



Sustainable sanitation and climate change

Full Proof Sanitation Solution Mahalaxmi Municipality's Commitment

Background

Sanitation is the basis for healthy, productive and dignified life. It is the fundamental right of every citizen and is essential for sustainable development. The Constitution of Nepal recognizes access to safe water and sanitation as a fundamental right as follows:

- Right to Clean Environment, Article 30:
 - (1) Every person shall have the right to live in a healthy and clean environment.
 - (2) The victim of environmental pollution and degradation shall have the right to be compensated by pollutant as provided for by law.
- Right to Health, Article 35(4): Every citizen shall have the right of access to safe water and sanitation.



Rosy Singh
Resource Centre Manager
ENPHO

The sanitation promotion initiatives accelerated and scaled-up to nation-wide level following the promulgation of the National Sanitation and Hygiene Master Plan in 2011. Furthermore, it was realized that unless open defecation is not ended by the proper use of toilet for excreta disposal, water bodies will continue getting contaminated and many water borne diseases will be transmitted to human bodies. Hence, nation-wide sanitation promotion and Open Defecation Free campaigns were intensified by implementing focused programs, advocacy and campaigns. As a result, Nepal succeeded to declare as Open Defecation Free nation on 30 September 2019.



Open Defecation Free Nepal declaration program (Source: nepalitrends.com)

For the period 1990-2014, Nepal was one of the top ten fastest urbanizing countries in the world, with a rate of urbanization of 3 per cent (UN DESA, 2014). For the period 2014-2050, Nepal will remain amongst the top ten fastest urbanizing countries in the world with a projected annual urbanization rate of 1.9 per cent (UN DESA, 2014). This rapid urbanization will certainly have a significant pressure on environment and urban water supply and sanitation services in the years ahead.

One of the primary factors contributing to urban growth is the increased rural-urban migration for better job opportunities, search for livelihood options and displacement due to natural disaster. Other important factor is the formation of new municipalities which resulted in the increment of the number of municipalities from 58 (2011) to 293 (2017). Around 48 per cent of the urban households with access to toilets are connected to septic tanks. But this untreated sewerage and faecal sludge are being disposed haphazardly into the environment without any proper treatment which ultimately jeopardizes the environment, water bodies and public health.

Basically, there are two types of sanitation systems. One is the non-sewered or on-site sanitation system and the other is sewered or off-site sanitation system. Onsite sanitation systems are prevalent mostly in the outskirts or peri-urban areas of the Valley. The study shows that 30 per cent of households in urban areas of Lalitpur, 8 per cent in Bhaktapur and 18 per cent in Kathmandu District still use septic tanks for disposal of excreta while in the peri-urban areas more than 50 per cent of the households use such onsite systems (HPCIDBC, 2011). In on-site sanitation system, the faecal sludge accumulated in pits or septic tanks require regular emptying.

Nepal is one of the members of the global initiative for sustainable development and one of the key elements for meeting SDG 6 is achieving safely managed sanitation services. However, on one hand, the septic tanks which are already built are not as per the standard guideline whereas on the other hand, those which are to be built are also not planned in accordance to the prescribed standards.

After the provincial government are in the lead role to formulate policies, the Local Governance Operation Act (2017) states the sanitation function of the Municipality and mentions to ensure new house design permits have in-built toilets and standard designs of septic tanks and soak away system (Article 29, pg. 64). The Faecal Sludge Management Institutional and Regulatory Framework (2017) issued by the Ministry of Water Supply states that households without sewer network are mandated to construct standard septic tanks. But most of the so called septic tanks are often found to be the holding tanks or pits.

Mahalaxmi Municipality and Implementation of ISO 24521

In this context, Mahalaxmi Municipality, located along Southern periphery of Kathmandu Valley, has shown the leadership role in managing the sanitation services and initiated for safe containment. The Municipality consists of approximately 28,000 households. But, day by day, new buildings are being constructed in the Municipality. Each working day, the Municipality issues design permits to about five new houses for construction. Realizing the adversity of the upcoming rapid urbanization upon human health, Mayor of Mahalaxmi Municipality Mr. Rameshor Shrestha committed to establish safe sanitation solution for the entire municipality.

As a result of the commitment, Mahalaxmi Municipality in coordination with ENPHO, Kathmandu Valley Water Supply Management Board and Nepal Bureau of Standards and Metrology is implementing the project to implement ISO 24521 for the management of domestic wastewater services. This project, which is supported by the Bill and Melinda Gates Foundation (BMGF) under grant assistance, is the first of its kind in Nepal and globally.

