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Beyond ODF - Citywide Inclusive Sanitation

"Cities have a capacity for providing something for everybody, only because, and only when, they are created by everybody" – Jane Jacobs

Bhushan Tuladhar
Environmental Expert/
Chairperson, ENPHO

As the world becomes increasingly urban, it is clear that the challenge of achieving the Sustainable Development Goals (SDGs) will be won or lost in the cities of the developing world. It is estimated that in this decade (2010-2020), 95% of the global population growth will be in cities and of these 92% will be in developing countries.[1] While this is seen as a major challenge, especially as cities in the developing world already suffer from a multitude of problems from pollution to poor governance, this can also be seen as an opportunity as most future cities in the developing world have not yet been built and many cities have not locked themselves into major infrastructure or sanitation systems. Proper urban planning and strengthening the chain for delivery of basic services in these cities can therefore be a game changer as we strive to achieve prosperity, equity and sustainability.

The recent World Water Week 2017 highlighted promising new developments in urban sanitation, particularly in providing sanitation services to the urban poor.[2] The challenge now is to take these developments to the field and integrate them with urban development plans and strategies and ensure that all five aspects of sustainable sanitation – technical, financial, social, environmental and institutional – are addressed properly in the local context to benefit all citizens particularly the poor and marginalized.

According to the World Bank, Nepal is the most rapidly urbanizing country in South Asia.[3] The 2011 census identified 17% of the population as urban but with the recent reclassification of local governments, there are now 293 municipalities in the country which are home to over 40% of the population. Although all the areas occupied by these municipalities are not urban in nature, the new classification of municipalities together with the establishment of local elected governments, have paved the way for accelerated urban development. There is therefore an urgent need to prepare and implement citywide inclusive sanitation plans, to address existing and emerging sanitation needs in the cities of Nepal.

Over the last few years, Nepal has made impressive progress in accelerating sanitation coverage throughout the country. According to the recently released Nepal Demography and Health Survey 2016, the percentage of household with improved sanitation in the country increased from 38% in 2011 to 62% in 2016, and the people who practice open defecation decreased to below 15%.[4] The government has a target of 100% open defecation free (ODF) country by the end of 2017. As Nepal races to meet this target, there is an urgent need to consolidate the gains achieved so far and also think beyond ODF. And as we consider sanitation beyond ODF, urban sanitation clearly needs to feature on the top of the priority list.

The government is considering preparation of WASH plans for local governments. While this is a welcome initiative, it is important to ensure that these WASH plans are comprehensive in nature to address all aspects of water sanitation at the citywide scale, inclusive to ensure active participation of all stakeholders, and locally led to facilitate ownership and implementation. The newly formed local governments will need external technical and possibly financial support to prepare and implement the WASH plans, but the overall process has to be initiated and led internally and outputs need to be internalized within the overall planning framework of the municipalities. This will require consensus building among all stakeholders, uniform guidelines and building of local capacity on all aspects of urban sanitation from increasing access to toilets (households, as well as institutional and public toilets) to proper management of water supply, faecal sludge, wastewater, storm water, and solid waste.

In the past, ENPHO has assisted in preparing city sanitation plan for Madhyapur Thimi, conducting feasibility studies on faecal sludge management for several cities, and demonstrating decentralized wastewater and faecal sludge management systems. Now, there is a need to critically analyze and learn from the planning processes and demonstration projects of the past and develop systems to support cities in preparing and implementing WASH plans. But before, diving into WASH plans, organizations such as ENPHO will have to work with key stakeholders, particularly government of Nepal, to build consensus around the processes, tools and contents of WASH plans so as to ensure that they are comprehensive, inclusive and locally led. In this context, experiences from other countries such as India which has almost 10 years of experience in preparing and implementing City Sanitation Plans, will be useful. ENPHO looks forward to work closely with all key stakeholders in this process in the days ahead.

