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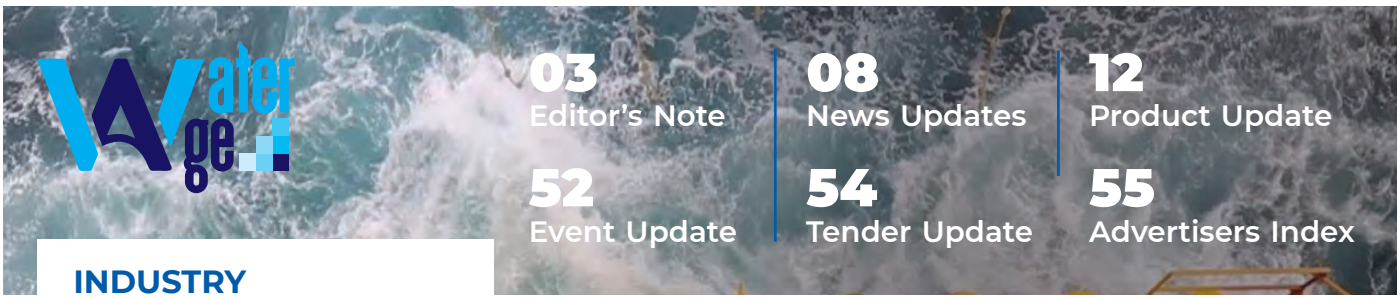

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R E N U T O M A R
(Editor-in-Chief)

DEAR READERS,

Over 600 million people in India are suffering from severe water shortages, making the situation there dire. According to research by the Observer Research Foundation (ORF), the demand for water in India is projected to increase at a rate of 2.8% compound annual growth rate (CAGR) from 2010 to 2030, with a possible supply deficit of 50% by that time. This would have a negative effect on agriculture and other important businesses, such as those that process food, make drinks, manufacture textiles, etc., which would reduce the GDP by a lot by 2050.

Industrial water consumption is rarely given the necessary consideration when we talk about water scarcity. Almost 500 billion cubic metres of the entire quantity of fresh water available each year are used by industry, according to a study by the Central Pollution Control Board (CPCB). Water will continue to be in high demand for industrial uses, there is no doubt about it.

In addition to wastewater discharge, which has the potential to seriously contaminate our rivers, industrial water use is only one aspect of the problem. In managing their water consumption sustainably and reconsidering how they handle wastewater, industries may play a significant contribution. Wastewater, in its simplest form, is water that has been used for home, industrial, and commercial purposes.

At smaller, more localised sizes, wastewater reuse is also technically and financially viable. One of the ways that businesses may manage their water resources effectively is by turning their wastewater into high-quality, clean water that can be utilised for internal uses. All of the ETP/STP (sewage treatment plant) water generated by the industry is transformed into potable water and utilised for laundry, cooling towers, and other applications.

Even apartment complexes are using cutting-edge water recovery equipment to transform STP-treated water into water of potable grade because they recognise the true worth of treated effluent. By allowing the sale of this high-quality water to enterprises, some complexes have gone one step further and begun to generate income from it.

This edition is focusing on Trends & Technologies in Water & Wastewater Treatment that can help tackle the issue of water scarcity.

Please read the engaging and educational articles and case studies and let us know what you think.

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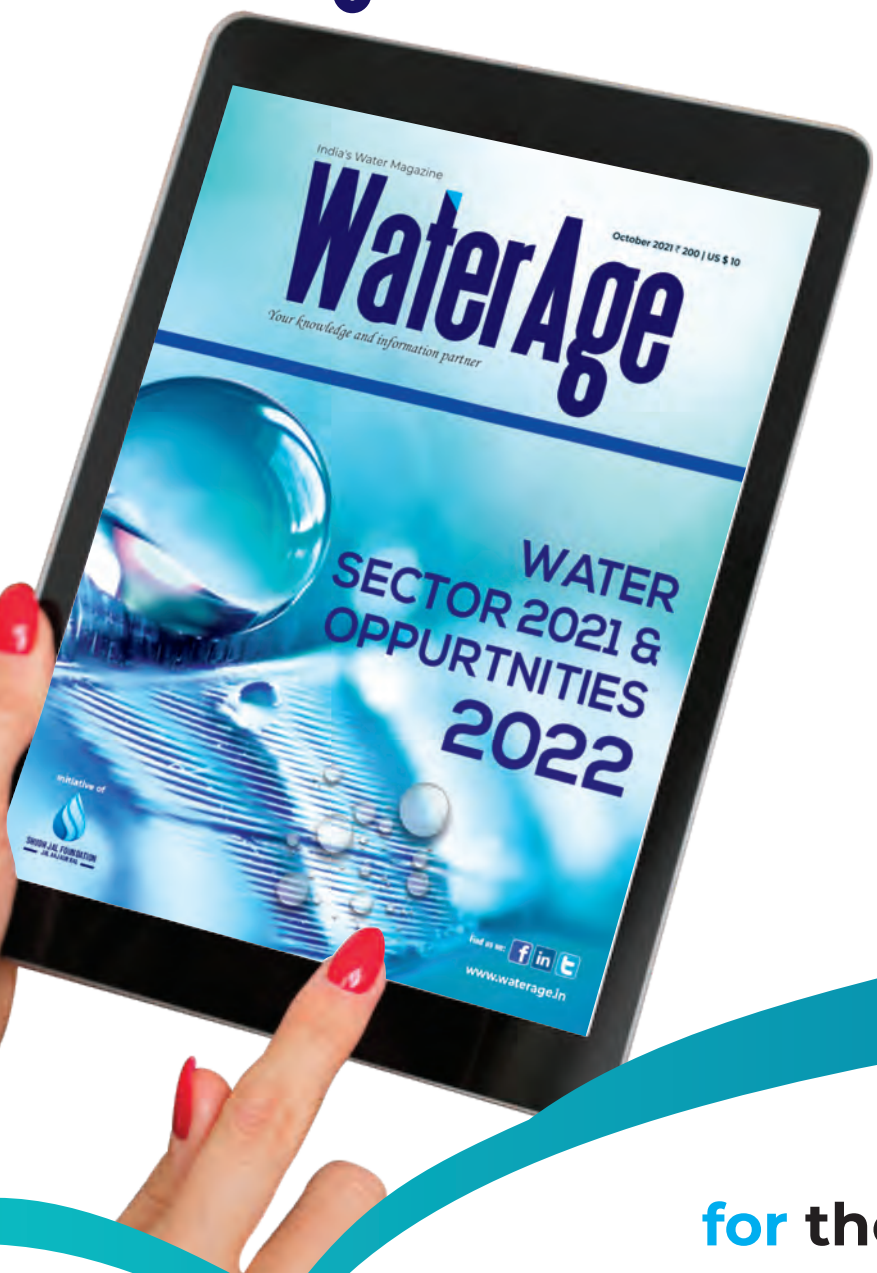

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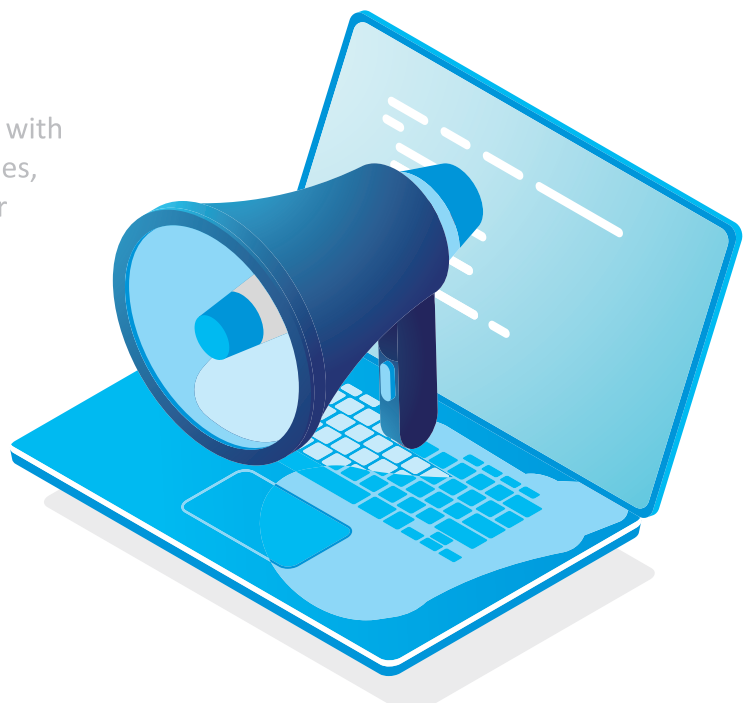

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Apple and a UK NGO to enhance India's water management

Apple Inc. said that it will support the creation of data– and analytics–driven approaches to better manage and preserve water in India in collaboration with the non–governmental organisation (NGO) Frank Water, which has its headquarters in the United Kingdom.

The cooperation was launched with a pilot project in the Anekal neighbourhood of Bangalore, where the Organization would gather data to describe water usage there and assist locals in taking action to reduce water waste and increase consumption efficiency.

In order to achieve this, Apple and Frank Water will employ a method known as "hydrological modelling," which measures water inflow, consumption, and wastage using computer simulation. According to Apple, the technology will be employed to generate results that will then be made available to local inhabitants, in order to reduce wasteful water waste and enhance strategic usage habits.

The corporations claim that the initiative will include participation from neighbourhood enterprises, groups, and citizens.

The decision was made around a year after Apple announced its plan to save mangrove forests in Maharashtra in collaboration with the Pune–based Nonprofit Applied Environmental Research Organization (AERF). The latter operates in Maharashtra's estuaries and contributes to the development of methods for improving the conservation of the area's carbon–absorbing mangrove trees. It received an unknown amount from Apple in the form of a donation.

Giving SIPCOT industrial parks a boost

To raise the groundwater table and promote green space, the State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT) is promoting aqua–green initiatives in its industrial complexes. At a cost of '100 crore, 92 water bodies spread over 19 industrial parks in 12 districts are being revitalised. Around these facilities, SIPCOT is also planting a million seedlings, largely of local species. The purpose is to increase groundwater recharge, increase biodiversity, and increase water body capacity in manufacturing centres.

A bird observation centre, eateries, and walking and cycling trails are also being built at a cost of $30 crore. The Navalur park is anticipated to open to the public in January 2024 with 50% of the development already finished. At the moment, Siruseri is home to 56 IT companies with 25,000 individuals on the payroll on a daily basis.

Following Navalur's lead, water bodies in 18 additional industrial parks totalling 1,114 acres are being revitalised for 70 crore by following the example set by Navalur. Among these are the local government–owned tanks in small towns near SIPCOT industrial parks that are located in rural areas. 37 of the 92 water bodies are linked to local bodies. In the Kancheepuram district, for instance, it's possible that boating services are available in the Kevallur water body at Irungattukottai. Prototypes of water recycling technology will be on exhibit, and the area around the tank will demonstrate how water is processed for reuse.

There will be walking tracks on each of the bunds within a 1–kilometre radius. According to government sources, work to restore the water bodies has already begun under the detailed project reports (DPRs) that SIPCOT has created. According to a SIPCOT official, desilting should result in a 10%–15% increase in water body capacity. Six million cubic metres of water may now be held in these bodies of water together.

The open space reserve of the SIPCOT industrial parks has also received 5.6 lakh seedlings. 50 indigenous species, including palmyra, are among them, according to SIPCOT sources.

Anit Thapa lays foundation stones for water projects worth Rs 122 crore

Anit Thapa, the Gorkhaland Territorial Administration's chief executive, lay the first stones on Sunday for a variety of drinking water projects totaling Rs 122 crore for the Kurseong sub–Tung–Saint division's Mary's neighbourhood.

The project will be carried out as part of the Jal Jeevan Mission of the central government, which aims to bring pipeline water to homes.

Through this programme, drinking water will be available in every home. After laying the foundation stone at Beltar, a community close to Kurseong, Thapa stated that the quality of the work must be maintained in order to benefit people.

The projects, according to reports, would be carried out at a number of tea estates in the subdivision, including gardens like Singel, Sepoy Dhura, Edenvale, Maharani, Nahori, Dyal Thong, Ringtong, and Chaitapani.

Moreover, drinking water amenities will be made available in places like Saint Mary's and Goethals, Champasari Forest and Kharia Busty, and Chatakpur Forest.

Moreover, a 20 million litre open groundwater reservoir would be constructed in Sepoy Dhura, according to a GTA official.

These water projects will provide service to 4,361 homes in total.

Drinking water supply in rural regions of the highlands has long been a big problem for the government and local organisations, especially during the dry months, which are from February to June.

Every day, leakage and theft cause Ahmedabad to lose 300 million litres of water

The local government of the city has invested Rs 125 crore over the past eight years on the installation of cutting–edge technologies, water surveillance, and water audits in an effort to stop water loss from its

supply lines. The sad fact is that Ahmedabad loses 300 MLD of water everyday to leaks and theft alone. The civic body would incur a loss of up to Rs 100 crore if it were calculated yearly.

When the Ahmedabad Municipal Corporation (AMC) invested Rs 25 crore to audit water usage in the city in 2016, it was one of the earliest initiatives to reduce water waste. Two projects were recommended for implementation in the report: a SCADA for managing the water network and another SCADA for general monitoring of public services. The 100 crore rupees in funding set aside for these initiatives. Yet, the AMC still loses 300 million litres of water every day even if the projects have been approved.

To pump water to 15,56 lakh homes and businesses in the city in 2021, the AMC estimated that it would cost Rs 380 crore. Just Rs 119 crore is contributed to this endeavour by Amdavadis. Only 36 crore rupees are paid for this by residential areas. Municipal council members encouraged residents to regularise 28,000 water connections between 2018 and 2021 in exchange for a Rs 500 fee.

Central Assistance for Building Infrastructure for Water Harvesting

Water is a state responsibility, and the federal government provides technical and financial support to the states in their efforts to conserve and replenish water supplies, including the development of infrastructure for water collection.

The Indian government has been putting various plans into action to build infrastructure for water harvesting. Major schemes/ programmes implemented by the Government for promoting creation of water harvesting infrastructure include Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Watershed Development Component of Pradhan Mantri Krishi Sinchai Yojana (WDC–PMKSY), 15th Finance Commission Grants, 'Jal Shakti Abhiyan: Catch The Rain'(JSA:CTR), etc.