International Standard ISO 24521

This International Standard provides guidance for the management of basic on-site domestic wastewater services, using appropriate technologies in their entirety at any level of development. It includes the following:

- Guidelines for the management of basic on-site domestic wastewater services from the operator's perspective, including maintenance techniques, training of personnel and risk considerations;
- Guidelines for the management of basic on-site domestic wastewater services from the perspective of users;
- Guidance on the design and construction of basic on-site domestic wastewater systems;
- Guidance on planning, operation and maintenance, and health and safety issues

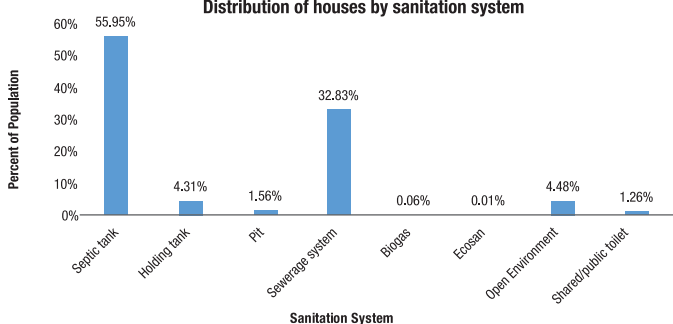


(ISO 24521:2016(E))

Brief Overview of Sanitation Situation in Mahalaxmi Municipality

Under this project, in 2019, ENPHO with the support from Innovative Solution Pvt. Ltd. conducted sanitation situation assessment in Mahalaxmi Municipality. The census survey showed that 61.36 per cent of the houses have containment (where faeces are collected), of which 55.49 per cent have septic tank, 4.31 per cent holding tank and 1.56 per cent pit.

Distribution of houses by sanitation system

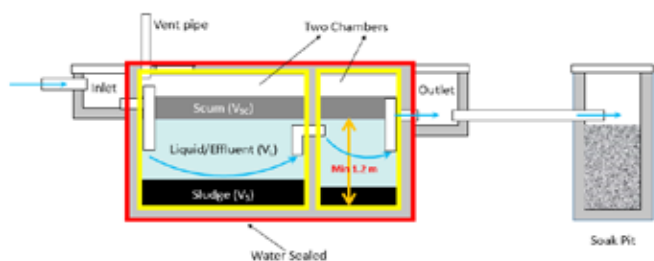


What is a Septic Tank?

A septic tank is a watertight rectangular structure. It consists of two chambers separated by a baffle wall, which allows to undergo anaerobic digestion of organic materials of wastewater coming into the system. Effluent from septic tank is infiltrated into ground using soak pit or is sent to sewer line for further treatment. Standard septic tank possesses mainly following four characteristics:

- Water seal structure
- Tanks consists of 2 chambers
- Minimum liquid depth of 1.2 m
- Soak pit for effluent discharge

If the containment is rectangular in shape but does not meet other criteria, it is the holding tank. If the containment is circular in shape, it is the pit.



Septic tank and its key components

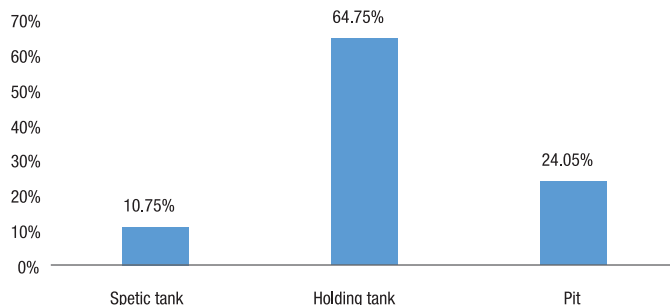
The census survey also showed that about 71.7 per cent of the houses in Mahalaxmi Municipality have a water well in their premises as one of the sources of water. A further breakdown of the data shows that 66.22 per cent of the houses with the septic tanks have well in their premises. Similarly, 51.59 per cent of houses with holding tanks and 23.99 per cent of the houses with pit have well in their premises.

Moreover, a sample survey of 400 houses was undertaken to assess the existing situation of the containment in Mahalaxmi Municipality. As per the survey, out of 400 houses, 362 houses consisted of septic tank, 31 houses holding tank and 7 houses consisted of pit. The containment was verified by physically observing the containment and fitting it into the containment criteria.