1 UNDESA, 2014: World Urbanization Prospects
2 https://www.devex.com/news/5-takeaways-from-stockholm-world-water-week-90939
3 Muzzini E. & Aparicio G., 2013: Urban Growth and Spatial Transition in Nepal, World Bank, Washington DC
4 Ministry of Health Nepal, New ERA and ICF, 2017: Nepal Demographic and Health Survey 2016, Kathmandu, Nepal

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Status of Faecal Sludge Management in Five Urban Municipalities of Nepal

Reetu Rajbhandari, Prabina Shrestha and Kabir Rajbhandari; ENPHO

Context and Situation

Government of Nepal (GoN)'s commitment of achieving universal access to basic sanitation by 2017 is being realized gradually evidenced by the current sanitation progress made from 63% (2068 BS) to 95% (2074 BS) through ongoing sanitation campaigns. This campaign at the start is concentrated on Open Defecation Free (ODF) movement with a focus on basic sanitation i.e. pit latrines.

In urban areas of Nepal, 60% of population have access to on-site sanitation facilities (septic tanks and pit latrines), 30% are sewer connected and 9% are deprived from even basic sanitation access (CBS, 2012). The filling up of the pits and septic tanks, normally termed as containments (storage), are gradually becoming the major issues in urban areas of Nepal with an increase in the access of people to basic sanitation facilities as mentioned above. These issues ultimately lead to the challenges in managing faecal sludge in urban areas of Nepal, though importance of its safe management has been reflected in Total Sanitation Guideline promulgated by Department of Water Supply and Sewerage (DWSS/GoN).

While talking about the sanitation in urban areas, one of the studies showed that 68,000 septic tanks exist in Kathmandu valley and these containments are expected to fill up within an interval of 3-3.5 years (HPCIDBC, 2011); meaning by this time, either these containments are filled up or are already emptied. Another similar study in Kathmandu valley shows that 170,000 cum faecal sludge (FS) is being produced annually from existing on-site sanitation systems and discharged into water bodies by 15 desludging vehicles without any treatment (ENPHO, 2014). This means, currently desludging/ emptying of faecal sludge from the containments (as mentioned above) are not safely managed/practiced. This has been the growing fate in terms of managing faecal sludge, primarily desludging and disposal, in most of the urban areas of Nepal. This challenge has been further aggravated by rapid urbanization and haphazard settlements in urban towns of Nepal, where critical studies are not yet conducted in this discourse. Therefore, in urban areas of Nepal, Faecal Sludge Management (FSM) is becoming a growing issue.

FSM is relatively a new issue. So, emptying, transportation, treatment, reuse and safe disposal of FS (components of sanitation value chain) have not yet received adequate attention from the concerned authorities. To a small extent though, research and studies have been carried out on technical, economical and institutional aspects of FSM, but these are not yet sufficient and more efforts are still required in this discipline. In this context, ENPHO, an NGO actively working in the WASH sector, has undertaken some studies related to FSM including feasibility studies on FSM in few municipal towns of Nepal. The study findings help to track the sanitation situation, and more importantly the overview of Total Sanitation (post ODF) status including FSM practices in those cities. This case is an outcome of those studies.

Findings from the study

The study was conducted in 5 municipal towns representing each development regions and 3 ecological zones as mentioned in the Table 1 below.

Table 1: List of studied Municipal Towns

Municipality	Development Region	Ecological Region
Solu-Dudhkunda	Eastern	Mountain
Lalbandi	Central	Terai
Shuklagandaki	Western	Hill
Kohalpur	Mid-Western	Terai
Amargadhi	Far-Western	Hill

The preliminary findings of the feasibility study on FSM conducted in 5 municipal towns as mentioned above are discussed briefly in the following areas. (Refer Figure 1)

- Coverage of toilet at household is increasing. (User Interface)
- Most of the toilets are connected to onsite containments. (Containments)
- Regular emptying practice was not observed. (Emptying)
- No treatment facility was found. (Treatment)
- Very few households emptying their containments are reusing by applying them in farmland but majority of them are disposing haphazardly to open environment (Reuse/disposal).

