LEGAL AND POLICY FRAMEWORK FOR WASTEWATER TREATMENT AND REUSE IN INDIA: A BACKGROUND REVIEW

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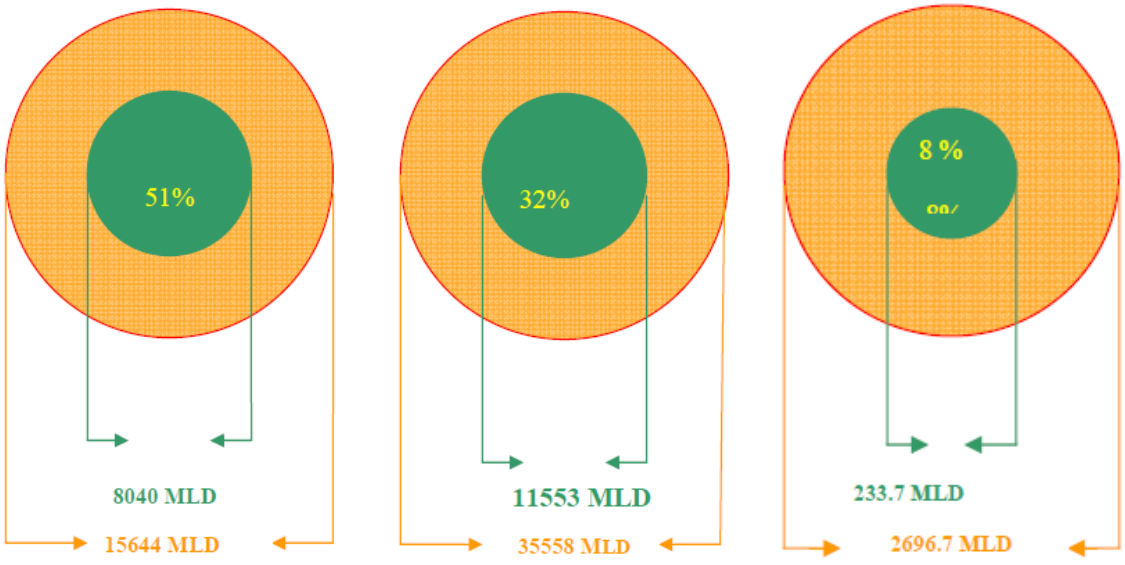
Municipal wastewater treatment: Status and challenges

In India, the estimated sewage generation from Class I cities and Class II towns (representing 72% of urban population) is 38,524 million litres/day (MLD), of which there exists treatment capacity of only 11,787 MLD (about 30%)[1]. The 35 major metropolitan areas (with population over 1 million) have a collective sewage treatment capacity of just over 50%, but high variability exists among them. Only five metro cities have treatment capacity close to 100% of their sewage generation, these are Hyderabad, Vadodara, Chennai, Ludhiana and Ahmedabad[2]. Delhi has the largest sewage treatment capacity in absolute terms, but it is only about 60% its needs, while Mumbai has the second largest treatment capacity in absolute terms but meets only 80% of its needs. Almost all other major metropolitan cities have treatment capacities below 50% of their sewage generation[2]. The 498 Class I cities (with population over 100,000) which account for 93% of the urban sewage generated in the country, have a combined treatment capacity of about 32% of generation, while the 410 Class II towns (population between 50,000 and 100,000) have a combined treatment capacity of only 8% of their generation[2].

Figure 1: Sewage generation (yellow) vs. treatment capacity (green) in Indian cities[2]



However, the actual performance of the sewage treatment plants is quite different from their installed treatment capacity. A 2010 report by the New Delhi based Center for Science and Environment (CSE) put the effective treatment capacity at only 19% of total sewage generation[3] compared to an installed capacity of 30%. A 2005 study by the Central Pollution Control Board (CPCB) found that only 86% of the studied plants were operational, nearly 40% of the plants did not meet general discharge standards, and the average capacity utilization was 72%[4]. A 2007 sample survey by the CPCB classified the performance of only 10% as "good", with 54% falling into the "poor" and "very poor" categories[5]. Several factors influence this dismal situation. The conventional engineered wastewater treatment system is extremely expensive and requires complex operations and maintenance. Add to this the complication and cost of expanding sewer networks, which are very rudimentary or non-existent in many Indian cities that mostly started off as unplanned settlements. The total capital cost of establishing collection and treatment systems for the entire urban wastewater generated is much more than what the government plans to spend; as a result progress in increasing coverage is likely to be slow in the foreseeable future[6]. Like any other infrastructure project in India, land conflicts/disputes often hold up sewage treatment plan (STP) construction long after funds have been sanctioned. An important reason that STPs run below installed capacity is the lack of adequate sewer connection. Other important factors include frequent power cuts, lack of skilled personnel, and inability of urban local bodies (ULBs) to afford operation and maintenance costs. Sometimes, when industries operate within urban boundaries, untreated industrial effluent can damage STP equipment/processes leading to forced downtime[4]. As a result, untreated urban sewage is considered by far the largest source of surface water pollution since India's record on industrial wastewater treatment is somewhat better. Municipal sewage is also a leading cause of groundwater contamination near urban areas[3].

