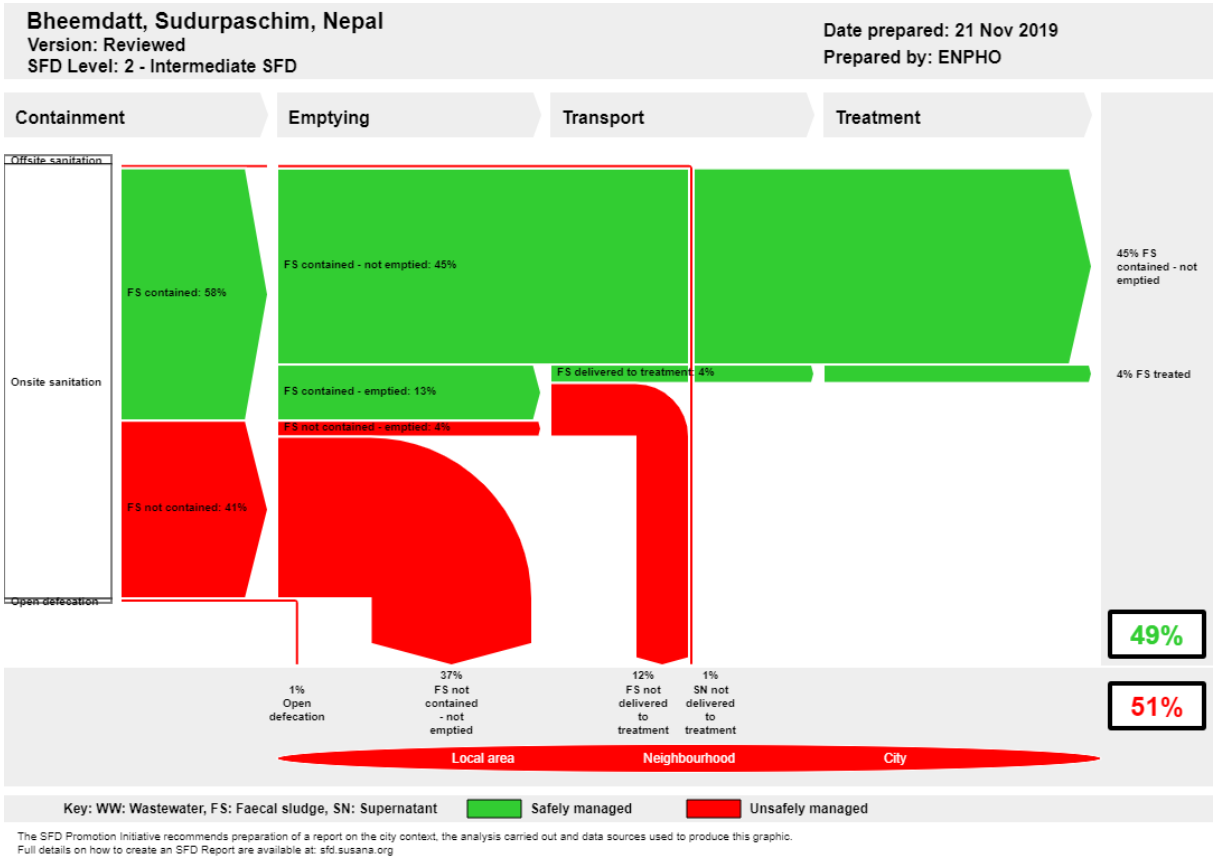

Figure 13: SFD graphic of Bheemdatt Municipality.

Figure 13 shows the SFD graphic for Bheemdatt municipality. It shows that currently, 49% of faecal sludge is being safely managed. More precisely, only 4% of faecal sludge has been safely managed in households where anaerobic biogas digester are installed, since FS is treated and applied as a soil conditioner. 45% of faecal sludge contained - not emptied, is accumulated in the containment and ensures a safe level of protection from faeces i.e. pathogen transmission to the user or the general public is limited since it is safely stored.