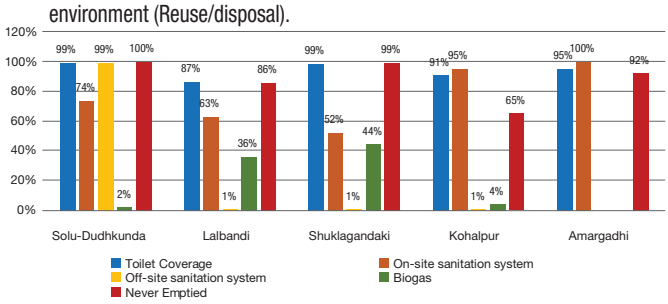


Figure 1: Status of Existing Sanitation Systems

Discussions

The preliminary findings present an overview of each component of sanitation value chain. None of the municipalities have been declared ODF as of now; though they are at the verge of declaration (average sanitation coverage is 95%). Among these, only 11% containments (on an average) have been emptied, which are partly applied in farm and rest are dumped in water bodies and open environment, thus confirming unsafe management of the faeces. This smaller proportion of the containments being desludged evidenced that type of containments, currently in practice, are neither properly designed nor executed, for example: problems of leakage due to unlined containments has rendered consolidation of faeces. While talking about the containments, generation of faecal sludge is also equally important. The volume of faecal sludge generation per day in aforementioned municipalities ranges on an average from 1.4 cum/day to 10.6 cum/day (Refer Figure 2).

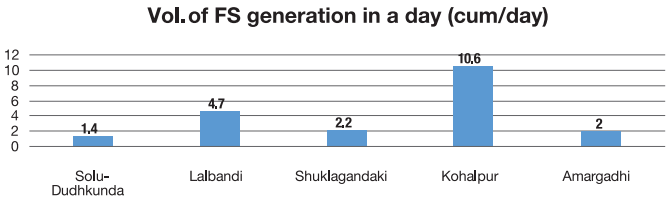


Figure 2: Faecal Sludge generation in a day

The study revealed that despite of the age of the majority (around 40%) of the containments varying from 3-10 years,[1] the emptying practices and its safe disposal are not in proportion thus indicating that good FSM practices are yet to be made regular through its robust awareness among the users. As filling up of containment being a continuous process, containments of the study area, which are gradually filling up, should be given due consideration for proper management of the faecal sludge. So the possibilities of requiring emptying services by the municipal dwellers in the coming future is quite high, for which appropriate mechanism such as clear policies regarding FSM and regulation for proper treatment before disposal etc. should be the immediate priority of the respective municipal authorities.

Conclusion

The country is heading for declaring ODF with a provision of universal access to sanitation by 2017. This however also demands for appropriate mechanism for managing the faecal sludge generated from the containments connected to the latrines. With the progress in the basic sanitation coverage in the studied municipalities, the management of faecal sludge is at a very early stage. To be precise, the containments where toilets are connected are not properly designed and executed which is evidenced by the emptying practices, which are not followed by any treatment practices, adopted by negligible HHs when summed up from the 5 studied municipalities. This haphazard practices of faecal sludge in urban towns are clearly becoming an environmental threat as they do not consider seriously, the extent of pollution, in water bodies (including ground water) and other places where users currently dump the sludge. To account this challenge, concerned local government needs to come up with appropriate policies, regulations and mechanisms for enhancing best practices to improve the existing sanitation practices be it on-site sanitation or off-site. This is very essential as it contributes to on-going Total Sanitation initiatives of the Government of Nepal (GoN).

1 Age group of the containment has been categorized as <3 years, 3-5 years, 6-10 years and >10 years.

Defining Wastewater as one of the Important Sources of Water

Luna Keshari Kansakar, Freelancer and Robert Dongol, Nepal Engineering College

Would you like to drink water out from a toilet? The reaction to such question comes unanimously out loud as "Are you out of your mind!!!" Yet, we can see through various media that people are drinking water directly from undrinkable, dirty water sources. On the other hand, we can also see people drinking treated wastewater- of course coming out of high-tech treatment systems as in NEWater of Singapore. Thanks to such technologies due to which drinking water from toilets is possible. Scientists have always highlighted the fact that fresh water on the earth is limited commodity and is in fact non-renewable. Yet, 80 percent of the water that we use goes down into the drain.

