

FOCUSING ON PUBLIC HEALTH ENGINEERING

Relevant for: Environment | Topic: Environmental Conservation, Sustainable Development, and EIA

An open canal in Mogappair, Chennai. | Photo Credit: VEDHAN M.

Globally, around 80% of wastewater flows back into the ecosystem without being treated or reused, according to the United Nations. This can pose a significant environmental and health threat. In the absence of cost-effective, sustainable, disruptive water management solutions, about 70% of sewage is discharged untreated into India's water bodies. A staggering 21% of diseases are caused by contaminated water in India, according to the World Bank, and one in five children die before their fifth birthday because of poor sanitation and hygiene conditions, according to Startup India. As we confront these public health challenges emerging out of environmental concerns, expanding the scope of public health/environmental engineering science becomes pivotal.

For India to achieve its sustainable development goals of clean water and sanitation and to address the growing demands for water consumption and preservation of both surface water bodies and groundwater resources, it is essential to find and implement innovative ways of treating wastewater. It is in this context why the specialised cadre of public health engineers, also known as sanitation engineers or environmental engineers, is best suited to provide the growing urban and rural water supply and to manage solid waste and wastewater.

The availability of systemic information and programmes focusing on teaching, training, and capacity building for this specialty cadre is currently limited. Both as professions and as practice, engineering and public health have been traditionally understood as different fields. However, together, these fields can offer a wide range of opportunities for the development of advanced wastewater treatment systems, for understanding complex quality and monitoring processes, designing and managing septic tank systems, supplying good quality water in adequate quantities, maintaining hygiene and access to water, and ensuring that water supply is sustainable, including the study of relevant industry standards and codes of practices.

Currently in India, civil engineering incorporates a course or two on environmental engineering for students to learn about wastewater management as a part of their pre-service and in-service training. However, the nexus between wastewater and solid waste management and public health issues is not brought out clearly. Most often, civil engineers do not have adequate skills to address public health problems. And public health professionals do not have adequate engineering skills. India aims to supply 55 litres of water per person per day by 2024 under its Jal Jeevan Mission to install functional household tap connections. In this regard, expansion of the pipeline network, identification of sustainable sources of water which have water available year-round, installation of online systems for monitoring the quantity and quality of supply, and collection and treatment of wastewater become increasingly important. The goal of reaching every rural household with functional tap water can be achieved in a sustainable and resilient manner only if the cadre of public health engineers is expanded and strengthened.

In India, public health engineering is executed by the Public Works Department or by health officials. This differs from international trends. To manage a wastewater treatment plant in Europe, for example, a candidate must specialise in wastewater engineering. With the Government of India starting to think along these lines, introducing public health engineering as a two-year structured master's degree programme or through diploma programmes for professionals working in this field must be considered to meet the need of increased human resource in this field. For this, the role of medical colleges and public health institutes deserves a

discussion. In the current scenario, optimisation and efficiency forms key words in all services. Refresher courses for health and engineering institutes with an updated knowledge in areas of environment science should be made available. Public health professionals can be groomed through in-service training.

Furthermore, public health engineering should be developed as an interdisciplinary field. Engineers can significantly contribute to public health in defining what is possible, identifying limitations, and shaping workable solutions with a problem-solving approach. Similarly, public health professionals can contribute to engineering through well-researched understanding of health issues, measured risks and how course correction can be initiated. Once both meet, a public health engineer can identify a health risk, work on developing concrete solutions such as new health and safety practices or specialised equipment, in order to correct the safety concern.

Public health engineering's combination of engineering and public health skills can also enable contextualised decision-making regarding water management in India. For example, wastewater management systems, especially decentralised and onsite systems, have to be designed based on hydro-geological data and observations of climate patterns. From promoting a robust understanding of processes, trends, and the latest technology in water and wastewater quality monitoring, treatment, and management, public health engineering can help decision/policy makers explore the available options. Given the population growth, diminishing resources and risky exploitation of natural resources, various State governments and not-for-profit organisations are looking to hire environmental engineers through whom public health problems can be addressed.

There is no doubt that the majority of diseases are water-related, transmitted through consumption of contaminated water, vectors breeding in stagnated water, or lack of adequate quantity of good quality water for proper personal hygiene. Diseases cannot be contained unless we provide good quality and adequate quantity of water. Most of the world's diseases can be prevented by considering this. Training our young minds towards creating sustainable water management systems would be the first step. Currently, institutions like the Indian Institute of Technology, Madras (IIT-M) are considering initiating public health engineering as a separate discipline. To leverage this opportunity even further, India needs to scale up in the same direction.

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