

The Role Of Ultraviolet Disinfection In Protecting India's Water (Article)

Protecting public health and the environment by treating and disinfecting water and wastewater is a global endeavor. India is no exception, and with a rise in population and industrialization, protection of water resources is critical.

TrojanUV is part of Trojan Technologies, a global company with over 40 years of water treatment experience. TrojanUV designs and manufactures pressurized and open-channel ultraviolet (UV) disinfection systems for municipal wastewater and drinking water and UV-oxidation systems for environmental contaminant treatment and potable reuse. Today, there are over 10,000 TrojanUV installations throughout the world. These installations help safeguard municipal drinking water and wastewater against harmful microorganisms, bacteria, viruses, and contaminants.

Over the last five years, TrojanUV has expanded its presence in India, providing crucial water disinfection technology at several locations. Water Online spoke with Dinesh Kumar, TrojanUV India Market Manager, to find out more about how UV disinfection can be used to improve India's water quality.

Why is there such a need for wastewater treatment and reuse in India?

In an effort to modernize and improve its wastewater management, the India Central Pollution Control Board (CPCB) has set new wastewater discharge standards. In addition, new finance models are being developed (namely the Hybrid Annuity Model). To meet the standards, public-private partnership (PPP) models and new financing methods provide funding to accelerate construction of new municipal wastewater treatment plants.



Dinesh Kumar, TrojanUV India Market Manager, speaking at a UV disinfection workshop in New Delhi.



These concrete channels now house the TrojanUV3000Plus disinfection system at the Varanasi Sewage Treatment Plant.

Many of these new plants will be constructed to treat wastewater before it is discharged into the Ganga and its tributaries in the Ganga Basin under the Namami Gange Programme and other rivers under the National River Conservation Directorate (NRCD).

Also, growing awareness of the importance of water reuse is fueling the need to build new, and augment existing, wastewater treatment plants across the country.

Why is India's Clean Ganga Project so important and what role is TrojanUV playing in this project?

The Ganga is a river that starts in the Himalayas and, after traversing a course of more than 2,500 km through the plains of north and eastern India, merges with the Bay of Bengal. It is India's holiest and most important river. However, as a result of growing urbanization and industrialization it is now one of the most polluted rivers in the world.

In November 2008, the Ganga was declared a *National River*. [The National Ganga River Basin Authority](#) (NGRBA) was formed to plan, implement, and monitor measures aimed at protecting the river.

In July 2014, the government of India renamed and restructured the NGRBA as NMCG (National Mission Clean Ganga) within the Namami Gange Programme and allocated ₹2,037 (400M USD) toward it. Additionally, several funding agencies, including The World Bank, have committed to provide loans and financing.

TrojanUV systems are now being considered for and installed at several treatment plants as part of this project. One such plant is the Sewage Treatment Plant at Varanasi in Uttar Pradesh. The TrojanUV3000Plus installed there will disinfect 120 MLD (5,000 m³/hr) of wastewater before it is discharged into the river. The system design consists of two duty channels with one bank of lamps per channel, 31 modules per bank, and 496 lamps.



TrojanUV hosts free UV disinfection workshops throughout India. At these workshops, Consulting Engineers, Regulators and Municipal Wastewater Industry Professionals have the opportunity to learn more about the parameters required to design UV systems, and the monetary and non-monetary factors to consider when evaluating disinfection systems.

How does UV compare economically to chlorine disinfection in India?

The cost of chlorination equipment is typically a small part of the overall capital cost. Because chlorination requires a lengthy retention time, a large chlorine contact tank or channel is required unless one already exists. This adds additional concrete, civil works, excavation, and construction to the overall capital cost.

In fact, the original plan for the Varanasi plant was to disinfect with chlorine. However, after calculating the cost impact and return on investment versus chlorine, in addition to environmental and safety factors, the project's contractor decided to switch to UV. Another deciding factor was that the UV system could be installed in a smaller footprint than chlorine. This would ultimately reduce the size of the plant. With land being at such a premium, not having to build expansive chlorine contact tanks was a significant benefit.

