

A 21st century revolution

India must adopt reinvented toilets and omni processor waste treatment plants to scale up sanitation



G. ANANTHAKRISHNAN

When Microsoft founder Bill Gates displayed a glass beaker with human faeces on stage at a sanitation conference in Beijing recently, he was praised by World Bank president Jim Yong Kim for “making poop cool”. Mr. Gates was in China to pursue the serious business of reinventing the toilet. Innovation, he reasoned, would expand sanitation quickly and save children in developing countries from the crippling consequences of stunting. In many places, children play amidst faeces in the open and contract disease, resulting in malnutrition and stunting.

Decentralising sanitation
Over the last seven years, the Bill and Melinda Gates Foundation (BMGF) has devoted \$200 million to incubate new technologies that will dramatically scale up sanitation. It has announced a further investment of \$200 million to achieve this, and trials of new toilets and processing technologies are going on in India, among other countries. According to UNICEF, 22.2% of children, or 151 million, under five years were stunted globally in 2017. The World Bank says annual healthcare costs from lack of sanitation in developing countries is a staggering \$260 billion.

The challenge to decentralise sanitation, in Mr. Gates’s view, has parallels with the historic shift from main-frame computing, which only governments and large corporations could afford, to personal computers. Fast-expanding cities cannot have massive sewage treatment plants. What they need is stand-alone processors, which will help communities and individuals.

At the Beijing conference, which also hosted the Reinvented Toilet Expo, Mr. Gates observed that “in many places in India today, 30% or 40% of the kids end up malnourished.” That is because faeces containing pathogens lie exposed. Open defecation has a high health cost. It spreads disease, stunts children and prevents them from achieving normal physi-



“Reinvented toilets are special as they turn liquid waste into clear water for flushing, and solids into pellets or ash that is fertilizer.” Visitors look at a model of a self-contained toilet at the Reinvented Toilet Expo in Beijing. • AP

cal and mental development. The answer lies in new technologies, some of which are at a high stage of maturity now. If India adopts them, it can rapidly expand sanitation at low cost.

To many observers, including Mr. Gates, India is further behind on sanitation than on other issues, which is reflected in the high levels of stunting. This situation persists despite high levels of economic development over the years. The BMGF wants to change that not just for Indians, who form a significant proportion of the 4.5 billion people worldwide looking for solutions, but those in Africa and other parts of Asia. The solution it offers is the reinvented toilet and omni processor waste treatment plants.

Technologists and researchers have been working on these from the time the BMGF issued a “challenge” to them in 2011 seeking innovative solutions. The technology teams now have working prototypes. It is now up to politicians and policymakers to make decisions to adopt them, especially because the Sustainable Development Goal of sanitation and clean water for all by 2030 is not far away.

Innovation involves a shift away from the gold standard of flush toilets connected to sewers. In the new order, there will be stand-alone facilities that are aesthetically designed, finely engineered and equipped with reliable chemical processes that produce nothing more than ash from solids, while reusing the liquid as non-potable water after treatment. The

future, the BMGF hopes, will belong to these Multi-User Reinvented Toilets. The prototypes are undergoing trials in far-flung centres such as Coimbatore in Tamil Nadu and Durban in South Africa. The technologies that run inside them have been developed by research institutions such as California Institute of Technology (Caltech), University of South Florida, and Duke University. Some products are ready for prime time. Caltech’s partnership with toilet-maker Eram Scientific will help induct the technology and deploy it at scale. There may also be a mix-and-match approach, leveraging the best technologies from the individual prototypes.

What makes these reinvented toilets special is that they expel nothing. They turn liquid waste into clear water for flushing, and solids into pellets or ash that is fertilizer. Success will depend on making large community deployments, and developing cost-effective models for individuals. One reinvented toilet by Helbling of Switzerland has a classic European design and cost \$500 to develop. While the reinvented toilet gets optimised, India should, in parallel, look at omni processors for faecal sludge treatment plants (FSTP). These “zero emission” processors will end dumping of faecal sludge taken from septic tanks into rivers, lakes, farms and open spaces. They can also prevent the death of workers in septic tanks. Some models also attach a gasifier that can use

municipal solid waste, providing a solution to handle that urban waste stream as well.