However, a significant proportion of this safely managed sludge (more than half of it) comes from FS not emptied from fully lined tanks (T1A3C10). Similarly, the rest comes from FS not emptied from tanks with semi-permeable walls and open bottom without outlet or overflow (T1A4C10), lined tanks with impermeable walls and open bottom, connected to a soak pit (T1A4C5), septic tanks connected to soak pit (T1A2C5) and lined pits with semi-permeable walls and open bottom, no outlet or overflow (T1A5C10). In the medium- to long-term, as the population and population density increases, this practice would not be sustainable and improve sanitation management services may be required since those systems eventually will require emptying services.

Whereas, 51% of FS is haphazardly either disposed into environment after emptying the containment without treatment or infiltrated into groundwater from technically inefficient containment such as unlined pits, damaged containment, lined tank or pit with open bottoms. Also, FS is being directly released into environment through open defecation.

Offsite Sanitation System

Nepal Demographic and Health Survey reported that 6.9% of the urban population in the country have offsite sanitation systems connected to piped sewer networks (MoH, Nepal, New ERA and ICF, 2017). No piped sewer networks have been developed in Bheemdatt Municipality, however, 1% of septic tanks are connected to storm sewers that contributed direct discharge of FS into open environment as in offsite sanitation system without any treatment facilities.

Onsite Sanitation System

The population relying in onsite sanitation system is 99%. Among them, 58% are using technically effective containment that safely stores faeces and 41% with unsafe containment. The descriptions on flow of FS from the onsite sanitation system as shown in the SFD graphic is explained in Table 5.

Table 5: Descriptions of the variables of the SFD graphic.

Variables	Description	Percent
FS contained not emptied	FS that is contained within an onsite sanitation technology and not removed where there is no significant risk to groundwater pollution. These containments are fully lined tanks (T1A3C10), tanks with semi-permeable walls and open bottom without outlet or overflow (T1A4C10), lined tanks with impermeable walls and open bottom, connected to a soak pit (T1A4C5), septic tanks connected to soak pit (T1A2C5) and lined pits with semi-permeable walls and open bottom, no outlet or overflow (T1A5C10).	45%
FS contained – emptied	FS that is contained in onsite sanitation technology and emptied either mechanically or manually.	13%
FS delivered to treatment	FS that is removed from onsite technology and delivered to the treatment plant. In this particular case, there is no FSTP and anaerobic biogas digester at household level is considered as the treatment facility.	4%
FS treated	FS treated in a well functioned anaerobic biogas digester	4%
FS not contained	FS that is not contained within an onsite sanitation technology such as septic tanks, lined tanks, lined pits and unlined pits connected to an open environment where higher risk to groundwater pollution exists.	41%
FS not contained – emptied	FS that is removed from an onsite sanitation technology where FS is not contained which is emptied using either motorized or manual emptying equipment.	4%
FS not contained – not emptied	FS that is not contained within an onsite sanitation technology and not removed which may either remain in the containment or infiltrate to ground polluting groundwater.	37%
FS not delivered to treatment	FS emptied from an onsite sanitation system either FS contained or not contained but not delivered to a treatment plant.	12%
SN not delivered to treatment	SN not contained from septic tanks connected to to open drain or storm sewer.	1%

Open Defecation

Despite declaring ODF zone, approximately 1% of the population practised open defecation in the nearby jungles, rivers and open spaces.

4 Stakeholder Engagement

4.1 Key Informant Interview

The KIIs and sharing on the objective of study were conducted with the major stakeholders in sanitation sector in the municipality. Mayor and staffs from sanitation section of the municipality were interviewed on current sanitation services. The proprietor of *Mahendra Safai Sewa* was interviewed on emptying services in the municipality. The interview was mainly focused on their current service area, a number of emptying vehicles, its registration, service charges and challenges they faced in the business.

4.2 Household Survey

A random household survey was conducted in all wards of the municipality through mobilization of volunteers selected by the municipality. The household survey was conducted using mobile application "KOBOCOLLECT" after orientation. Two days orientation training was conducted to make volunteer understand on objective of the survey, technical terms regarding sanitation, use of mobile application and conducting random sample survey.

