Wastewater Management- Concerns & Prospects

Wastewater from Urban India may cross 120,000 million litres per day by the year 2050 and Rural India will also generate not less than 50,000 million litres daily. There is an urgent need for better infrastructure and management with regard to wastewater management explains **Rishabh Sethi**.

Water – the natural resource with no substitute continues to escalate at unsustainable rates, driven by population growth and industrial expansion. The resources remain constant in terms of quantity whereas the quality is being systematically worsened as a result of human activity and their effects. In the last one decade, one third of India's population has become urban. The level of urbanization has increased from 27.81 per cent in 2001 to almost 33 per cent currently. The growth of the Indian economy has also put pressure on water supplies and increased water usage across sectors. Groundwater sources are being rapidly depleted, surface water sources are largely contaminated and the infrastructure needed to treat the used water both in urban and rural areas is either non-existent or needs extensive development and upgrades.

As per CPHEEO estimates about 70-80 per cent of total water supplied for domestic use gets generated as wastewater. The per capita wastewater generation by the class-I and class-II cities representing 72 per cent of urban population in India has been estimated to be around 98 litre per capita daily (lpcd). A recent study of water and wastewater management in 71 Indian cities shows that nearly 40,000 million litres of wastewater is being generated per day in these cities only. Central Pollution Control Board (CPCB) has estimated that there are 269 sewage treatment plants (STPs) in India, of which only 231 are functioning. Even the operational treatment plants are not working to their designed capacity leaving a big gap between wastewater generation and treatment. Thus, the existing treatment capacity of wastewater is just 21 per cent of the generation.

This leaves a big gap of almost 80 per cent of generated wastewater is not being treated before its release to the water bodies leading to large scale ground water contamination. From the public health perspective, it is estimated that the impact of water borne diseases in the country affects 37.7 million persons annually including the death of 1.5 million children from diarrhea alone. There are more deaths from diseases caused by drinking contaminated water than from HIV/AIDS, Malaria & TB combined every year.

It is estimated that the wastewater from urban India may cross 120,000 million litres per day by the year 2050 and by that time, the rural India will also

Tertiary Treatment Plant, Bangalore

generate not less than 50,000 million litres daily. There is an urgent need for better infrastructure and management with regard to wastewater management.

INNOVATIONS IN WASTEWATER MANAGEMENT

The increasing urbanization trend and sharp rise in India's population are the two key factors for increase in wastewater. Proper treatment before its release to the ground poses a significant environmental challenge for municipal authorities and industries across the country. The municipal authorities are finding it difficult to do so in the absence of suitable infrastructure and lack of financial resources to build it with new and innovative technology. The new techniques like physical, chemical, biological and ultra filtration treatment are environment friendly and focuses that wastewater can be resource.

The innovation in wastewater treatment has to satisfy a number of criteria:

- to integrate planning with other local services, such as solid waste management, organic composting programs, energy generation and public services so that multi-faceted benefits are derived from wastewater treatment
- to lower the costs of wastewater treatment through recovery and reuse
- to minimize environmental pollution
- to embrace flexibility for adoption of new innovations and technologies as they become available for better efficiency

The innovations in wastewater treatment can be implemented depending upon a number of factors: operating costs, potential revenues, value of the resources, public acceptance for wastewater as resources and the modern engineering needed to create them. Some of the latest innovations in the field of wastewater treatment are:

- **Decentralized Treatment Plants:** smaller and locally based treatment plants on membrane-based technology to serve populated communities
- **Satellite Water Reclamation Plants:** such plants are set up to treat from nearby sewers to produce reclaimed water closer to the user area
- **Membrane Separation Technology:** treated wastewater using membrane technology can be so clean that it can be used for even drinking purpose but mostly used for irrigation
- **Resource Recovery:** Biodiesel from fats, oil, and grease (FOG) from wastewater is collected during treatment in plants and converted to biodiesel through esterification and hydrogenation
- **Electricity & Heat from Co-generation:** Biogas fueled cogeneration systems helps a wastewater facility to utilize energy from the treatment process itself. Co-generation systems produce electricity and hot water from biogas, a natural byproduct of sludge dewatering. The electricity produced can be used to supply power to anaerobic digesters in the plant, thus saving on electricity bills
- Electricity from biogas or sewage powered fuel cells:

