
HINDUSTAN

VIKAS CHOUDHARY / CSE

Water & SANITATION

4

PREVIEW

Open defecation
Local action, not just upfront subsidy, is needed to make India open defecation free

Monitoring waste
Do we have a plan for disposing the waste discharged from toilets?

Universal sanitation
Can usage be ensured without providing well designed toilets?

Wetland protection
States across India have failed to implement wetland protection rules, announced six years ago

Water equity
To provide access to safe drinking water, risks to water sources need to be assessed and managed

OPEN DEFECATION
Enable communities

To achieve zero defecation, India needs to practise community-led sanitation in its true letter and spirit

VIKASH CHOUDHARY / CSE

KAMAL KAR
Chairman, Community Led Total Sanitation Foundation

Food for thought: although India has the highest sanitation budget among developing countries, it is home to the highest number of people who defecate in the open, globally. The 65,000 tonnes of faeces disposed unchecked everyday, cause harm not only to the environment, but also to public health and the economy. Not only does India rank first in open defecation (OD) ranking globally, it is far ahead of the second highest country, Indonesia, by at least 500 million people. While Pakistan has 41 million open defecators, Nepal has 11 million and China has 10 million. In a country of 564 million open defecators, almost twice the number are active mobile phone users. No wonder then India's sanitation crisis is a global concern. The important question to ask is whether the current approach is appropriate to achieve universal sanitation coverage by October 2019, as promised by the Prime Minister Narendra Modi.

Problems with current approach

One of the main problems with the current approach is policymakers and planners' belief that since the poor do not understand the importance of sanitation, they need to be

prescribed the technology and given subsidy or free toilets to improve their condition. So, for decades, the government's focus has been on constructing free or subsidised latrines. The total number of toilets constructed in the last five decades under schemes such as Central Rural Sanitation Programme (CRSP), Total Sanitation Campaign (TSC), Nirmal Bharat Abhiyan (NBA) and the Swachh Bharat Mission (SBM), along with other national and international non-profit programmes might be the total number of households in the country, if it has not exceeded already.

To achieve the target of SBM, 65,000 toilets have to be built everyday by September 2019, according to Water Aid, a non-profit. Since 1986, India has spent more than US $3 billion on constructing toilets, according to the Ministry of Drinking Water and Sanitation. It is now gearing up to spend an additional $31 billion over the next four years under SBM. States with the worst sanitation indicators-Uttar Pradesh, Madhya Pradesh and Bihar, spent the most amount of public money over the past 15 years. Uttar Pradesh alone accounted for nearly a fifth of the sanitation budget since 2001. It was one of the few states which consistently spent over 90 per cent of the allocated money every year.

However, studies show that more than 40 per cent of the latrines, which were built free or with subsidy, were not used at all. Those in use were used by women, the elderly or sick, when they could not go out to defecate. OD is rampant in rural areas and it is hard to find a village without unused toilets or sanitary hardware lying unused. It is quite common for people to practice OD even when they own modern toilets. These are only used by acquaintances from towns and cities. Relics of unused free toilets can also be seen in Solomon Island, Sierra Leone, Mongolia, Madagascar, Burkina Faso and Bolivia.

It is important to note that in spite of major efforts such as a national campaign by the Prime Minister, a US $1.5 billion loan from the World Bank and a sanitation tax (Swachh Bharat Cess), neither toilet usage nor behavioural change has been achieved, commensurate with the resources and efforts invested. There are no improvements in public health either. India carries the highest burden of pneumonia and diarrhoea deaths in children. One out of five children dies due to pneumonia and diarrhoea in India. In 2015, of the global 5.9 million deaths of children below five years, pneumonia was the top killer at 16 per cent, while deaths due to diarrhoea accounted for 9 per cent. According to the United Nations Children's Fund (UNICEF), 48 per cent children, which is almost half, are stunted and malnourished in India.

Community-led approaches

A major paradigm shift was seen in the early 2000s with the emergence of Community Led Total Sanitation (CLTS). The need to achieve sustained and collective behavioural change through community involvement was acknowledged globally. CLTS is now practiced in over 70 countries in Asia, Africa and Latin America, with at least 25 which have adopted CLTS as their national strategy. Today, more than 45 million people live in an open defecation free (ODF) environment.

CLTS not only fast tracked access to basic sanitation through direct involvement of thousands of villages in each country, but it also empowered governments of poorer countries to provide ODF environments, thus saving them from illnesses and ill productivity.

Countries with limited resources in Asia and Africa such as Bangladesh, Nepal, Timor Leste, Ethiopia, Kenya, Malawi, Mali, Chad and Liberia realised that a top-down approach, which was focused on donations and construction, created overt dependence on external resources. These programmes divided the community on the basis of a family's eligibility to receive subsidy, which was based on criteria determined by outsiders, such as above poverty line or bellow poverty line status. Without involving the community, the programmes were meaningless. But the adoption of CLTS not only resulted in fast progress in sanitation, but also helped multiply the limited funds with community contribution.

More than 40 countries, including our neighbours, have changed their national sanitation strategies from upfront subsidy to CLTS. From 35 per cent OD in 1999, Bangladesh recently achieved more than 99 per cent access to basic sanitation. Nepal adopted a zero subsidy approach a few years after implementing a local empowerment model in Hetauda and other

SOUTHERN
Asia accounts for 34 per cent open defecation, of which India accounts for 26 per cent

TO ACHIEVE
the target of SBM, 65,000 toilets have to be built everyday by September 2019

districts. Today, half the country's village development committees are ODF. Pakistan too achieved its Millennium Development Goals (MDG) target in sanitation through CLTS and has abandoned subsidies. Sri Lanka has also wiped out OD.

In India, toilets remain unused because community empowerment is undermined. This is in spite of the fact that toilet subsidies, which currently amounts to ₹12,000 per household, increased at least three times over the past decades. Tasked with implementing sanitation programmes, the Water and Sanitation department, under the Rural Development Ministry, focuses only on infrastructure, ignoring public health improvements.

Although state governments can customise the scheme, their progress is still evaluated on the basis of number of toilets constructed and total money spent. Moreover, the percentage of funding allocated to 'behaviour change' under SBM has been reduced to 8 per cent from 15 per cent in Nirmal Bharat Abhiyan (NBA).