For the period of 1990-2014, Nepal has been one of the top ten fastest urbanizing countries in the world, with a rate of urbanization of 3 percent (UN DESA 2014: p.68). The Kathmandu Valley is the most populated urban region and one of the fastest-growing urban agglomerations in South Asia (Muzzini & Apericio, 2013; MoUD, 2015). But the development activities lags behind resulting in poor quality of even the basic life sustaining services. Due to lack of adequate wastewater treatment facilities, more than 95 percent of the sewerage ends up into the rivers without any form of treatment (UNHABITAT, 2011). Due to rapid urbanization, on one hand, there is high demand of water and on the other hand, there is extreme degradation of surrounding environment including holy rivers due to the produced wastewater.

This is the point where we definitely need to think deeply and question ourselves as to - Could this water i.e. wastewater be our source of water? If we are talking about 80 percent of the water that we use going into the drain, that's a huge volume of water we have at our disposal which is simply polluting our water bodies. Whether we admit or not, we definitely are ignoring the significant source of water. This article indicates some of the possible home works that needs to be in place, if we treat wastewater out from the toilet as one of the sources of water.

Understanding our wastewater: Research and development need to be constantly undertaken in order to understand wastewater. The data on wastewater proves to be crucial to design the treatment systems.

Creating market for the wastewater business or entrepreneurship development: There's no doubt about high water demand in Kathmandu Valley leading to the emergence of water entrepreneurs. However, similar for wastewater can be challenging because it is not considered of any value. This would definitely require ideas, strategies and expertise to convert waste into something valuable and consequently, help to create market for the wastewater. One of the viable strategies is to encourage cross-sectoral convergence while discussing the use of treated wastewater. We need to work closely with the sectors with potential value of treated wastewater – could be energy, agriculture, nutrition, and many more. Collaborative efforts to understand needs, values and develop appropriate strategies and business plan are very crucial to create market for wastewater business.

Guideline on use of water and level of wastewater treatment as per its intended use: Guideline needs to be developed on sector specific wastewater treatment as per its intended use.

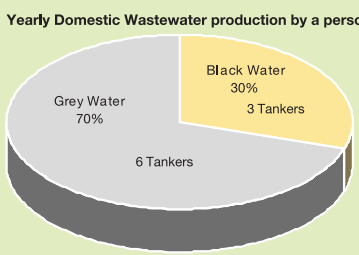
Creating enabling environment: None of the above mentioned ideas or approaches will be able to work without the support from relevant stakeholders and enabling environment. Appropriate policies and their proper enforcement are needed for the wastewater business to flourish.

Thus, this article highlights the need of Multi-sectoral Wastewater Management Plan if we want to tactfully address the issues of wastewater and water scarcity. For this, discussion with the relevant sectors with expertise and potential use for wastewater needs to be initiated, and understand their requirements in order to make 'wastewater' as one of the possible sources of water and meet the increasing water demand.

Reuse of Household Wastewater

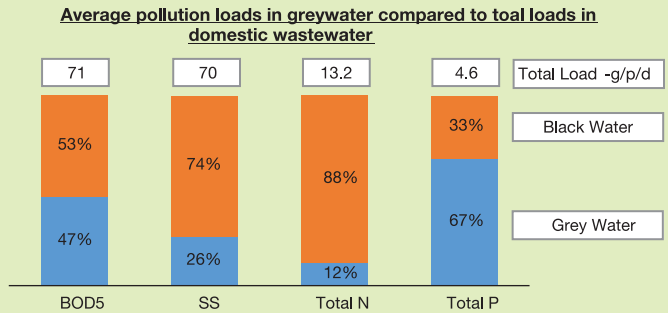
Krishna Ram Yendyo, ENPHO

Huge amount of water supplied to the residents turns into waste. As per the thumb rule, more than 80% of water supplied is converted to wastewater. Thus, to reduce the load on demand of fresh water, reuse of wastewater is essential.



The water supplied to city dwellers are used for various purposes and as a result, different constituents are dissolved in the wastewater generated. There are different activities related to water use in daily activities like cooking, bathing, toilet flushing, dishwashing, laundry, floor cleaning etc. The domestic wastewater can be categorized as Black water and Grey water. The wastewater produced from activities except toilet flushing is known as grey water. Wastewater generated from flushing of excreta and urine is known as black water. If a person consumes 90 liters of fresh water per day for daily activities then 6 tankers of grey water and 3 tankers of black water per year is generated as shown in the figure.