4.2.1 Determining Sample Size

The number of households to be sampled in the municipality was determined by using Cochran (1963:75) sample size formula $n_o = \frac{Z^2 pq}{e^2}$ and its finite Population Correction for the Proportion $n = \frac{n_0}{1+\frac{(n_0-1)}{N}}$.

Where,

Z^2	1.96	At the confidence level of 95%
p	0.5	Assuming that about 50% of the population should have some sanitation characteristics that need to be studied (This was set at 50% since this percentage would yield the maximum sample size since the percentage of the population practising some form of sanitation is not clearly known at the intervention sites).
q	1-p	
e	±5%	Level of precision or sampling error.
N		Total number of population (households in the municipality).

This is followed by proportionate stratification random Ssampling such that each ward in the municipality is considered as one stratum. The sample sized required in each ward is calculated as

$n_h = \frac{N_h}{N} \times n$, where, N_h is a total population in each stratum.

Thus, a total of 375 households were sampled from 9,432 households distributed in 9 wards with proportionate stratification random sampling as shown in Annex 4.

4.2.2 Direct Observation

Various sanitation technologies in the households in all the wards were observed and visual references were kept. Also, observation of the emptying and transportation of the containments was carried out. The disposal site of both the municipality and private entrepreneur was observed during the usage.

4.2.3 Sharing and Validation of Data

The sharing and validation of findings on sanitation status was conducted in the municipality hall participated by the Mayor, ward chairpersons, general members of municipal council and other relevant stakeholders, as shown in Figure 14. The participants responded the findings has reflected the current sanitation situation of the municipality. The participated validated the findings and committed to develop effective FSM plan and implement to provide sustainable sanitation services in the municipality. The list of participants with their designation is attached in Annex 5.

Figure 14: A sharing program of findings on sanitation status of Bheemdatt Municipality.

5 Acknowledgements

We would like to acknowledge United Cities Local Government - Asia Pacific (UCLG ASPAC) for funding the Municipalities Network Advocacy on Sanitation in South Asia (MuNASS) and Municipal Association of Nepal (MuAN) for coordination with the municipality.

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7 Appendix

7.1 Annex 1: Number of Institution Survey

Table 6: Number of surveyed institution.

Ward	Financial Institutions	Hotel/ Home Stay	Commercial Buildings	Educational Institutions	Government /Non-government Office	Community Buildings	Health Care Centre	Total
1		1		2	1			4
2				6	1	1		8
3		1	2	8	1	1		13
4	10	3		4	6		2	25
5		1		3	1			5
6	1	20	1	15	2			39
7	2			7	1			10
8				3	1			4
9				3				3
10				3	1			4
11				1	2			3
12				7	1			8
13				4	2			6
14				1				1
15				5	3			8
16				2	1		1	4
17	2			1	2		1	6
18	12	6	4	23	1	2	6	54
19				1	2		1	4
Total	27	32	7	99	29	4	11	209

7.2 Annex 2: Stakeholder identification

Table 7: Stakeholder Identification.

S.N.	Stakeholder group	In Bheemdatt Municipality context
1	Municipal Council	Municipal Council, Bheemdatt Municipality
2	Ministry in charge of water supply and sanitation	Department of Water Supply and Sewerage Management
3	Ministry in charge of environmental protection	Department of Environment
4	Service provider for solid waste management	Sanitation Section of Bheemdatt Municipality
5	Service provider for construction of onsite sanitation	Local masons
6	Service providers for emptying and transportation	Private mechanized emptying service entrepreneurs
7	Service provider for operation and maintenance of treatment infrastructure	N/A
8	Market participants practising end-use of FS end products	N/A
9	Service provider for disposal of FS (sanitary landfill)	Sanitation section of Bheemdatt Municipality, Private mechanized emptying service entrepreneurs
10	External agencies associated with FSM services	Municipal Association Nepal, Environment and Public Health Organization

7.3 Annex 3: Tracking of Engagement

Table 8: Tracking of Stakeholder engagement.

