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The Predicament of Industrial Wastewater

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The Engineering City of South India, Coimbatore began growing in its industrial capacity during the early 20th century and has never stopped since. The industrial growth spurt began with the establishment of the cotton industry in 1847, following which several cotton entrepreneurs set up shop in Coimbatore. The advent of textile producing industries paved the way for industries manufacturing equipment for the textile sector. The large-scale industries have diversified to multiple sectors hence. This has been supplemented by the mushrooming of a significant number of small-scale industries. Today, Coimbatore stands as one of the important industrial cities in India, with more than 25,000 small, medium and large industries. The city boasts of industries in various sectors like textile, leather tanning, foundry, pumps, electrical and electronics, jewelry, chemicals, automobile and retail.

The small-scale industries have been observed to be a key contributor to the wastewater generation across cities. National level statistics indicate that about 40% of the wastewater generated comes from small-scale industries. Most of these small industries operate out of a small shed or house and are located within the residential area. Hence, more often than not, the effluent from these industries goes unnoticed. The situation in Coimbatore, is also on similar lines. Much like other cities in India, there are not enough industrial zones in Coimbatore to accommodate all the enterprises. The small-scale industries are prevalent within the cityscape. Functioning from small houses, hutments or sheds, their effluents are deceptively released into the drainage channels that are designed to carry domestic sewage. This has affected several qualitative aspects of the water, most notably, the total dissolved solids (TDS).

Textiles are one of the most common industries found in Coimbatore. And, this industry is very resource-intensive: along with using thousands of gallons of water, it also generates a large amount of wastewater. The effluents are mainly composed of dyes, acids, surfactants, reducing agents, binders, ionic metals and their complexes, biocides, toxic anions etc. This wastewater is dumped into channels that ultimately meet the Noyyal River. The excessive amounts of toxins from the textile units have asphyxiated the river and rendered the water lifeless.

The Noyyal River, which was once crystal clear, is a frothing mess today which is a very common sight in Vellalore area. The pollution persists all the way up to Orathupalayam in Tiruppur District. Over time, the level of contaminated water at the Orathupalayam Dam has reportedly reached heights of 11.3 m. The fish varieties in the river have reduced drastically. The groundwater has also been adversely affected. In the last 5 years, the groundwater has become brackish and the hardness has increased considerably. Analysis of groundwater chemistry by scholars indicated a very high value of electric conductivity and total dissolved solids, which are

indicative of high ionic concentrations in the water. High levels of salinity has made it difficult for farmers to use the water for irrigation. Accordingly, cationic concentrations were also observed to be beyond the permissible limit. Furthermore, the high levels of dissolved solids can affect the root zone's osmotic pressure. This further degrades the soil and could result in reduced yield and hindered plant growth.

There are around 450 foundry units in Coimbatore. They have also contributed to the wastewater scenario in the city, albeit not in large volumes like the textile industry. While the quantity of wastewater produced by such industries is less, foundry wastewater can be attributed to have magnified heavy metal concentration in the channels and streams. An increase in Chromium concentration in the water around the city could be attributed to the presence of electroplating and casting industries in the city. Researchers have also observed the Copper concentrations to be much beyond the prescribed levels for industrial effluents in 85% of samples tested across Coimbatore. The steel industry, machinery and transport equipment industries located in some pockets of Coimbatore District have also supplemented the increasing concentration of Iron in the water, up to even 468 milligrams per litre. Other heavy metals that have whose concentrations have increased dramatically include Manganese, Nickel and Lead.

All is not lost. There are measures being taken by the industries in Coimbatore towards safeguarding their water resources. SIDCO Private Industrial Estate in Kurichi, Coimbatore, is one of the major industrial hotspots in Coimbatore. A study conducted by the Tamil Nadu Pollution Control Board (TNPCB) states that the total quantity of trade effluent generated in the estate is 2.6 KLD (kilo litres per day). All effluent generating units have the necessary sewage treatment plants. Some industries (in Tiruppur as well) have also incorporated zero liquid discharge into their operations. The treated effluent is effectively reused or disposed by means of solar evaporation. These efforts were implemented post the declaration of Kurichi as a 'critically polluted' area by the National Ministry of Environment and Forests in the year 2010 and have seen astounding results. But, this isn't enough – the efforts have to span a wider geographical reach as both industries and their wastewater are not localized.

Pooling in the entire wastewater generation of the city to one place and treating it hence, is a mammoth task. Each kind of wastewater generated has its own method of treatment and due care is to be provided when handling industrial effluents. The existing wastewater treatment plants have neither the capacity to handle such volumes of water, nor the advanced technologies for treating the toxicity in the wastewater. It is therefore essential to break the system down into smaller, manageable pieces. Decentralization is the way forward – local, focused and flexible.

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The AQUA-Hub project

In the AQUA-Hub project Water Innovation Hubs are being implemented in the two Indian Smart Cities, Coimbatore (Tamil Nadu) and Solapur (Maharashtra), and accompanied by pilot measures of German technology for water quality monitoring. AQUA-Hub addresses the needs of the local water sectors identified in previous projects, as well as the challenges of the German water industry to develop projects, relationships and business on the Indian market. Qualified HubManagers as a local presence of the Water Innovation Hubs are of great importance for the relations and the exchange of information between the German and Indian actors. In addition to network activities and the mediation of business partners, the hubs fulfil the function of project centres for the realisation of technical demonstration projects, provide information on current developments in the water sector for the respective local situations and support the access to water technologies "Made in Germany".

For more information: www.aqua-hub.de

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Appendix



Figure 1: Frothing Noyyal.
Source: SWF India Project Team (Mohr)



Figure 2: Clogged drains near Selvachintamani Lake in April 2022.
Source: AQUA-Hub Project Team (Beckett)



Figure 3: Discoloured water near Valankulam Lake in April 2022.
Source: AQUA-Hub Project Team (Liehr)



Figure 4: Waste disposed by surrounding industries at Valankulam Lake outlet in April 2022. Source: AQUA-Hub Project Team (Prakash)