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LEVERAGING PRACTICAL INSIGHTS: THE CASE STUDY EDITION 2023

Dear Esteemed Readers,

The Case Study Special Edition of EverythingAboutWater has consistently been the most popular and sought-after edition throughout the years. Professionals find great value in learning from the experiences of users worldwide, as presented in real-life situations. Originating in the early 1960s at Harvard Business School, the Case Study approach to managerial education involves dilemmas or uncertain outcomes, capturing events, people, and factors influencing decisions.

Governments and industries grapple with water-related problems, and the collective knowledge and understanding continue to grow through professionals learning from each other. The Case Study method effectively encapsulates the collaborative nature of finding solutions to water issues.

While complete information is rarely available, computer solutions are limited by unknown inputs, emphasizing the importance of experts' collective judgment and wisdom. Extracting, pumping, conserving, transporting, and distributing water involve high-level physics, civil and hydraulic engineering, chemistry, process know-how, and mechanical design. Cutting-edge technologies in mechanical, chemical, civil, and instrumentation fields are covered in the issue, addressing diverse international issues with the latest technologies and solutions.

In conclusion, I extend my heartfelt gratitude for joining us on this expedition into "THE 15TH SPECIAL CASE STUDY EDITION OF EVERYTHINGABOUTWATER MAGAZINE." May the distilled insights from these pages inspire transformative actions in your respective domains, ensuring a resilient and water-secure future for generations to come and we hope that readers enjoy and derive value from this edition, sharing experiential knowledge for the global water sector.

Thanks & Regards,
Simran Arora
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DROPLETS

ABB acquires innovative optical sensor company to expand smart water management offering

ABB has announced that it has agreed to acquire Canadian company Real Tech, a leading supplier of innovative optical sensor technology that enables real-time water monitoring and testing.

Through the acquisition, ABB will expand its strong presence in the water segment and complements its product portfolio with optical technology critical for smart water management. Financial terms of the transaction that is expected to close in Q1 2024 were not disclosed.

Unlike traditional water quality measurement, which can be a time-consuming process, Real Tech's product portfolio provides critical measurements in real-time. This enables better process control and continuous water quality assurance. Real Tech's patented solutions cover the entire digital water value chain for water quality monitoring with a focus on data creation and analytics.

Real Tech's portfolio includes optical sensors, controllers and a suite of optional accessories that allow each system to be configured according to customer needs. Leveraging the power of light, the sensors measure water composition. They use spectrophotometry and fluorescence measuring techniques to move testing from the lab to the process environment for real-time use. Liquid AI, a proprietary AI software platform, completes the service offering, providing an easy and accurate way to analyse data from Real Tech sensors. The company has approximately 40 employees and is based in Whitby, Ontario.

Aqualia to enter U.S. market

Aqualia, the fourth largest water company in Europe by population served and ninth largest in the world, has acquired a controlling stake in a Houston-area water management company, marking its entry into the United States market.

Aqualia announced that it acquired a controlling stake in Municipal District Services LLC (MDS), which manages the end-to-end water cycle for more than 364,000 people on the outskirts of Houston. MDS has approximately 140 service agreements with municipal utility districts.

MDS is the second-largest provider of water, wastewater and stormwater services in the Houston area for municipal utility districts.

Aqualia says that, with this acquisition, it will take on development of the business with an aim of becoming one of the leading operators in the southern U.S.

The acquisition is part of Aqualia's strategy for international growth. The company currently serves 43.7 million users in 18 countries. In the 2022 financial year, the company had a turnover of US$1.4 billion and maintained a business portfolio of more than US$18 billion.

Delhi Budget to Focus on Water Sector, Yamuna Cleaning a Priority

With the Assembly polls scheduled in 2025, the Delhi Government's budget this year is likely to be focused on tackling water issues across the city, sources said. These issues will include cleaning of the Yamuna, 24-hour water supply, water generation, sewage treatment, sewer network connection, water overflow meter, and water pollution, among others.

