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Best Practices for Ensuring Total Sanitation

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Abstract

The large majority of Indian urban population is living without access to adequate water, sanitation, drainage and solid waste disposal services provides strong evidence that conventional approaches to environmental sanitation are unable to make a significant change in the living condition.

The need for searching for better and improved sanitation measures both "bottom-up" or "top-down" approaches is the need of the hour.

The study of the best practices like Community Led Total Sanitation (CLTS) and Household-Centred Environmental Sanitation (HCES) reveals that the community can be motivated and trained to use better sanitation facilities on their own efforts. The toilet tripod suggest good measures that can be used to ensure adoption of sanitation measures on a large scale and maintaining the balance between the community aspirations and available sanitation practices.

Integrated approaches must be developed through the scientific and systematic research and rational planning approach. This research work is an attempt to understand the best practices of the sanitation which can be replicated with due modifications in the small town.

Political will, model legislation and institutional development and change in the mind-set of people are necessary for increased awareness. As such, urgent redressal is important to ensure inclusion of all habitations with safe drinking water and safe disposal of wastewater.

Keywords:

Best Practices of Sanitation; Public Toilets; Community Toilets; Toilet Tripod; Total Sanitation; Sanitation Practices; Hygiene and Health

Introduction

The study of the best practices in the field of the sanitation gives us an overview of the practices that are currently used. This study aims to compare and study them so

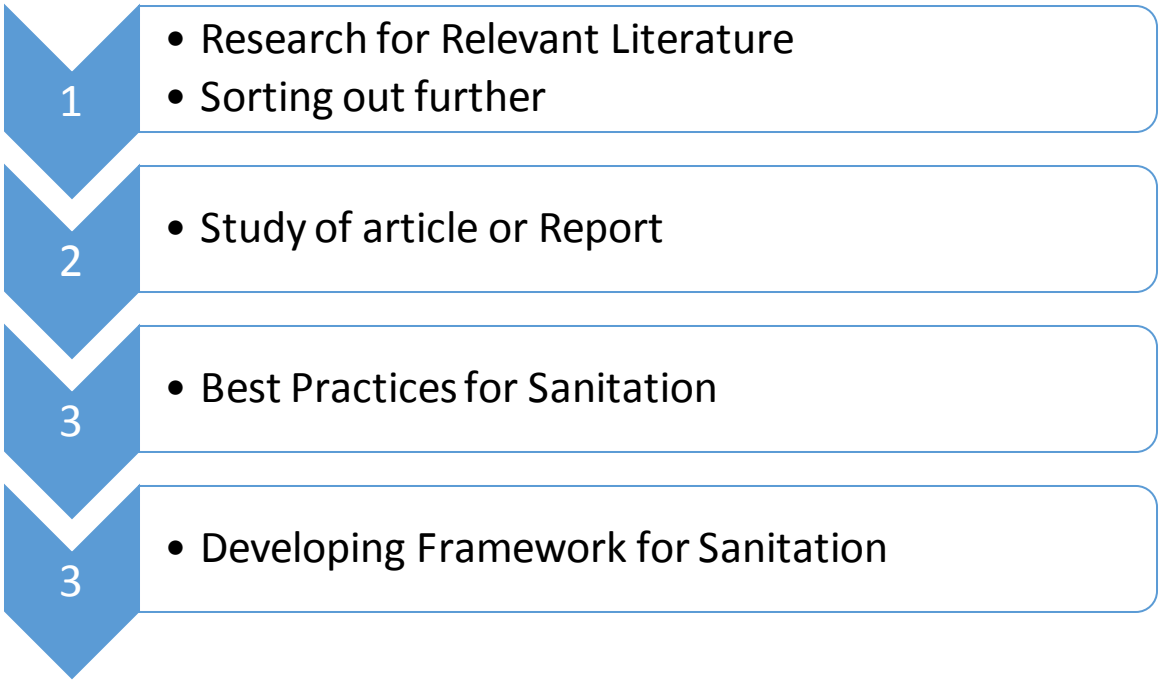
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as to evolve a framework for developing sanitation programme for small towns. There are many best practices undertaken in different countries and some of them are very popular. We will study some of them which are population and which can be used for the sanitation in community. The sanitation planning at community level is the best option to engage the users and make them aware about the various dimensions of the sanitation like, types of the toilets, different models, sanitary market, toilet construction, bio-toilets, eco-toilets etc.