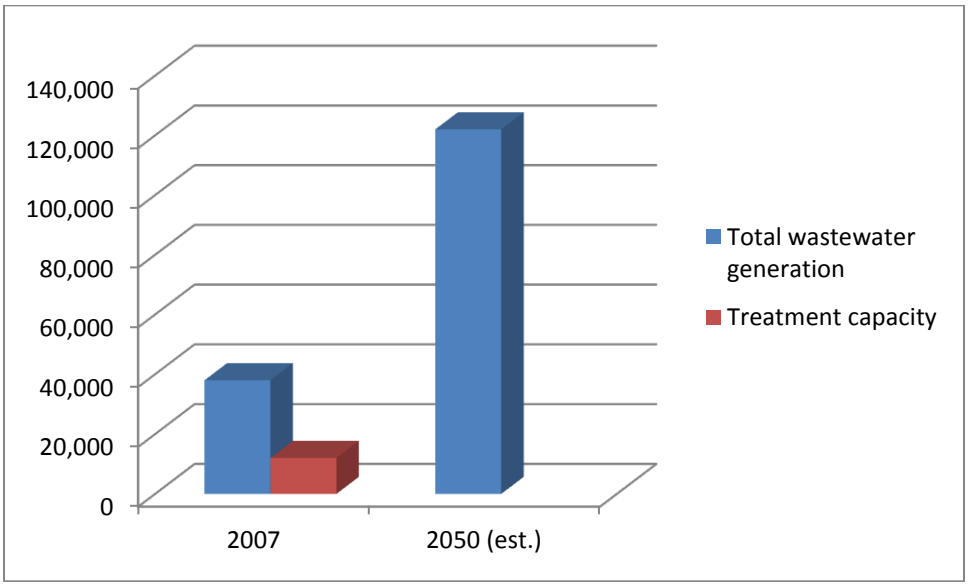
Efforts to expand municipal sewage treatment

Acknowledging that cities cannot tackle the sewage problem alone, the central government launched the Ganga Action Plan in 1985, releasing central funds to cities along the river Ganga for construction of STPs. Subsequently, Action Plans for other rivers were also taken up and in 1995, these separate programs were merged under the National River Conservation Plan (NRCP). A National River Conservation Directorate was set up under the Ministry of Environment and Forests (MoEF) to manage the program. To date, the program has covered 190 towns in 20 states in 39 river basins; sanctioned funds have exceeded Rs. 7,860 crores of which Rs. 4,900 crores have been spent; total pollution load tackled is 3,500 MLD[7]. But, due to the factors discussed above, progress has been slow and effective treatment capacity lags far behind installed capacity. Similar to the NRCP, the MoEF also administered the National Lake Conservation Plan (NLCP) and the National Wetland Conservation Programme (NWCP), that included sewage treatment infrastructure to protect important lakes and wetlands. In 2013, the two schemes were merged into an integrated scheme, the National Plan for Conservation of Aquatic Ecosystems (NPCA)[8].

In recent years, the Government of India has attempted to improve urban sewage treatment through urban development type schemes. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005 for a period of seven years, and was recently extended till 2014. In addition to sewage treatment it also covers water supply, public transport, solid waste management and slum improvement. The scheme works by providing central funds as grants or soft loans to state and local governments who have to identify projects for implementation based on set criteria. State and local governments have to provide matching funds and/or seek public-private partnerships; but the central government contribution is typically the largest share. Under the JNNURM, to date, 126 sewerage projects have been approved and 34 have been completed at an approved cost of slightly over Rs. 16,000 crores[9].

While new schemes for expanding urban sewage treatment is a step in the right direction, the rapid pace of urbanization in India means urban sewage generation is expected to increase dramatically. The CPCB estimates that sewage generation will increase from the present 38,000 MLD to more than 120,000 MLD by 2050[1]. At the current rate of progress, the gap between sewage generation and treatment is only likely to widen.

Figure 2: Current and future sewage generation in Class I and II cities in India compared to current treatment capacity[1]



Framework for water pollution control

The Water (Prevention and Control of Pollution) Act of 1974 restricts discharges of pollutants to water bodies and created Central and State Pollution Control Boards with authority to set standards and enforce water pollution rules. The Water (Prevention and Control of Pollution) Cess Act of 1977 established a levy on industries using water, using the funds thus generated to augment the resources of the Central and State Pollution Control Boards[10]. The Ministry of

Environment and Forests (MoEF) was established in 1985 amid significant reorganization in which all environment related decision-making, including the CPCB, was brought under one umbrella. The Environment (Protection) Act of 1986 was passed in the aftermath of the Bhopal Gas Tragedy of 1984, and is an umbrella act on all issues related to environmental protection and provides for the audit of all facilities that require permits under water pollution, air pollution and hazardous waste rules. Together, these laws enshrine the "polluter pays principle" into Indian environmental policy, and have evolved to include citizen suits, right to information, and incentives for pollution prevention[11].