Black water are either flushed to the septic tank or to the sewer. In urban area both grey water and black water are directly flushed to the city sewer along with storm water from the resident compound. Typical grey water contains less amount of organic matters, suspended solids, and total nitrogen in comparison to black water. However, total phosphorous in grey water is in higher side than in black water. Typical pollution loads in grey and blackwater is shown below.



Source: Greywater management in low and middle-income countries by Sandec

By 2030, the gap between demand and supply for the fresh water can increase up to 40% as per the projection made by UNEP, 2011. It is magnificent gap as 1.8 billion people are still without reliable access to water of good quality to be safe for human consumption. Flushing and forgetting wastewater by human society may bring great challenge in maintaining adequate quantity of fresh water in coming days. Thus, to mitigate the pressure on fresh water demand, reuse of wastewater can be good option. Wastewater produced by one activity may be useful to another activity. Greywater after treatment can be used as toilet flushing, gardening and street washing in residential level. Similarly, blackwater after treatment can be used for irrigation purpose. The pressure on fresh water demand can be reduced by 20% only by using the treated wastewater for latrine flushing and cleaning of house at household level.

Faecal Sludge Treatment and Reuse System in Mahalaxmi Municipality, Nepal

Reetu Rajbhandari, Bipin Dangol and Rajendra Shrestha; ENPHO

Background

After the devastating earthquake on 25 April, 2015, many INGOs, NGOs, local communities and Nepal Government built number of relief camps which included on-site sanitation systems, hand washing platforms and bathing units to improve the sanitation practices and safeguard the health conditions of the people residing in the camps. Lubhu situated in recently ODF declared Mahalaxmi Municipality of Kathmandu Valley is one of those areas where 10 such camps were set. The intensive use of emergency latrines in the camp and settlements resulted the problem of overflowing black water from the pits. Due to lack of appropriate Faecal Sludge (FS) treatment system in Kathmandu Valley, the unsafe disposal of FS after the desludging was preeminent problem.

In this context, ENPHO with the support from the Municipality, Bremen Overseas Research and Development Association Organization (BORDA) and The Consortium for DEWATS Dissemination (CDD) Society established Faecal Sludge Treatment Plant (FSTP) primarily to treat the FS generated from the camp sites and earthquake affected households. The pre-fabricated treatment plant was constructed within 45 days in 300 m^2 land area provided by Help for Children Beilngries- Kathmandu (NGO). The treatment plant with design capacity of 6 m^3 per week is based on gravity flow system and has reuse potential in the existing vegetable farmland.

Mechanism

The FS in the feeding tank gets conveyed into separate sludge and wastewater treatment units (Figure 1) after retention. The FS treatment unit includes two bio-gas digesters in series where sludge gets stabilized anaerobically producing biogas followed by a stabilization tank and three planted sludge drying beds for bio-solids. Similarly, wastewater treatment unit includes integrated settler, anaerobic baffle reactor and anaerobic filter for anaerobic degradation of organic load, planted gravel filter for oxygenation and collection tank for treated water.

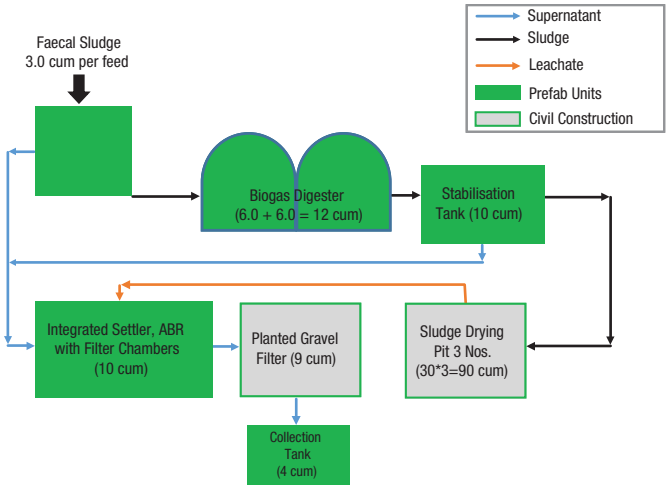


Figure 1

Treatment efficiency and current status

The sampling of influent and effluent samples were done three times, after 76 days, 152 days and 271 days of FSTP operation. All the collected samples were analyzed in ENPHO laboratory following standard methods of wastewater analysis. The selected parameters and the results are provided in the Table 1.