Create an enabling environment

It is time India seriously reviews its sanitation strategy. The good news is that zero defecation has been achieved by countries not as resourceful as India. To fast track access to basic sanitation and make India ODF, here are a few recommendations. It is important to note that these cannot be achieved without political will.

We must ensure an enabling environment, without which community empowerment becomes futile. Local action cannot be initiated when there are subsidies and prescriptions dictated by outsiders. Except for Himachal Pradesh (HP), CLTS is not being practiced in its actual spirit in the country. In just three years, sanitation in HP increased from 42 per cent to more than 80 per cent. An enabling environment includes a policy which is decentralised, community-led and allows the community to work with their resources and capabilities.

It is also important to truly understand local empowerment. Merely labeling CLTS a community-led approach is futile. Making money the central driver of change will only shift the focus away from behavioural change. There is a dire need to change the monitoring indicators to measure progress. But there is no need to follow a particular approach as long as it focuses on outcomes. Cost effective schemes which improve public health must be welcomed. Models which blend local empowerment with subsidy have worked in the past.

A decentralised approach should be facilitated by ensuring the involvement of natural leaders and community consultants as agents of change. Empowering state governments is equally important. Thus, chief ministers and top political leadership should be encouraged to learn from neighbouring countries and states. This can be done by organising a national consultation on sanitation where leaders from poorer countries from Asia, Africa and Latin America share their experiences of the community-led sanitation approach. ■

FROM THE ARCHIVE

Mission possible

India has been struggling to achieve universal sanitation coverage since 1986, when it launched the Central Rural Sanitation Programme, a supply-driven scheme with subsidy. But handing out subsidies has never really worked.

In 1996-97, the Indian Institute of Mass Communication, in Delhi conducted a comprehensive survey on knowledge, attitude and practices in rural areas. The survey showed that only two per cent respondents acknowledged subsidy as the major motivating factor, while 54 per cent claimed to have moved to sanitary latrines due to convenience and privacy. In fact, 51 per cent respondents were ready to spend up to ₹1,000 to acquire sanitary toilets. The Central government, however, ignored the message. Its sanitation programme was a no-gain toilet construction scheme. India built millions of toilets but people could not use them. Of the total toilets built since 1986, 20 per cent are defunct. In 2008, Prime Minister Manmohan Singh said 50 per cent of the toilets built under the government's sanitation programme were not in use. A 2010 study for MDWS, non-profit Centre for Media Studies found that poor construction quality and unfinished toilets were the reasons for the gap between access and use.

Down to Earth, 16-31 January, 2014

FAECAL SLUDGE
Who will clean the shit?

Amid the toilet building frenzy, the Centre has ignored waste treatment, end use and its disposal

VIKAS CHOUDHARY / CSE

SURESH KUMAR ROHILLA, BHITUSH LUTHRA, MAHREEN MATTO & CHHAVI SHARDA

For years, successive attempts have been made to make India cleaner. In 2012, the Nirmal Bharat Abhiyan (NBA) was launched, with a focus on building toilets in rural India. In October 2014, NBA was restructured into the Swachh Bharat Mission (SBM) to give a new thrust to the sanitation programme. SBM, which has two sub-missions, Urban and *Gramin*, is seen as dedicated effort to set and implement tangible targets in water, sanitation, hygiene and behavioural changes. However, with the advent of SBM, the focus has been shifted from sewerage networks to sanitation. Although some headway has been made to make India Open Defecation Free (ODF), by emphasising on the number of accessible toilets in the country, SBM is ignoring an important issue. The quality of life will surely improve with increased number of toilets, but it would also mean an increase in water demand and hence, an increase in waste water generation.

Inadequate planning for waste management

One of the important challenges of SBM is to provide suitable technology and ensure its application. For instance, in a high rainfall state like Goa with *khazan* lands, or coastal

wetlands reclaimed from mangroves, a high-water-table and 105 km of sandy-coastline, using twin pit toilets is a disaster because it pollutes the groundwater via seepage. Using septic tanks followed by soak pits may not be the perfect solution either as the soak pit leaches the partially treated effluent into the water table. Bio-digester or bio-tanks are relatively newer technologies and comparatively expensive. Currently people lack the skills to construct, operate and maintain these toilets.

Moreover, all the on-site sanitation systems approved under SBM (urban), septic tank, twin pit, bio-tank and bio-toilets, fail to monitor the movement of the discharge and desludged faecal sludge (FS). The lack of a plan for the waste (solid and liquid) of these systems means that it often ends up into waterbodies unchecked and pollutes the groundwater through different pathways.

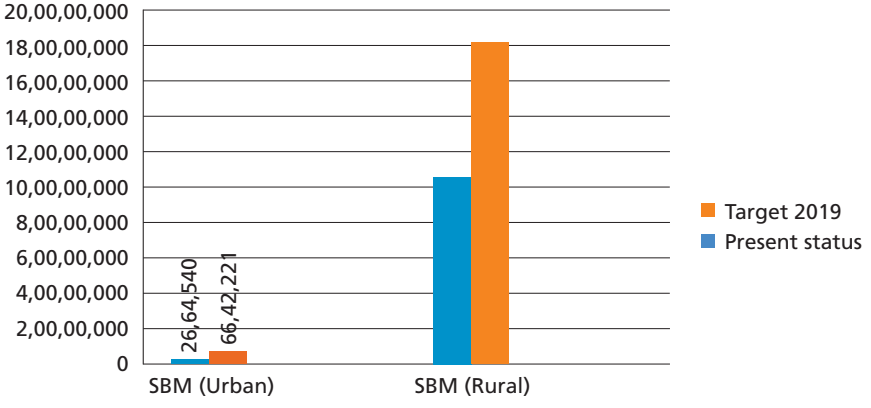
According to a 2015 report by the Central Pollution Control Board (CPCB) on wastewater treatment, India had the capacity to treat only 30 per cent of its wastewater. A 2009 report by CPCB shows that large cities have about 51 per cent of the required wastewater treatment capacity, as opposed to only 17 per cent in small cities. This is a concern because untreated wastewater can pollute the environment, particularly drinking water sources such as lakes and rivers, causing health hazards. What aggravates the problem is the lack of access to adequate public health facilities and resources in small cities.