Spending on technology
India’s record in treating urban sewage is poor at 30%, and a third of about 847 large sewage treatment plants are not functional, according to BMGF estimates. The priority should be to put all these plants to full use, and equip them to handle faecal sludge by adding omni processors to them. In Beijing, Mr. Gates observed that “political leaders like Prime Minister Modi have been willing to speak about sanitation.” The Swachh Bharat Mission has brought faecal sludge treatment within its ambit, and many Chief Ministers want FSTPs. Put together, their orders total 415 such plants this year. Disappointingly, only a minority of these will have omni processors. Indians have contributed a lot by way of taxes for sanitation, and the money should be spent on the new technology.

Even in an advanced State such as Tamil Nadu, which is working to upgrade its infrastructure, only 30% of urban sewage is treated, says Alkesh Wadhvani, Country Director, Poverty Alleviation, BMGF. On the other hand, in 3,500 small cities, very little gets treated. There are some promising signs. Odisha wants 115 faecal sludge treatment plants. Andhra Pradesh has taken the lead and funded 33 plants, and, importantly, tendered for omni processors for these. Tamil Nadu has announced that it will build 48 plants out of its own funds, estimating that 80% of the faecal sludge problem can be managed across the State at a cost of less than about ₹200 crore. Large and often idle sewage treatment plants can be put to dual use, by adding an FSTP, preferably with an omni processor. In the case of small towns, a cluster approach will help, and two or three of them can come together to share treatment plant capacity.

Philanthropy of the kind advanced by Mr. Gates aims to take up issues that may not otherwise get attention, and to lower the barriers for governments to act. Now that technology is ready with a “zero effluent” toilet, national policy should make it accessible to everyone.

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A gender curriculum

The #MeToo moment calls for a different kind of learning



ANUSHNA JHA

Over the past few weeks, many women have spoken about their experiences of sexual harassment. Some have named the accused. Many of these accounts have been of incidents at the workplace and by co-workers, and expose the prevalence of deep-seated sexism across professions. There have been various responses by the accused to these testimonies: unconditional apologies, resignations, stepping away from duties until further investigation – but also denial, intimidation and even further harassment. Some of these were immediate responses to mounting public pressure and questions; whether they reflected repentance or realisation on the part of the accused is debatable. Some other responses, such as intimidation through defamation cases, show the entitlement that many men in power enjoy. Both sexual harassment and the kinds of responses from the accused lay bare a critical failure of our education system. It will not be sufficient to say that it is society that allows, or even conditions, men to behave the way they do. Education, an important part of the socialisation process, is also to blame.

What our education lacks

The education that we are imparted needs to be held accountable at this juncture because of its failure on fundamental grounds. The purpose of education is not to only ensure that people secure employment or rise to coveted positions of power alone, it is also to ensure that they learn and practice equality and mutual respect. Many of the accused are qualified, educated men. Their actions compel us to ask whether those years spent in school, college and university have been unsuccessful in instilling basic values. It seems as though rising to top positions and enjoying power have emboldened men to behave in unacceptable ways, and the education system has done nothing to prevent this.

It is not uncommon to hear of incidents of sexual harassment being justified as “casual flirting” or being attributed to the offender’s “glad eye”. Using these terms to explain away or even justify these acts reflects the depth and expanse of the problem. I am reminded of an encounter that a friend’s mother had with a senior bureaucrat (now retired) a few years ago. During a meeting regarding a project on which her organisation and his

department were collaborating, he told her that she was “smart and beautiful”. He then recited couplets in Hindi and Urdu. Such blatant display of inappropriate behaviour, which makes women uncomfortable, shows that men in power enjoy the impunity that accompanies attitudes and acts entrenched in patriarchy.

Today, many of us are not surprised at the volume of complaints of sexual harassment. This is because it has been normalised. Sexism is not casual, it is systemic. That our education system is failing to teach boys and men to recognise, challenge and refrain from sexist and even unlawful behaviour must be acknowledged and tackled.

The way forward

Sexual misconduct or gender inequality is not a by-product of a lack in education. The spotlight is not to be put on the educated alone, but on the system too. Among other things, education has the basic duty of ensuring that we become socially aware and sensitive beings who know how to interact and engage with people of different genders, castes, classes and communities. We must teach students that consent is an essential component of any interaction and that decisions, even of refusal, must be respected.