Table 1: Lab analysis report with removal efficiency

Parameters	Unit	After 76 days of operation	After 152 days of operation	After 271 days of operation
		Pre-monsoon (June)	Monsoon (August)	Post-monsoon (December)
		Removal Efficiency (%)	Removal Efficiency (%)	Removal Efficiency (%)
pH	-	NA	NA	NA
Electrical conductivity	µS/cm	55.41%	69%	22%
Total Solids	mg/L	71.37%	78%	50%
Volatile Solid	mg/L	75.70%	85%	70%
Total Alkanity as $CaCO_3$	mg/L	40.43%	91%	26%
Nitrogen-Ammonia	mg/L	53.87%	71%	42%
Nitrate	mg/L	NA	90%	96%
Total Phosphorus	mg/L	72.90%	80%	71%
Total Nitrogen	mg/L	55.78%	73%	56%
Total Kjeldahl Nitrogen (TKN)	mg/L	55.78%	73%	56%
Organic Dry Matter	mg/L	75.70%	85%	70%
Chemical Oxygen Demand (COD)	mg/L	90.62%	91%	86%
Potassium (K)	mg/L	33.11%	65%	-68%
Helminths	Present/ Absent	Absent	Absent	Absent
E.coli	CFU/mL	TNTC	TNTC	TNTC

The results indicate the FSTP is good in removing organic matters and nutrients. Helminths were not present in the treated effluent, indicating safe to reuse in the farmland. Around 420 m^3 of FS (140 trucks) have been fed into the treatment plant. So far, 579 m^3 of biogas and 340 m^3 of treated wastewater have been produced which is being used by the operator for cooking and irrigation, respectively. Besides the benefits of its end-products, this FSTP is providing facilities to FS private entrepreneurs in legal disposal of FS.

Conclusion and Recommendation

The promising results of the treatment efficiency, the emerging demand and the self-sustaining potential of this type of treatment plant indicates the relevance and hence the importance of scaling up of these types of systems in the rapid and haphazard urbanizing cities. Also, continued research and monitoring in terms of financial, institutional, environmental, technical and social aspects of such treatment plant is essential for the policy makers in developing and implementing standards and policies on FS handling, disposal and treatment.

Inclusive WASH Facilities: Fundamental Rights to Persons with Disabilities

Birendra Raj Pokharel (PhD), Action on Disability Rights and Development, Nepal

Access to safe and clean water and sanitation facilities is a fundamental right of all people, including children, persons with disabilities and older people. Nepal has adopted the WASH facilities as of fundamental rights in the Constitution. As such access to clean water and basic sanitation is a right stipulated in international human rights instruments including the Convention on the Rights of Persons with Disabilities in its Article 28, providing adequate standard of living of persons with disabilities. Similarly the SDGs include goals for ensuring availability and sustainable management of water and sanitation for all, to be achieved by 2030. These include universal and equitable access to safe and affordable drinking water for all and access to adequate and equitable sanitation and hygiene for all. As such improved access to WASH activities in community settings has a great impact on the health, hygiene, cleanliness, dignity and quality of life of marginalised groups particularly persons with disabilities, the WASH activities are traditionally designed for persons in communities. Consequently, a large number of people are excluded from many WASH activities and facilities in Nepal.

The accessibility assessment of ADRAD shows that children and adults with disabilities have largely been excluded from WASH initiatives in Nepal even during post-earthquake reform despite of accessible guideline adopted by the Government. There are several barriers that cause the exclusion of persons with disabilities from WASH-related initiatives. Most problems are caused by external factors, such as social, environmental and institutional barriers.

Environmental barriers relating to infrastructure include high steps and concrete platforms, narrow entrances, lack of or too heavy doors, slippery or dirty floors, narrow cubicles, lack of light and handrails. Most of the public toilets installed within capital city missed the accessible standards whereas only four out of seven toilets in the corporate houses are inaccessible for persons with disabilities particularly wheelchair users.