To achieve SBM's target by 2019, 100 million individual toilets, both urban and rural, have to be built, apart from several thousand community toilets. If it achieves 80 per cent of its target, there will be nearly 80 million new toilets across the country. In a survey done by the Centre for Science and Environment (CSE), it was found that most of the Urban Local bodies (ULBs)/panchayats install twin pit technology, as it is one of the cheapest options. And if 80 per cent of the toilets are connected to the twin pit technology and the rest are connected to a septic tank, or a bio-digester, or bio-tank, the number of pits dug into the earth will amount to 128 million. Since these pits are unlined, 2.56 billion litres of untreated liquid would leak into ground daily and may pollute groundwater (see 'Faecal waste management' *p96*). Due to improper design, paucity of funds and skilled labour, the faecal sludge, which needs to be desludged would need further treatment and proper disposal.

If we assume that each toilet is used by four-five users, then these pits would have to be desludged within two-three years and the quantum of sludge which India would need to take care of would be roughly 256 billion litres. This would mean taking care of 341.3 million litres of faecal sludge daily. Unfortunately, India is not yet prepared to handle this amount and worse, there is no planning to deal with the problem. The remaining 20 per

NUMBER OF TOILETS BUILT

None of the on-site sanitation systems can monitor the movement of the waste generated



Source: http://www.swachhbharaturban.in/sbm/home/#/SBM, http://sbm.gov.in/sbmdashboard/Default.aspx and https://www.thequint.com/india/2015/08/05/swachh-bharat-who-built-more-toilets-upa-did-better-than-nda
Note: These figures are updated daily. For the latest figures, please visit the source

FROM THE ARCHIVE

Excreta's journey to pollution

Our planners want a sewerage system, which will connect toilets the flush variety, the water closet to laid-out, concrete underground sewers. This system, it is believed, will magically connect the waste to the treatment plant, which will then treat the sewage and dispose it of in the river or the neighbouring water body.

But we are not learning lessons from cases where sewerage systems are failing to keep up with the excreta challenge. The problem is the current sewage collection and conveyance paradigm is based on centralised systems. These rely on using a large quantity of clean surface and groundwater to transport a small amount of human excreta through expensive sewer lines to an expensive sewage treatment facility, which cannot cope with the amount of waste generated and releases it untreated into the environment. In this way, this system has become part of the environmental problem and not the solution.

The capital intensity of the waste system results in an arrangement whereby cities can only provide for a few and not for all. Most cities cannot afford a sewage drainage system, let alone a sewage treatment system.

Waste treatment needs capital investment in infrastructure. More importantly, it needs funds for operation, particularly to pay for energy costs of pumping and treatment. The costs of capital investment or the costs of operation and maintenance are not paid for by even the richer users, who use water maximally and thus generate most of the waste.

Moreover, large parts of our modern cities remain unconnected to the sewerage system, for people live in unauthorised areas or slums where municipal services do not reach. This is the situation that gives rise to the political economy of defecation, the condition where the rich (who are also the sewage-connected) are subsidised, not the poor.

Currently, India has an installed capacity to treat roughly 30 per cent of the official excreta generated. (The sewage generated in unauthorised slums or settlements is called illegal sewage; city municipalities refuse to consider it in their scheme of things.) But some of these plants do not function because of high recurring costs electricity and chemicals. Those that do function cannot because they have no sewage to treat. This bizarre situation arises because, like water pipelines, sewer pipelines have to be built and then maintained. But most of our cities, old and new, do not have underground sewerage systems. Even if they do, the pipes are old and defunct. Which means, actually only 20 per cent of the human excreta cities generate is treated.

The final blow comes when sewage, cleaned through expensive treatment, is let back out into drains, which carry untreated sewage of the majority. In a situation where municipalities are already not recovering the cost of supplying water, forget sewage treatment, such a blow is indeed cruel. The end result is India drowning in its excreta. Changing ways to the future we will have to think differently.

The challenge is twofold. Rich cities of the poor world will have to invest in efficiency so that they do not, first, become water-wasteful and then learn the science and art of efficiency. They will also have to invest in managing and treating wastewater. The objective is to re-invent the most modern waste management system so that it reuses every drop of water discharged at costs that can be afforded by all.

Firstly, we will have to spend less on bringing water to our houses. In other words, cut the length of the pipeline to reduce electricity and pumping costs and the ubiquitous leakage loss. This means we will have to revive local water bodies and recharge groundwater, so that we can source water from as close as possible.

***Excreta Matters*, Centre for Science and Environment, 2012**

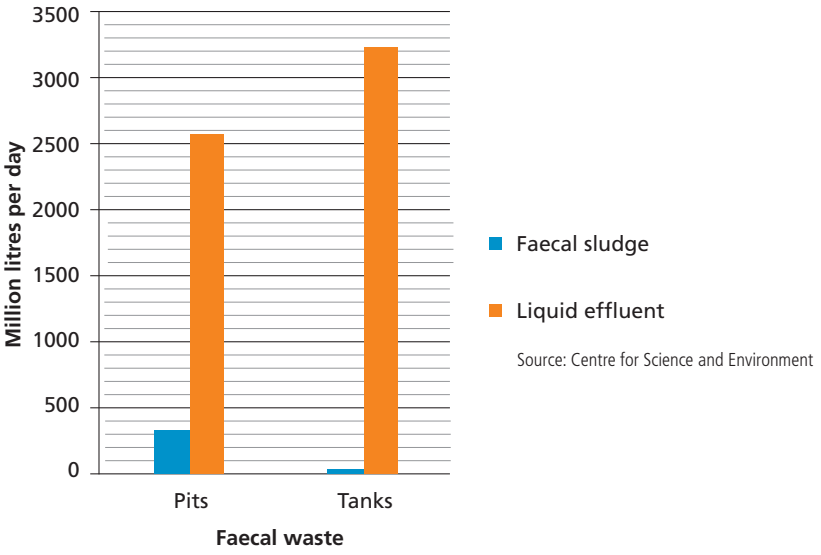
cent toilets with other technologies would also generate waste water and/or faecal sludge, which would require proper management. Roughly 320 billion litres of wastewater would be generated on daily basis if we assume it to be connected to flush toilet. Out of 20 per cent, if 10 per cent are connected to septic tanks, then 42.6 million litres of septage would be generated per day. These numbers do not even include the quantum of waste that would be produced from community and public toilets.