How well does UV compare to other disinfection technologies regarding environmental impact that would be important in India?

Today, UV disinfection is widely accepted

for municipal wastewater disinfection around the world. UV is rapidly growing, given it's a safe and cost-effective alternative over chemical disinfection. Also, it produces no disinfection byproducts or a chlorine residual, which is harmful to the environment. The UV disinfection process adds nothing to the water but UV light and, therefore, has no impact on the chemical composition of the water.

UV is a very cost-effective and reliable technology that protects the public against pathogenic micro-organisms, including protozoa, bacteria, and viruses. Chemical disinfection using chlorine is also effective against these pathogens; however, there are pathogens such as *Cryptosporidium* and *Giardia* that are chlorine-resistant but can be disinfected by UV light.

Unlike chemical approaches to water disinfection, UV provides rapid, effective inactivation of microorganisms through a physical process. The retention time required to achieve disinfection ranges from a few seconds compared to several (>30) minutes for chlorine

disinfection. This eliminates the need for large chlorine contact chambers, thereby reducing the required footprint and cost of installation.

What are some of the concerns regarding wastewater disinfection in India, and what is TrojanUV doing to help?

There is currently a lack of awareness in India about wastewater treatment and disinfection as it relates to its benefits (e.g., healthier lives, economic growth). There is also a knowledge gap regarding technologies available and the need for a cleaner environment (e.g., promote aquatic/plant life, reduce pollution, algae growth).

Today, sewage capacity in India is extremely inadequate. This will change as the new treated wastewater quality standards are enforced. For example, treatment plants will now need to meet <1000 FC/100 ml (bacteria limit), whereas in the past relaxed standards were set. This is a major shift in the regulations, requiring new plants with immediate effect and augmentation of existing plants to meet these limits.

Traditional methods of disinfection using chemicals, such as chlorine, are well known in India. However, there is little knowledge of the disadvantages, such as the environmental impacts, toxicity, and the need for

dechlorination to protect aquatic life.

While this is a concern, it's also an opportunity to educate stakeholders and ensure that everyone understands that UV is safe and cost-effective and is being used today in thousands of wastewater plants worldwide. There's a big misconception that UV disinfection is a new technology, when in fact UV disinfection has been around for over 100 years and has rapidly grown in markets such as North America, Europe, and China.

UV disinfection of wastewater is key to safeguarding public health in India, and education needs to be at the forefront. Trojan has local associates and established local partners hosting free educational seminars for engineers, regulators, and stakeholders.

The main reasons for the adoption of UV are its key benefits: lower total cost of ownership, community and plant safety, and significantly smaller footprint versus chlorine.

As part of our education, in addition to our seminars, we're working with engineers, DBOs/EPCs, and stakeholders to provide true CAPEX and OPEX for both UV and chlorine disinfection so they can evaluate both technologies.

Currently, what products/services is TrojanUV offering in India?

For product service and support, we are collaborating with Alfaa UV, our regional representative company. As for our products, we are focusing on municipal UV disinfection equipment, primarily for wastewater disinfection projects. The main focus is on treating the plant effluent going into the Ganga River. We have a diverse wastewater disinfection product offering, but the two systems that are ideally suited for the applications in India are our TrojanUVSigna and TrojanUV3000Plus.

In five years, what do you hope TrojanUV will have accomplished in India?

In five years, we'd like to see a sustainable market for municipal UV disinfection with established regulations in place. From a company perspective, we're hoping to have built an integrated sales/marketing/service team and be the preferred brand for UV disinfection in India.

In many respects, we'd like to replicate the success we've had in China. Since entering the China market in 2005, we have grown to become a leader in the municipal wastewater disinfection market. In fact, TrojanUV systems are now treating approximately 20 percent of the country's wastewater. We were able to accomplish this through education and close collaboration with stakeholders and are now working to do the same in India. ■