While there is considerable discussion on the need to change mindsets, efforts to actually bring about such long-term structural changes are rare. Gender equality must not be limited to newsroom debates, stand-up themes or films, although these are necessary. What the #MeToo movement demands is a continuous and systematic process of learning that leads to equality.

There must be efforts to incorporate a gender curriculum in all school and college classrooms, establish anti-sexual harassment cells, organise regular awareness programmes on consent across the country, and formulate measures to address incidents of sexual harassment. The police should initiate community engagement drives so that students know how to report sexual harassment. Campaigns like Operation Nirbheek, initiated to improve safety and security of girls in schools, have proven to be successful to a large extent. Interventions in educational institutions will be a much-needed start to strengthen voices against sexual harassment and make homes and workplaces safe. It is imperative that we begin early if we are to secure a closure to our #MeToo experiences.

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SINGLE FILE

Science outside labs

Various outreach programmes are bringing science to the masses, but there is more to be done

SHUBASHREE DESIKAN



‘Chai and Why,’ a popular outreach programme conducted by a group of faculty members of Tata Institute of Fundamental Research, Mumbai, hosted its 250th event on November 18. The programme, which has been going strong since 2009, comprises talks and demonstrations by scientists or research scholars on a science topic, pitched at an easy-to-grasp level. These talks take place on alternate Sundays at Mumbai’s Prithvi Theatre, among other places.

A similar annual event, ‘Science at the Sabha’, is conducted by scientists from the Institute of Mathematical Sciences, Chennai. For three years since 2016, SATS, which includes four talks from four different disciplines in science, has been held at the Music Academy, Chennai, known as the premier city platform hosting musical and dance programmes. As a bonus, at last year’s event, the organisers distributed dodecahedral calendars for free.

The National Centre of Biological Sciences has in its cocktail of outreach activities a programme called ‘Out of the Lab,’ in which scientists from the institute can be invited to homes, where they address fascinating aspects of their respective fields to neighbours who have gathered together.

There is little doubt that outreach programmes have come far from the days when they were thought of as additions to academic work. Science in its very practice tends to lead researchers into ivory towers. The more demanding the task, the less time the scientist has to communicate the relevance of her work. The first casualty of this traditional workflow is that knowledge of what goes on within the lab is understood by few outside. The other is that labs within research institutes get separated from the universities, colleges and schools where future scientists are groomed. Add to this existing social gaps due to language, class or caste, and you have an apparently insurmountable situation.

Outreach programmes do a lot to break the notion that research can be understood only by people within the lab. They do, however, suffer from a couple of drawbacks such as of scalability and of reaching beyond urban borders. The Indian National Science Academy encourages its Fellows to travel to remote locations and give talks. Delhi-based Vigyan Prasara, in conjunction with science clubs across the country, holds camps to demonstrate science experiments beyond textbooks. For three years now, they have roped in many partners to commemorate zero shadow day (for two days in a year, those within the tropics can observe that a vertical pole does not cast a shadow).

While such activities enthuse participants and stoke scientific temper, they still may not convey the power of science fully. If collaborations proliferate that leverage the willingness of research institutions to engage in outreach, and use it creatively, much more can be achieved.

The writer covers science for The Hindu



NOTEBOOK

The many secrets buried in sheaves of paper

Filing an RTI can help obtain more information than is sought

ANURADHA RAMAN

The Right to Information Act of 2005 is a journalist’s favourite tool. It enables us to liberate information from bureaucratic stranglehold and discover the limits to how much information Ministries are willing to share.

The year was 2009. The Information and Broadcasting (I&B) Ministry held the key to “proper programming” of news on television, entertainment and cinema. This was also the year of *Indian Summer*, an adaptation of Alex von Tunzelmann’s book of the same name. It was about the last days of British rule in India and had the tantalising possibility of a romance thrown in between Edwina Mountbatten and Prime Minister Jawaharlal Nehru. You could say that it had all the ingredients of a good film. Hugh Grant and Cate Blanchett were to play the

Mountbattens, and the film was to be directed by British filmmaker Joe Wright. However, expectedly, the script had run into problems with the I&B Ministry. Nothing much was heard of it for a while. All we heard was a terse comment by Mr. Wright that he was waiting to hear from the Ministry.