The Manual Scavenging Act, 2013, which prohibits manual cleaning of septic tanks and sewers, suggests elimination of insanitary latrines. Even if SBM converts all insanitary latrines to sanitary latrines, it would increase the possibility of manual scavenging by increasing the number of toilets.

India should learn from South Africa, which had initiated a similar campaign in the 1990s, but without proper planning for sludge management. However, in 2010, they researched about pit filling rates, characteristics of faecal sludge (FS), effectively emptying

FAECAL WASTE MANAGEMENT

If 80 million toilets are built by 2019, 2.56 billion litres of untreated liquid will leak daily into the ground



Source: Centre for Science and Environment

pits, treatment and reuse of FS, innovative operations and maintenance (O&M) models.

As we move towards the target year, we will improve living standards, but at the cost of environmental degradation. Merely achieving ODF misses the bigger picture. By constructing so many toilets and pits, we are just holding back the problem, not resolving it. Thus, it is time we bring into focus discussions about the management of the waste of these toilets. This will ensure not just an ODF India, but also pollution free water bodies, cities and villages. It will also help achieve the aims of the Sustainable Development Goal 6, which includes improving water quality by reducing pollution, eliminating dumping and minimising the release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycle and safe reuse globally by 2030.

Thus, efforts should be made to ensure systems under SBM should be designed according to local conditions. Pits or tanks should be accessible for operation and management (O&M). Research should be conducted to understand pit filling rate and also to understand the physical, chemical and biological characteristics of faecal sludge (FS). The best treatment methods for both liquid and solid waste should be identified and decentralised solutions to promote end-use of by-products should be implemented. To recover the O&M cost business models for the by-products should be promoted. Lastly, the roles and responsibilities of those tasked with the emptying, transporting and treatment of FS should be clearly defined.■

RESOURCES

- *Making India Open Defecation Free: Challenges and Achievements;* Global Citizen India: The article highlights the achievemnets of SBM such as bringing Water, Sanitation and Hygiene (WASH) into focus, integrating the entire force of the government, along with corporate and social sectors, to meet SBM's targets; Available at *https://globalcitizen.in/en/content/making-india-open-defecation-free-challenges-and-a/*
- *Status of Water Supply, Wastewater Generation and Treatment In Class-I Cities & Class-Ii Towns Of India:* Central Pollution Control Board; This article provides the status of water supply, sewage generation and treatment of 498 class-I cities and 410 class-II towns along with information of 53 coastal class-I cities and 35 coastal class-II towns besides Ganga Basin as a separate subsection; Available at *http://cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf*

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TECHNOLOGY
A mindless chase

Site specific toilet technology needs to be ensured to achieve universal sanitation coverage

VIKAS CHOUDHARY / CSE

SUSHMITA SENGUPTA AND RASHMI VERMA

The Swachh Bharat Mission (SBM), launched by the National Democratic Alliance (NDA) government on October 2014, has undoubtedly brought the issue of sanitation the much needed attention. SBM's target is to achieve universal sanitation coverage by October 2019. However, more than a year after the scheme was launched, a survey by the National Sample Survey Office (NSSO) found that not even half of the toilets built under SBM were in use. This mindless chase of toilets built undermines a key aspect required to achieve the outcomes. Appropriate toilet technology is important for efficient containment, handling, treatment or resource recovery, says Puneet Srivastava, a policy manager at Water Aid, one of the major non-profits which helped Bangladesh become Open Defecation Free (ODF). The suitability of the technology depends on the local soil, weather, hydrogeology and socio-economic conditions, adds Srivastava.

However, it is important to note that toilet design has to be site specific. For instance, if a pit system is installed in a shallow groundwater region, groundwater will be polluted.

Twin pit toilets

Srivastava says that the best technology for rural India is the twin pit pour flush because its construction materials are available locally and it uses much less water than conventional flush toilets. The low maintenance design is also suitable for areas where groundwater is found at a depth of less than or equal to eight metres. The main components of the twin pit design are two pits, a pan, water seal, squatting platform, junction chamber and a superstructure. Pit walls are like a honeycomb and the bottom of the pit is not plastered. The size and the shape depend on the population and availability of space. Each pit is used for three years, and after it fills up, the second pit is used. After two years of blockage of the first pit, its contents degrade completely and turn to odourless and pathogen-free manure, used for agriculture and horticulture.

The twin pit toilet has been modified by many organisations. Bindeshwar Pathak, the founder of Sulabh International Social Service, a Delhi-based non-profit, says that Sulabh toilets are priced from ₹1,600 to 58,000 per toilet. They can also be used even in areas with shallow groundwater, with some modifications. Sai Damodaran, founder of Gramalaya, a Tiruchirapalli based non-profit, says although their twin pit toilets cost a little more than ₹12,000, the cost can be brought down by using locally available material. However, pit toilets fail in areas where there is hard rock and shallow groundwater, says Janardan Prakash Shukla of Knowledge Link, a Uttar Pradesh-based company which offers technical support in sanitation.

In the past two decades, twin pits toilets have been overused under sanitation programmes in rural areas across India. This is because of its affordability, a strong supply chain and trained masons even in village *panchayats*, says Srivastava. In single pit technology, which contractors opt to save money and space, the pit is dug deep to avoid getting filled up. As a result, the pits contaminate groundwater. According to Pathak, in a single pit system, de-sludging has to be done immediately after the pit fills to enable reuse. This involves handling fresh and undigested excreta, which is hazardous for health.

According to a study conducted by Gramalaya in 1997, twin pits were more suitable for rural areas. While the villages which constructed single pit toilets had to resort to open defecation after 30 to 40 per cent usage, those which had twin pits showed that even after 98 per cent usage, there was no waste spillage and waste was decomposed properly inside the pit.