This study will help us in developing a workable framework for the sanitation in the slums and community.

Methodology

This research is based on the literature study. The articles relevant to the urban sanitation and best practices of sanitation were studied. The research papers written in Indian context has been given priority over similar papers for others countries is to ensure that right balance of ethnographic perception and acceptance of the sanitation can be taken into account. The author has used these research papers as a basis for developing suitable best practices for the small town in India.



Aim and Objectives of the Study

The aim of the study is to develop a framework for assessing sanitation in urban areas.

The objectives of the study are as follows:

- To analyse the best practices of sanitation
- To assess the gap in the current practices and develop a framework for sanitation planning.

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This research work intends to make aware the professionals, decision makers, planners and sanitation engineers who are responsible for city planning and management and those who are involve in some manner for urban infrastructure provision including Non-Governmental Organizations (NGOs).

Literature Review- Indian Context

The planned development of the sanitation in urban areas though the provision of the effective sanitary arrangements that can be linkedto sustainable collection and transport and treatment of the excretato the point of re-use. Luthi et. Al (2011) suggest, "The ecological approached wherein it is suggested that the smaller urban centres, closer to therural hinterland, can use make provisions for re-cycle of the nutrients back to the agricultural fields".

The population in Indian towns are increasing due to the economic opportunities available in the urban system. The increasing population leads to increasing generation of waste in the urban areas. The ecological recycling of the waste is not possible in urban areas then hence the excessive waste accumulation leads to environmental problems,water pollution and problem to healthy living conditions. .



Figure 1 Mumbai's Shadow City. Some call the Dharavi slum photo dated May 2007 (Source: ngm.nationalgeographic.com accessed on Sep 7, 2014

"Poor sanitation facilities have impact on health and social life too. It has been observes that the lack of toilets makes women and girls vulnerable to some form of harassment when they are forced to defecate only after nightfall and in secluded areas"(UNICEF, 2008).

"The sanitation facilities in slums and squatters settlements is not adequate and majority of the urban population living in low income settlements use some form of on-site sanitation but many of these facilities are rudimentary and poorly maintained"(Lüthi, et al., 2011). Often the slums mushroom near the drains or water bodies of the outskirts of the urban settlements where excreta flows out from cesspools into the streets, is dropped indiscriminately through open defecation.

"Sanitation is one of the most neglected component of the urban system. The low prioriety of the sanitation has been attributed to the low prestise associated with it. Many people shy away from this topic. It has been observed that at the policy and implementation levels, sanitation continues to be neglected by municipal, national and international decision-makers"(Lüthi, et al., 2011).

"There are some good schemes and measures taken by some of the municipalities to ensure better sanitation. The Slum Sanitation Program (SSP) constructed 328 toilet blocks with more than 5,100 toilet seats in slums across

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Mumbai. At design capacity, these facilities serve the needs of 250,000 people. Empirical observations suggest that the actual number of users exceeds 400,000 people"(World Bank, 2006).

There are 1544 Community Toilet Complexes (CTCs) located in all the 12 zones of MCD(Sheikh, 2008). Whereas a study reveals that Water and sanitation facilities in unorganized colonies, particularly JJ clusters, are poor. "Only 21 % of colonies are covered with piped water supply and 10% are covered by sanitation. Though there is satisfactory level of infrastructure availability in unplanned settlements, but these facilities are non - functional in around 75-80% of the settlements. Further, around 85-90% of JJ clusters did not have even community toilets, forcing habitants to defecate in the open near the water bodies or drainage channels"(Centre for Environmental Planning and Technology, 2006).

There are some good public toilets complexes built during Common Wealth Games. One of such toilets can be seen in the given image.



Figure 2 Public Toilets in Delhi: A Modern Look (Access on 7 Sept 2014(Qumbet, 2014).

The National Slum Development Programme (NSDP) was launched by the Prime Minister in August 1996. The introduction to the guidelines of the programme says: "as far as slum improvement and upgradation are concerned. Experience shows that virtually none of the "State Governments have been able to provide sufficient funds for the scheme as a result of which there has not been much improvement and upgradation work in urban slums \except, perhaps, where external funding agencies like the Department for International Development (UK) were involved"(Sheikh, 2008).