S.N.	Name of Organization	Person	Designation	Date of Engagement	Purpose of Engagement
1	Bheemdatt Municipality	Surendra Bist.	Mayor	17th March 2019	KII (1)
2	Planning Commission	Pushpa Raj Bhatt	Planning Officer	11th March 2019	KII (2)
		Padam Raj Joshi	Environmental Officer		
3	Mahendranagar Water Supply and Sanitation User's Organization	Man Singh Bohara	Chairman	14th October 2019	KII (3)
4	Mahendranagar Safai Sewa	Bikram Bhandari	Proprietor	17th March 2017	KII (4)
5	Bheemdatt Municipality		Local Volunteers	12th March 2017 onward to 18th March 2017	Household survey

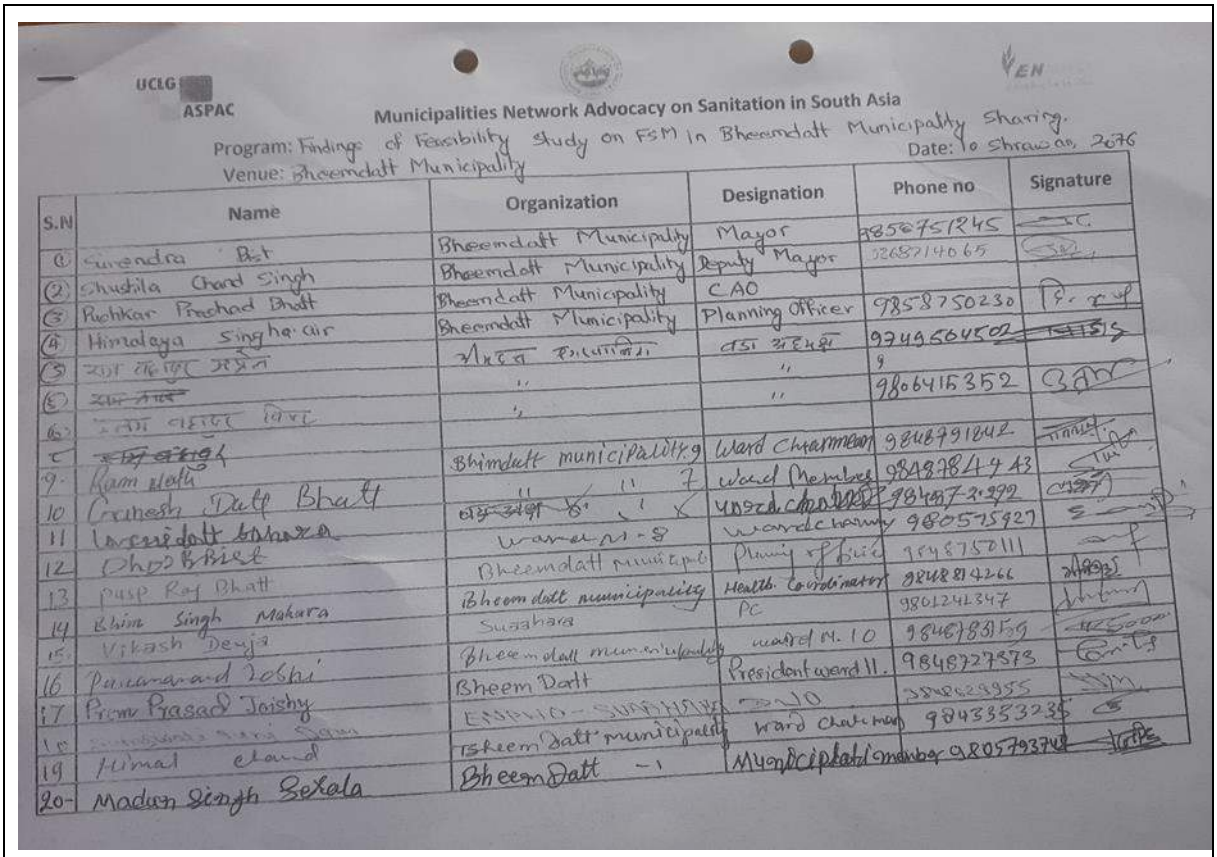
7.4 Annex 4: Number of household in each wards and sampled number of households

Table 9: Number of total household in each ward and sampled households.