It was then that an RTI was filed to obtain information on the inordinate delay in granting permission to the film. While the government was obliged to share only its decision or proffer reasons for the delay in approving or disapproving the script, buried in the official information shared was more: a sheaf of papers tied up with a string. This contained the script submitted to the Ministry and the observations of a one-man committee appointed by the Ministry to vet scripts submitted by foreigners. Surprisingly, the committee had taken a

very liberal view on what was largely a work of fiction. Yet, the Ministry, or the Minister, decided against giving a nod to the proposed film. *Indian Summer* was over even before it could begin.

Some years later, on the 25th anniversary of the ban on Salman Rushdie’s *The Satanic Verses*, the RTI was again deployed to understand how books are banned in the country. This was a tedious process and took almost a year as the Home Ministry did not have a reputation for sharing information. I kept appealing under the RTI with the sole purpose of wearing down the Ministry. From refusing to give information on how close to 30 books were banned in independent India and how those bans were never revoked, the Ministry finally relented and offered to give information on three books: *The Satanic Verses*, James W. Laine’s *Shivaji* and Peter Heehs’

The Life of Sri Aurobindo. But even here the Ministry continued to dig in its heels, citing potential law and order problems that would arise from sharing full information on the books, till the Central Information Commission ordered it to share whatever it had subject to the provisions of the RTI Act.

When the information was shared, it was nothing short of a miracle. In the thick files were inputs from the Intelligence Bureau, which were hidden by a tape. Section 8 of the RTI Act is a lifeline for bureaucrats, especially in the Intelligence and Home departments. It elaborates on exemption from disclosure of information. But all I had to do was to lift the tape, read the information, and stick the tape back. Also buried in the files were the photocopies of the banned books. And I got to read them all!

FROM The Hindu. ARCHIVES

FIFTY YEARS AGO NOVEMBER 20, 1968

Problems of man's moon trip

The Soviet Union claimed to-day [November 19, Moscow] it has solved the “fundamental problems” of sending man to the moon. The basic problem of re-entry of a spacecraft at second cosmic speed (lunar recovery speed) of seven miles per second was successfully accomplished by the latest moonship Zond-6, the official Soviet news agency Tass said. The spacecraft, which “soft-landed” on Soviet territory after an eight-day near lunar flight, also tested the “more complex and promising method of return of interplanetary ships”, Tass said. The flights of Zond-6 and its sister ship, Zond-5, which made the first circumlunar journey and splashed down in the Indian Ocean on September 21, 1968, were regarded as essential preliminary for a similar manned flight.

A HUNDRED YEARS AGO NOVEMBER 20, 1918.

Starving Germany. An Appeal.

The German Government has sent a wireless message to the Allies and America protesting that the conditions of Armistice seriously menace the economic conditions on the left bank of the Rhine and its relations with German territory on the right bank and declaring that if the conditions are not alleviated existence will become impossible and Bolshevism inevitable. In order to obviate this the German Government requests the following: Normal intercourse on the left bank of Rhine. Completely normal economic communications between left bank and the remainder of Germany and foreign countries even during Military occupation. German owners to exploit as heretofore coal, potash and ore mines on the left bank of the Rhine within the old territory of the Empire with transportation permission up and down and across the Rhine to the right bank. The general free use of the Rhine for transports within the old boundary of the German Empire. Free navigation via Rotterdam and the coast for the provisioning of Germany via North Sea and Baltic coasts with coal, potash and food supplies.

CONCEPTUAL

Menu cost

ECONOMICS

This refers to the cost incurred by firms due to the change in prices of goods and services that they sell. As prices change frequently, firms may need to print new menus to display their new prices, remove old price tags and replace them with new price tags, and in general invest more time and effort in managing the pricing of their products. A firm, however, may willingly incur menu costs only if there would be significant losses incurred by the firm if its prices are not changed immediately. The concept of menu costs was first proposed by Israeli economists Eytan Sheshinski and Yoram Weiss in their 1977 paper “Inflation and Costs of Price Adjustment”.

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