In the rural communities, the environmental barriers persists uneven, rough or steep paths on muddy and/or slippery ground. It often happens that pathways are completely inaccessible. For many, water sources are too far away and absence of sanitation facilities, where girls and women with disabilities are put at risk of sexual violence.

Legislation and policies related to marginalised groups can lack strategies or guidelines for implementation. As such the relevant ministries responsible for water and sanitation are rarely aware of these. Consequently, persons with disabilities and other marginalised community members are still frequently left out of WASH practices. Moreover, many policy makers are not familiar with disabilities and are not aware of inclusive solutions.

The solution is to install facilities closer to the user. For example, sanitation facilities should be as near to the house as possible, preferably inside the house. The objective is to design pathways and roads that allow the user to move around safely and independently. Paths to toilets should be smooth, clear and preferably with a non-slippery surface such as concrete. There should be landmarks on the way, such as gate posts, trees or large rocks, or ropes leading from the house to the toilet, so that the blind and people with visual disabilities can find their way to the toilet. Support rails along the path are recommended. It is good to have visual signs and/or symbols on the wall, beside the door with contrasting colours highlighting the door and thus making it easier to find. A change of floor texture should mark the location of the door for persons with visual disabilities. The entrance should be wide enough for wheelchair users. Toilet floors should be smooth, easy to clean, but not slippery. For wheelchair users, there should be enough space for a wheelchair to turn and provide adequate support such as handrails attached to the floor or wall at a height of 70-90 cm to assist persons moving from a wheelchair or persons with limited strength.

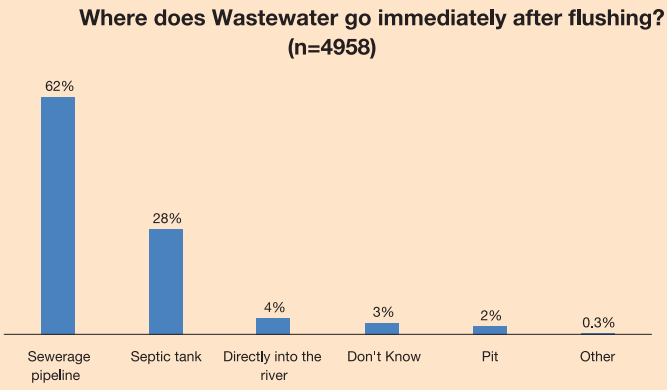
A recent public toilet constructed in Bhrikutimandap has fulfilled the accessible standards which is welcomed initiatives. Similarly, the in-house toilet constructed in the building of district coordination committee in Dhading district has fulfilled compliances of accessible standards in line with the accessible guideline.

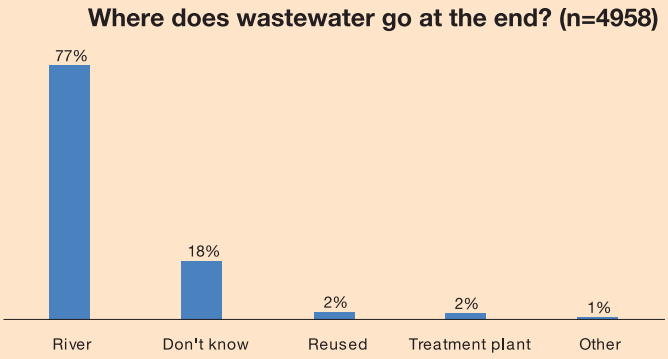
The universal access in the Sustainable Development Goals (SDGs), particularly in target 6.2 on sanitation can only be achieved if women, girls, the elderly and people with disabilities express satisfaction with their sanitation and hygiene facilities while tracking the progress.

Knowledge, Attitude and Practice of General Public on Wastewater Management in Kathmandu Valley

In an attempt to assess public understanding, ENPHO conducted Knowledge, Attitude and Practice (KAP) survey regarding wastewater management with the support of Paschim Paaila youth volunteers. Data from 4,958 random pedestrians was collected from 34 strategic locations within Kathmandu Valley.