The state– and UT–specific committed central aid, release, and utilisation certificates filed for the AMRUT and AMRUT 2.0 projects are appended as Annexures I and II, respectively. Central funds made available and used under WDC–PMKSY are listed in Annexures III and IV, respectively. In Annexure–V, there are state–by–state breakdowns of the Central Assistance provided to various states and the costs associated with the Surface Minor Irrigation (SMI) and Repair, Renovation, and Restoration of Water Bodies (RRR of WBs) of PMKSY programmes. In Annexure–VI, the amount spent on water harvesting and conservation under MGNREGS for each State and UT during the last three years is broken down by year. Under JSA:CTR, each district receives a financial contribution of Rs. 2.00 lakh, split into two payments of Rs. 1.00 lakh each, for the purpose of GIS water body mapping and the creation of scientific planning. In Annexure–VII, the specifics of the money released under JSA: CTR are listed.

The development of capacity in terms of the amount of water that can be stored is an ongoing process that involves the inter–sectoral convergence of several Central & State Government schemes/programs.
Shri Bishweswar Tudu, Minister of State for Jal Shakti, provided this information in a written reply to a question in the Rajya Sabha.

Swachh Sujal Shakti Samman 2023 Conferred by the President of India

The President of India, Smt. Droupadi Murmu, attended the "Swachh Sujal Shakti Samman 2023," which the Ministry of Jal Shakti arranged to honour the women leaders in the rural water and sanitation sector. The purpose of this celebration, which was held in advance of International Women's Day, was to honour the exceptional and noteworthy work being done at the local level by women in the implementation of the Swachh Bharat Mission – Grameen (SBM–G), Jal Jeevan Mission (JJM), and Jal Shakti Abhiyan: Catch the Rain (JSA–CTR). The Indian President and Union Minister of Jal Shakti awarded the "Swachh Sujal Shakti Samman 2023" to 36 women who had won WASH competitions. The event also saw the launch of Jal Shakti Abhiyan – Catch the Rain 2023 and release of National Water Mission's(NWM) SoPs on Source Sustainability by Minister of Jal Shakti Sh. Gajendra Singh Shekhawat. Union Minister also presented President with the first copy of the 'Swachh Sujal Shakti Ki Abhivyakti' – a compendium of case stories from SBM (G), JJM and NWM. A customized 'My Stamp' for NWM was launched by Minister of State for Communications Sh. Devusinh Jesingbhai Chauhan, who also presented the first copy to President.

In her address, President observed that women are at the forefront of all the 3 missions of Ministry of Jal Shakti, 'We recognize the efforts of women in the Self–Help Groups and community–based organizations who have played a vital role in spreading awareness about the importance of water conservation, water management and sanitation. Their hard work and determination have been instrumental in the success of the Swachh Bharat Mission, Jal Jeevan Mission and Jal Shakti Abhiyan'. President added that it's the women leadership in the SBM(G) and JJM programs, that has brought piped water supply to more than 11 crore rural households and in achieving more than 2 lakhs ODF Plus villages. Highlighting the overall benefits of the flagship missions, Smt. Murmu said, "Nobel laureate Michael Kremer, in his study has reported that 1.36 lakh lives of children under five years of age can be saved every year in rural India by providing safe and adequate drinking water through tap connections and having safe sanitation practices".

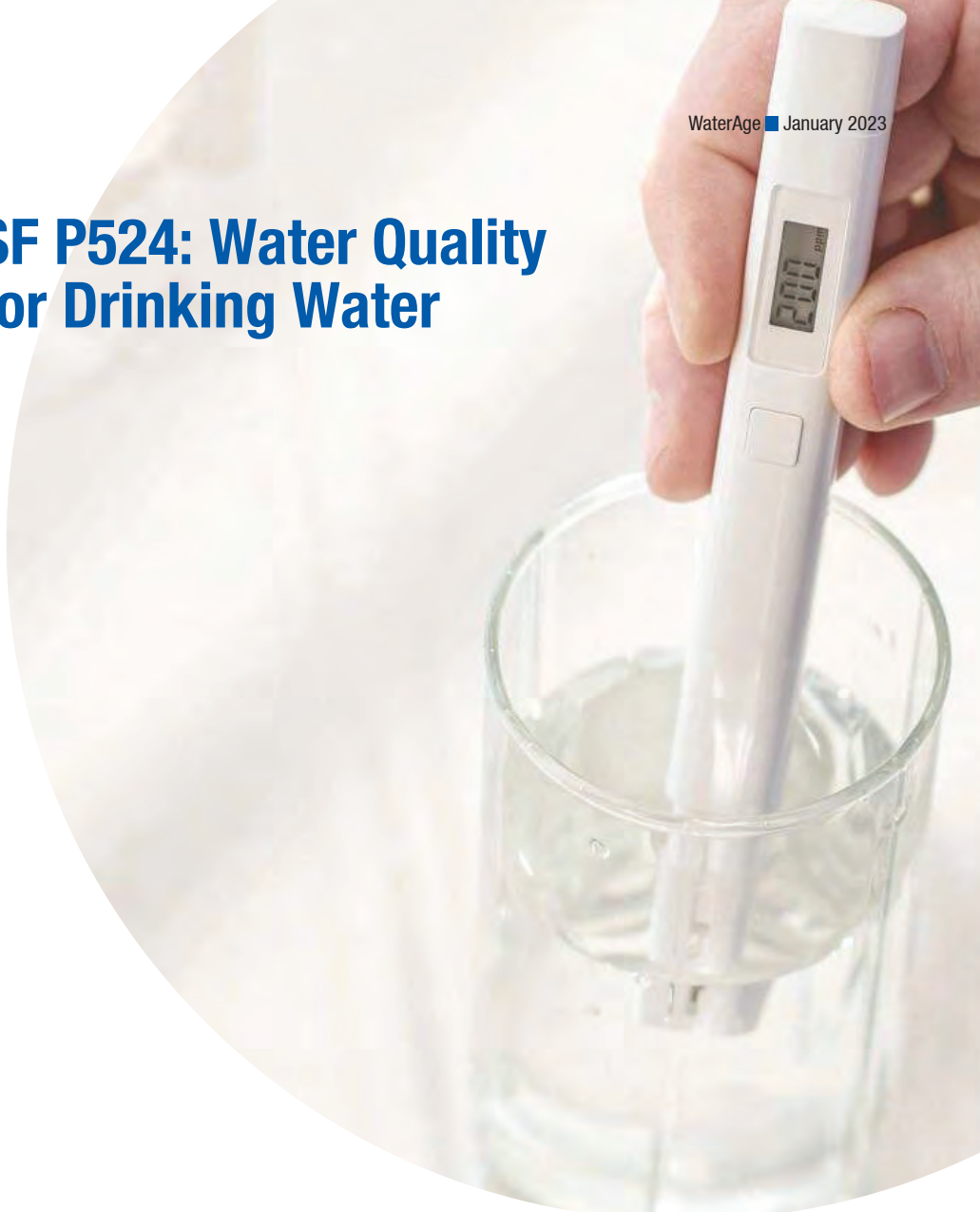
Applauding the women champions, she said that we all have seen how Babita Gupta of Bihar was awarded today for converting plastic waste into decorative products, Salila Jena of Odisha for solid and liquid waste management, Munni Devi of Jharkhand for providing tap water to homes, and Neelam Singh for playing an important role in making the village

ODF plus through community cooperation. "These women make my belief stronger that with their dedication and hard work, India will present an example to the world in water management and sanitation." In her concluding remarks, President said, "I would like to tell all the Awardees present here that when you go back to your villages, tell people about the work being done in the field of cleanliness and water conservation across the country, inspire them to follow environmental friendly practices. I am sure that today's award will inspire you to work with more dedication and seeing you, other people will also learn and contribute to cleanliness, water and environment protection."

DDWS is implementing two flagship programmes of the central government i.e. Swachh Bharat Mission Grameen (SBM–G) and Jal Jeevan Mission (JJM). SBM–G was started on 2nd October 2014 with the objective to stop Open Defecation. All villages in the country declared themselves as Open Defecation Free(ODF) on 02nd October, 2019. Thereafter, SBM–G 2.0 was launched to sustain the ODF status of the villages and to improve the level of cleanliness in rural areas through Solid and Liquid Waste Management, thereby making the villages ODF Plus. As on date more than 2 lakh villages of the country have been declared ODF Plus. On 15th August 2019, Jal Jeevan Mission was launched by the Prime Minister. At the time of the launch only 3.23 Crore rural households had access to tap water connection, with relentless efforts made on ground by the Mission in partnership with the State and UTs, today over 11 Crore rural households are getting potable water through taps.

To make water everyone's business, Jal Shakti Abhiyan (JSA) was launched in 2019, a national call to action that involved millions of people in water conservation and recharge efforts. This campaign led to creation and rejuvenation of more than 6 lakh water related structures all with public participation and active involvement of the communities. JSA 2019 was followed by the launch of "Catch the Rain" campaign in 2020 focusing on water conservation and rainwater harvesting. The overwhelming response received even during COVID, from the campaign encouraged the Ministry make it an annual event, commencing prior to the monsoon season and continuing for the next six months. Therefore, Jal Shakti Abhiyan: Catch the Rain campaigns were launched with an expanded scope for pan–India implementation in 2021 and 2022. The campaigns have been able to create a synergy in bringing together all stakeholders working on water conservation & water management. Buoyed by the success, The President of India launched "Jal Shakti Abhiyan: Catch the Rain–2023" on the theme 'Source Sustainability for Drinking Water', 4th in its series. Focused interventions of the JSA:CTR–2023 include consolidation of activities i.e. (1) water conservation and rainwater harvesting; (2) enumerating, geo–tagging & making inventory of all water bodies; preparation of scientific plans for water conservation based on it (3) setting up of Jal Shakti Kendras in all districts (4) intensive afforestation and (5) awareness generation.

NSF Launches NSF P524: Water Quality Testing Devices for Drinking Water



NSF, a leading public health and safety organization, announces the launch of protocol, NSF P524: Water Quality Test Devices for Drinking Water. This is the first–ever the protocol that provides a standard third–party validation of the performance of water quality testing devices (WQTD) used in drinking water, ensuring public health protection by providing assurance that these crucial devices perform according to the manufacturer's claims.

The new protocol has been developed through collaboration between NSF's leading experts and industry experts including manufacturers and public health officials. Until now, manufacturers of potable water WQTDs could only advertise performance claims based on their own validation testing.

NSF P524 covers any device, sensor, or test kit used to measure water quality parameters in drinking water where the operation of the kit does not require access to lab facilities or equipment and provides results in real–time or after a short wait period. The protocol verifies the manufacturer's claimed accuracy and precision for the device across its claimed operating range. Certification testing verifies the claims by comparing measurements taken with the device to established laboratory reference methods.

The protocol is designed to validate WQTDs that measure a variety of water quality parameters, including but not limited to metallic and organic, and microbial contaminant concentrations, turbidity, total suspended solids, alkalinity, and hardness. Certification to NSF/ANSI/CAN 61 is a prerequisite for in–line WQTDs that contact drinking water. By verifying the manufacturer's performance claims, the protocol provides assurance that water quality testing devices are consistent and reliable, allowing users to make informed decisions about drinking water quality. The protocol also provides a framework for manufacturers to evaluate their devices and make improvements to their accuracy and precision.

"Access to clean and safe drinking water is a fundamental right, and it is essential that we have reliable tools to measure the safety of our water supply. The launch of NSF P524 for water quality test devices is a significant step forward ensuring users have access to accurate information about the safety of their drinking water," states Dave Purkiss, Vice President of NSF's Global Water Division. "Having this protocol available for water quality testing devices used for drinking water helps provide confidence to utilities NSF Confidential and other users that these products are suitable for use in our water systems. This protocol will help provide another layer of protection for the safety of our drinking water."

The launch of this new protocol is a major milestone in the efforts to improve the accuracy and reliability of water quality testing devices. It will help to ensure that people have access to safe and clean drinking water and will support the continued development of high–quality water quality testing devices.

NSF is a global leader in standard development that promotes public health and safety.
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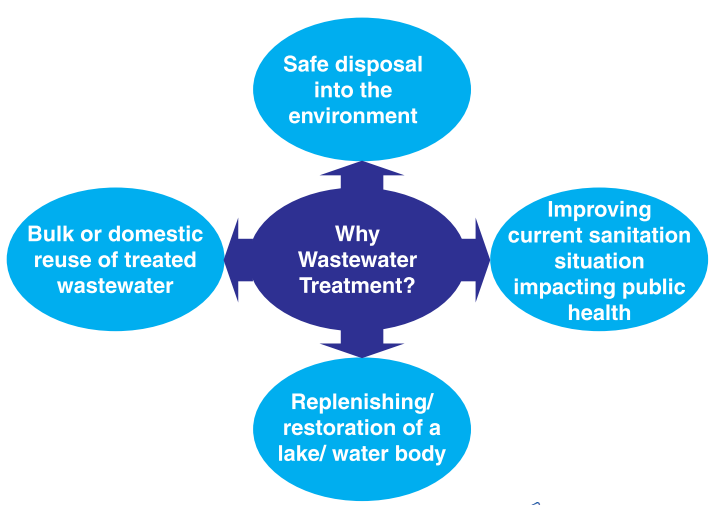
Anjali Porwal has more than 4 years of experience in the field of water, serving my knowledge and working under the Ministry of Jal Shakti (National Jal Jeevan Mission) at U.P. Jal Nigam (Rural) as a Quality & Technical Manager. Being a part of the public health sector, insuring to provide safe drinking water in rural areas.

TREATING WASTEWATER

Water is an essential part of our day–to–day life. Since the past decade, we have witnessed an awareness regarding saving water and reusing it. With time there are many other water–related issues came to our knowledge like safe drinking water, clean surface water, etc. For these, some government schemes like– Jal Jeevan Mission, Namami Gange, Swachha Bharat Abhiyan, etc. are giving a positive social awareness of the importance of water. There are also many videos available on social media, which show how water is tested after washing hands and flushing the toilets.