Shankar Balram model

According to the Ministry of Drinking Water and Sanitation (MDWS), septic tanks are also suitable for rural areas. A combination of water closet and specifically designed septic tank, called the Shankar Balram model is another option. They have an advantage over pit toilets in areas with shallow groundwater level and rocky terrains. The closet is connected to two concrete hume pipes of different diameter and concrete bottom. The pipe specifications depend on the number of users. The two pipes are connected by another thin pipe to allow effluent flow. The effluents are discharged into a sewer network or a sand pit.

MDWS officials say that around 25 litres of water per person per day is required for optimal function and the effluent produced is of equal volume. In the absence of a sewer network, as is common in rural areas, a larger soak pit needs to be built, making it an expensive affair. Srivastava says that timely technical assessments of the technology by experts can help overcome the challenges.

Ecosan toilets

In recent times, ecosan toilets, an existing model which has been modified according to local needs, are seen as one of the best technologies for rural toilets. They help in the recovery of nutrients from decomposed faecal matter and can be used in all terrains and suit all hydrogeological conditions. Since water is not used, it can be used in water scarce areas. Groundwater and surface water contamination is also avoided as no wastewater is generated. They cost ₹12,000, same as Gramalaya's twin toilets.

There are two kinds of ecosan toilets. In dry toilets, faeces and urine pass through a drop

hole at the bottom of the squat pan. In urine diverting dry toilet, the urine passes through a front hole and faeces pass through large chute. Another additional benefit of ecosan toilets is that by connecting these toilets to a bio-digester, excreta can be converted into biogas. The discharged water from ecosan toilets can be diverted to the kitchen garden and prevented from mingling with human faeces as in Gramalaya's design. Faeces can be used as manure and urine as fertiliser, says Damodaran.

Bio-toilets

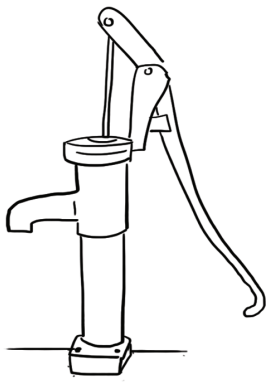
Another advancement made in toilet design is bio-toilet, which is developed by the Defence Research & Development Organisation (DRDO). A colony of anaerobic bacteria converts human waste into water and a small amount of gas. The bacteria is kept inside a container, which is placed under the lavatory. The gas is emitted into the atmosphere and the water is discharged after chlorination. These toilets can be implemented in all soil types and require less area. The end-product is highly nutritive and is used as a fertiliser. Currently, they are used in railway coaches, but their availability is limited in both urban and rural areas. This is because of the lack of trained manpower. However, their efficiency has been contested several times.

Finance models

Although the government offers an incentive of ₹12,000 per toilet, the cost of a sustainable household toilet varies depending on the place of operation, says Srivastava. With better financing from households, users can build toilets which suit their needs. Therefore, adherence to technical design, different kinds of sanitation systems and co-financing models are key to sustainable sanitation.

Although the end-product from bio-toilets is highly nutritive, their efficiency is marred by several implementation challenges

In September 2016, the Centre for Science and Environment (CSE) conducted surveys in Tamil Nadu, West Bengal, Odisha, Haryana, Rajasthan and Gujarat to find the reasons for open defecation. It survey found that lack of finance was one of the main reasons users did not construct toilets. Damodaran says that financial assistance from HT Parekh Foundation helped them construct 150 toilets in three hamlets in Thottiyam block of Tiruchirappali, Tamil Nadu. While the Corporate Social Responsibility unit of HDFC provided ₹3 million in 2016, Gramalaya led the project. More corporates should offer finance to achieve the goals of the SBM, adds Damodaran.



The government's single technology approach and reluctance to adopt upgraded toilet designs is hampering SBM's targets. It must see that communities are ready to participate towards better sanitation, as long as they are assured of safe water supply and usage

Joe Mediath, founder of Gram Vikas, a non-profit based in Odisha, says that the priority should be to build good quality toilets and to make users self-reliant. Gram Vikas, which started work in the poor districts of Ganjam in the 90s, first made the water supply in villages sustainable and then constructed toilets. Toilet usage was achieved primarily because water supply was ensured.

The total cost of a toilet and bathing room is ₹25,000 on an average. In the Gram Vikas model, each family contributed ₹1,000 on an average. Poorer families contributed less. The once in a lifetime contribution is transfered to an endowment fund, which is not used for any expenditure other than sanitation. The interest from this corpus is used to ensure drinking water needs, sanitation systems and coverage, even in the absence of subsidies.

While the non-profit contributed around 75 per cent, villagers contributed the rest (see 'Building toilets by sharing finance', *p* 81). Families provided labour works by making bricks, collecting and transporting rubble, sand and aggregates. Government incentives were used to buy construction material such as cement, steel, toilet pans, provide skilled masons' wages and white washing.

However, not all the villages from this district followed the same model. In Tamana, for instance, revenue from crops and proceeds from a social forestry scheme were used for toilet construction. In villages such as Palukhala, the survey found that utensils, gold and silver were taken as contribution. Mediath says that contributions from users and a shared finance model helped bring down the cost significantly for families. Gram Vikas' role was restricted to providing ideas for funding and acting as a guarantor against bank loans.

The need of hour is to understand that toilet technology must suit local needs, which includes geohydrological and socio-economic conditions. However, the government's single technology approach and reluctance to adopt upgraded toilet designs is hampering SBM's targets. It must see that communities are ready to participate towards better sanitation, as long as they are assured of safe water supply and usage. Ganjam is an example of this. By focusing on appropriate and low cost on-site sanitation technology, the gap between demand and use fastens rapidly, reducing open defecation. ■

RESOURCES

- *A handbook on technological options for on-site sanitation in rural areas;* The Ministry of Drinking Water and Sanitation, 2016: The handbook discusses different toilet technologies which can be built across different regions of India. It also gives an understanding of civil construction and the cost of the construction material; Available at *www.mdws.gov.in*
- *Dr Bindeshwar Pathak's PRISACA theory to solve the social problems of sanitation and social discrimination;* Sulabh International Social Service Organisation, 2015: This book offers in-depth research by Bindeshwar Pathak on the state of sanitation and manual scavengers in India. The technologies of different types of toilets, efficient in Indian scenario are also explained; Available at *http://www.sulabhinternational.org*

PATANJALI

Kesh Kanti

HAIR CLEANSER & OIL

Your Hair Oil may contain cancer causing mineral oil !