Accordingly, out of 400 houses, the sample survey identified that 10.75 per cent actually have the septic tank, 64.75 per cent have the holding tanks and 24.5 per cent have the pits.

This data further shows that it is imperative to raise public awareness about actual septic tank and clarify misconception of considering holding tank or pits as the septic tank.

Percent of house by type of containment satisfying its criteria



Similarly, 75.5 per cent of the houses responded that they have not emptied their containment as it had not been filled and 2.5 per cent of the houses were not sure about it. Considering the age of the containment of all those houses which have either never emptied containment or not sure, 32.8 per cent of the houses have containments constructed six years ago and most of them are holding tanks and pits.

This study and the findings clearly show lack of public awareness about standard septic tank and also that the septic tanks have not been properly designed and constructed. Furthermore, people are unaware on performance of proper septic tank and its required size which is making it unnecessarily expensive as well. Other major challenges are lack of technical knowledge amongst technicians about designing and constructing standard septic tanks and lack of enforcement from the Municipality on construction of proper septic tanks. As a consequence, the infiltration of untreated wastewater from the containment is polluting the ground water thereby jeopardizing the environment and overall public health with various waterborne diseases.

Institutionalization of Standard Septic Tank in Mahalaxmi Municipality

Generally in sanitation, only the user interface or the toilet is considered. In fact, the entire sanitation service chain needs to be addressed. It is the responsibility and duty of the Municipality to formulate necessary policies and regulations, implement them and provide information to the city dwellers on safe management of municipal wastewater and faecal sludge. In this regard, Mahalaxmi Municipality has played a leadership role in institutionalizing the standard septic tank in its Municipality.



"The construction of standard septic tanks has been made mandatory in all new house design permits. We are campaigning for constructing sealed and standard septic tanks in new buildings to be constructed in Mahalaxmi Municipality. We are further raising public awareness on importance of standard septic tanks, its implications on water sources and human health. Permanent permit will be granted only to those new houses which have constructed standard septic tanks. If not, the houses not constructing standard septic tanks will also be barred from getting other facilities and recommendations to be provided by the Ward office and Municipality. We are optimistic that the residents will follow the regulation," Mr. Rameshor Shrestha, Mayor of Mahalaxmi Municipality shared.



"The construction of standard septic tanks has been made mandatory in all new house design permits."

Mr. Rameshor Shrestha, Mayor, Mahalaxmi Municipality, Lalitpur

Mr. Shrestha further added, "Immediate improvements of the old containments may not be possible. However, Municipality will be gradually providing them necessary technical support and also rewarding them to construct the standard septic tanks in old buildings."

Key Achievements

In line with the provisions made in Local Governance Operation Act (2017- Article 29, pg. 64), the FSM standard project, which is being implemented in Mahalaxmi Municipality, has supported to include a two-page guidelines on standard septic tanks and soak away system as an integral component to the new house design permits. The Sanitation Cell established in the Municipality is providing necessary support for this.

One of the major achievements is the formulation and approval of **Faecal Sludge Management By-Laws** by the Municipality and is **the first ever on-site sanitation legal instrument in Nepal – “Rajpatra” publication**. Sanitation services shall be operationalized and regulated as per this By-laws for the safe management of on-site domestic sanitary waste. This By-Laws clearly mentions the provision of containment technology. In addition, with the support of ENPHO, the Municipality has also developed **standard design guidelines for the construction of septic tanks**. **This manual is also the first ever septic tank design manual published in Nepal.**



Faecal Sludge Management By-Laws (left) and Standard Septic Tank Design Manual (right)

Special Acknowledgement:

Mr. Rameshor Shrestha, Mayor, Mahalaxmi Municipality, Lalitpur • Dr. Roshan Raj Shrestha, Deputy Director, BMGF • Mr. Sanjaya Adhikary, FSM ISO Project Team Leader
Ms. Bhawana Sharma, Executive Director, ENPHO • Mr. Rajendra Shrestha, Program Director, ENPHO

COVID-19 and Sanitation Facilities

Keshab Shrestha, I-WASH Manager, ENPHO

Nepal became the first South-Asian country to be declared an open defecation free (ODF) country on 30th September 2019. It is a proud moment to all Nepalese to celebrate a World Toilet Day 2020 in the post-ODF era of sanitation sector in Nepal. The Total Sanitation Guideline 2017 and targets of Sustainable Development Goals (SDG) -2030 have guided the country for its transition from ODF to post-ODF campaign and to achieve the targets of SDGs and total sanitation status. The SDG targets on sanitation for Nepal focused to achieve targets of 95 per cent of households have access to improved sanitation facilities; all communities are open defecation free; and all urban households are connected to a sewerage system¹. And the total sanitation guideline emphasized that every households, institutions and public places have adequate toilets facilities; and the institutional and public toilets are user's friendly².