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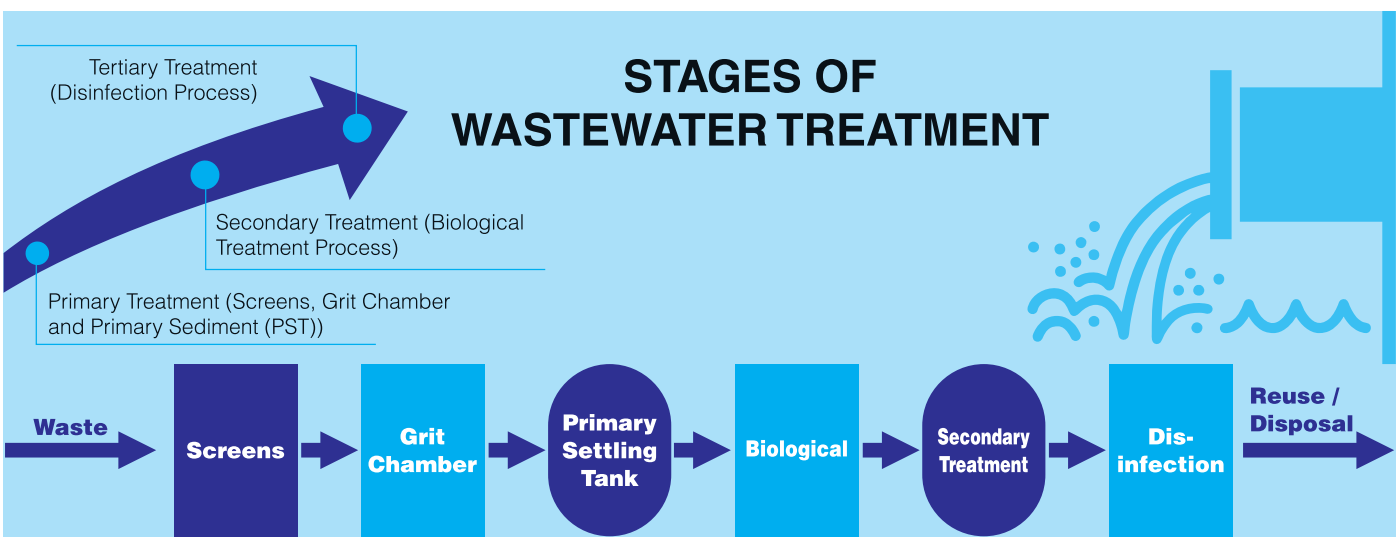
If we talk about wastewater management or wastewater treatment, many new technologies have been extended to reduce the wastage of water. Adaptation of such techniques compiles physical, chemical, biological, and combined technologies to treat wastewater. Wastewater is treated in three phases. The first one is primary in which the solid from wastewater is removed. The secondary phase is the removal of bacterial decomposition. And the final one is tertiary, i.e. the extra filtration. The treatment of wastewater is a must because the untreated water cannot be put directly into other water bodies. Doing this can raise the issue of water pollution, which will not just hamper the life of common people lives nearby but also affects the living organisms lives in the water. In our day–to–day life, we generate a huge amount of wastewater. This wastewater goes down to the gutter and ends up in water treatment plants.

Tankas, Kunds, and Baolis are examples of preserving rain or running water for further use. In the present time, there have been many water treatment plants in urban and rural areas as well.



Why is filtration of Wastewater important?

- As the population increases day by day, the demand for water grows too. As the water is limited on the earth. Hence, to meet that demand with the supply, the need of treating wastewater increases.
- Wastewater treatment system emits harmful bacteria and living organisms from the water. This ultimately keeps the environment and living beings safe from diseases.
- The modern wastewater system requires minimal maintenance and can last up to 15 years if it is maintained in the correct way.
- By adopting this process, the reuse of water can be done soon. As most modern wastewater treatment systems have the potential of breaking down solids in quite a faster way.
- It decreases water bills. The water crisis is taking place in many countries. If a country is capable of managing its wastewater by re–treating it, then the worry of water can be sorted out to an extent.

Primary Level Treatment of Water

In the primary level of treatment near about 35% of pollutants are removed as solid waste. Hence, this initial level is one of the major

Aeration maintains solids in suspension, scours the membrane surface, and provides oxygen to the biomass, leading to better biodegradability and cell synthesis. This led to the further development of the MBR system.

steps in cleaning up the water. The second step of purifying water begins with putting water into settling tanks. After a few hours as the sludge is settled and the scum is formed on the top of the water, both of them are removed from the top and the bottom as well. After this process, the partially treated water is shifted to the secondary treatment level.

Water Treatment at the Secondary Level

In the secondary level of treatment, bacteria is being used to low down the pollutants from the water. This process is being done by forcefully mixing the wastewater with oxygen and bacteria. By going through this process, 90–95% of the wastewater is purified. Many plants also go with the sand filtration process, for the removal of extra pollutants from the wastewater. Further, the water is disinfected by using ultraviolet light, chlorine, and ozone

The thought of preserving water has been involved in India as well. In recent research, the Indian Institute of Technology Jodhpur's researchers has developed a two–step approach to deal with the wastewater generated by textile industries. In which the coloured wastewater released from the textiles can be treated and reused for our day–to–day life needs. This step will resolve a huge problem, as there have been many textile industries, which have been dumping wastewater directly into the water without treatment. It majorly had a severe effect on the water bodies. India has been an ancient place where the concept of preserving water was part of our life.

Tankas, Kunds, and Baolis are examples of preserving rain or running water for further use. In the present time, there have been many water treatment plants in urban and rural areas as well. In many modern cities, where the treated water is being kept in a huge space, it is being converted as a park as well with a bridge on it, so that the space can be utilized in a more efficient way.

Can we purify our drinking water at home?

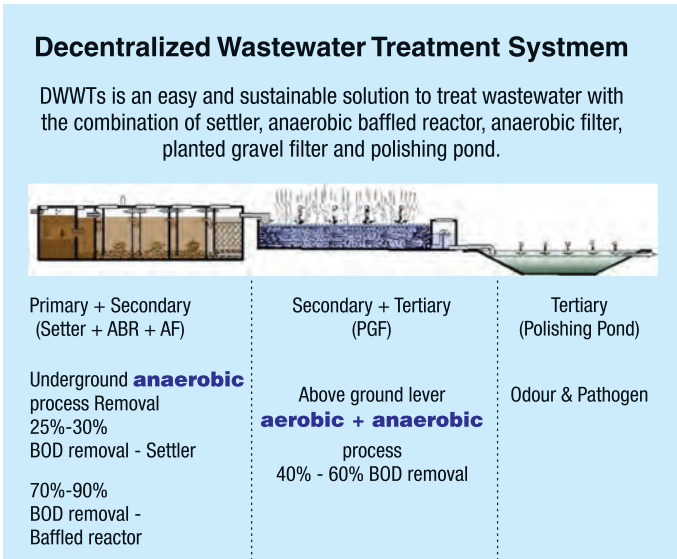
It is crystal clear that no life can be expected without pure water on earth. There are many wastewater treatment plants to purify water. But those aren't enough yet, as a big number of people still don't get pure water to drink. In that case, our responsibilities increase towards our own and our family's health. Here are a few points: by considering them, we can make our drinking water pure and free from bacteria.

- Boil your water, before consuming it. This will eliminate bacteria from the water and you will definitely get pure water to drink.
- Installing a water purifier is also one of the easiest ways to get better water to drink. As modern water purifiers eliminate harmful chemicals and impurities from the water.
- Water Chlorination is one of the traditional methods of removing impurities from the water. But, this shouldn't be tried without consulting the experts.
- Distillation of water is also a way one can go with. Distillation is a water purification process that engages collection of the condensed water after evaporation. Although this process takes much time and is not as effective as RO's purified water.
- One of the most ancient ways of making water purified is by keeping water in clay pots. Keeping a water in a clay pot can help you get better drinking water.

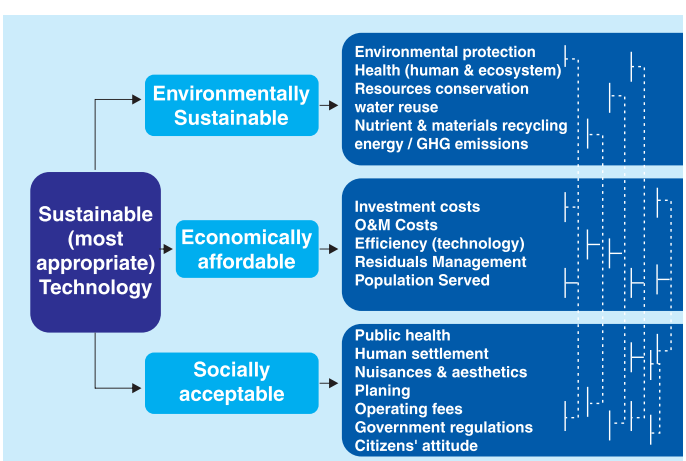
Water Treatment Techniques

Decentralized Waste Water System (DWWTS)

In addition to wastewater techniques, I would like to add the most effective and affordable technique i.e., Decentralized Waste Water System (DWWTS).



Factors to be considered to select the most appropriate technology

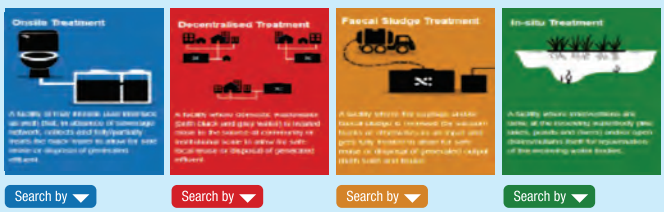


Presentation Structure

- Factors affecting the selection of treatment technologies
- Types of Decentralized Wastewater treatment technologies
- Understanding the Nature–based treatment technologies with the help of case
- Introduction of MOUNT and its exploration.

Menu on Un-networked Technologies

MOUNT is an aggregator platorm for various sustainable technologies, encouraging and disseminating knowledge and good practices for wastewater management. MOUNT divides treatment process in 4 Categories



Sub Type of Technology Capital cost (Rupees (KLD) O&M (Rupees/KLD) year)	Constructed Wetlands - Wastewater Treatment Systems Decentralised Wastewater Treatment Systems Fixed num biofilter technology Phytorid wastewater treatment system Soil Bio Technology (SBT)

MOUNT

Categorization of Decentralized Technologies

Capex/KLD (Rs)	Technologies	Opex/KLD (Rs)	Technologies
0-10000	Constructed Wetlands	0-4000	Phytorid, SBT, FFBT, Constructed Wetlands
10000-20000	Soil Bio Technology (SBT)	4000-8000	DWWTs
30000-40000	Fixed Film Biofilter Technology (FFBT)		

Some Other Technologies

Nature based Decentralized Wastewater Treatment Technologies

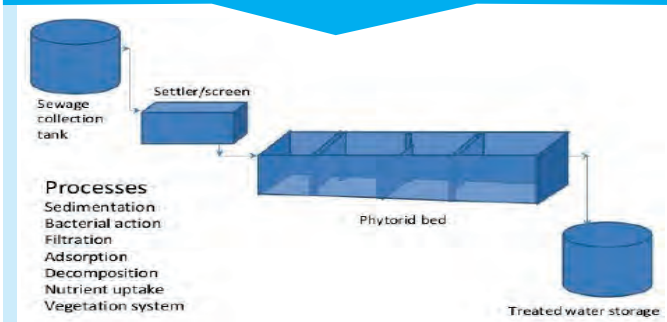
Name of the Technology	Reuse of treated water	Capital cost (Rs/KLD)	Capital cost (Rs/KLD)
Constructed Wetland	Horticulture	10000	1500-2000
DWWTs	Horticulture	50000	8500
Green Bridge	in situ treatment of water bodies	200-500	20-50
Biosanitizer / Eco Chip	In situ treatment of water bodies, Horticulture	10000 per Chip excluding construction cost	20-50
Nualgi	In situ treatment of lakes/ ponds, increase in fish yield.	0-35	9-10

Electro-mechanical Decentralized Wastewater Treatment Technologies

Name of the Technology	Treatment Capacity	Reuse of treated water	Capital cost (Rs/KLD)	O&M Cost (Rs/KLD/Year)
Soil Bio technology (SBT)	5KLD-tens of MLD	Horticulture Cooling Systems	10,000-15,000	1000-1500
Trans Biofilter	5KLD-3 MLD	Gardening, Landscaping, farming & other non-potable purposes	N/A	N/A
Tiger Biofilter	15KLD-500 MLD	Washing, flushing, construction, and gardening	25000-30000	1800-2000

Phytorid Wastewater Treatment System

Phytorid is a sub-surface flow type treatment system, it treats wastewater with the help of porous media such as crushed bricks, gravels and wetland plants. The system is divided broadly into the three zones viz. inlet zone, treatment zone and outlet zone.



Treated Water cab be utilized in irrigation, fountains etc.

Soil Bio–technology (SBT)

Soil Bio–technology (SBT) Soil Bio–technology is a terrestrial system for wastewater treatment with a combination of physical and biochemical processes.

It is based on the principle of a trickling filter.

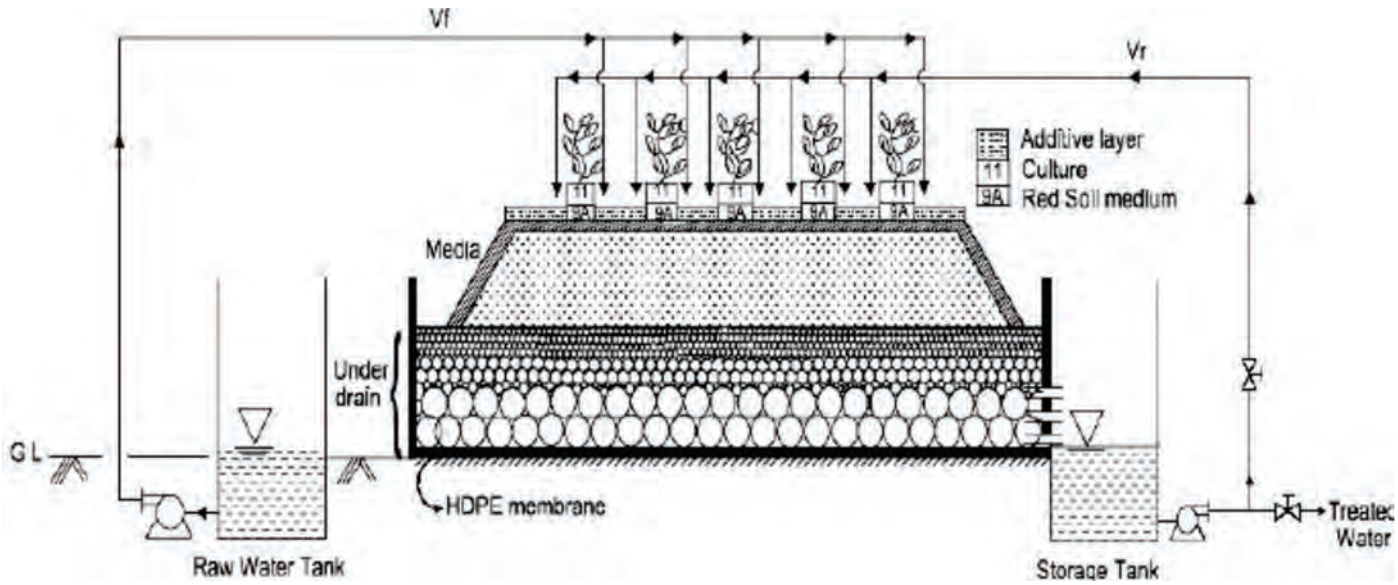
Suitable mineral constitutions, cultures containing native micro–flora, and bio–indicator plants are the key components of the system.

