

# Sanitation for all

Water pollution from sewage is causing great damage to India. The nation needs to complete its waste systems and reinvent toilet technologies, says **Sunita Narain**.

Sanitation is a much-sanitized word. It hides the horror of disease and the crippling indignity that people have to endure when they do not have access to a toilet. It also hides the technology divide for human excreta, which favours the rich in its collection, conveyance and disposal. The only solution is a complete sanitation system — toilets that are connected to a waste-removal and treatment system. But conventional technology does not work everywhere, or for all.

Rapidly-modernizing India is drowning in its own excreta. According to the World Health Organization, more than 600 million Indians practise open defecation — making up 60% of the 1.1 billion people who do so worldwide<sup>1</sup>. But even as toilets get built, the challenge of managing excreta grows.

More than 87% of people in India's cities (compared with 33% in rural areas) now have access to a toilet<sup>2</sup>. But leaking and incomplete sewage systems contaminate rivers and lakes, causing diseases such as cholera. Around 97 million Indians do not have access to clean drinking water, putting the nation second only to China<sup>2</sup>. Similar problems afflict other developing countries.

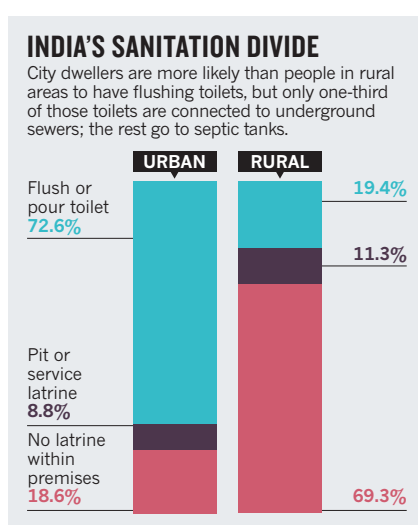
The challenge for India is to come up with ways of dealing with excreta that are affordable and sustainable. The first step is to match investment in waste-water systems with that for water supply. Innovative and affordable toilets must be designed and accessible to everyone. Only if all waste is treated can pollution be controlled.

## THE SEWAGE SPIRAL

Emerging countries such as India are following a sanitation trajectory, gradually upgrading facilities from no toilets to sophisticated systems (see 'India's sanitation divide'). By 2011, just 20% of urban Indians had no toilet or used a public latrine<sup>2</sup>. But most of those with toilets had them connected to septic tanks or flowing into open drains. Only the top end — one-third of urban households and 2% of rural — had toilets that were connected to underground sewage networks, and not all of those reached treatment plants.

Progress along the trajectory is slow because the technology for collecting and disposing of excreta was invented in the water- and money-rich industrialized world. It is capital-intensive, favouring the rich over the poor. And it is resource intensive, using huge quantities of water.

City planners worry more about supplying water to their citizens than about the waste water generated. Yet the effluent inevitably goes into streams, lakes and rivers, or seeps into the ground to contaminate drinking water. Nitrate levels in groundwater across India exceed 45 milligrams per litre — a sure sign of sewage contamination<sup>3</sup>.



Leaked sewage leads to a deadly and costly spiral. As surface or groundwater gets contaminated, the city must source clean water from farther afield. The cost of pumping water rises — it now accounts for 30–50% of the price of supplying water. The cost of building and maintaining pipelines increases. And if the network is not maintained, water is lost — 30–50% of the water leaks. The nation therefore has less clean water to supply and needs to pay more to get it to the people. It cannot provide these services for everyone, and it chooses the rich. As the water system degrades, the rich move to bottled water. The poor get sick.

The over-burdened water utility then has no money to invest in sewage facilities. Most Indian cities do not have underground systems, and those that do, have old pipes that are in disrepair. There are few treatment plants. Officially, the country has the capacity to treat 30% of its waste water<sup>4</sup>. But in practice only 20% is processed: not all plants function and the pipes leak. The final blow comes when the treated waste water of the minority gets mixed with the untreated sewage of the majority.

Most believe that the sanitation divide will

eventually disappear: one day, everywhere will have flush toilets, sewers and treatment plants. But in reality, Indian cities are way behind: they are growing so fast that their infrastructure cannot catch up. This cycle must be broken.

## THINK OUTSIDE THE BOX

Governments must demand change in how water and waste are managed. They must cut the length of the pipeline, by investing in local water supplies such as lakes and ponds and using water more efficiently. They must invest more in sewage systems, even before they invest in water supply. Water accounts and tariffs must reflect the full cost of supply and of waste collection and treatment.

The challenge for science is to look beyond the modern engineering mindset. We know that current technologies, which use large amounts of clean water to transport small amounts of excreta through expensive pipes to costly treatment plants, are **unworkable** and unaffordable in much of the world. Yet toilets and sewage disposal are among the least researched technologies.

New technologies and new thinking are urgently needed for use across diverse ecosystems. Open drains might become planted waterways, with the vegetation cleansing the water. Or microbes might be used to decompose and de-pathogenize effluent. Sewage must be treated as a resource — turned into water for drinking, irrigation or industry.

Cities must leapfrog within the sanitation trajectory — go straight from no toilets to hygienic toilets for all that do not cost the Earth. Only then can the challenge be met. ■

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1. WHO/UNICEF *Progress on Drinking Water and Sanitation* (WHO/UNICEF, 2012).
2. Office of the Registrar General and Census Commissioner *Census of India 2011* (Government of India, 2012).
3. Kamyoetra, J. S. *Water quality and waste water management vision 2012–17* (Central Pollution Control Board, 2011).
4. *CPCB Status of Water Supply, Wastewater Generation and Treatment in Class-I cities and Class-II towns of India* (Central Pollution Control Board, 2009).