The sector was moving forward to address challenges of sanitation sector through; a) upgrading the toilet facilities built during ODF campaign for safety and sustainability; b) sanitation services in informal settlements that are not served; c) climate change adaptive and disaster resilient sanitation facilities; and d) management of faecal sludge and wastewater. But the COVID-19 pandemic has stressed the need of further insights on sanitation facilities for emergencies. It has arisen the multiple questions such as whether the current sanitation facilities are adequate, safe and sustainable for emergencies or not; whether the toilets in quarantine centers (of which mostly are the schools) are adequate and also hygienic or not. If the conditions of the toilets in schools- the quarantine centers are not hygienic, it further raises the question of how the students have been using these facilities for years. Although there is lesser evidence about survival of the corona virus in water or sewage and the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses³, some studies have shown the existence of corona virus in

1 National Planning Commission, 2015: Sustainable Development Goals, 2016-2030, National (Preliminary) Report. Government of Nepal, National Planning Commission, Kathmandu, Nepal
2 Total Sanitation Guideline 2017, Ministry of Water Supply and Sanitation, Government of Nepal.
3 Water, sanitation, hygiene, and waste management for the COVID-19 virus, interim guideline, World Health Organization; 19 March 2020.

FSM By-Laws, in the provision of containment technology states “New house design shall have to include toilets and standard designs of septic tanks and soak away system in the designs”



Conclusion and Way Ahead

Sanitation is not just about toilet construction. The entire sanitation value chain needs to be addressed and it starts with safe containment. Mahalaxmi Municipality has taken the step forward with formulation of FSM By-Laws and making the standard septic tanks mandatory in all new house design permits. Now, effective operationalization and regulation of this By-Laws has become a crucial factor. Furthermore, the Municipality must formulate an oversight system to ensure regular supervision and monitoring of the compliance to provisions of this By-Laws. While the construction of standard septic tank is mandatory in new houses, the existing containments which do not meet the criteria of standard septic tank also require upgradation either through installation of new septic tanks or a retrofitting process.

The regulation on standard septic tanks and its institutionalization in the Municipality are definitely Mahalaxmi's exemplary step for safe containment and a major initiative to move ahead for faecal sludge management and contribute to achieve its vision of “Clean, Hygienic, Prosperous and Beautiful City”. This model initiative has a huge potential to be out-scaled and replicated in similar other municipalities which are currently under tremendous pressure of urbanization and need for better public health initiatives.

wastewater⁴. Hence, in this situation, it is clear enough how unsafe we are through the open discharge of the wastewater into the water bodies. Thus, COVID-19 pandemic has equally called for better sanitation facilities and practices for emergencies. Fundamentally, the ways to deal with sanitation in emergency needs:

a) Adequate sanitation facilities in institutions: The sanitation facilities in institutions, particularly health institutions and schools, are grossly insufficient even in normal condition. World Health Organization (WHO) has recommended health facilities to provide adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection) which are essential for all the emergencies and disease outbreak. WASH in School Guideline of Nepal also emphasizes the requirement of child, gender, differently able and environment friendly toilet in schools at the ratio of 1:25 toilet compartment for girls and 1:50 toilet compartment for boys⁵.

b) Safer and hygienic sanitation system: As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed wastewater treatment plants. WHO also recommends managing excreta (faeces and urine) safely, ensuring that no one comes into contact with it and is treated and disposed correctly. Therefore, the faecal sludge and the wastewater must be treated efficiently through the faecal sludge and wastewater treatment plants respectively.

c) Ready-to-build sanitation technologies: The emergency situation demands large number of sanitation facilities to accommodate huge population. Therefore, ready-to-build sanitation systems should be designed and invented. Such options should be hygienic, safe to use and able to address the need of children, women, elderly and differently able people. Only few examples of such toilets exist in Nepal which have been invented and demonstrated by few agencies working in water, sanitation and hygiene. The investment and engagement of the private sector is crucial for the sustainability and accessibility of such initiatives.