Yelahanka TTP

Methane from sludge dewatering plants can be converted into biogas or hydrogen, direct fuel cells that can be used for powering of wastewater plants

- **Water-source heat pumps:** used to extract residual heat from wastewater, after treatment and before discharge by outfall that can be used as an energy source
- **Reclaimed water from wastewater:** using membrane technology, water can be purified and used in industries, for irrigation, recharging of water bodies or as a supplement to existing ground and surface water sources
- **Biogas from wastewater & sludge:** Biogas is produced from methane, which is a byproduct of bio solids processing; already being used to fuel cars, taxis, trucks and public transports in European countries. It can further be refined as a cooking fuel for use in homes and restaurants; biogas can also be burned in plants along with wood or other waste to generate power required for the treatment plant itself and many more useful purposes.

FUTURE PROSPECTS

Certain practices, if implemented efficiently, can definitely make a difference. In the developing country, pushing for greater efficiency in rain-fed agriculture is a cost-effective way to conserve water, produce more food, and reduce poverty. A research report suggest that agriculture accounts for 74 per cent of global water use, while industry is responsible for 18 per cent and domestic use is only 8 per cent. Suitable policy measures need to be formulated to encourage the reuse of treated wastewater for irrigation purposes. Measures may include incentives to Urban Local Bodies (ULBs) to construct treatment facilities using relevant technology, constituting a central and state level water sector regulator to regulate tariff and quality standards of treated water for reuse. Construction, operation and maintenance of treatment facilities should be given to specialized companies who will work under the respective ULBs. Municipalities could treat wastewater as per CPCB obligations to supply it to farmers and industries and can even make it a revenue source for themselves.

Sewage Treatment Plant, Okhla, Delhi

Developments in wastewater treatment and reuse practices from developed countries could be made available through the creation of an information network, which can serve as a forum for exchange of information, ideas and knowledge about the latest research, techniques and technological advancements in the realm of wastewater management and practices. Such a network must be broad in scope, addressing various aspects of wastewater management, including appropriate and affordable wastewater collection, treatment and disposal technologies and best practices as well as the planning and regulation issues that are fundamental to wastewater management. With the business environment improving, one can expect several new initiatives aimed at wastewater and sanitation sector. Different industrial segments also offer varied potential for the wastewater treatment markets.

With over three decades of experience, SPML Infra has gained a strong foothold in the area of design and construction of wastewater treatment plants. SPML has adopted modern treatment techniques and provide solutions for proper treatment and disposal of municipal and industrial wastewater to ensure that the generated wastewater does not harm our delicate ecosystem and is recycled for further usage.

Some of the signature wastewater treatment plants constructed and maintained by SPML:

- 240 MLD Sewage Treatment Plant, Ahmedabad, Gujarat
- 72 MLD Sewage Treatment Plant, Okhla, Delhi
- 70 MLD Sewage Treatment Plant, Nasik, Maharashtra
- 60 MLD Sewage Treatment Plant, Mysore, Karnataka
- 42 MLD Sewage Treatment Plant, Kanpur, Uttar Pradesh
- 10 MLD Tertiary Treatment Plant, Bangalore, Karnataka
- 80 MLD Effluent Treatment Plants in Delhi

The rising cost of fresh water and increasing pollution control enforcement are persuading industry to look at wastewater recycling. The treated wastewater can be made fit for reuse in industries or for irrigation thus leaving a lot of fresh water for drinking purposes. ▲

(Rishabh Sethi is the Executive Director, SPML Infra.)