Salient Features

- The process can be run in batch or continuous mode
- The overall time of operation is 6–7 hours per day
- No sludge production Mechanical aeration is not required

Fixed Film Bio Filter Technology (FFBT)

Fixed Film Bio filter Technology (FFBT) Fixed film Biofilter Technology offers efficient biodegradation of the contaminants in wastewater by



providing microorganisms with maximum surface area for growth and an Inter–phase with the wastewater for optimum retention time.

Salient Features

- The PVC material used can withstand UV radiations of the sun.
- No electrical or mechanical energy is required.
- Initial inoculums are required.
- Wastewater entering the biofilter chamber should be grit free.

Packaged Wastewater Treatment Systems

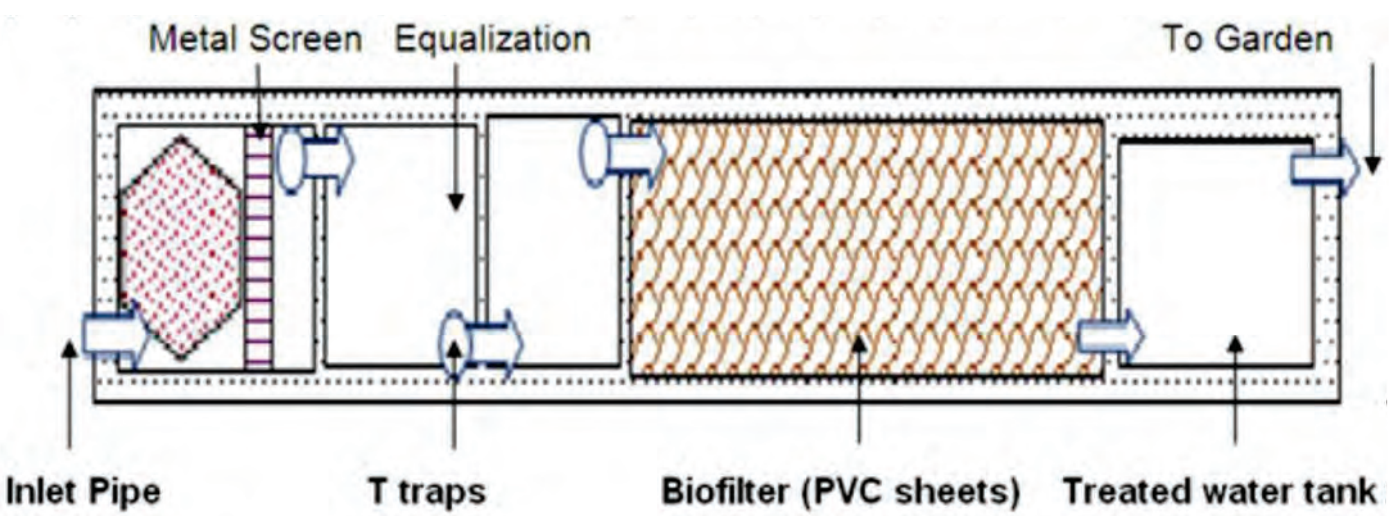
- MBBR Packaged Sewage Treatment Plant

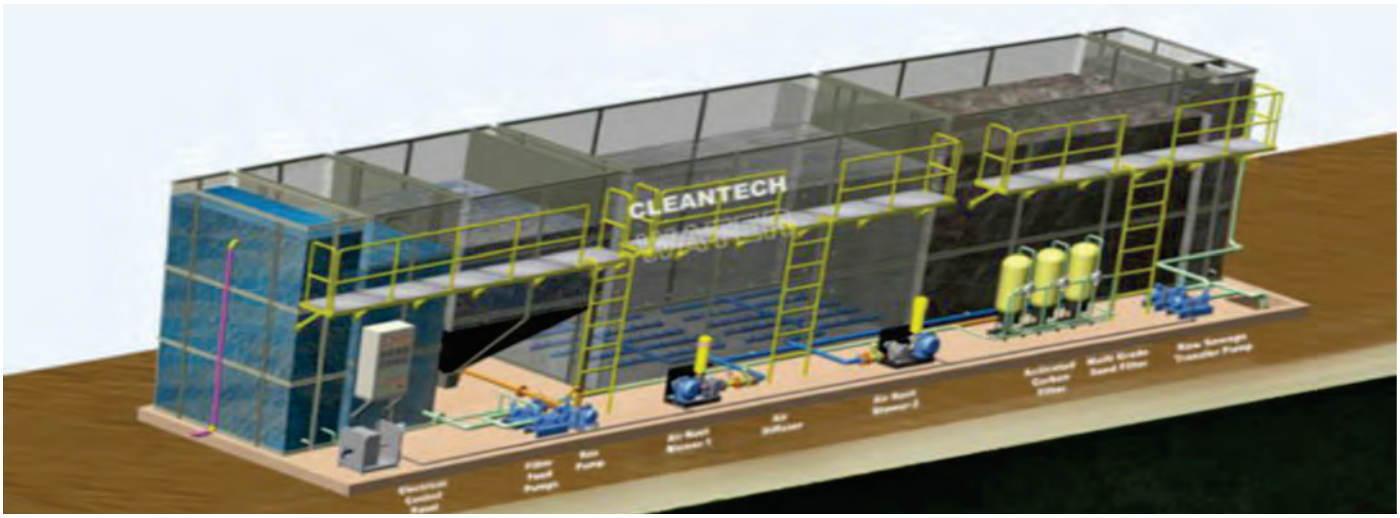
MBBR uses a cluster of polyethylene biofilm carriers that move randomly in the aerated basin containing wastewater. Since each carrier offers an effective surface area to cater to autotrophic and heterotrophic bacteria, this system is useful for a high–density population of bacteria.

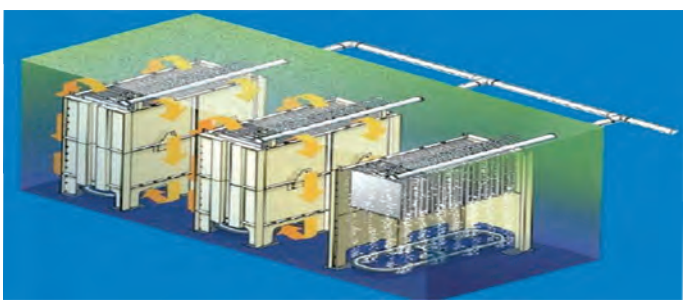
High degrees of reliability and ease of operation is assured by the MBBR system. Packaged sewage treatment plant offers a packaged, ready–to–use system which is an integration of subsystems such as screening, aeration, equalization of the water flow, sludge digestion, and disinfection of effluent impurities. Since it is a fully–assembled system, they are easy to install and use. Made from high–quality reinforced carbon steel, the package sewage treatment plant is made for long–lasting performance.

- MBR Immersed Packaged Sewage Treatment Plant

  The submerged configuration relies on coarse bubble aeration to produce mixing and limit fouling. In submerged configurations, aeration is considered one of the major parameters of process performances both hydraulic and biological. Aeration maintains solids in suspension, scours the membrane surface, and provides oxygen to the biomass, leading to better biodegradability and cell synthesis. This led to the further development of the MBR system.







- ASP Packaged Sewage Treatment Plant

  The packaged activated sludge process (formally known as the Conder ASP) is a small sewage treatment plant that provides superb value for money. With low installation and maintenance costs and a robust and durable design, the ASP is the perfect sewage treatment plant for domestic use and for smaller commercial projects. Available in polyethylene, the ASP sewage treatment plant services a population of 6 to 25 people.

- Single houses
- Small communities or developments
- Small commercial applications
- Integrated Biological Packaged Sewage Treatment Plant

Applications:

- Restaurant and kitchen wastewater
- Capacity increase
- Plant modification and expansion
- Toilet Flush, Landscape, Car Wash, Construction, Gardening, etc.
- Apartment Buildings
- IT Parks
- All Commercial Establishments such as hospitals, hotels, Educational Institutions, etc.
- Decentralized STP in remote and hilly terrains.

Advantages of Package STP

- Stable operation and superior effluent quality
- Easy revamping of existing plants
- Easy process control
- Small footprint
- Less sludge production
- It can perform with uneven inlet load by adjusting the operating conditions

Dr. Bhakti Devi
Founder, Jalsmruti

Dr. Bhakti Devi is the founder of Jalsmruti a water policy think tank and research group. She is a trained Civil & Environmental Engineer holding a Doctorate in Water Management with 30 years of work experience & expertise in sustainable water management. She relocated to India in 2018 after spending 25 years as a leading water professional in Australia.

UNTAPPED POTENTIAL OF URBAN WATER DEMAND MANAGEMENT POLICY

The Challenge

For the water utility, the challenge of upgrading the water supply to meet the ever–increasing
water demand of the growing population is real and persistent.

On top of that, the nature of the water supply infrastructure – be it dams, water storage reservoirs, water supply headworks, and distribution network is such that there is a long the time lapse between planning and actually building the infrastructure.

Depending on the complexity of the design and procurement of the infrastructure, in the case of a growing city, oftentimes this time–lapse can be significantly longer than the time it takes for the city's population to grow and its water demand to increase to a size bigger than what the upgraded infrastructure was designed for.

As a result, by the time the water supply infrastructure is built, its capacity is already out

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of date and becomes under capacity and the water utility is back to planning the next round of water supply infrastructure to catch up with the growing water demand. Or continue to operate in a state of under capacity until the next round of funding is handed down for upgrading the water supply infrastructure. Thus, many cities continue to work under capacity for years with a cumulative and ever–widening gap between their capacity to supply water and the water demand of the ever–growing population.

In spite of operating under such severe constraints of water supply capacity, managing water demand as a means to manage the supply–demand deficit is not being resorted to by any of the water utilities in India.

Significance of Demand Management

Demand–side management is the foundational principle of any utility management for ensuring financial sustainability as well as the sustainability of freshwater resources. This is because demand management provides a significant reduction in the capital cost required to upgrade the water supply infrastructure and often results in deferring (postponing) the investment in undertaking the water supply upgrade thus providing monetary savings to the water utility. Demand management is also proven to provide savings on the operating cost of pumping and treating water and the associated sewage flows.

Every well–functioning water utility in North America, Europe, and Australia considers it imperative to use water demand management as a first line of defense in meeting the supply–demand deficit arising from the growing population. In fact, the economic regulator of water utilities in developed economies makes it mandatory for utilities to show evidence of the investments they are making in the management of water demand as a prerequisite to making available any capital

Most wastewater treatment plants function on such platforms along with the contemporary database platforms with minimal analytical competency.

If there is a breach in the connectivity, the data will be stored temporarily in the gateway. Once the internet connectivity is re–established, data will be transferred to the cloud server instantly.

investment to build a new supply–side infrastructure.

Energy utilities in India have a tradition of facilitating demand–side management by putting in place relevant policies that promote energy efficiency by their customers. However, water utilities in India are yet to recognize water demand management as an important tool of sustainable water management even when they need it the most to manage their ever–growing water–supply deficit.

Solution

Management of freshwater demand at the customer end has the potential to achieve a reduction of 50 to 75 percent of the current water demand for city water supply or extraction of groundwater. Assuming this is achieved in properties constituting 80% of the city's total water demand, in financial terms, this translates to potential monetary savings as a result of

- 40–60 percent reduction in the cost of pumping and treating water and sewage and
- 40–60 percent reduction in capital cost of an upgrade of water & sewerage infrastructure.

The solutions include:

- Water efficient fixtures
- Smart water meters
- Rainwater harvesting
- Groundwater recharging solutions
- Greywater treatment and reuse

Demand management of freshwater is technically feasible and can be achieved a) by Incorporating within the new buildings various proven off–the–shelf demand management solutions such as – water efficiency fixtures, rainwater harvesting the system, greywater recycling unit, and connecting non–potable water to uses such as toilet flushing, irrigation of landscapes, and air conditioning. b) Retrofitting of water–proven shelf demand management solutions into existing buildings.

Despite being technically feasible, uptake of these solutions by builders of new buildings and owners of existing buildings & new buildings is easier said than done as currently there is no policy driver in the form of any incentives for implementing the demand management solutions or in the form of fines penalizing them for not implementing them.

Thus, it is a significant missed opportunity to manage the supply–demand deficit for the water utility. This is because the management of water demand does not require building of any infrastructure by a water utility.

Rather it requires introducing and implementing an innovative policy that

- Mandates new buildings to incorporate features that will significantly reduce the reliance of the building on freshwater supplied by the city
- Can incentivize and nudge the owners of existing buildings to retrofit off–the–shelf solutions to make them more water efficient and to substitute the city–supplied freshwater with rainwater collected on the site and convert used water into usable for non–drinking use.

In conclusion, in India having an effective policy for urban water demand management will contribute to solving the water crisis. Additionally, this will also activate the market for the freshwater–saving solutions helping companies that are struggling to acquire customers in the absence of a demand management policy.

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TRENDS & TECHNOLOGIES IN WATER & WASTEWATER TREATMENT

Aravind Natarajan
CEO & Co–founder
KarioT – Smart Water Revolution

Aravind Natarajan is an entrepreneur with 10+ years of experience in Technology with engagements of different Sizes, Industries, and Geographies. Managed teams that delivered many projects across time zones and different continents. Project Head with expertise in all phases of IT projects throughout the software development lifecycle that includes planning, execution, and control. Responsible for handling the development and deployment of a portfolio of projects, including planned enterprise applications, software applications, and choosing server requirements and configuration, and system design and security projects with complete responsibility for Budget, agenda and customer satisfaction.