Ward	Households	Sample	Ward	Households	Sample
1	693	11	11	870	14
2	1,507	24	12	655	11
3	1,262	20	13	1,088	18
4	1,266	20	14	670	11
5	914	15	15	881	14
6	2,017	32	16	653	11
7	1,117	18	17	415	7
8	1,010	16	18	3,825	62
9	1,585	26	19	984	16
10	2,110	34	Total		**379**

7.5 Annex 5: List of Participants in Sharing and Validation of findings

S.N.	Name	Organization	Designation
1	Surendra Bist	Bheemdatt Municipality	Mayor
2	Shushila Chand Singh	Bheemdatt Municipality	Deputy Mayor
3	Pushkar Prashad Bhatt	Bheemdatt Municipality	Chief Administrative Officer
4	Himalaya Singh Ayer	Bheemdatt Municipality	Planning Officer
5	Ram Bahadur Japrela	Bheemdatt Municipality	Ward Chairperson
6	Uttam Bahadur Bista	Bheemdatt Municipality	Ward Chairperson
7	Ram Nath	Bheemdatt Municipality	Ward Chairperson, 9
8	Ganesh Datt Bhatt	Bheemdatt Municipality	Ward memeber, 7
9	Laxmi Datt Bohara	Bheemdatt Municipality	Ward Chairperson, 4
10	Pusp Raj Bhatt	Bheemdatt Municipality	Planning Officer
11	Bhim Singh Mahara	Bheemdatt Municipality	Health Coordinator
12	Vikash Deuja	SUAAHARA	Project Coordinator
13	Pramanand Joshi	Bheemdatt Municipality	Ward Chairperson, 10
14	Prem Prashad joshi	Bheemdatt Municipality	Ward Chairperson, 11
15	Swarswoti Puri Bam	SUAAHARA	District WASH Officer
16	Himal Chand	Bheemdatt Municipality	Ward Chairperson, 17
17	Madan Singh	Bheemdatt Municipality	Municipal Member
18	Gunawati Parki	Bheemdatt Municipality	Ward member, 2
19	Rabindra Prasad Tiwari	Bheemdatt Municipality	Ward member, 1
20	Pawan Chandra Lachak	Bheemdatt Municipality	Sub-engineer
21	Padam Raj Joshi	Bheemdatt Municipality	Environmental Officer
22	Lal singh Mahara	Bheemdatt Municipality	
23	Buddha Bajracharya	ENPHO	Project Coordinator, MUNASS
24	Jagam Shrestha	ENPHO	Senior WASH Officer