"The Ministry of Urban Development and Poverty Alleviation, Government of India finalized the National Slum Policy Draft in April 1999. One point under the 'Physical Infrastructure Development' heading says that "ULBs (Urban Local Bodies) should avoid constructing community latrines within slum/informal settlements as these quickly degenerate on account of poor operations and maintenance (O&M) thus becoming counterproductive to public

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health. Where there is insufficient space for individual sanitation options (mostly where on-site disposal systems have to be adopted) group or cluster latrines with clearly demarcated and agreed household responsibility for O&M may be a suitable alternative option"(Ministry of Urban Development and Poverty Alleviation, 1999-2001)."

One of the Mission Objectives of Basic Services to the Urban Poor (BSUP) states that, "Provision of Basic Services to Urban Poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery through convergence of other already universal services of the Government for education, health and social security(JNNURM, 2005)."

"This sub-Mission is being taken up in only 63 selected cities: 7 cities with a 4 million plus population as per 2001 census population, 28 cities with 1 million plus but less than 4 million population and another 28 cities of religious/historic/ tourist importance"(JNNURM, 2005).

In spite many such schemes and programmes the sanitation condition in many towns are not good. This necessitate the search for better option and practices of sanitation which are successful in some countries. The next few sections will try to explore such options.

Best Practices for Sanitation

When the best practices of the sanitation for study where selected then it was kept in mind how operates and key factors or propositions that drive this theory into practice. Also, waste management and sanitation should turn waste into a useful resource and keep the urban system free environmental pollution. Here some of the best practices of the sanitation has been presented.

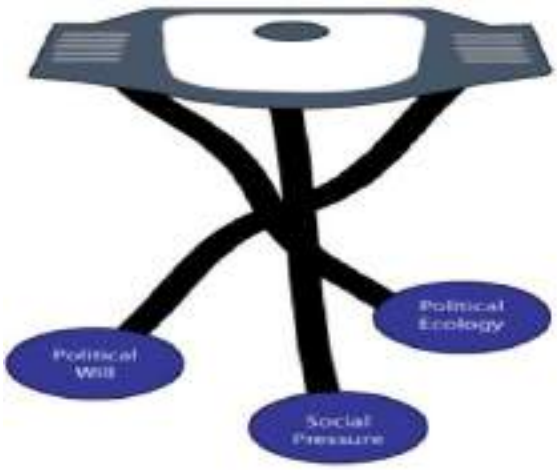


Figure 3 Toilet Tripod (Reilly & Louis, 2014)

Toilet Tripod

According to a study conducted by (Reilly & Louis, 2014)"The toilets tripod seeks to make use of the integrated approach to motivate public in using sanitation facilities. Their research shows that successful toilet adoption depends on three factors":

(1) Multi-scalar political will on the part of both governmental and NGOs);

(2) Proximate social pressure;

(3)
Political ecology

In this method of sanitation adoption, the community has to initiate person-to-person contact between when there is the political will for promotion of sanitation. The adoption can be accelerated through the

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initiatives of the NGOs and community based organizations (CBOs).

The research study was conducted in rural villages of West Bengal and Himachal Pradesh over the period September 2012 to May 2013.

This toilet tripod take into account the political will for change, social or peer pressure and the programmes and policies which can be beneficial in adoption and promotion of the sanitation. The researchers have given analytical study and the framework is more theoretical in nature than practical in use.

Community Led Total Sanitation (CLTS)

|"Community led total sanitation practices can ensure sanitation adoption among community as whole and the this being a collective work, all get benefited in long run in terms of better living conditions and hygiene. The community as whole decides to adopt and practice sanitation to make a clean and hygienic environment that benefits everyone"(Kar & Chambers, 2008).

The following are the basic steps for this sanitation promoting practice proposed by Kar & Chambers

Pre-triggering

Selecting a community

Triggering

Ignition moment

Post-triggering

Figure 4 Basic Steps for adopting CLTS (Kar & Chambers, 2008)

Action planning by the community

Follow up

Scaling up and going beyond CLTS

"Many communities in many counties are adopting this sanitation practice under the guidance of the Plan UK is a child-centred community development organization"(Kar & Chambers, 2008).

The simple to follow technique of this practice can be promoted at community level through the incentivizing of the community efforts through proper training and guidance.

Figure 5 ODF community of Vidyasagar colony inKalyani Municipality inWest Bengal, India proudly declared sanitation status of their neighbourhood (Kar & Chambers, 2008).