4 W. Ahmed et al. / Science of the Total Environment 728 (2020) 138764, First confirmed detection of SARS-CoV-2 in untreated wastewater in Australia: A proof of concept for the wastewater surveillance of COVID-19 in the community. <https://doi.org/10.1016/j.scitotenv.2020.138764>
5 WASH in School Guideline 2017, Ministry of Education, Government of Nepal

RTI Toilet- An Innovation for Emergency Response

Anil Maharjan, Project Officer, ENPHO

Every year, the Terai region of Nepal face the problem of flooding and inundation resulting to destruction of hectares of agricultural land and crops, and taking the lives of hundreds of inhabitants. In the aftermath of the flood, thousands of people are left homeless, compelled to live in Internally Displaced People (IDP) camps or open space without proper and adequate facilities for water, sanitation and hygiene (WASH). The situation is further aggravated by illness and deaths due to poor sanitation and hygiene.



RTI toilet with twin pit at IDP site, Girighat

Considering such situations in WASH and mitigate the challenges arose from poor sanitation and hygiene, ENPHO has been continuously striving for technological innovations on WASH.

Ready-to-Install (RTI) toilet is one among such innovations developed by ENPHO. The RTI toilet was first developed during emergency response of the mega-earthquake in Nepal to provide safe and proper sanitation facility to the earthquake affected communities. It is portable due to its foldable structure and can be installed easily in about 2 to 3 hours.

In continuation of emergency response activities, ENPHO, with the support of WASH Alliance International (WAI) installed RTI toilets in flood-affected communities in Girighat, Ward No. 2, Barahatal Rural Municipality, Surkhet in June 2020. The displaced community people from 105 households were taking shelters in temporary center and using the latrines which were insufficient to the population and visibly dirty. They even defecated openly in the forest beside the temporary camp. The installation of RTI toilets in the camp provided huge relief to the displaced community in terms of access to safe sanitation.

Till date, ENPHO has installed more than 100 RTI toilets in IDP camps since the mega-earthquake in 2015.

ENPHO's WASH Warriors

With increment in COVID-19 cases in Kathmandu, Nepal Government established isolation centers in various hospitals including Bhaktapur Hospital, Bir Hospital, National Ayurvedic Research and Training Center and Civil Service Hospital. To meet the need of WASH facilities in these isolation centers, ENPHO with the support of UNICEF carried out rapid WASH assessment and planned for the improvement of those facilities. However, this was not an easy task amid the lockdown imposed by the Nepal Government. One of the major challenges was unavailability of skilled human resource while the other was difficulty in mobility.

Despite these hindrances in this pandemic, ENPHO's staff members left no stone unturned in providing services or constructing and improving WASH facilities. Amongst our many such WASH warriors, Shushil Nhemaphuki is one of them. He works as Technical Assistant Officer at ENPHO. When ENPHO faced the difficulty in getting human resource and technicians for the construction and improvement of WASH facilities, Mr. Nhemaphuki stepped forward and constructed the WASH facilities in the isolation center. "No one was willing to go out and work in the isolation center. Working in WASH sector for years, I truly know how important the sanitation and hygiene is, especially for those staying at isolation centers. Hence, I could not just stay at home when my small action could support so many people. I am equally thankful to ENPHO for providing me all the necessary support," Mr. Nhemaphuki shared. Indeed, ENPHO family is proud of Mr. Shushil Nhemaphuki.

In addition, ENPHO family is proud of and salutes all WASH Warriors not only at ENPHO but in Nepal and across the globe working day and night to provide WASH facilities and services to their communities.



Mr. Shushil Nhemaphuki, Technical Assistant Officer at ENPHO installing toilet at isolation centre in National Ayurvedic Research and Training Center, Kirtipur.