This article covers the conventional issues faced in Wastewater Treatment Plants (WWTP), real–time challenges, and how KarloT provides ideal solutions to overcome these problems and challenges. KarloT uses IoT (Internet of Things) and AI (Artificial Intelligence) technology integrated with Smart Water Management trends & techniques to assure quality and real–time monitoring services. Apart from industrial sectors, we provide solutions for residential, commercial, and Government units. We have achieved multiple awards and earned top–notch fame and reputation. Our organization has won the renowned FICCI awards for launching the pioneering product Smart Water Management solution. We are also pleased to receive the prominent Start–up TN Seed Award from Tamil Nadu Government.

Crucial challenges of Wastewater Treatment plants

In recent times, population growth has increased to an enormous extent. It has led to more pressure on various water resources. The changes in climatic conditions tend towards enhancing variability and creating an impact on weather events. There is no proper maintenance for the wastewater treatment plants. If the wastewater is not treated

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properly, it pollutes multiple water sources which creates more problems. There are multiple crucial challenges affiliated with Wastewater Treatment plants, where their efficiency and effectiveness will be affected to an enormous extent.

Lack of real–time monitoring

The real–time monitoring system is mandatory for the WWTP, which is lacking in the traditional system. KarloT facilitates the issues of leakages and breakdown in the machinery parts along with the exceptional solution of automation and innovation to produce wastewater treatment greener.

Managerial requirements

Nowadays, industrial units are facing water quality issues, restriction of water flow, and severe wastewater discharge. Additionally, industrial ETP guidelines have to be adopted with more needs and targeting on the industrial sectors. KarloT installs IoT sensors in the storage tanks to determine level, flow, and usage & tests the quality of treated water.

High capital cost

The systems like SCADA & PLC need high installation costs, infrastructure, and license costs. KarloT provides the best alternative option for SCADA & PLC which is defined as IoT. It requires minimal installation cost and supports the dashboard and app. An added advantage of IoT is a centralized monitoring system.

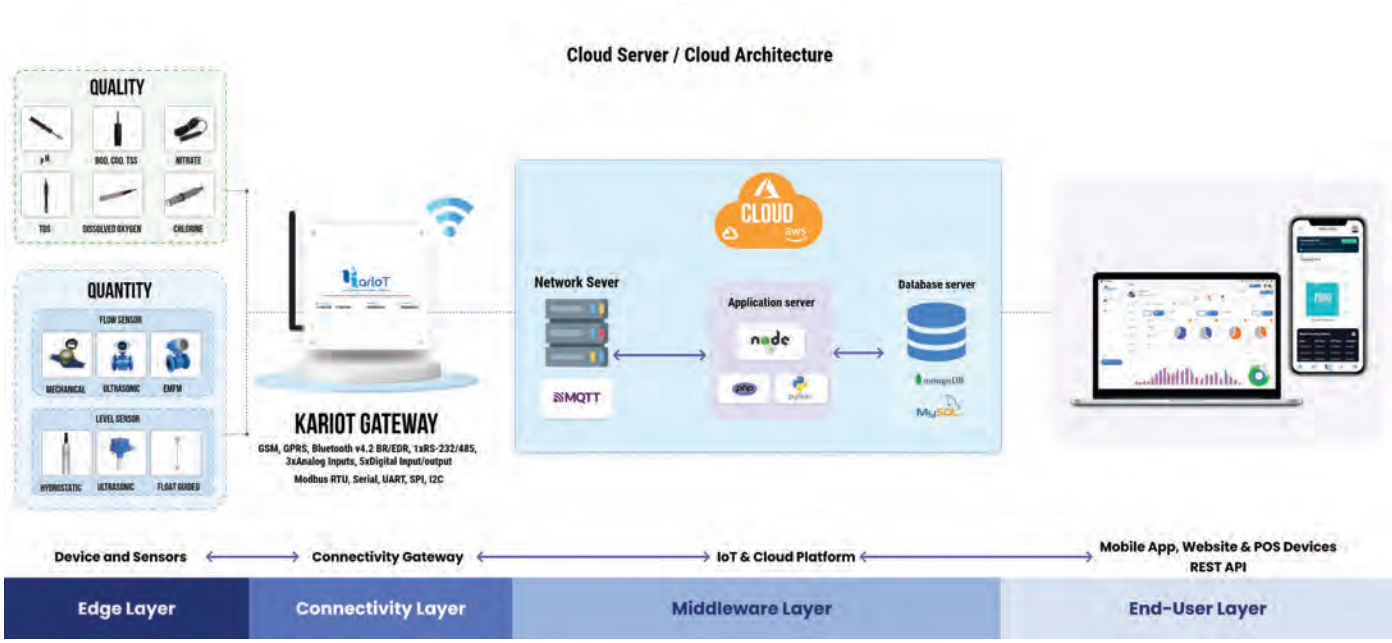
Manual reports

In the conventional system, human intervention is essential to download the daily/ weekly/monthly reports. KarloT supports the automation process where the manual process is not needed.

No proper maintenance

The minimal–cost plant operations possess multiple challenges. The reality is water

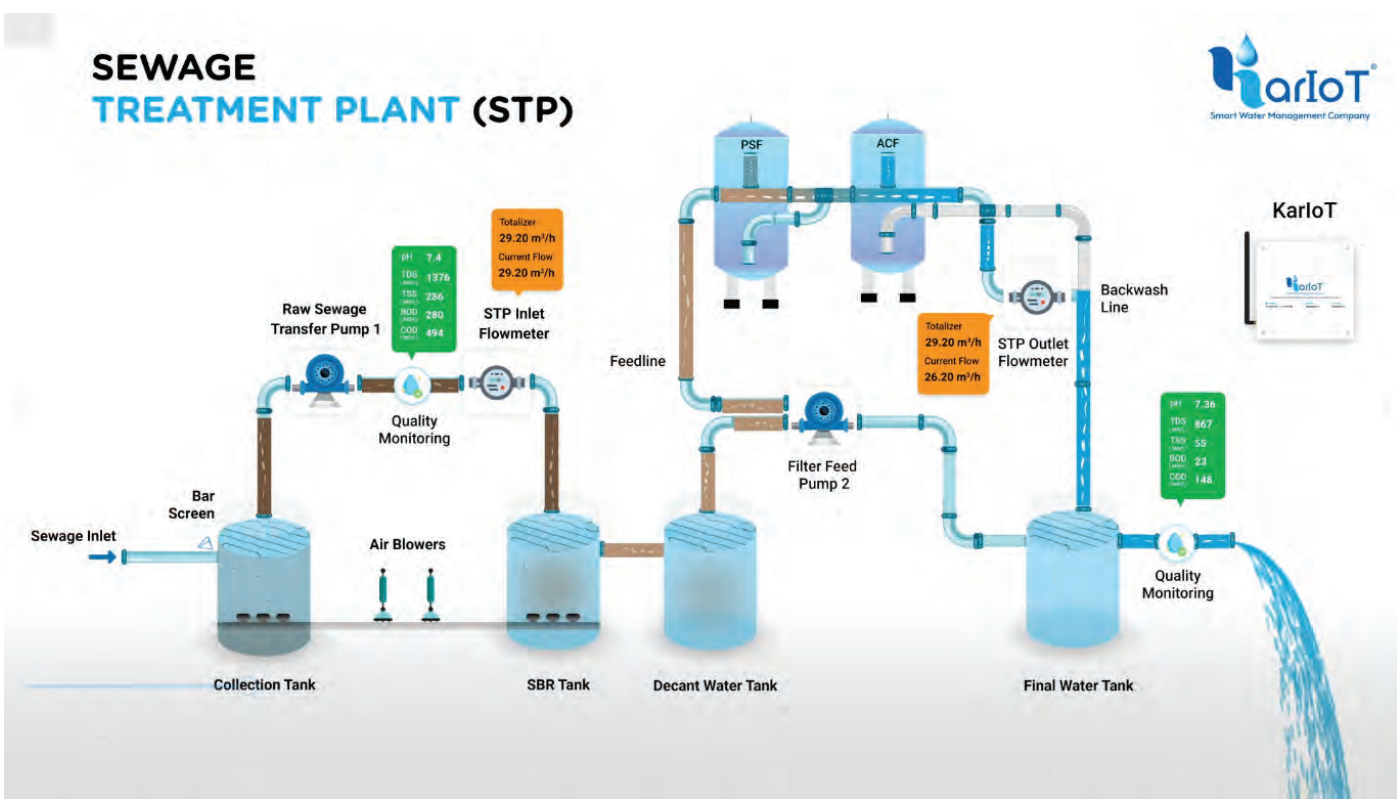
Most wastewater treatment plants function on such platforms along with the contemporary database platforms with minimal analytical competency.



Architecture View

If there is a breach in the connectivity, the data will be stored temporarily in the gateway. Once the internet connectivity is re–established, data will be transferred to the cloud server instantly.

KarIoT flow diagram



STP–Animation

Working

treatment plants are not operated as per the needs and demands. The major challenge for water treatment plants is to maintain them. KarloT provides 24/7 real–time monitoring of equipment that enhances maintenance. The maintenance cost is not high, it is affordable.

Traditional WWTP Control System

The traditional system boasts a typical SCADA platform where data from several wastewater treatment plants are catered to exhibit rapid values and trends of multiple parameters. By relying on the user's demands, reports provide data value and trends. Despite of, it is tedious to examine the streaming data in a manual process and acquire real–time monitoring details of the wastewater treatment plant.

Most wastewater treatment plants function on such platforms along with the contemporary database platforms with minimal analytical competency. The above–mentioned control systems are placed at each site and not linked with the other plants. The details of one wastewater treatment plant stay private and it is not distributed to other sites.

Capacity constraint

Day by day urban spots is being expanded. Hence, WWTPs can lead to diminished effectiveness and enhanced chances of system failures. For the breakdown of machinery issues and system collapse, KarloT uses an automated alert system. This system sends instant notifications through the app. The operators can take immediate action to sort out the issues.

Energy consumption

The WWTP utilizes more electric power and there will be a regress in terms of manual monitoring which leads to enormous production loss. KarloT provides efficient remote monitoring of pumps, valves, motors, and blowers to manage energy consumption.

The prospect of small–scale business

There should be awareness among small–scale businesses to treat wastewater. Some organization focuses on short–term goals that build unhealthy competition. Apart from large–scale businesses, KarloT provides 100% support for SMEs too. We provide awareness for them in treating effluents and managing water free from wastage.

Contemporary trends in Wastewater Treatment Plants

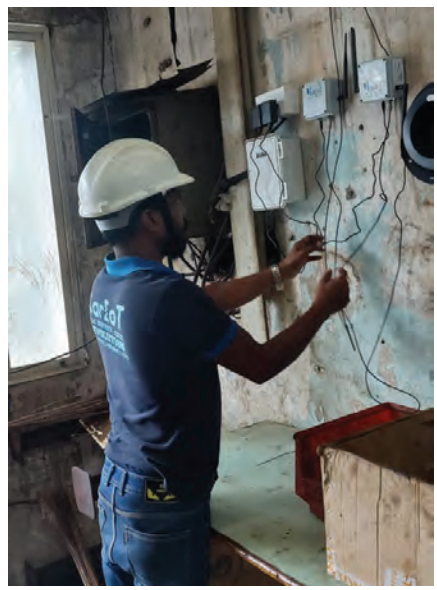
KarloT addresses the challenges of Wastewater treatment plant providers and conventional issues. They afford exemplary solutions such as equipping IoT sensors that permit remote monitoring of water flow and level & examining the quality of treated water. Continual monitoring of equipment functioning that upgrades 100% maintenance and stimulates if there is a sudden breakdown. In the final era of the WWTP process, instant reports will be generated subjective with Central Pollution Control Board.

Data Analytics

In the KarloT system, the data produced from multiple sensors of wastewater treatment plants can be accumulated in a typical database that systematically stores data and enables scientific scrutiny with the aid of contemporary statistical methodologies.

Lists of parameters:

- Operational parameters
- The operational parameters include power consumption, total hours taken to complete the operation, maintenance information, etc.



- Performance parameters
- The performance parameters assess the performance of the treatment plant. It plays a vital role in the evaluation part. Lists of parameters are Total Dissolved Solids, ORP, Pressure, Flow, TSS, etc.

Major steps involved in Data Analytics

KarloT supports the transformation of the SCADA platform into IoT oriented controlled system. It is requisite to connect an Internet Gateway. The main role of the Internet Gateway is to transform the data to the cloud server on a real–time basis. It possesses its own capacity to accumulate the data points till it reaches the server. If there is a breach in the connectivity, the data will be stored temporarily in the gateway. Once the internet connectivity is re–established, data will be transferred to the cloud server instantly. While selecting the gateways, examining multiple factors like latency, data storage, and capability takes place.

Role of AI in WWTP

The main target of Artificial Intelligence in wastewater treatment is to forecast the influence of minimal manpower. Its objective is to minimize energy consumption and enhance production. KarloT–enabled Artificial Intelligence technology in Wastewater treatment plants affords multiple benefits:

- Precise predictions and detailed reports are generated with minimal mankind activities.
- Assured 100% efficiency through optimized data analysis and computes capabilities that enable well–defined scheduling, planning, real–time tracking, and interpreting issues.
- Minimal manpower errors through mechanized decision–making that relies on past data.

Internet of Things

IoT is a system of devices, data, and other tech–oriented elements that permit any enterprise to operate efficiently without human power. It has created a huge impact on the industrial and commercial globe. The IoT plays an important part in WWTP. In the treatment of wastewater, KarloT boasts multiple usages. The major ones are listed below:

- Inter–connecting datasets to the reliable system
- The main focus of the IoT system is to collect data related to functional intelligence. KarloT develops an asset management system that can accumulate different data like performance factors, testing water quality, monitoring of sensors, etc.
- Harmful arsenic or chemicals
- The wastewater possesses chemicals, contaminants, and germs dissolved in it, which is riskier. KarloT facilitates multiple IoT sensors to detect harmful components in water.
- WWTP equipment maintenance and management
- The data accumulated on IoT water sensors provide palliative actions. It provides real–time information about the equipment and water supplies.