The CPCB is the main authority that sets pollutant discharge standards while the State Pollution Control Boards (SPCBs) have the mandate to monitor performance and take enforcement action. The CPCB has developed General Discharge Standards that apply to all discharges including those from STPs (in addition, there are industry specific standards that are discussed in the following section). Discharge standards have been developed for 33 parameters under four categories: discharges to inland surface waters, in marine coastal areas, to public sewers, and on land for irrigation[12]. While the standards are quite comprehensive, monitoring and enforcement by the SPCBs is a recognized weak point due to inadequate manpower, technical and financial resources. While the central government may fund the construction of STPs, ULBs and their agencies are responsible for their operation. However, pollution control boards have been historically unwilling to hold local government bodies accountable for poor performance[11].

Status of industrial wastewater treatment

About 13,468 MLD of wastewater is generated by industries in India of which only about 60% is treated[13]. In addition to the general discharge standards mentioned above, the CPCB has developed detailed industry specific discharge standards for 104 categories of industries[14]. Enforcement rules, often backed up by court rulings, allow for shutting down industries that are out of compliance. This measure has been instrumental in improving effluent treatment performance by industries, as compared to municipal STPs[11]. However, concerns remain about inadequate monitoring and enforcement resources at the SPCBs. Policy analysts have pointed out that the current enforcement model is inefficient in that it only allows for drastic action, eg. shutting down, for grave non-compliance. Instead, they have urged the CPCB to move towards a market-based system of fines/levies based on the amount of pollutant discharged which will act as an incentive for industries to continuously decrease their effluent discharges; shutting down may be reserved for extreme violations. However, such a change not only needs administrative reorganization but also more accurate monitoring mechanisms, and is therefore only under discussion at present[15].

A serious concern is the performance of micro, small and medium enterprises (MSMEs), which account for the vast majority of industrial discharges in India but rarely have the technical and financial resources to implement effective effluent treatment. To address this problem, the government of India has advocated setting up Common Effluent Treatment Plants (CETPs) for MSME industry clusters so that the burden of expensive effluent treatment is shared among

many industries. Further, the MoEF has instituted a subsidy scheme in which 50% of the capital cost of a CETP (25% from central government and 25% from state government) will be provided and the MSMEs would have to come up with the remaining 50%. As a result, 88 CETPs having total capacity of 560 MLD have been set up throughout India covering more than 10,000 polluting industries[13]. Recently, this subsidy has been increased to 75% of capital cost (50% from central government and 25% from state government)[16]. One remaining concern is the performance of MSMEs that are dispersed and not part of an industrial cluster.

Framework for wastewater reuse

The only directly relevant policy for wastewater reuse is the CPCB standards for land application of treated wastewater for irrigation. While the general discharge standards for discharge into surface waters cover 33 parameters, those for land application for irrigation only cover 8, including suspended solids, pH, and BOD[12]. In addition, for each industry specific discharge standard, there are standards for land application, although like in the case of the general standards, only limited parameters are covered. For example, the discharge standards for the fermentation industries (breweries/distilleries) only specify a standard for BOD for land application[13]. Despite the presence of such (rudimentary) standards, land application of wastewater for irrigation is almost completely unmonitored and unregulated given the inadequate resources of SPCBs who can barely monitor air and water discharges of regulated industries. As a result, use of untreated or inadequately treated wastewater for irrigation is widely practiced, often out of compulsion in peri-urban or water scarce areas, with questionable impacts on public health and the environment[17] *(for details see accompanying review of wastewater reuse in agriculture in India)*.

In light of increasing water scarcity in India, several recent policy documents from the government have started emphasizing water conservation and end use efficiency, correct water pricing, and reuse and recycling. The National Water Policy of 2012 encourages recycling and reuse of water after treatment to specified standards as well as preferential tariffs that incentivize treated wastewater over freshwater[18]. However, there are no specifics on legal frameworks or implementation mechanisms. The National Urban Sanitation Policy (NUSP) of 2008 addresses reuse of wastewater as an important factor in helping to meet the environmental targets of the city[19]. The NUSP recommends the Service Level Benchmarks defined by the Ministry of Urban Development (MoUD) and recommends a minimum of 20% reuse of wastewater in every city[20]. Again, no specific implementation guidelines are provided. In the absence of specific standards and guidelines, wastewater reuse for irrigation is going on in an informal way all over India, often with negative consequences. In several parts of the country, local governments earn revenue by selling treated or untreated sewage to local farmers; there are many instances of industries selling or giving away their treated effluent to local farmers as well *(for details see accompanying review of wastewater reuse in agriculture in India)*. Perhaps the best formal arrangement in India can be seen at Chennai Metro Water, which earns Rs. 12 crores a year from selling treated wastewater and covers its entire operating cost[21]. However, a lack of comprehensive standards and policy framework is hindering the development of a formal market, appropriate technology and sustainable business/financial

models. In addition to comprehensive standards by the central government, local Water Users' Authorities (WUA) comprising of diverse stakeholders can be established to set tariffs and monitor allocation and use, as suggested by the National Water Policy[18].

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