People's Perception on FSM in Five Municipalities of Nepal

Mr. Buddha Bajracharya, Project Coordinator, ENPHO

Introduction

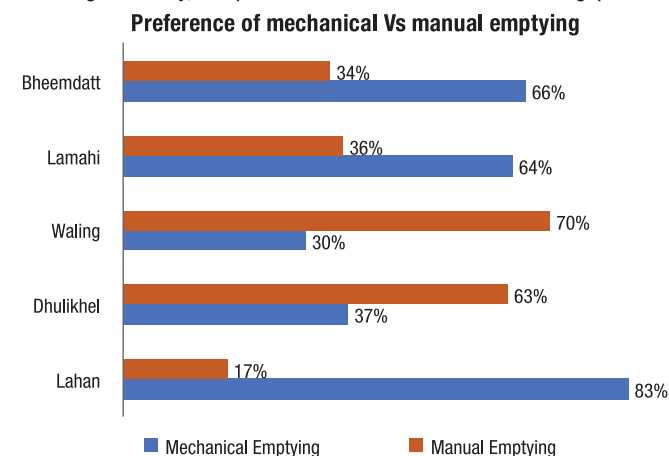
Faecal Sludge Management (FSM) is one of the components that is aligned with achieving Sustainable Development Goal 6.2. In a country like Nepal where 70 per cent of the population rely on non-sewered sanitation system, it is important to understand people's perception towards FSM so as to design appropriate and context specific technologies. Under the project "Municipalities Network Advocacy on Sanitation in South Asia (MuNASS)", a study on non-sewerage system and current knowledge and practices of FSM was carried out in five municipalities of Nepal namely Lahan, Dhulikhel, Lamahi, Waling and Bheemdatt Municipalities to assess the current status of FSM that will be helpful in designing an effective FSM plan.

Methodology

The sample size for the survey was determined by using Cochran formula at the confidence level of 95 per cent assuming 50 per cent of the proportion of the population should have some sanitation characteristics that need to be studied and at sampling error of ± 5 per cent. A random household survey was conducted using mobile application "KOBOLLECT". The total samples from five municipalities were 1,871 (Lahan: 376, Dhulikhel: 364, Lamahi: 375, Waling: 377, Bheemdatt: 379).

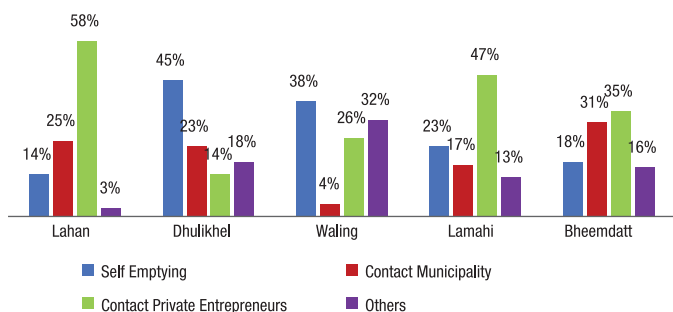
Result and Discussion

There was significant difference in preference towards manual and mechanical emptying in all five municipalities. 17 per cent of households in Lahan preferred manual emptying in contrast to 70 per cent households in Waling. Similarly, 30 per cent of the households in Waling preferred



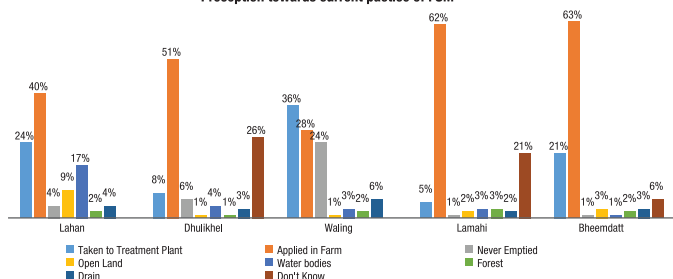
mechanical emptying as compared to 83 per cent of households in Lahan. Road access is one of the factors determining the preference. Municipalities of Terai region such as Lahan, Lamahi and Bheemdatt with better road access prefer mechanical emptying as compared to manual emptying, which is more preferred in hilly region with lesser road access such as Waling and Dhulikhel.

Preferred means of emptying



In terms of means of emptying, there was quiet variance among all the municipalities. Contacting private entrepreneurs was most preferred option in Lahan (58 per cent), Lamahi (47 per cent) and Bheemdatt (35 per cent) as private entrepreneurs providing desludging services are easily available. Due to lack of access to road, self-emptying was choice of majority of households in Dhulikhel (45 per cent) and Waling (38 per cent).