CLTS is now being implemented in at least eight of the 24 provinces of Cambodia(Kar & Chambers, 2008).

This technique of sanitation promotion practice has been used and promoted



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among countries like Bangladesh, India, Cambodia, Indonesia, Mongolia, Nepal, China and Pakistan in Asia; in Uganda, Zambia, Ethiopia, Tanzania, Kenya and Sierra Leone in Africa; in Bolivia in South America; in Yemen in the Middle East; and in other countries. It was started in 1999 and used for a long time. This sanitation promotion is still ongoing in some countries.

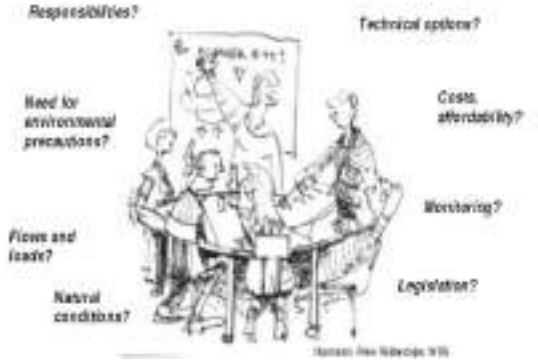
"The best thing that one find in this sanitation promotion practice is the engagement of the local people and assisting them in understanding the need for sanitation and training them in using the locally available construction techniques for making toilets. They first of all lay stress on 'triggering' which will surely help in gaining the support of the NGOs and other individual and organisations which are working in the field of sanitation and community development. This is evident from the case of Cambodia where government is supporting this campaign"(Kar & Chambers, 2008).

Open Wastewater Planning

Open Wastewater Planning is a methodology developed in Sweden by (Bodik & Ridderstolpe, 2007). "The framework for this method is derived from the "Best-Available Technology" principle in which the technology which is most economical and feasible should be chosen"(Dijk, Mwalwega,, & Ssempebwa, 2014). This practice tries to develop a better understanding of the objectives for having a sanitation system in the specific local context. The various options can then be compared based on the stated objectives for the system and a selected solution that will best meet them. Through this process it promotes locally adapted solutions and the development of new technologies as it encourages planners to consider the whole system and its functionality rather than only one specific technology.



"Open Wastewater Planning encourages a participatory approach that is led by an independent expert who has a good knowledge of sanitation solutions and the local policy context. Although it takes



extra time and money in the early planning phase, it can be argued that such

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an approach is more cost-effective and leads to more sustainable choices in the long run"(Bodik & Ridderstolpe, 2007).

The process is performed in five steps suggested by (Kvarnström & McConville, 2007):

1. Problem identification
2. Identification of boundary conditions
3. Terms of requirement
4. Analysis of possible solutions
5. Choice of the most appropriate solution

Figure 6Open dialogue with stakeholders on requirements and means (Rivera, 2008).

An analysis of SWOT (Strengths, Weaknesses, Opportunities and Threats) is undertaken by experts and community members as a team(Rivera, 2008). The practical considerations are more geared towards user concerns and include costs, technical reliability, user satisfaction, and management issues(Lüthi, et al., 2011).

Open Wastewater Planning (OWP) framework led the municipality to explore a wider range of solutions to problems with the water supply and sanitation services in the island of Lambarö in Sweden.

Household-Centred Environmental Sanitation (HCES)

HCES was developed in the year 2000 by a representative expert group under the auspices of the Water Supply and Sanitation Collaborative Council (WSSCC) in Geneva. HCES is based on the Bellagio Principles(Water and Sanitation in Developing Countries (Eawag), 2005) which focus on human dignity and quality of life, involvement of all stakeholders in decision-making, and waste considered as a resource with maximum use of recycling and reuse potential. The HCES planning approach deals with the most immediate social priorities of rapidly urbanizing areas of the developing world, for example sanitation, water and waste. It is a radical departure from the centralized planning approaches of the past and recalibrates decision making to include those who count most: the users.

A precondition for adopting the HCES approach includes understanding and working towards a so-called enabling environment(Lüthi, et al., 2011).