Scientific facts about mineral oil

According to a 2012 report by DCA, Govt. of India Institute, 90-95% of the available brands of hair oils contain mineral oil (paraffin). According to the DCA, mineral oil does not have any health or medicinal properties nor any nutritional benefit for hair. According to NCBI (US Institute) mineral oil is carcinogenic in nature for living being and may cause cancer.

Patanjali brings you, mineral oil free, Kesh Kanti Hair Oil and Shampoos, made with the goodness of 21 herbs. It gives your hair natural nourishment and care. Crores of Indians have used Kesh Kanti Hair Oil & Shampoos to make their hair healthier, stronger from roots, and to get rid of hair related problems.

PLEASE THINK!

Will you apply natural Kesh Kanti Oil or just any hair oil made from mineral oil which may cause cancer ?

Benefits of Kesh Kanti

• Provides effective protection against problems such as dandruff, graying of hair & split ends • Gives natural nourishment and makes hair softer, smoother, stronger and shinier • Reduces dryness and greasiness

Method of use:

1. Do oil massage one day before shampooing your hair.
2. Apply Kesh Kanti Oil at night and wash it with Kesh Kanti Shampoo next morning, for natural & better conditioning of your hair.
3. Both male and female should use Kesh Kanti Oil regularly for complete benefits.

Patanjali Range of Hair Oils:
Coconut, Sheetal, Amla & Almond oil

Kesh Kanti Range of Shampoos: Natural, Milk Protein, Anti-dandruff, Aloe Vera, Reetha & Amla Shikakai

Availability Information: Ayurvedic Medicines of Divya Pharmacy for Hypertension, Diabetes, Obesity, Heart Diseases, Arthritis and Asthma are available only at Patanjali Mega Store, Chikitsalaya and Arogya Kendra governed by our Divya Yog Mandir Charitable Trust. There are 500 products of Patanjali Ayurved, these pure edible and beauty products are available in Patanjali Stores and in the open market as well.

PATANJALI

Prakriti ka Aashirwad

HARMFUL CHEMICAL SOAP

OR

NATURAL SOFTNESS AND BEAUTY WITH PATANJALI HERBAL BATH SOAP

The main purpose of using a bath soap is not just to clean your body with chemicals. The fact is that you want to take bath with a soap that along with cleansing your body gives your skin a natural protection shield as well as natural beauty.

These bath soaps are enriched with Multani Mitti, Milk, Milk Cream, Turmeric, Sandal, Neem, Aloe Vera, Rose and other herbs along with a perfect blend of 40% Coconut Oil and Vegetable Oil.

WETLANDS
Need to strengthen protection rules

States must ensure timely implementation of the Wetland Rules, 2010 to efficiently manage the country's wetlands

ISTOCK PHOTO

SUSHMITA SENGUPTA

On December 2010, the Ministry of Environment, Forests and Climate Change (MOEF&CC) published exclusive rules for wetland management, regulated under one authority. Before this, wetlands in the country were protected indirectly under many laws, including the Indian Wild Life (Protection Act), 1972, the Indian Fisheries Act, 1897 and the Indian Forest Act, 1927. The new regulations, called Wetland Rules, 2010, require states to identify and notify their wetlands in brief documents. But so far, not a single state has compiled the data, or created nodal agencies, as per the rules. This was discovered during the question hour in Rajya Sabha and Lok Sabha sessions in July-August, 2016.

Although the Wetland Rules, 2010 are much needed move, their shoddy implementation is obstructing wetland protection in India. Environmental lawyer Ritwick Dutta says that the delay in identifying and notifying wetlands will dilute the rules and affect wetland management. Dhrubojyoti Ghosh, a Kolkata-based ecologist, who played an important role in

the preservation of East Kolkata wetlands, says that th ereason for the states' lack of interest is because like in many other countries, the issue in India lacks popular support, which is required to enable political decisions in favour of conservation.

Poor implementation

In December 2016, the ministry announced a fresh set of rules called Wetlands (Conservation and Management) Amendment Rules, 2016, which give more power to the states.But he question is whether new rules rules should have been announced when the Wetland rules, 2010, were not even implemented properly.

In November 2015, Pushp Jain of a Delhi-based environmental watchdog, EIA Resource and Response Centre, filed a Public Interest Litigation in the National Green Tribunal (NGT) questioning the failure of the states and Union Territory (UT) to identify and notify wetlands as per the Wetland Rules, 2010. Anand Arya, a Uttar Pradesh-based environmentalist, also filed a similar petition in 2015 to protect wetlands. Following these two, the NGT in April asked MOEF&CC to submit a record of states/UT which have notified wetlands within the next two weeks. After six months of no response, it asked the states/UT to identify and notify wetlands in at least 5-10 districts under their jurisdiction by July. However, till October 2016, only fifty per cent of the states had responded, adds Jain.

In July 2016, the green bench had also ordered that a Central Wetlands Regulatory Authority (CWRA), which was formed under the rules, should meet monthly. Comprising experts and government representatives, CWRA was set up to know the status of the work and to ensure the proper implementation of the rules. However, CWRA met only three times since 2011, according to a Right to Information application filed by Jain. In March 2015, its tenure was terminated and August next year, it met for the fourth time with a new constitution.