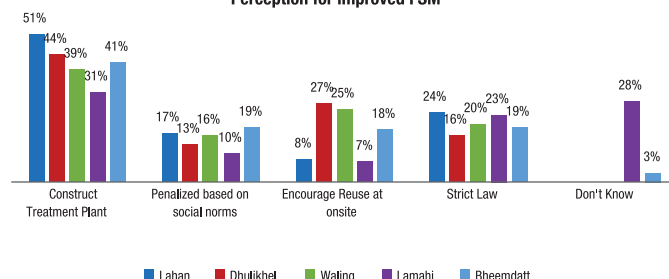
Perception towards current practice of FSM



In regard to the beliefs regarding management of Faecal sludge, majority of the households in Lahan (40 per cent), Dhulikhel (51 per cent), Lamahi (62 per cent) and Bheemdatt (63 per cent) believed that collected Faecal

sludge are applied in the farm. In contrast, as high as 36 per cent in Waling Municipality believe that Faecal sludge are managed in treatment plant. However, actual scenario is completely different from what is believed. None of the municipalities have Faecal sludge treatment plant and open disposal is the only practice that has been followed.

Perception for improved FSM



Complementing all the beliefs, majority of households from all the municipalities urge for the construction of Faecal sludge treatment plant at municipal level for the better management of the generated faecal sludge. Additionally, they also believe that strict laws should be implemented and provision for penalty should be developed so as to strengthen the management system.

Conclusion and Implication

With 70 per cent of households relying on non-sewerage sanitation system, it is important to understand people's perception on faecal sludge management in order to plan for FSM that meets the need of the people. Various socio-geographical factors should also be considered while outlining ideas as a single strategy might not work in different settings. It is important to understand the existing gap on current practices and people's expectation so that it not only meets the demand but also prevents environment pollution and outbreak of possible diseases. The knowledge and technical skill of the concerned local authorities should be enhanced for them to be able to design and develop appropriate structures and treatment systems. This can only eventually provide better services on FSM. Income generation can be other advantage from proper FSM through the use of compost in farming. Enacting fine and punishment could be effective in prohibiting open disposal of the faecal sludge. Thus, there are definitely various possibilities for proper faecal sludge management at household, local and national level and initiation is what we all need.

Eco-Friendly Systems for Safely Managed Sanitation

Nitesh Shrestha, Technical Manager, Eco Concern Pvt. Ltd.

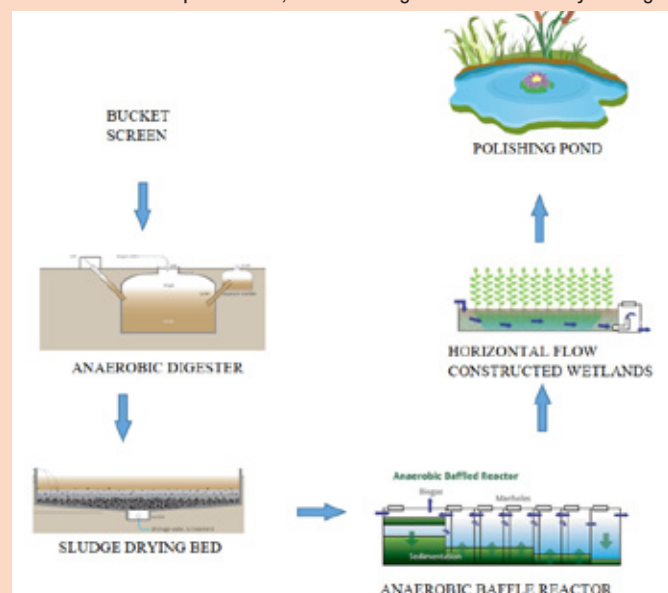
The growing population demands more facilities which might result in crisis of the facilities and services especially in the low income countries like Nepal. Safely managed sanitation is yet another need of this growing population to tackle the sanitation crisis and meet Sustainable Development Goal 6. As climate change is getting worse, its impact such as flood, drought and rise in sea level is threatening sanitation systems. To help stop the spread of infectious diseases such as COVID-19, cholera and typhoid, sustainable sanitation with adequate water, handwashing facilities and safely managed

sanitation plays a crucial role. Apart from this, the concept of sustainable sanitation system holds safe reuse of waste to boost agriculture and reduce emissions of harmful gases.