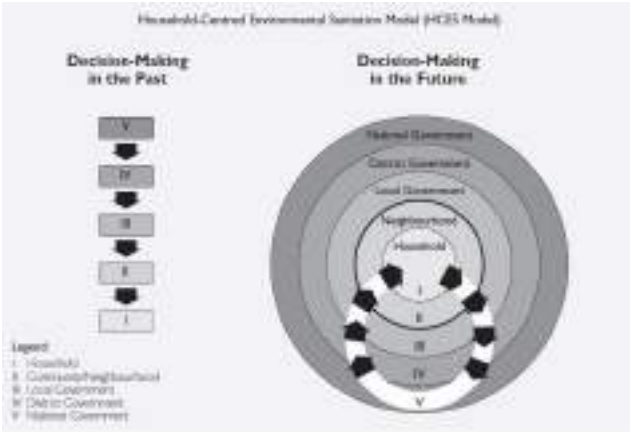


Figure 7 Household-Centred Environmental Sanitation Model (HCES Model) (EAWAG, 2005)

The HCES approach has recently been field-tested in several towns in Africa, Asia and Latin America, with a focus on unserviced urban and peri-urban settings.

The HCES has been successfully implemented in urban areas include a dense informal settlement in Kangemi,

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Nairobi, a peri-urban settlement on the city fringe of Dodoma, Tanzania; an inner-city unserved settlement in Vientiane, Laos and a small town setting in Burkina Faso.

The basic stages or steps for HCES(Lüthi, et al., 2011)(EAWAG, 2005)

Step 1; Process ignition and hygiene promotion

Preparing the ground and "triggering" the community for action, initial stakeholder assessment.

Step 2; Launching of the planning process

Identify key actors at each level. Assess the range of interest groups, carry out stakeholder analysis, and agree on project committee or task force.

Step 3; Detailed assessment of the current situation

Analysis of existing services/infrastructure and the enabling environment. Diagnosis of main problems and deficiencies.

Step 4; Prioritising and Validation

Assessment of people's priorities using a variety of tools (pocket voting, participatory assessments, focus group discussions, etc)(EAWAG, 2005).

Step 5; Service options for environmental sanitation

Identify possible solutions and technology options based on systems perspective. Build pilot technologies to give beneficiaries the opportunity to test and assess pre-selected options. Allow informed choice before making final selection.

Step 6; HCES action plan

Produce planning document which details how to implement the agreed objectives including institutional, financial, and technological and maintenance considerations.



Figure 8 Images of HCES process in Dodoma, Tanzania. Simple Pit then workeshop and the result is improved toilets in next few weeks. (Lüthi, et al., 2011)

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Step 7; Implementing the action plan

Implementation of the environmental sanitation service plan using measurable indicators and benchmarks

Biogas toilets

"The anaerobic digestion of faecal matter has been applied in India and Kibera slum (Kenya) for economic gain from the produced biogas as energy source. An innovative Sulabh biogas toilet that utilises anaerobic digestion to produce biogas from human excreta was developed in India and has been recognized for contributing towards the sanitation MDG target" (Pathak, 2009). The facility consists of a toilet connected to a digester and biogas is stored under the fixed dome by hydraulic displacement of the digesting slurry inside the digester (Sulabh International Social Service Organisation, 1999). "This technology has been implemented in slums in India at households for excreta disposal and for use in slums as public toilets linked to a biogas plant or effluent treatment systems for nutrient recycling" (Jha, 2005).

This sanitation practice is more common in rural areas in India and some of the African countries are adopting this technique of sanitation.

Sulabh flush Compost Toilet

The Sulabh flush compost toilet is one of the sanitation systems that have been used in urban slums (Sulabh International Social Service Organisation, 1999). It is a two pit pour flush toilet made of brick work and concrete and has been developed in India for safe disposal of human excreta (Pathak, 2009).



Figure 9Sulabh biogas toilet system in India: public toilet linked to a digester (Pathak, 2009).



Figure 10Sulabh biogas toilet system in India: public toilet linked to a digester and effluent treatment part of the system (Pathak, 2009).

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Figure 11 Sulabh Toilet Complex in Raipur. Photo Coutersy Indiawaterportal.org accessed on 7 Sept 2014

"Sulabh toilets have sludge holding pits that are not water proof to allow for exfiltration and should not be built in areas with a high water table and less than 30 m upstream of a drinking water source. Sludge stored in a pit for a period of 2 to 3 years undergoes composting after which it is safely removed as a dry manure or soil conditioner with low levels of pathogens that may not pose a risk during handling" (Sulabh International Social Service Organisation, 1999). This type of sanitation facility can also be used in urban slums located in areas with low water table since it is simple and inexpensive in terms of construction and operation and uses less water.

