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Managing sewage – an overview

Water is one of the most valuable resources of nature, and also one of the most threatened. Two of India's formost problems — growth of population and lack of infrastructure — are intimately connected to one of its key environmental challenges: increasing water stress. On one hand, growing population is driving large masses of people into the cities, and leading to establishment of new slum areas; by 2011, India's urban population had risen to an estimated 387 million.

On the other hand, public services — such as water supply and sewerage — have not been able to keep pace with this growth. In 2008, as per data available with the Water and Sanitation Programme (WSP), approximately 17 per cent of the urban population remained deprived of sanitation services, even as 50-80 per cent of untreated water was disposed off in water bodies.

According to the Central Pollution Control Board (CPCB), in 2009, Class I and II cities generated 38,254 million litres per day (MLD) of wastewater. Sewage treatment plants (STPs) had the capacity to treat a mere 31 per cent of this wastewater — 11,787 MLD. In reality, only 22 per cent actually got treated. The remaining 78 per cent made its way into water bodies or groundwater without treatment. The indiscriminate disposal of untreated or partially treated sewage is the primary cause of water pollution in almost 75 per cent of the water bodies in India (National Urban Sanitation Policy [NUSP], 2008). According to a study by the World Bank, every year, inadequate sanitation causes a big dent worth about US $54 billion in the Indian economy.

This whole scenario clearly depicts the alarming state of sewage management in the country and the lack of capacity to face the challenge. It calls for a shift in approach from a resource-intensive centralised one to more sustainable and affordable local-decentralised approaches, including reuse and recycle of treated wastewater.

STATUS OF SEWAGE TREATMENT PLANTS (STPs) IN INDIA

Wastewater management in urban India is focused on creating centralised systems of sewerage networks to provide treatment and disposal. But according to the CPCB (2004), most of the existing treatment plants that are working with the activated sludge process, are not operating satisfactorily due to a variety of reasons such as inefficient collection system, lack of finances to run the plant, shortage or absence of electricity and even lack of sewage. Nearly 39 per cent of the plants do not conform to the general standards for discharging into streams prescribed under the Environment (Protection) Rules.

Usually, STPs are located wherever land is available, and not where the sewage is. The sewage is collected, pumped and transported over a long distance before it finally reaches an STP. The operational and maintenance costs of this system of conveyance are very heavy. Installing an STP, thus, does not guarantee an end to all the problems; instead, it makes the task more complex.

Table 1: Water and sewage status in Indian cities

Population size	Metro cities	Class I cities	Class II towns
	More than 10 lakh population	Population between 1–10 lakh	Population between 50,000 to 1 lakh
Total cities in India	35	498	410
Water supply		44769 MLD	3324 MLD
Sewage generated	15,644 MLD	35558.12 MLD	2696.70 MLD
Sewage treatment capacity	8040 MLD	11553.68 MLD	233.7 MLD

Note: MLD = Million litres per day; **Source:** 'Status of water supply, wastewater genertation & treatment in class I cities and class II towns in India', Central Pollution Control Board report, 2009

The treated sewage is usually disposed off without any prior planning — either in an open area, a nearby water body or in drains which are already filled with untreated wastewater from various sources. The treated sewage, thus, mixes with untreated sludge and runs into a river, thereby defeating the entire purpose of having a treatment system. Civic authorities do not plan for reuse and recycle of treated wastewater while making STPs. Thus, rather than controlling pollution, they end up making it murkier.

DATA: UNAVAILABLE AND UNRELIABLE

The task of sewage planning becomes more challenging due to the absence of reliable data. There is no national account of the sewage which is actually being generated. We

assume that sewage makes up 80 per cent of the water consumed by a city. However, this assumption does not really work for Indian cities. There are no statistics about the number of connections served in Indian cities or the length of distribution networks. Metering is either non-existant or unreliable; hence, the volume of wastewater generated cannot be estimated accurately.

In fact, no one really knows how much water is consumed by Indian cities. In most cases, water consumed by a city exceeds the water provided by civic authorities. This is attributed to the unaccounted for and underestimated groundwater extraction, which does not reflect in the official data. The prevalence of illegal and unauthorized colonies, which also contribute towards sewage generation, makes a precise estimation more difficult.

THE ECONOMICS OF CENTRALISED SEWAGE TREATMENT

Growing scarcity and pollution of water has a severe impact in terms of costs — of treating the water and of public health. According to one approximation, treating just 1 MLD of sewage costs around ₹1 crore through a centralised treatment system, excluding the land cost. We can therefore assume that the finances involved in implementing and sustaining centralised systems to treat the huge quantum of sewage are massive.

The wastewater management sector has received significant funding in urban reforms through schemes such as Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), but investment towards building more centralised systems and laying more pipelines are not going to solve the problems. Centralised systems are capital and

Table 2: Cost of water and sewage treatment in India

Sector	Per capita cost (₹)	Per capita O&M (₹)	Total expenditure needed (₹ in crore)
Water supply	5,099	501	3,20,908
Sewage	4,704	286	2,42,688

Source: Sunita Narain *et al, Excreta Matters*, Centre for Science and Environment, 2012, New Delhi

Table 3: Economics of sewage collection, transportation and treatment

Item	₹ crore per MLD	₹ crore per km	Per capita (in ₹)
Average cost of comprehensive sewage project, including collection network and treatment plant	3.33–6	–	4,000
Building underground sewage systems		0.74–1.25	
Sewage treatment plant	0.30–1.00	–	360–800
Sewage network-pumping stations and mains		0.80	

Source: Sunita Narain *et al, Excreta Matters*, Centre for Science and Environment, 2012, New Delhi

energy-intensive; they need large amounts of money for their functioning and maintenance. These systems do not cater to the total volume of wastewater; additionally, most of the times, they are non-operational or underperforming. The need of the hour is to treat sewage locally, using sustainable and affordable decentralised technologies with a scope for recycling and reusing treated sewage.

NUSP (2008) has emphasised on a community-driven approach, improving the existing facilities and on decentralised methods of treating wastewater. The CPCB too is promoting decentralised wastewater treatment systems which include recycling and reusing treated wastewater.