Delhi Chief Minister Arvind Kejriwal, during the 2020 Assembly polls, had said that river Yamuna will be cleaned by 2025 and that he will take a dip in it before the next assembly polls. L-G VK Saxena who has paid several visits to river Yamuna since he took charge, has instructed DJB to expedite projects related to the cleaning of the Yamuna.

Meanwhile, due to the ongoing tussle between the officers and the elected government over funds to the DJB, several projects are stuck, according to sources. The Finance Department had also ordered a special audit of the DJB, and the utilisation of funds and expenditure in the last five years.

Sources said, "Due to the ongoing funding issues, several projects related to cleaning the Yamuna are stuck… installation of RO plants, STPs… The department had announced installation of 500 tubewells besides initiatives to end groundwater depletion… there was a project to install water flowmeters to check the flow of water… Project is being personally monitored by the CM… Besides, sewerage management, availability of drinking water and increasing water supply… the government is working on schemes to increase water availability from the present 995 MGD to about 1,240 MGD by March 2025. This was also part of the 2023-24 budget."

"A major action plan is likely to be prepared for cleaning the Yamuna and tackle water pollution. It will include a timeline for sewage treatment… plan on how to prevent discharges containing phosphates, detergents, surfactants, flood management, opening of Okhla Barrage gates to monitor water overflow during floods, waterlogging, cleaning of all

ATER NEWS

three major drains," said a source.

In addition to this, the budget will also focus on the environment, with a key focus on pollution control. The total budget is expected to be more than last year's budget of Rs. 80,000 crores, said officials.

Jal Jeevan Mission Crosses Momentous Milestone of Providing Tap Water Connections To 14 Crore (72.71%) Rural Households

Jal Jeevan Mission (JJM) crossed a momentous milestone of providing tap water connections to 14 Crore (72.71%) rural households. Launched by Prime Minister, Shri Narendra Modi on 15th August 2019, the flagship initiative of the Government of India has demonstrated unparalleled speed and scale, increasing rural tap connection coverage from 3 Crore to an astounding 14 Crore in just four years. This significant achievement marks a paradigm shift in rural development, emphasizing the Mission's commitment to ensuring water quality, empowering communities, and promoting sustainable practices.

Working in collaboration with States/ UTs and various development partners, JJM has achieved several milestones. As of today, six states, namely Goa, Telangana, Haryana, Gujarat, Punjab, and Himachal Pradesh and three Union Territories of Puducherry, D&D and D&NH, and A&N Islands have achieved 100% coverage. Mizoram at 98.68%, Arunachal Pradesh at 98.48% and Bihar at 96.42% are on track to achieving saturation in the near future.

The heart of this transformation lies in the combined efforts of the Union and State governments, along with the active participation of development partners. Every second witnesses the installation of a tap water connection, leading to a paradigm shift in the rural landscape. More than 2 lakh villages and 161 districts are now 'Har Ghar Jal.'

By implementing water purification and treatment methods, JJM has ensured that the water reaching households meets the standards, significantly reducing waterborne diseases and improving overall health in rural communities.

In addition to household connections, the Mission has ensured tap water supply in 9.24 lakh (90.65%) schools and 9.57 lakh (86.63%) anganwadi centres nationwide. In the 112 aspirational districts, tap water access has surged from 21.41 lakh (7.86%) households at the time of launch to 1.96 Crore (72.08%) households today.

The 'Har Ghar Jal' initiative is bringing substantial socio-economic benefits, liberating the

DROPLETS

NX Filtration announces further delay in revenue growth

Global provider of direct fibre nanofiltration (NF) technology for water NX Filtration reported 1.5 years delay in the roll out of its original business plan, that is caused by longer lead times to convert pilot projects into large full-scale projects. This is driven by both pilot trajectories taking longer than anticipated, and longer lead times towards larger projects after the pilot phase. The current financing environment negatively impacted its customers' capital expenditure plans, and its original equipment manufacturers (OEMs) in maintaining stock of its modules in anticipation of upcoming projects.