Peepoo bag

"Peepoo bags were developed as a result of the unhygienic practices of disposing human waste in polythene bags commonly referred to as "flying toilets" because they are used and disposed of indiscriminately. The peepoo bag has outer dimensions of 15 × 40 cm2 with a gauze liner and is coated on the inside with a film of urea (4 g) as the sanitising agent" (Vinnerås, Hedenkvist, Nordin, & Wilhelmson, 2009)(Katukiza, et al., 2012).



Figure 12The peepoo bag with the outer bag folded down; holding the bag with hand covered by inner foil; and the used bag and use of peepoo bag in slums (Kenya) (Vinnerås, Hedenkvist, Nordin, & Wilhelmson, 2009).

"The concept is that by the contact between urea and faeces, breakdown of urea into ammonium and carbonate raises the pH and triggers hygienisation resulting in elimination of viruses, bacteria and parasites over time, depending on the environmental conditions". (Vinnerås, Hedenkvist, Nordin, & Wilhelmson, 2009).

This sanitation practice has been widely used in Kenya and it has been successful in creating awareness and adoption of safe sanitation practices.

From the study of the above practices of the sanitation system, it can be interpreted that it is important to find indigenous solutions to problems rather than just importing existing solutions of developed nations. Cost-effective and culturally acceptable solutions with less human and financial resources and easy maintenance are required as per local conditions of the area where the project has to be implemented. The evolution of water and wastewater management technologies and practices is a continuous process. Water resources of the world, particularly in the developing countries like India, are no more in plenty, rather in many situations it has become a scare commodity. Hence, adoption of better alternatives for sanitation are required. Increasing urbanization, unplanned development, over-exploitation of

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groundwater resources and deterioration in the quality of surface water have thrown enormous challenges in the sanitation.

Discussion

"The world has celebrated and forgotten the International Year of Sanitation 2008, when the world leaders pledged to ensure the reach of sanitation facilities to 40 per cent of the world's population who continue to live without improved sanitation"(UNICEF, 2008).

The sanitation development strategies outlined in the 'Sustainable Sanitation for Cities' (Lüthi, et al., 2011) encourages the development of sanitation systems:

• Based on the principles of a closed loop recycling economy and the 3 Rs (reduce, reuse, recycle);

• Resource efficient and reduce long-term dependency on energy and transport costs;

• Open up new options and opportunities for local job creation; and

• Based on the multiple use of urban space and integration of sanitation and reuse systems in urban design.

We can anlalyse that how this framework talks in a holistic manner. First of all, addresses the basis problem of sanitation i.e. how to manage the liquid waste of the urban centres. The proposition for use of the techniques for reducing, reusing and recycling the waste is a viable solution. The waste water from the bathrooms i.e. grey water can be separated from the black water (latrine and sewer). The use of the eco-toilet papers can reduce the consumption of water. The facilities like biogas plants and decentralized waste management system can be used to recycle the waste in a productive manner.

The sanitation facilities which are resource efficient need to be explored. The training of the local people for managing and maintaining the sanitation facilities can generate employment too. The best way to use the urban space is the multiple use of the same space. The public toilet complex can be good spot for advertising for commercial and awareness campaign for keeping city neat and clean.

In this content it will be good to recall the four Bellagio Principles namely

- Human dignity and demand responsiveness,
- Good governance and effective participation,
- Integrated waste management processes
- And the maxim that waste should be managed as close as possible to its source and diluted as little as possible(Water and Sanitation in Developing Countries (Eawag), 2005).

Scholars have highlighted that toilet adoption comes from providing the right kinds of toilet designs

(Devine, 2009), community involvement(Kar & Chambers, 2008), involvement of the state innovating location specific solutions. top-down" and "bottom-up" planning approach by incorporating both the participatory approaches of collaborative planning and expert-led thinking needed for criteria

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planning(The Water and Sanitation Program, 2005).“Another scholar lays stress on the need for more public toilets especially for women. There is no denying the fact that adequate facilities with regard to public toilets need to be provided to the vast population living in slum and resettlement areas and more so for women. The provision of basic facilities like toilets would ensure quality health, both physical and mental, which is the foundation of a developing society”(Sheikh, 2008). The researcher further adds that only 4% of the public urinals in Delhi have facilities for women. Women face a constant risk of being sexual harassed while going to the toilet outside (ibid).