Process automation

KarloT enables the following seamless and smooth operations:

- Reducing manual work
- By installing IoT–enabled smart meters, the readings can be taken from remote places. This contemporary technology saves human effort and traveling expenses to make note of manual readings.
- Dynamic billing system
- As per the consumption of water, bills will be generated automatically.
- Automated alert system
- In case of any leakages or any other issues, an instant alert notification will be sent to the consumer.
- Overcoming conventional methods
- Smart water meters overcome traditional methodologies and created a huge impact on the conservation of water.
- Automatic ON/OFF
- Operates valve control from remote locations, examines overhead

tank level, and enables automatic motor and valve ON/OFF.

- Monitoring water quality
- Tests the water quality and determine pH, TDS, Nitrate, and chlorine level.

Our innovation in WWTP

In most chemical and dyeing industries, the effluent contaminant water will be sent to discharge outflow. In the WWTP projects, we faced many crucial challenges. First, the sensors cannot be placed in the interior portion of the tank, as wastage can be mixed with chemicals. There should not be direct contact between wastewater and sensors. To overwhelm these challenges, ultrasonic sensors are placed to determine the exact level of wastage in tanks. An electromagnetic flow meter measures the total liters of water that are pumped from one tank to another. The customization is done for both valve & motor automatic ON/OFF. Through a centralized monitoring system, wastewater in the storage tanks is monitored. Nearly, 10–30 lakhs liters of effluent water are discharged from industries. The automation process equipped with sensors vanquished the manual process. In the end, the water will be completely free of zero waste.

KarIoT uses IoT (Internet of Things) that can connect to any standardized meter/sensor. The gateway solution is smart enough to collect data via the cloud. This cloud network is secure and does not limit data storage. Data is triggered every 3 seconds to provide real-time reports on desktop or mobile applications. A user can remotely access the application to view, monitor, get alerts, and also operate the water systems remotely from any location and at any time.

The platform uses advanced AI (Artificial Intelligence) algorithms to analyze data which makes it easy for any layperson to comprehend the data - available in simple graphs and patterns. KarIoT has been developed in new-age hybrid technology – Flutter (an open-source framework by Google) and Node.Js technologies for highly scalable and multi-platform capabilities.

The solution reduces manual effort/errors, increases efficiency, and minimizes overall production downtime due to leakages, fluctuations, faulty equipment, and anomalies in quality parameters. The physical device is compact and easily integrated into new or existing systems without disrupting the infrastructure.

With growing awareness of smart water systems, KarIoT is working towards building a better and enhanced system to cater to a larger audience in any sector.

Ganesh Shankar
Founder and CEO, FluxGen Technologies

Ganesh Shankar is the Founder and CEO of FluxGen Technologies – a Bangalore–based company. FluxGen believes if you don't measure you can't manage risks. FluxGen's water intelligence SaaS platform AquaGEN powered by IoT and AI measures, analyses and aids in eliminating water leakage, wastage and excessive usage, saving up to 30% of water, and also generates high–quality water management reports required for CGWA and Pollution control board compliance. FluxGen has deployed the solution in 50+ Industrial clients, including Britannia, Lactalice, Pirmal, Vedanta, and Tata group of companies, with a goal to save a billion litres of water per day and help industries become water positive.

WATER – UNDERSERVED CLIMATE PIECE!!?

A few weeks ago I read that Exxon Mobil, Shell, and Chevron made the highest profits in their history, Exxon made 55B USD profit. In an alternate universe, I wish energy efficiency companies or Renewable Energy companies made such profits.

The point I want to make is, the planet is warming at an unprecedented pace, climate change mitigation is not catching up, and now we don't have enough time for Climate Adaption as well. It is said that if Climate change is Shark water is its teeth. Though we live in the same cities that were built by emperor Ashoka to Akbar, since we live on a warmer planet, we don't have the same water availability due to changes in evapotranspiration and hydrology. There is going to be both drought and flood, leading to various socio–economic implications.

Rapid Urbanization, rather than mindless development, has led to exacerbating the water crisis. For example, Bangalore, the city I come from, once had thousands of lakes.

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The majestic bus stand, Kantirava Stadium, Koramangala, Domlur, and many places were lakes, we have a small fraction of lakes today. Because of this today, we get water from river Cauvery which is at a distance of 120kms, at the cost of people in the nearby towns not getting their fair share, and also jeopardizing food security as well. We are hoping it rains in Coorg or Mandya so that we can get water in Bangalore. And we are hoping it doesn't rain in Bangalore because it will lead to flood and overload the central wastewater treatment plants. Besides, there is a plan to get water from river Sharavati and in the future from river Krishna (500 kms)too, don't know how many more towns nearby will be deprived of water.

Since rivers are evaporating faster than ever due to hotter summers, groundwater withdrawal has become a convenient alternative. Can you guess when was Borewells first time introduced in India? It was in 1972, by UNICEF to combat the water crisis. It became a popular choice in the 90s. And today India's groundwater withdrawals are the sum of the whole of the US and China put together, more than 25% of global groundwater withdrawals.

Surface treatment activity is one the major process where water is used and wasted abundantly with a focus on the end product quality/ finish on the product, ending up in the generation of huge wastewater volumes with high inorganic pollutants, heavy metals, etc.

It takes more than 1000 years to fill confined aquifers, today we are mining it like at a much higher pace than ExxonMobil, Chevron or Shell mining oil, but in an unregulated way. No wonder Niti Aayog's report says 21 major Indian Cities are running out of groundwater. It's important to note groundwater acts like a sponge during an earthquake, taking it away is like removing a seatbelt while driving.

I have heard people say, Desalination can solve the water crisis – well, yes, but at a cost. That's exactly why Borewells also came to India. Desalination requires 22 times more energy (more carbon emission) than getting water from freshwater sources, and brain solutions produced in the process can significantly affect the biodiversity of the seas and can affect fisheries.

The water Crisis is a time bomb that can explode anytime – people are dying because of the unavailability of water and contamination, many industries will shut down leading to mass unemployment, large–scale migration and political instability, etc.

When I read modern history it was mostly about wars fought for land acquisition – the World War, colonization, and Spanish invasion. When my 3– year old Son reads modern history it will be about wars fought for oil – Kuwait and Iraq war, Iran War, etc. When my granddaughter, hypothetically, reads Modern history, going with the current trend, it will most likely be about violence and wars fought associated with the water crisis. I believe we can avoid that history in making, by investing in Water Positive Initiatives!

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Sameer Patwa
Managing Director, SAM ENVIRO

Sameer Patwa is a technocrat willing to make a difference in wastewater treatment technology for recycling purposes. He is the Managing Director of Sam Enviro. SAM ENVIRO is at the forefront of innovation, with qualified and experienced design engineers in–house, are involved in the manufacturing process itself for understanding & optimizing the water usage at each unit operation stage in the process to ensure reduction in excess generation of wastewater, without hampering the product quality.

WASTEWATER TREATMENT IN SURFACE TREATMENT INDUSTRY

Over a period of decades, water consumption patterns have changed a lot and due to awareness of optimization water usage at the industry & institute levels. The overall water consumption measurement needs to be authentic & yet to be seen more seriously since it is key data for the designing of wastewater treatment systems. The water usage in industries for the process has been overlooked for the need of product quality rather than the optimization from the perspective of water used per unit of product output, and hence the wastewater quantum varies a lot from industry to industry for similar process activity.

Surface treatment activity is one the major process where water is used and wasted abundantly with a focus on the end product quality/finish on the product, ending up in the generation of huge wastewater volumes with high inorganic pollutants, heavy metals, etc.

The surface treatment process mainly involves three process stages – pre–cleaning – key surface coating and post–cleaning. Pre–cleaning stage involves the metal / non–

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metal job – cleaning through – Degreasing for removal of dirt, oil, etc. followed by De–rusting for removal of rust and scales. Both processes are followed by batch / continuous water rinses to remove the excess chemicals from the surface of the job. Degreasing is mainly alkaline whereas de–rusting is acidic and water rinses are respectively alkaline & acidic. The water rinses after degreasing and de–rusting are lowly polluted streams which are major sources of wastewater, having traces of alkali and acid, whereas the degreasing and de–rusting baths are highly concentrated polluted wastewater sources. The key surface coating stage after precleaning involves various electroplating like zinc, nickle, chromium, phosphating, tin, silver, copper, cadmium & hot–dip galvanizing, aluminum anodizing, CED, painting, etc. The wastewater from this process stage is highly polluted with heavy metals. The third stage – Post cleaning stage involves the removal of excess coating chemicals from the job and passivation of the coating surface followed by drying for the desired surface finish required, which may be functional or decorative requirements. The wastewater from this process also has medium pollutants but has heavy metal traces and requires effective treatment with highly polluted second–stage wastewater.

Out of the three process stages the wastewater volumes are averagely observed as 70% from water rinses and 30 % from concentrate baths, bifurcated into low polluted streams & highly polluted streams respectively.

Water rinses from the precleaning stage – i.e., degreasing and de–rusting can be separated out in one line for their self–neutralization action and handled separately for a preliminary polishing treatment and can be recovered for reuse to the maximum extent as good raw water. whereas the concentrated bath wastewater from the second & third process stages i.e., key surface coating & post cleaning

Surface treatment activity is one the major process where water is used and wasted abundantly with a focus on the end product quality/ finish on the product, ending up in the generation of huge wastewater volumes with high inorganic pollutants, heavy metals, etc.

For optimizing and reducing wastewater treatment and recycling costs per unit of your surface treatment activity, do call SAM ENVIRO experts for process audits, pilot studies, environmental analysis, and turnkey execution of ETP–ZLD & WTP.

can be segregated and given effective treatment from the removal of heavy metals and may be subjected to further advanced treatment stages for recovering it for reuse in the process.

SAM ENVIRO has developed its competency over the past 27 years, in designing wastewater treatment systems based on the process audit studies for – technical process stages water consumption pattern, Possibilities of recycling at source, removal of pollutants from the bath at source for delaying the discard frequency & segregation of water streams based on the detailed analysis.

In this process, more than 95–97% of wastewater collectively, is recycled back into the process and the balance 3% is recovered as dissolved salts, by achieving ZLD – Zero Liquid Discharge. Inhouse, NABL–approved Environmental analytical laboratory, with the latest instruments, R&D setup, pilot plants, and skilled chemists & engineers add value to competent and effective designing of wastewater treatment plants and execution at the customer end for ensuring end results – wastewater treatment cost reduction per unit of product.

For optimizing and reducing wastewater treatment and recycling costs per unit of your surface treatment activity, do call SAM ENVIRO experts for process audits, pilot studies, environmental analysis, and turnkey execution of ETP–ZLD & WTP.

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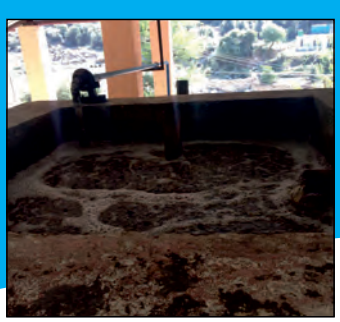

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A CASE STUDY FOR "IN–SITU" GREYWATER MANAGEMENT IN VILLAGES

By A. Mohan, Co–Founder, WSAFE (WaterSpaceAirFireEarth) Sustainability Services

Water is a complex and often misunderstood subject, and waterbodies are usually undervalued as mere pools or reservoirs of Water, whereas they are God's gift to all the terrestrial life forms. These bodies of water uniquely converge soil, water, and air, enabling them to naturally decontaminate water, recharge and enrich groundwater, mitigate air pollution, conserve biodiversity, maintain & manage the ambient temperature in the vicinity and act as a blue carbon sink, through their native aqua ecology – all as a part of ecosystem services. However, this capacity is dependent on the health and vitality of the waterbody.

Ecological rejuvenation of waterbodies is vital for sustainable & holistic natural resource management, for climate change mitigation, combating global warming, promoting biodiversity, carbon sequestration, and biodiversity conservation.

This article explores an In–Situ waterbody rejuvenation project by WSAFE Sustainability Services that was implemented at Hassanpur Village in Murthal, district Sonipat, of Haryana state, showcasing substantial improvements in water quality and positive impacts on behavioural changes as well as community engagement. The project was funded through NGO and was implemented using our Cownomics® Technology.

Pre–treatment

Water Dosing

Post Treatment

A. Mohan, Co–Founder, WSAFE (WaterSpaceAirFireEarth) Sustainability Services

A. Mohan is a seasoned IT professional who has developed a strong interest in water conservation and revitalizing water ecosystems. He firmly believes in the restorative abilities of natural waterbodies, provided that their native aquatic ecology is revitalized. A. Mohan is dedicated to advancing year–round water conservation efforts through his initiative "Catch The WasteWater," which aims to promote the significance of water conservation beyond just seasonal "Catch the Rain" campaigns.

☞ www.grundfos.com/in

Problem Statement

Over the past two decades, the primary water source for this village Pond has been the greywater and sewage generated by the surrounding village households, resulting in a consistent supply of contaminated Water. However, the area is plagued by foul odour and the stagnant waterbody serves as a breeding ground for mosquitoes, leading to the spread of vector–borne illnesses. The surrounding region is littered with solid waste, rendering the water unsuitable for any form of life – all contributing towards WASH (Water, Sanitation & Hygiene) problems for the entire village.

By leveraging Cownomics® Technology, we can resurrect the native microbiota of the Waterbody augmenting the natural ecosystem in ponds, lakes, and rivers through harnessing the power of sunlight, water, soil, air and the aquatic food chain to consume & digest the nutrients overload.

This process involves breaking down organic matter in wastewater using the native aerobic microbes. Moreover, the autotrophic microbiota also produces oxygen through their metabolic processes thereby naturally oxygenating the water body.