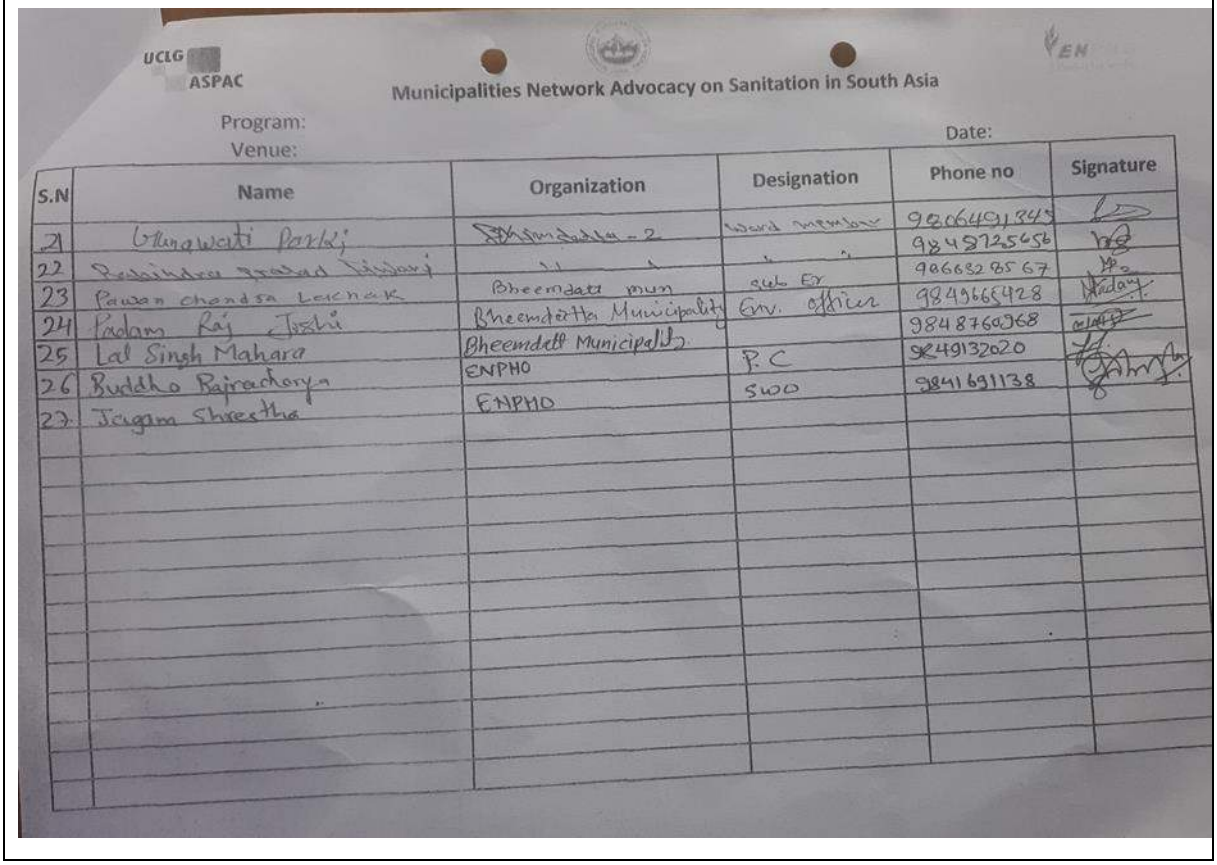
UCLG ASPAC

Municipalities Network Advocacy on Sanitation in South Asia

Program: Findings of Feasibility Study on FSM in Bheemdatt Municipality Sharing. Date: 10 Shrawan, 2076

Venue: Bheemdatt Municipality

S.N	Name	Organization	Designation	Phone no	Signature
1	Surendra Bist	Bheemdatt Municipality	Mayor	9858751245	
2	Chudila Chand Singh	Bheemdatt Municipality	Deputy Mayor	9268714065	
3	Pushkar Prashad Bhatt	Bheemdatt Municipality	CAO		
4	Himalaya Singha Sir	Bheemdatt Municipality	Planning Officer	9858750230	
5	[illegible]	[illegible]	[illegible]	9749564502	
6	[illegible]	"	"	9	
7	[illegible]	"	"	9806416352	
8	[illegible]				
9	Ram Nath	Bhimdatt municipality	Ward Chairman	9848791242	
10	Ganesh Dutt Bhatt	" " 7	Ward Member	9848784743	
11	Laxmidatt Bohara	[illegible]	[illegible]	9848737972	
12	Chandra Bir Bist	Ward No - 8	Ward Chairman	9805-75927	
13	Pushp Raj Bhatt	Bheemdatt Municipality	Planning officer	9748752111	
14	Bhim Singh Mahara	Bheemdatt municipality	Health Coordinator	9848814266	
15	Vikash Devja	Suzahara	PC	9801242347	
16	Pancharam Joshi	Bheemdatt municipality	ward No. 10	9846788159	
17	Prem Prasad Joishy	Bheem Datt	President ward 11.	9848727573	
18	[illegible]	ENPHO - SUPPORTER	ward No 10	9848629955	
19	Himal Chand	Bheem Datt municipality	Ward Chairman	9843532335	
20	Madan Singh Sekala	Bheem Datt - 1	Municipality Member	9805793748	