When private service providers are given contracts for running and maintenance of the sanitation then they should be allotted area wise and not sector wise like construction to one, maintenance to other and revenue collection to another one. “The policy of contracting out the whole sanitation package, integrating health and hygiene education, community organization, planning, design, construction and community capacity building for operation and maintenance under a single contract”(World Bank, 2006).The study of the Slum Sanitation Programmeundertaken in Mumbai demonstrated the importance of adopting an integrated approach to slum sanitation.

Poor sanitation in urban slums results in increased prevalence of diseases and pollution of the environment(Katukiza, et al., 2012).

“There are so many technological options that most social and economic conditions can be met. Creativity is needed to find the appropriate technology and the best way of implementing, operating and financing”(Langergraber & Muellegger, 2005).

Framework for Sustainable Sanitation Practices

“The sustainable sanitation system should ensure that the nutrient rich organic wastewater is returned to urban or peri-urban agricultural land(Lüthi, et al., 2011). When improving an existing and/or designing a new sanitation system, context specific sustainability criteria should be identified that refer to ecological, economic and social aspects”(SuSanA, 2007).

Based on the best sanitation practices and understanding from the study of different research papers on sanitation. It is natural to evolve a framework that can be used for assessing or evaluating the sanitation practices in a town. Different cities of different sizes can afford and implement sanitation plan which can be which might be centralized or decentralized, conventional or closed-loop, high-tech or low cost, centralized large treatment or decentralized smaller treatment plant.

Appropriate solutions can be developed based on the adjustment of the local basic conditions with available technologies, enabling environment such the social, legal and institutional framework.

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Health and Hygiene

"One of the criteria for assessing the sanitation is the condition of the health and hygiene in the locality or town this includes the risk of exposure to pathogens andhazardous substances that could affect public health at all points of thesanitation system from the toilet via the collection and treatment systemto the point of reuse or disposal and downstream populations"(Lüthi, et al., 2011).

Technology and Operation

The sanitation can be high tech or low cost and this has to be studied to see if the technology adopted for sanitation is appropriate or not. "The cost of the operation and maintenance is crucial as this will decide the replicability of the system in other areas or towns. There must be consideration for reduce life-cycle costs by facilitating operation and maintenance" (O&M)(Jorgensen, et al., 2008). "One need to assess the functionality and theease with which the entire system, including the collection, transport,treatment and reuse and/or final disposal, can be constructed,operated and monitored by the local community and/or the technicalteams"(Lüthi, et al., 2011).

Financial and Economic issues

"The cost of the operation and maintenance of the sanitation system often demands for the payment of the user fee or monthly tarrif by individual households or communities. Here the one need to assess the construction, operation, maintenance of sanitation services"(Lüthi, et al., 2011).

Such external costs are for example environmental pollutionand health hazards, "While benefits include increased agriculturalproductivity and subsistence economy, employment creation, improvedhealth and reduced environmental risks. There should be cost recovery prospect of the sanitation system"(Dijk, Mwalwega,, & Ssempebwa, 2014).

Socio-cultural and Institutional aspects

The sanitation system get socio-cultural acceptance and appropriateness(Bolaane & Ikgopoleng, Elsevier). "Positive perceptions, gender issues and impacts on human dignity need to be considered. Such systems should be in compliance with the legal framework andinstitutional set-up of the town"(Lüthi, et al., 2011).

Environment and Natural Resources

The sanitation system should be constructed from the locally available materals as this will reduce the cost. "This will involve the required energy,water and other natural resources for construction, operation andmaintenance of the system"(Lüthi, et al., 2011).

There should be assessment of the degree of recyclingand reuse of the wastewater; "Returning nutrients and organic material to agriculture. In this regard the production of renewable energies such as biogas can be explored. Some traditional pit latrines are designed to let the liquids percolate into the soil which may cause

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pollution of soil and groundwater"(Katukiza, et al., 2012).

Conclusions

The study of the various reports and articles show us the real scenario of the urban sanitation and the available best practices for managing the urban sanitation in suitable manner.

The toilet tripod can be a tool for better understanding the road blocks in the adoption of the toilets and sanitation practices and it points the necessary connections between environmental and political will for promotion of sanitation(Reilly & Louis, 2014).

The study of the Community led total sanitation practices can ensure sanitation adoption among community as whole and the this being a collective work, all get benefited in long run in terms of better living conditions and hygiene.

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