The states' lack of interest is seen in the delay or absence of any response to NGT's directions. While Gujarat and Assam were penalised for failing to respond, most states have not even implemented the rules. The Karnataka Lake Development and Conservation Authority recommended the inclusion of 34 lakes as wetlands, but that was all. Nodal authorities either have not been constituted or do not function properly. Arya says that Odisha, Manipur, Karnataka, Jammu and Kashmir, Bihar, Rajasthan and Madhya Pradesh have constituted nodal agencies, but have failed to implement the rules properly. These states

MORE
For data on state of water bodies go to *P* 217 ▶

FROM THE ARCHIVE

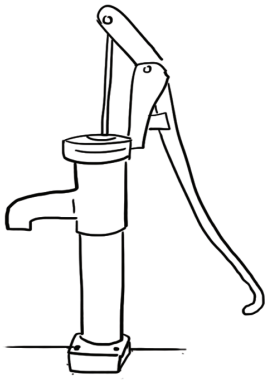
Flawed laws

Merely assigning a protected area status to a wetland will not automatically ensure wise use. Keoladeo National Park, in Bharatpur, Rajasthan, is a case in point. An artificial wetland area, a designated Ramsar site and a duly notified national park, Keoladeo is a wetland where wise use by human beings is essential. But it is also a national park where restrictions on human activities are imposed.
This area has had a history of conflict between the park management and local villagers after grazing and fuel wood collection (wise uses) were stopped after designating it as a national park in 1981. However, Bombay Natural History Society scientists, who had carried out a ten-year study of the park, were emphatic that regulated grazing was needed to control aquatic macrophytes, colonising the wetland and altering its ecology.

Wetlands are not only home to certain species, but play an important ecological function in maintaining the groundwater table and preventing excessive soil erosion. The Wildlife (Protection) Act 1972 should be amended to include ecologically fragile wetlands, which should also be notified under the Environment (Protection) Act 1986 and site-specific wetland management plans drawn up to ecological parameters of the area. Otherwise wetlands will be lost forever and, with them, critically endangered species of fauna and flora that survive only in this specific habitat.

Down to Earth, 1-15 July, 2005

States should prepare an atlas and open database of all the wetlands and catchment areas. This should include type, category and current status of the waterbody. Moreover, public, civil society and scientific institutions should be encouraged to engage in this process



have also failed to develop the brief documents. Only Punjab and Assam submitted documents, which unfortunately, were dissatisfactory, according to CWRA.

Apart from delay in implementation, rules have also been violated. Partha Das, head of Water, Climate and Hazard, Aranyak, a Guwahati-based non-profit, says that solid waste dumping in and around *beels* of Assam is still not phased out. This is a violation of the rules, according to which solid waste dumping had to be phased out within six months from the publication of the rules. Discharge of untreated waste from industries and human settlement, which had to be phased out by December 2011, also has not stopped in Assam, adds Das.

Rampant encroachment in all urban wetlands, including Ramsar wetlands is also a cause of concern. Ramsar wetlands are those designated of international importance by the Ramsar treaty, established in 1971 for the convention of wetland conservation and protection. Jain says that the MOEF&CC could be delaying the implementation to dilute the Wetland Rules, 2010. But the good news, he says, is that the new draft announced in April 2016 are yet to be finalised and that 150 organisations have objected to it.

The new draft does not have an exhaustive list of prohibited activities listed in the 2010 rules. Das says that the restrictions (both prohibition and regulation) imposed on activities harmful to wetlands should be retained. He ads that states should prepare an atlas and open database of all the wetlands and catchment areas. This should include type, category and current status of the waterbody. Moreover, public, civil society and scientific institutions should be encouraged to engage in this process.

The new draft also lacks clarity on the penalty imposed if a state fails to identify a threatened water body. This should be clarified. Instead of giving states full authority to manage wetlands, CWRA should monitor the Ramsar sites, suggests Das. The state authority should be independent and not be led by the chief minister or the environment minister to avoid conflict of interests. ■

RESOURCES

- *Draft wetland rules, 2016:* The Ministry of Environment and Forest and Climate Change: After the Wetland (Conservation and Management) Rules, 2010, faced criticism, the ministry released a fresh draft of the rules in 2016; Available at *http://envfor.nic.in/sites/default/files/GSR%20385%20(E).PDF*
- NGT cases; In 2015, two Public Interest Litigations were filed in the National Green Tribunal questioning the failure of states and Union territories to implement the Wetland Rules, 2010; Available at *http://www.indiaenvironmentportal.org.in/*

WATER EQUITY
ACCESS TO SAFE WATER

A two-step strategy, comprising assessment and management, can ensure safe drinking water

ISTOCK PHOTO

BIRAJA KABI SATAPATHY

Social development expert, specialised in water, sanitation and social inclusion

There is a growing consensus globally that providing universal and equitable access to safe drinking water should be a primary responsibility of governments. To achieve water safety, proper management of solid and liquid waste as well as basic access to sanitation is required.

In fact, one of the United Nations' core goals, the Sustainable Development Goal (SDG) 6, is also to ensure availability and sustainable management of water and sanitation for all by 2030. SDG 6 plays a crucial role in strengthening other SDGs.

How India should protect its water sources

Pathogenic bacteria, viruses and parasites transmit through contaminated drinking water, causing outbreaks of diarrhoea, typhoid, Hepatitis E and several life-threatening diseases. Such outbreaks are common across several countries, including India. According to the 2011 Census, 43.5 per cent households in India use tap water for drinking, 11 per cent use water from wells, 42 per cent from hand pumps and tube wells, and the remaining 3.5 per cent use from springs, rivers and lakes. However, not all the sources are safe and even

the most improved source, the piped water supply, can get contaminated in the event of a breakdown at any point of supply between the source and distribution.

To ensure safe drinking water, it is important to assess and manage risks to a supply source (see 'Factors of contamination'). When assessing the microbial quality of water, sources of the faecal material, such as humans, birds and animals, are called hazard factors. The second factor, called the pathway factors, represent the potential routes by which water supply can get contaminated. Lastly, indirect factors indicate the lack of control measures to prevent contamination. To assess possible contamination by the above factors, a sanitary survey of drinking water sources must be conducted on a regular basis. This involves sanitary inspection, which is done on site to identify potential hazards and water quality analysis, which determines contamination and its extent. Such a survey was conducted between May and August, 2014 in 168 slums of 25 municipal wards of Bhubaneswar by the Population Foundation of India. The slums were covered under the India Health of the Urban Poor programme of the US Agency for International Development. Of the 742 public drinking water sources surveyed, 293 (40 per cent) were stand posts for public water supply; 108 (15 per cent) were borewells fitted with mechanical pump; 177 (24 per cent) were tubewells with hand pump; 162 (22 per cent) were unprotected dug wells; and two were protected wells. The survey was based on a format prescribed by the World Health Organization (WHO). In addition, they used H2S strips, a water quality testing kit to detect the presence of E coli in water samples.