Ease of implementation

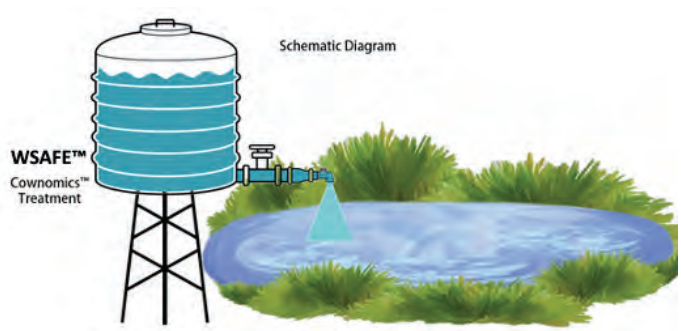


Figure –1, basic schematic diagram for the rejuvenation treatment

Water Tank @Site Picture

1. WSAFE team does the detailed site survey and basis that our research team prepares the medicine (Cownomics® Extract – a 100% botanical extract based liquid medicine).
2. Site preparation done by the local body – Installation of water tank, fresh Water/borewell water is made available at the site for amalgamation of the Cownomics® Extract.
3. Daily Dosing process by Village Community Stakeholders –

    a. The Cownomics® Extract, is amalgamated with fresh borewell water to create a homogenous mix, of the same agro–climatic zone as the Waterbody in the filled water tank.
    b. This diluted concentrate is poured in the Waterbody at the time of sunrise (6am–8am). During the day, in presence of sunlight, the medicine gets synthesized by the aqua–ecology and the resurrection of limnology, starts to happen.
    c. Same process mentioned in point a & b shall be repeated everyday in the morning time and as per the response from the waterbody, if needed, same may be repeated at evening Sunset time.
    d. The treatment is divided in three phases – Resurrection, Restoration and Rejuvenation.

Outcome of 4 Months of Project

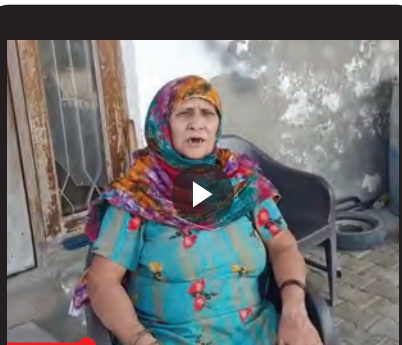
S.No.	Project Success Criteria	Achieved/ Not Achieved	Remarks
1	Entire **foul smell** in the vicinity due to anaerobic digestion will vanish	Achieved	Villagers' testimony
2	The **Water viscosity** shall reduce to give its natural flowing status	Achieved	Waves were back, captured in Photos/Video
3	The entire **mosquito colonies** shall be abolished, finishing the threat of vector borne diseases in the vicinity	Achieved	Villagers' testimony
4	All the **Water weeds like BGA, lilies, Hydrilla** etc. will start to dry and sink in Water clearing the entire surface of the waterbody	Achieved	No BGA/ Waterweeds observed till the time of treatment
5	Natural photosynthesis shall start in Water and **emission of oxygen** in air shall start making the air quality better	Achieved	Animal drinking water and increase in DO as per Lab report

Bio–Diversity Change observed.

As observed by Villagers, new flock of birds started coming, buffalos seen drinking water from the pond, monkeys seen taking bath in the pond water.

Villagers Testimony

Very happy with the services provided by WSAFE, now no foul smell in the vicinity, no mosquito breeding observed in pond. Now animals are back and seen drinking from the pond. All captured in the testimony videos below.



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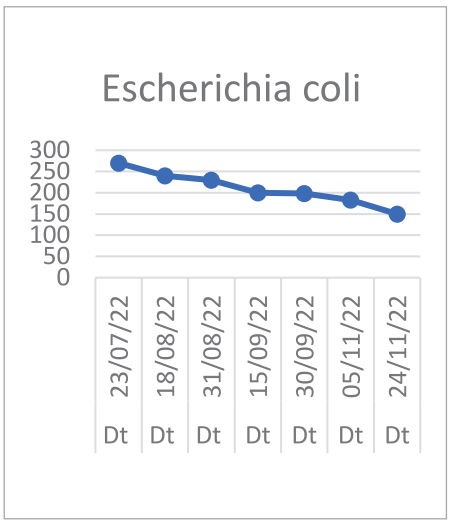
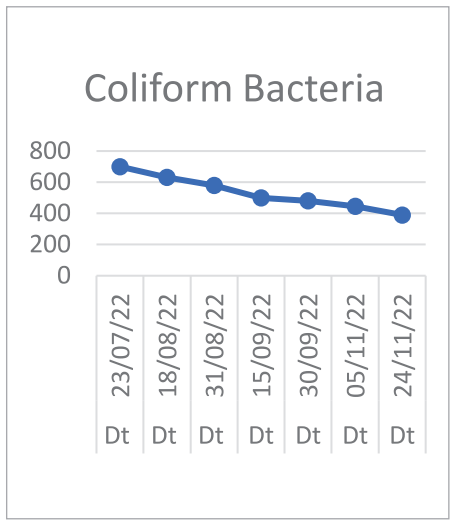
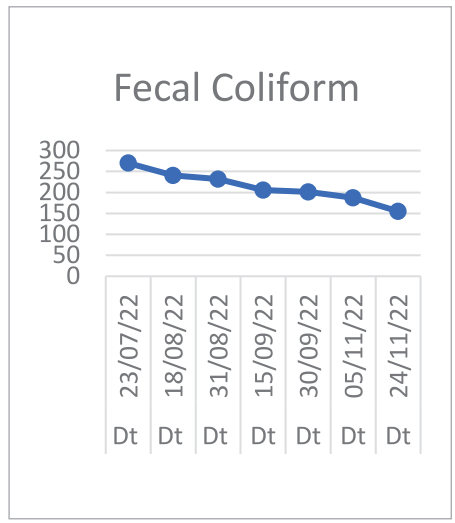
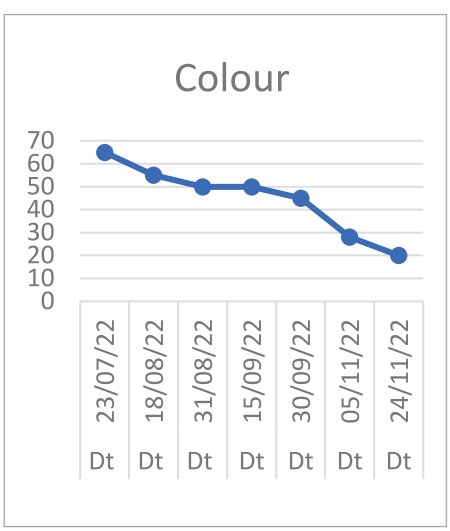
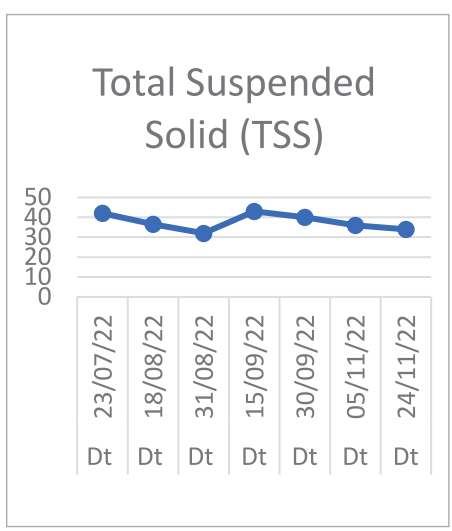
Change in Lab Parameters over 4 Months of Project

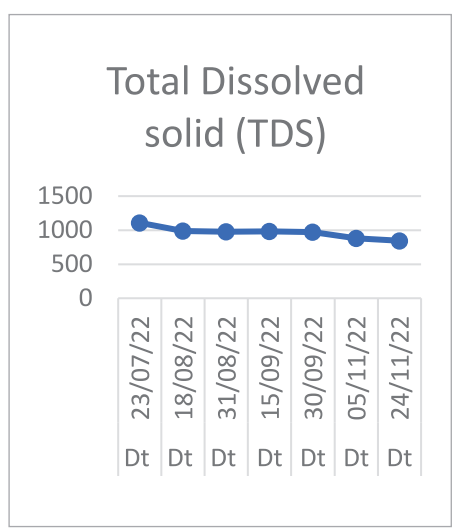


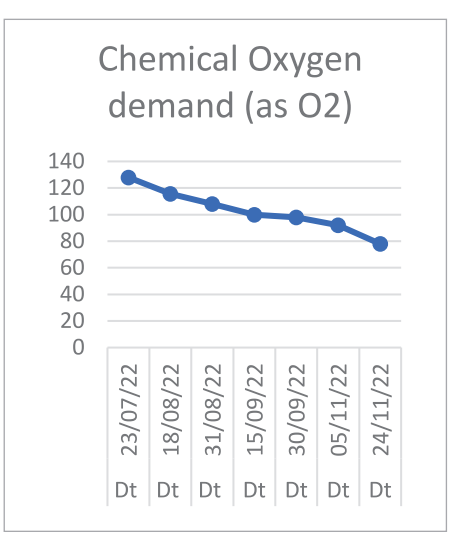


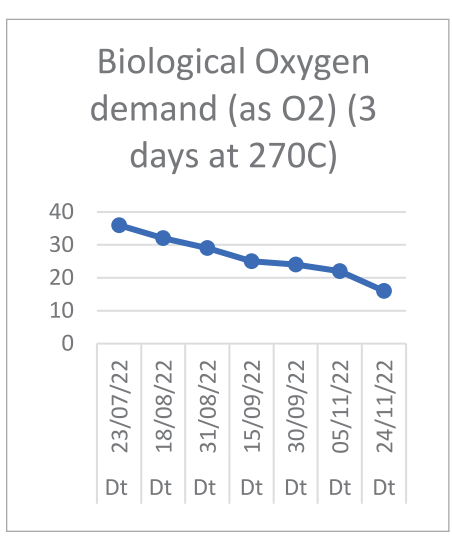


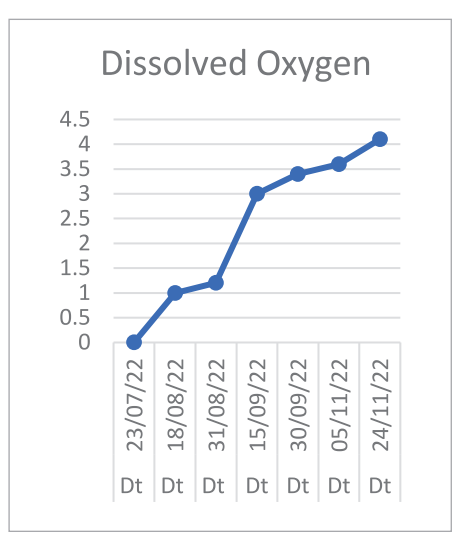


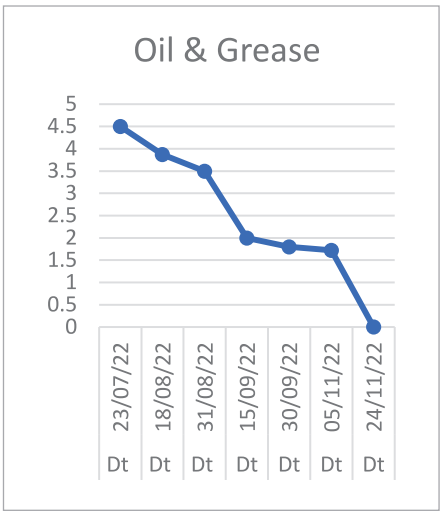


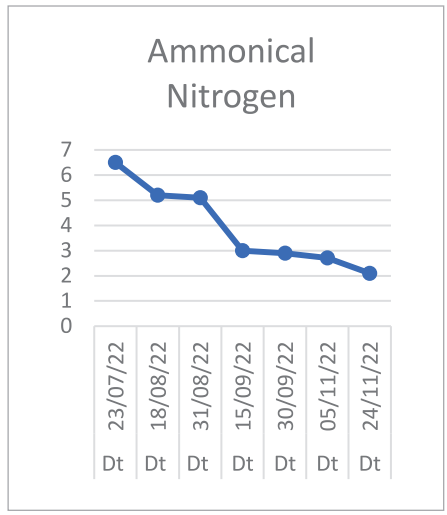


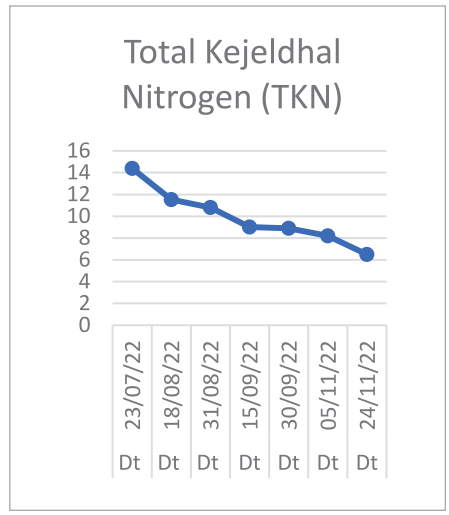


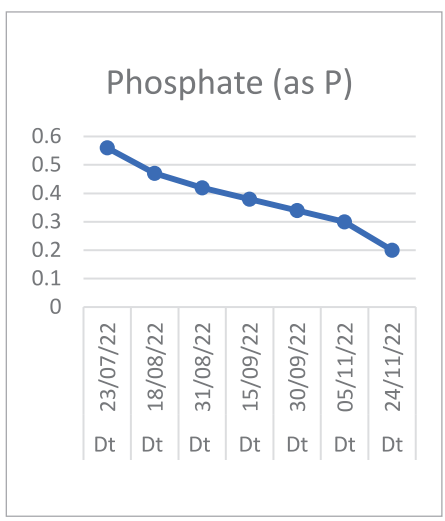


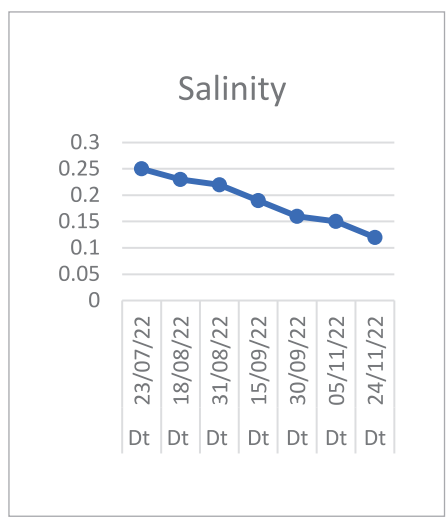












CommunityAwareness&Trianing

Conclusion and way forward

In conclusion, the project of in–situ greywater/sewage pond rejuvenation using natural botanical extracts –based dosing has shown promising results. The foul smell was completely removed, mosquito & mosquito colonies was fully eradicated, biodiversity was conserved, and the water was made useful for all plants & animals.

The lab reports confirmed the success of the project, and the testimony of the people who have benefitted from it is even more convincing.

The Cownomics® Technology, used here, has the potential to be used on a large scale for all surface Waterbody Rejuvenation, In–Situ greywater treatment, especially at the Gram Panchayat level, as the implementation is simple and cost–effective.