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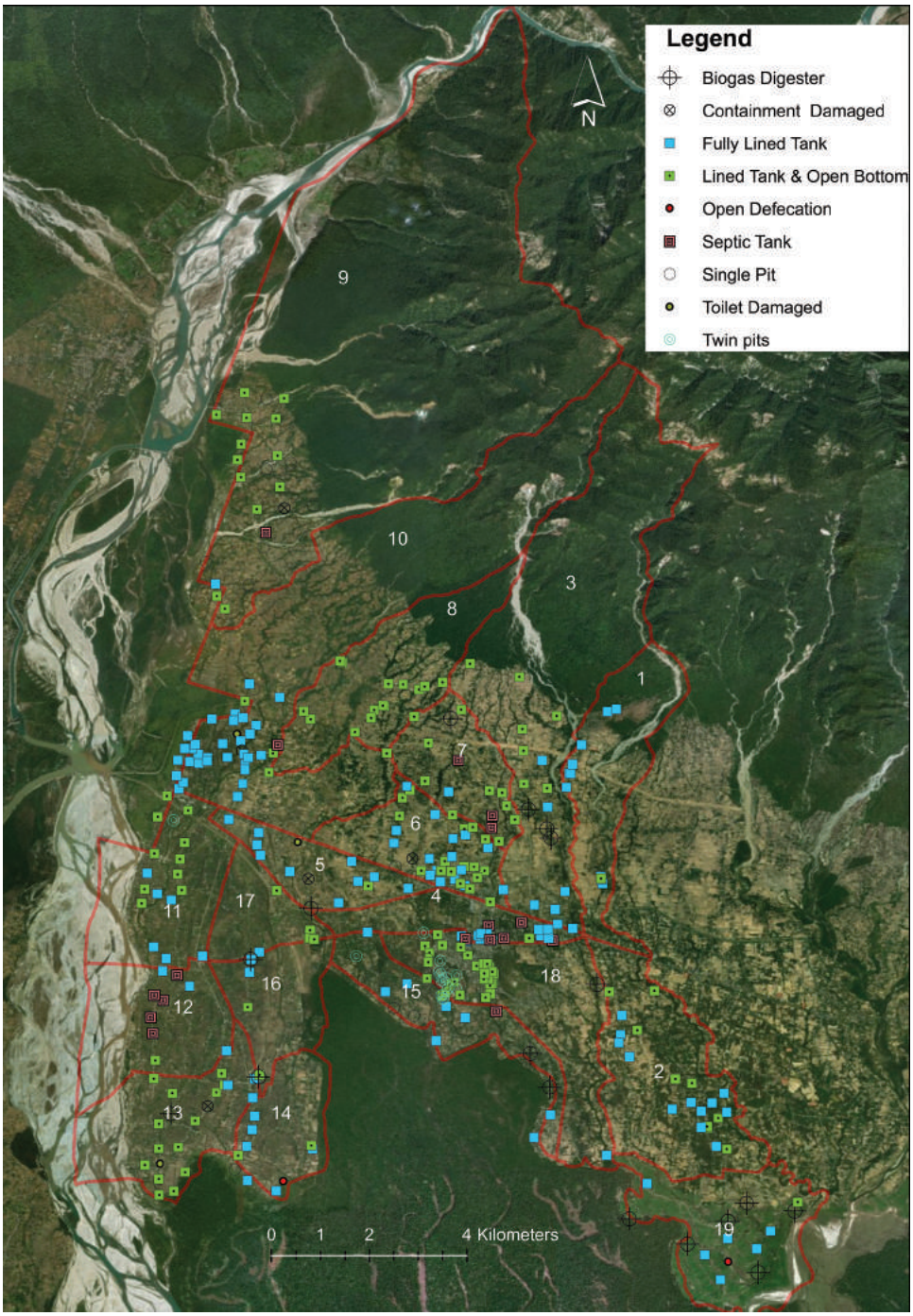
Program:

Venue:

Date:

S.N	Name	Organization	Designation	Phone no	Signature
21	Dhanawati Parki	Bheemdatta - 2	Ward member	9806491343	
22	Devendra Prasad Tiwari	" "	" "	9848725456	
23	Pawan Chandra Lechnak	Bheemdatt mun	sub Er	9866285567	
24	Padam Raj Joshi	Bheemdatta Municipality	Env. officer	9849665428	
25	Lal Singh Mahara	Bheemdatt Municipality		9848760368	
26	Buddha Bajracharya	ENPHO	P.C	9749132020	
27	Jagam Shrestha	ENPHO	SWO	9841691138	



For further information

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