IRRESPECTIVE OF the type of source, only 19 per cent of the sources were under low category of risk, showed a survey

ACCESS TO SAFE water supply gets compromised as inadequate sanitation, drainage and poor solid waste disposal create hazard factors for the sources

The survey showed that irrespective of the type of source, only 19 per cent of the sources were under low category of risk. 43 per cent belonged to intermediate risk category, 35 per cent to high risk category and 2 per cent to very high risk category. The stand post and the bore well fitted with mechanical pumps emerged as safer water sources, whereas unprotected wells were very high risk category. (see next page 'Level of risk of drinking water sources'). Almost one in every four water sources (23 per cent) was contaminated with faecal matter. These include 52 per cent of unprotected dug wells, 29 per cent tube wells fitted with hand pumps, 10 per cent of stand posts and 8 per cent of tubewells with hand pumps.The survey underscores the need to understand the risk factors associated with sources, before implementing any corrective measure to ensure safe water supply.

In case of a stand post, insanitary conditions of the surrounding area (hazard factors), stagnant water around it and cracked and eroded plinth (pathway factors), and access to the source for animals (indirect factors) are the predominant risk factors. The study of

FACTORS OF CONTAMINATION

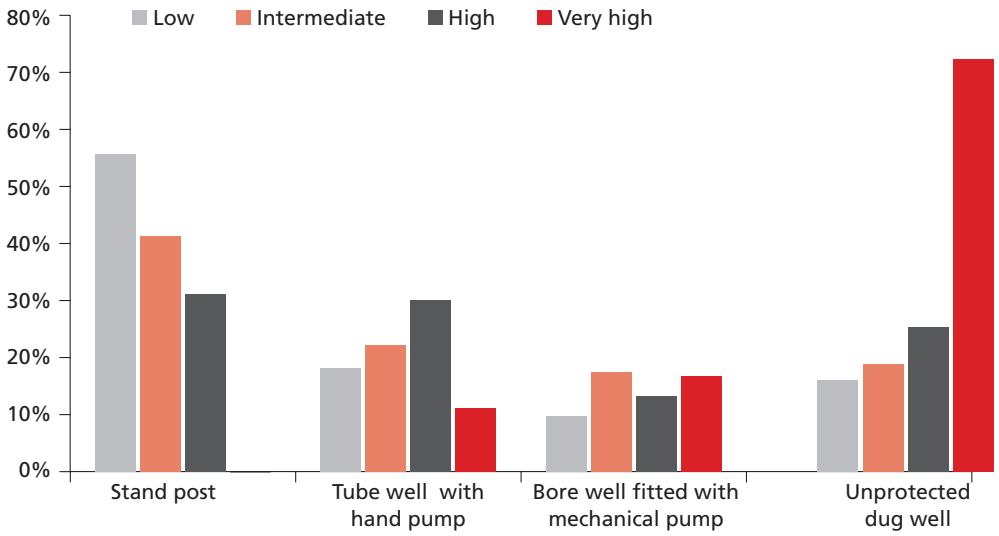
PATHWAY FACTORS: Environmental hazards are not enough as a risk. A feasible pathway must exist which allows hazards to travel from the source to the supply system. Pathway factors include cracks in the lining of borehole wells and improperly sealed apron of the wells.

HAZARD FACTORS: In places where people have least access to toilets and open defecation and surface disposal of faeces are common, these are the major causes of water contamination. Faecal material leaches out from pit latrines, overlying aquifers or located next to an abstraction source. Defecation in open drains and disposal of faeces of babies, aged and sick people in dumping yards or surface drainage channels also adds to the problem. The possibility of contamination of groundwater increases with pit latrines in high water table areas.

INDIRECT FACTORS: This indicates the lack of control measures to prevent contamination. For instance, absence of a fence around a source does not directly lead to contamination, but allows animals or humans to gain access to the source and create either a "hazard" by defecating next to it or a "pathway" by damaging the source or its immediate surroundings.

LEVEL OF RISK OF DRINKING WATER SOURCES

In a 2014 survey of 168 slums in Bhubaneshwar, only 19 per cent sources were low risk



Source: Population Foundation of India, 2014

distribution of contaminated source against each risk factor showed that 20 per cent of the stand posts with leakage in the distribution pipe, 19 per cent stand posts whose water supply had been discontinued for the last 10 days, and 17 per cent stand posts that are surrounded by stagnant water were more contaminated.

Dug wells and hand pumped tube wells were in close proximity to toilets and other polluting materials, such as excreta of animals and rubbish (hazard factors). They were also found with poor and faulty drainage channel, which created pools of stagnant water around them and cracks in the apron (pathway factors). Almost 81 per cent of the tube wells were actually in need of fencing (indirect factors).

About 34 per cent of the tubewells were installed close to toilets and were contaminated. About 30 per cent of the tubewells with faulty drainage channels were also found to be contaminated. The findings also show that 50 per cent of the dug wells located in proximity of toilets were contaminated. Almost 63 per cent of tubewells and 57 per cent of unprotected dug wells have less than one metre of concrete floor. However, as per WHO sanitary survey format, the concrete floor around wells and tubewells should have at least one meter radius.

Interestingly, none of the risk factors showed a significant association with the contamination of water supplied by borewells fitted with mechanical pump. These installations were installed either by non-profits or as community initiatives. The collective maintenance management or construction design could also be the reason for comparatively safer source of water. It was evident from the study that the access to safe water supply gets compromised as inadequate sanitation, drainage and poor solid waste disposal create hazard factors for water sources. Further, poor operation and maintenance lead to the emergence of pathway factors. Indirect factors also pose a risk to drinking water sources. These arrays of risk factors cause waterborne diseases in the locality.

This can only be avoided by first identifying the predominant risk factors, ranked based on priority and then take corrective measures. A sanitary survey can be used as a community tool for water safety surveillance. In the current study, women self-help group members, accredited social health activists (ASHA) and *anganwadi* workers involved in conducting sanitary survey showed enthusiasm. The knowledge and skill can be transmitted to the community in support of the local staff of water supply and surveillance agencies for a better drinking water supply regime. ■