By adopting this innovative approach, we can ensure a healthier environment and better living conditions for everyone, as well as restore the sustainability of life on our planet.

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DIGITAL TWINS FOR WATER UTILITIES VALIDATE THEIR ECONOMIC FEASIBILITY BY LEVELLING SYSTEM OPERATIONS AND IMPROVING DECISION–MAKING

By Sandra DiMatteo, Industry Marketing Director, Bentley Systems – Water Infrastructure

From aging infrastructure and changing environmental regulations to funding gaps and climate–fueled natural disasters, water utilities around the globe face a range of problems in their effort to deliver reliable and affordable water to their communities. Their potential solutions are similarly wide–ranging, from stimulus grants and conservation programs to smart water technologies.

Utilities are employing a variety of digital strategies to address urgent risks as well as meet the requirements for digital transformation aligned to strategic investments in water systems. One very compelling digital strategy that water utilities are adopting is a digital twin. Digital twins of water infrastructure can help utilities get the most out of their data to improve their decision–making. Most utilities have the key building blocks in place to make digital twins economically feasible as a short–term strategy with long–term benefits.

What is a Digital Twin?

A digital twin is a realistic and dynamic virtual representation of a physical asset, process, or system. Creating a digital twin for a water system involves integrating existing models and data. This could include engineering models (hydraulic models of the water network and 3D models of the water treatment plant and pumping stations), new virtual reality models (if 3D models are inadequate, outdated, or non–existent), and GIS, asset management and customer data. Additionally, digital twins are continuously updated with operational data from SCADA systems, sensors, meters, and other measured sources—creating a real–time model that can be used in operations and maintenance.

The integration of isolated, disparate data into a unified view provides a uniquely collaborative and connected digital twin environment that water utility personnel can use to gain insights from their data for better decision–making. The dynamic integration of operational data enables

Sandra DiMatteo
Industry Marketing Director, Bentley Systems – Water Infrastructure
Sandra DiMatteo is the Industry Marketing Director, Water Infrastructure at Bentley Systems. She has more than 25 years of experience in reliability and asset performance management software, and asset lifecycle information management, and is an expert in digital twin cloud solutions in the water and wastewater, energy, and process industries. Sandra holds an honors degree in accounting and is a Certified Reliability Leader. She sits on the Reliability Leadership Institute Board of Advisors and founded the Ontario Chapter of the Society of Maintenance and Reliability Professionals.

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utilities to see what's happening in real–time or review any moment in time, while also providing a definitive ledger of changes of the water systems and assets as they evolve. This dynamic aspect is also what differentiates digital twins from the static 3D models typically used for design and construction.

The end result is an information–rich digital infrastructure model that supports engineering, operations and maintenance, and capital planning for smart water networks. With digital twins, utilities can perform "what–if" analyses and simulations to make informed decisions throughout the lifecycle of a water system – from long–term system vulnerability and capacity planning to immediate performance monitoring and emergency response.

The process enables utilities to better understand the past and current performance of their water systems while helping them predict future performance and simulate the impact of potential changes in the virtual world before funds are committed.

Digital twins help develop smart sustainable water management platforms and powerful decision–support frameworks for the modern workforce. In particular, digital twins that are cloud–based enable the remote sharing of data, dashboards, and situational intelligence.

Thus, a cloud–based digital twin overcomes the limitations of legacy water control rooms since it interoperates with systems and real–time data, SCADA, and data historians. A digital twin handles large volumes of disparate data sources to gain insights in near real–time, and reduce or eliminate false alarms.

Bricks and Mortar

Moving toward a digital twin may seem daunting, but in reality, most water utilities have already started. They have in place a variety of systems that they use in their day–to–day operations: sensors, SCADA, automated metering, asset registry, hydraulic modeling, and so on.

And since the fundamental purpose of a digital twin is to unite the data from those different sources and provide a unified view of that data, utilities have already done the difficult work of implementing systems that generate digital data: aka the building blocks of their digital twin.

The next step involves the mortar that connects that data. And for a smooth journey, the mortar–slash–technology underpinning a digital twin must be open. Digital twin technology is not off–the–shelf software. Instead, every digital twin is assembled, built, customized, and advanced using pieces from many sources that will change over time. To ensure that a utility controls its digital twin and can include the systems and data important to them, they need to rely on technology that is open–sourced. This "openness" signifies that the digital twin can connect smoothly with other technologies.

The technology within that mortar must also include these other key

features— decision–making tools and scalability. The importance of digital twins rests on the ability to use data to make informed decisions. This implies the use of built–in decision–making software that can link current status or conditions data with a robust, mature portfolio of tools for analyses and simulations.

And scalability means that a digital twin can see and analyze at the scale of (for example) a city or a treatment plant, all the way down to an individual pump or valve.

Digital Twins for Network Operations and Management

Many utilities already have hydraulic models of their water networks that they use for planning and design. Incorporating those models within a digital twin helps utilities simulate events such as pipe failures, power outages, and so on, to analyze the resilience of their water network systems and assess their risk. Furthermore, integrating those models with SCADA data provides an accurate assessment of how a water system is currently behaving. This enables utilities to simulate and test different ways that their water systems could be operated to improve emergency response, increase efficiency, or save energy.

Continuously updating digital twins with measured operational data also helps a utility determine the location of potential leaks and reduce water loss. And a digital twin can leverage data from existing

work management and asset management systems, as well as other enterprise systems, to support risk–based asset management – informing their decisions such as repair vs. replacement and helping them prioritize capital improvement projects.

Digital Twins for Plant Operations and Management

Digital twins of water and wastewater treatment plants are particularly useful for improving plant efficiency, reliability, and resilience as well as for training and safety compliance. Virtual walkthroughs, Communications and simulations give personnel enhanced visibility of plant data and insights for better decision–making. For example, reliability engineers can simulate hypothetical events such as multiple screening systems or pump failures to evaluate the severity and consequences of the failures and take preventative actions.

Digital twins can also be used to flag real problems, such as equipment that is not operating properly – enabling virtual exploration and quick access to pertinent data. For example, operators can zoom into the equipment area and pull up data related to that particular item (such as manufacturers' specifications or repair manuals).

This gives personnel immediate access to information without wasting time digging through file cabinets or hunting through document libraries.

Conclusion

Digital twin technologies (such as Bentley's OpenFlows™ powered by the Bentley iTwin® platform) are smart integration solutions that connect information technology, operational technology, and engineering technology. These connections are helping water utilities exploit the potential of their data in a way that was economically unfeasible just a few years ago—uniting legacy data with operational and engineering data to provide a wider view of a utility's water system and enable data–driven decision–making.

In the coming years, digital twins will become an ingrained part of every aspect of the water utility control room. Utilities can start building digital twins overnight with the data and systems they already use. As they become the new normal for water utilities, digital twins will improve the reliability of water systems, reduce utilities' capital and operating expenditures, lessen their environmental footprints, and provide their customers with safe and efficient services.

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Siddharth Bansal
Director & CEO,
Skipper Limited – Polymer division

Siddharth Bansal, an entrepreneur, environmentalist, and humanitarian are the Director of Skipper Limited, one of the world's leading manufacturers of transmission towers and poles. In his current position as the Director and the CEO of Skipper Limited Polymer division, Siddharth has effectively led the procurement, operations, marketing, and sales quite successfully since 2010. Under his skilled leadership, the Polymer division is rapidly expanding its distribution and retail footprint across the country. He is currently listed as the Director of a total of 4 Indian companies– Skipper Limited, Skipper Polychem Limited, Skipper Polypipes Private Limited, and Skipper Pipes. Siddharth prioritizes initiatives concerning the growth, training, capacity building, and development opportunities for the plumbers and contractors community.

6 FACTS
ABOUT DRINKING WATER NOBODY TALKS ABOUT

Water is an essential component of human life, and access to potable water is vital for the health and well–being of individuals and communities. In India, less than 50% of the population has access to safe drinking water and over 1.96 million homes have water that has been contaminated chemically by pipes that can cause rust contamination primarily by fluoride and arsenic. This is because many individuals are unaware of the importance of the type of pipes used to transport water and the impact it can have on the quality of drinking water. In this article, we will discuss facts about drinking water that focus on the need for a seamless water supply and the types of pipes that one should consider for safe drinking water.

Seamless Water Supply is Crucial for Safe Drinking Water

Seamless water supply refers to the consistent and uninterrupted supply of water to households and communities. It is essential for ensuring that water is clean and safe for consumption. Interruptions in the water supply can lead to contamination, which can cause waterborne illnesses. Individuals should ensure that the water supply system is designed to provide a continuous and reliable flow of water.

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The Use of Lead–Free Pipes is Essential

Lead is a toxic metal that can cause significant health problems, especially in children. When lead leaches into drinking water from pipes, it can cause developmental delays, learning difficulties, and other health issues. To prevent lead contamination, constructors should use lead–free pipes for water supply systems. Materials like copper, stainless steel, and CVPC pipes are excellent options for ensuring safe and clean drinking water. Make sure that pipes are NSF International and ISO certified.

Awareness of the Importance of Water Filtration is Necessary

Water filtration systems are essential for ensuring that drinking water is clean and safe to consume. However, many consumers are not aware of the importance of water filtration or the benefits of using these systems. By raising awareness about the importance of installing

Moreover, when water is transported through a pipe, 20–50 percent of the water is wasted due to the failure of pipes. Hence, regular maintenance checks and upgradation should be scheduled to ensure that plumbing systems are in good working order.

water filtration systems, we can ensure that consumers have access to safe and clean drinking water. It is crucial to prioritize the health and well–being of the communities we serve.

Regular Maintenance is Crucial for Safe Water Supply

Regular maintenance of plumbing systems is essential for ensuring that drinking water is safe to consume. Over time, pipes can become clogged with debris, corroded, or damaged. This can lead to contamination of the water supply and potentially serious health consequences for those who consume the water. Moreover, when water is transported through a pipe, 20–50 percent of the water is wasted due to the failure of pipes. Hence, regular maintenance checks and upgradation should be scheduled to ensure that plumbing systems are in good working order.

Galvanized Iron Pipes Can Cause Rust Contamination

Galvanized iron pipes are a common type of water supply pipe used in older homes and buildings. These pipes are coated with a layer of zinc to prevent corrosion, but over time, this coating can deteriorate, causing rust and other contaminants to leach into the water supply. Constructors should replace galvanized iron pipes with newer, safer pipe materials like the finest–quality polymers, light chlorination process, etc. to ensure the safety and quality of drinking water.

In conclusion, access to clean drinking water is a fundamental human right, and everyone should be aware of the essential facts about drinking water. Lead–free pipes are crucial for ensuring safe drinking water, and regular testing can help to identify any contaminants. With technology shaping up in the Piping and fittings sector, companies are now working on greener piping solutions with superior product quality made with state–of–the–art technology and stringent R&D. Plumbers and constructors should consider the type of pipes used in water supply systems to ensure that the water is safe and free from contamination. By understanding the importance of a seamless water supply, the dangers of lead pipes, the risks of rust contamination, and the need for regular maintenance, we can ensure that we have access to safe and clean drinking water.

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Requirement:
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Document Fees: INR 15,000
EMD: INR 302,560
Tender Estimated Cost: INR 15,127,936
Closing Date: 10/04/2023
Location: Fatehabad, Haryana, India

Contact Details: Haryana Government, panchayati Raj Haryana, XEN Panchayati Raj Fatehabad Badopal Bangaon

Buyer/Seller: Urban Administration And Development

Ref. Number: 58391807
Tender Number: 2023_UAD_250383_2

Requirement:
Slater house waste water treatment plant process using electrocoagulation with lamella clarifier before treasury treatment at K.D. gate slater house and Gudri chouraha.

Tender Detail:
Slater house waste water treatment plant process using electrocoagulation with lamella clarifier before treasury treatment at K.D. gate slater house and Gudri chouraha. #*. Slater house waste water treatment plant process using electrocoagulation with lamella clarifier before treasury treatment at K.D. gate slater house and Gudri chouraha.

Document Fees: INR 5,000
EMD: INR 50,000
Tender Estimated Cost: INR 3,470,000
Closing Date: 03/04/2023
Location: Ujjain, Madhya Pradesh, India

Contact Details:
Directorate Urban Administration And Development, Muncipal Corporations, UAD, Muncipal Corporation, Ujjain, UAD, Water Supply (PHE) Deptt., Mc Ujjain, UAD, Ujjian

Buyer/Seller :
Directorate Of Municipal Administration

Ref. Number: 58425735
Tender Number: 2023_DMA_883397_10

Requirement: Paving & Strengthening of Road From Gawande Police House to St Mary's Convent. Laying of Underground Drain From Sarada Hospital to Potdukhe House. Construction of Waste Water Drain From the House of Deepak Sonar to the House of Vinit Sutkar in Front of the House of Govt Grain Godawoon Juna Road. Construction of Drain From Khorgade's House to Daryapur Main Road.

Document Fees: INR 2,500
EMD: INR 25,000
Tender Estimated Cost: INR 2,106,611
Closing Date: 03/04/2023
Location: Amravati, Maharashtra, India
Contact Details: Directorate of Municipal Administration||municipal Administration, Amravati||municipal Council, Anjangaon||civil Department Anjangaon Surji

Buyer/Seller:
Department Of Atomic Energy

Ref. Number: 57573705
Tender Number: 2023_DPS_740088_1

Requirement: Trial run of electro coagulation treatment system of 10kl /hr capacity for waste water treatment

Tender Detail:
Trial Run of Electro Coagulation Treatment System of 10kl /Hr Capacity for Waste Water Treatment #*. Trial Run of Electro Coagulation Treatment System of 10kl /Hr Capacity for Waste Water Treatment

EMD: INR 589,680
Closing Date: 04/04/2023
Location: Kota – Rajasthan – India
Contact Details: Directorate of Purchase And Stores||hyderabad Regional Purchase Unit Hyderabad – DPS NFC, Kota Rawatbhata Rajasthan

Buyer/Seller:
Haryana State Industrial Development Corporation Limited

Ref. Number: 57901714
Tender Number: 2023_HBC_262073_1

Requirement:
Engagement of project management consultant (PMC) for development of infrastructure facilities i.e. road network, water supply system, waste water collection system, recirculation system of treated waste water, storm water drainage system, utility TU

Document Fees: INR 20,000
EMD: INR 1,000,000
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