Majority of the respondents identified that the major sources of wastewater generation is the 'toilet flush'. About 62% responded that wastewater goes into the sewerage pipeline immediately after flushing and a huge majority of the people, about 77% percent, said that the toilet flush ultimately ends up in the rivers.





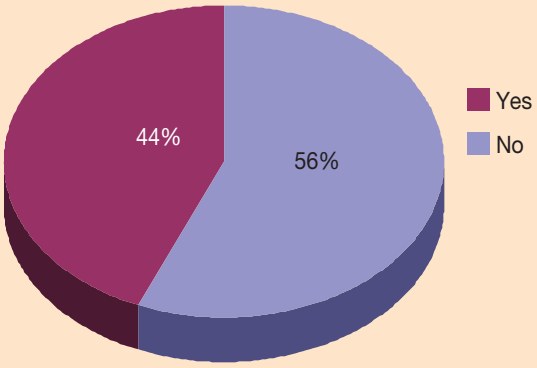
ENPHO Toilet Expo- World Toilet Day Celebration

Marking the World Toilet Day-2017, ENPHO organized Toilet Expo at Nepal Academy Hall, Kamaladi, Kathmandu on Sunday, November 19, 2017 from 10:00 am to 4:00 pm. The day was celebrated under the international theme of "Wastewater". The expo was an attempt to capitalize World Toilet Day 2017 to create a platform and sensitize the students and general public about importance of toilet, growing issue of wastewater and its effect on environment. Orientation program on importance of toilet and current sanitation situation of Nepal was also conducted. Models of various types of toilets and toilet pans promoted by ENPHO including wastewater treatment plants were also exhibited during the expo.

In addition to this, ENPHO with the support of UNICEF also organized Kathmandu Valley Level Inter School Drawing Competition to provide a platform for school students to showcase their artistic talent and knowledge on WASH. Rohit Kumar Jaiswal, a grade 10 student of Nepal Aadarsha Secondary School was declared as the winner of the competition. Likewise, Rohan Shrestha, grade 10 student

of Blue Bird School; Sujan Lama, grade 9 student of Shramik Shanti Secondary School and Jasmine Khaniwa, grade 10 student of Shree Ganesh Secondary School, were declared as second, third and fourth respectively. More than 150 individuals participated in the expo and observed the exhibition.

Have you heard about Wastewater Management?



Furthermore, more than 40 percent of respondents had not heard about wastewater management. Additionally, above 40 percent did not have any knowledge regarding the fact that wastewater can be treated. The results indicated that the knowledge about wastewater management including safe disposal and treatment amongst the people is very low. Additionally, only 8 percent of people had knowledge on the inclusion of wastewater management charges in current water bill.

While proper wastewater management including treatment and safe disposal is crucial, it is also equally important to generate awareness of general public on wastewater management. The support from the community people including all relevant stakeholders is vital in facilitating the process of sustainable wastewater management in rapidly urbanizing cities.

(For further information, Please contact at Resource Center Unit of ENPHO)

The Poo Journey

Shiva Khadka, 35, a residence of Dhungeni– Mahalaxmi Municipality depends on agriculture and the products from his farm helps him to sustain his livelihood. He lives with his wife and two children. "Earlier, I used chemical fertilizers and pesticides in my field which resulted increased yields of vegetables. However, later, I came to know and realize the chronic effects of the chemical fertilizers," Shiva said.

He came to know about Ecological Sanitation (EcoSan) toilets through one of the orientation programs conducted by ENPHO and immediately decided to construct one. Shiva, now, utilizes his toilet waste, both urine and faeces, as a form of organic fertilizers in his organic farming. He further shared, "People from various places come to buy my vegetables, which has equally improved by economic status. I am happy to increase my agricultural productivity and also to protect the environment and health of people."

Sanitation starts with toilets, but what happens after that is even more important: collecting, transporting, and treating waste safely. This #WorldToiletDay, think about supporting organizations like ours that are improving sanitation for everyone from #toilet2treatment.

Communities around the world are using new approaches and technologies to provide complete sanitation from #toilet2treatment. Together, we can help everyone have access to one of the most basic of all human needs. Happy #WorldToiletDay!