Holding onto the concept of sustainable sanitation, the Faecal Sludge Treatment Plant has been constructed in Mudhuban Municipality, Bardiya with the support of Bremen Overseas Research & Development Association (BORDA). This treatment plant treats Faecal Sludge (FS) through natural treatment process making the plant environment friendly. Being a natural system that runs under gravity, it has a minimal operating cost (as minimal energy is consumed due to absence of mechanical parts). The major components of this treatment plant are bucket screen, anaerobic digester, sludge drying bed, anaerobic baffle reactor, horizontal flow constructed wetlands and polishing pond.

The basic feature of the constructed treatment plant is as below:

Descriptions	Value
Wastewater Type	Municipal Faecal Sludge
Designed daily sludge flow	3 m ³ /day
COD inlet	5000 mg/L
TSS - inlet	27000 mg/L
Temperature	20°C
Peak Period	1 hr
BOD5- Outlet	20 mg/L
Gross Land Area	1072 m ²
Structure Foot Print	506 m ²



System Configuration of the FSTP in Madhuban Municipality

The concept of faecal sludge treatment plants with natural treatment process is widely used in Nepal and in the developing world for FS treatment. Since the treatment plants are cost effective, easy to construct (and can be



FSTP in Madhuban Municipality

constructed using local masonry skills), easy to maintain and operate, it is more relevant to a country like Nepal (where investments and funding are limited). FSTPs in Lubhu (constructed after Earthquake in 2015), Charali, Kakarvitta, and the one under planning in Tikapur are almost similar to this and have many components in common. Operators with necessary trainings can operate the plant whereas less engagement of high skilled personnel also keeps the system functional.

The reuse of the treatment products helps to “close the loop” in the value chain thus reducing the use of fresh resources while also improving the financial sustainability of the plant. This treatment plant also generates biogas from anaerobic digester as by-product.

Many toilets and containments have been built during ODF campaign in Nepal. The containments will slowly fill up and eventually will require to be emptied for which this treatment plant has been built. This treatment plant thus will work as an essential part for sustainable and safely managed sanitation.

Ready to Install (RTI) Eco Septic Tank

Ms. Isha Manandhar, Production, Marketing and Communication Officer, Eco Concern Pvt. Ltd.

A septic tank is a large vessel that collects household wastewater through an inlet pipe, treats the effluent through a bio-action process, and releases the treated water into a drain field where the water percolates underground. Ready to install (RTI) Eco Septic Tank adopt container based sanitation, where excreta is collected in sealable containers. This technology is suitable for densely populated low-income urban areas, emergency camps and for areas with high ground water table.

Septic tank provides primary biological treatment to crude sewage produced in a normal domestic environment. It retains solid and allows them to settle in, where they are partially broken down by biological “Anaerobic” action by microbes and bacteria. The remaining liquid effluent is left to flow down towards the outlet drain. The gases such as biogas, carbon dioxide etc. produced stay on top of the effluent and escape through the vent pipe. This effluent further undergoes anaerobic digestion in the subsequent chamber along the long flow path without any turbulence inside the tank ensuring high degree of settlement and sedimentation, thus providing a low level of suspended solids perfectly suitable for discharge into an underground soak-pit.

Specifications of RTI septic tank: Septic tanks come with 3 chamber baffle design system. This ensures a high degree of settlement and sedimentation, thus providing a low level of suspended solids, suitable for discharge into any underground soak away system.

All products are rotationally molded using PLC-Numerically Controlled Machines, in tough LLDPE (Polyethylene) which offers a very high impact resistance. Polyethylene is most resistance to human urine and is seven times more resistant than cement.

Other specifications are:

- HDPE plastic septic tanks
- Temperature resistant upto 60°C
- Smooth interior
- Chemical and gases resistant

Design and Dimensions

Capacity (Ltr)	Model	Overall Width	Overall Length	Overall Height	Wall Thickness	No. of Chambers	No. of Manholes	Size of Manholes	Diameter of inlet and outlet pipe	Diameter of gas vent
2000	60 Flush per day	860 mm	2500 mm	980 mm	10 mm	3	1	400 mm	115 mm	100 mm

Advantages of RTI septic tank

- Leak proof with good sealing properties.
- Environment friendly.
- These are easy to install and ready to use tanks.
- These are good alternatives to concrete and brick septic tanks as they are lighter in weight and rustproof.
- Suitable for sewage treatment in residential buildings, hotels, schools, hospitals, public toilets etc.

An easy to install RTI Eco Septic tank is being promoted by Eco Concern Pvt. Ltd. to support safe collection of faecal sludge.