Its full-year 2023 revenues are expected to be €8m, below the communicated outlook on total revenues of €10m to €14m. A delay of orders in 2023 are still part of the company's pipeline for delivery this year. For 2024, NX Filtration's total revenue outlook is €16m. Its current cash position at €50m is expected to fully finance the construction of a new megafactory in 2024, with its completion and start of commissioning planned for the end of Q1 2024. An asset-based financing on its €58m fixed asset base as per December 2023 is explored to increase its financial flexibility.

Its CEO Jeroen Pynenburg said, "In the context of the delayed roll out of our business plan we have taken cost control measures without impacting our medium and long-term growth ambitions." He added that NX Filtration will move all of its existing operations into the new megafactory. "Despite the delay in our revenue growth, our major opportunities planned to deliver in 2023 are still part of our pipeline today," he said. "The underlying drivers for our business are stronger than ever: the market is developing favourably, and we experience traction with major global water companies that are entering the next stage of roll out of our technology."

24 Carrot solution found by Hayley Group with special Chopper Pump

For a fast-growing company that makes machines for the post-harvest processing of vegetables, Hayley Group is set to provide two new Landia Chopper Pumps that have special external shredders. Originally developed to deal with difficult wastewater solids in the fish processing industry, the Landia shredder-propeller design has now proved its capability in handling troublesome stringy material such as carrot tops, that typically cause problems for standard pumps.

Speaking for Hayley Group, the leading nationwide engineering component supplier (who also supply bearing and pneumatic products to the machinery manufacturer), Daniel Moulding, Assistant Manager, said: "The Landia Chopper Pumps work extremely well for our customers in numerous applications. In this particular challenge, the specialist machinery company asked us for help, because their existing pumps struggled with the fibrous and gritty material that is an inevitable part of the wastewater process with vegetables.

"This latest purchase of two new Landia Chopper Pumps follows orders for five units that were successfully introduced at various locations during 2023. "Landia have been very helpful indeed in working with us to understand our customer's needs; adapting the shredder-propeller so that there is no longer any downtime on the processing lines, which is a huge benefit."

rural population, particularly women and young girls, from the arduous task of fetching water daily. The time saved is now redirected towards income-generating activities, skill development, and supporting children's education.

JJM's sustainable model aims to ensure the longevity of the infrastructure and promotes community-led development. Over 5.29 lakh Village Water & Sanitation Committees (VWSC)/ Pani Samitis have been constituted, along with the preparation of 5.17 lakh Village Action Plans (VAPs) focusing on drinking water source management, greywater treatment, and regular O&M of in-village water supply systems. More than 23.55 lakh women have been trained for testing water samples using Field Testing Kit (FTK) to ensure quality. Rigorous testing of water samples from source and delivery points is conducted regularly. Today, safe drinking water is available in all Arsenic and Fluoride-affected habitations.

Guided by the principle of 'Sabka Saath, Sabka Vikas, Sabka Vishwas aur Sabka Prayas,' Jal Jeevan Mission is steadfastly moving towards achieving Sustainable Development Goal 6 – providing safe and affordable water to all. The mission's commitment to delivering safe water through taps to all households, schools, anganwadis, and public institutions in rural areas perfectly aligns with the objectives of Viksit Bharat.

Rural Water Management Training Launched in Ladakh

In Ladakh, in an endeavour to fortify rural water resource management strategies, a pivotal two-day residential training programme was inaugurated in the Union Territory under the aegis of the National Jal Jeevan Mission (JJM) on Best Practices for Rural Water Resource Management. The inauguration of this residential training programme reflects a collective commitment to fostering expertise and sharing experiences in rural water resource management, promising a brighter and more sustainable future for water access and conservation in Ladakh under JJM.

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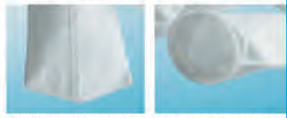

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Addressing the media, Executive Councillor Er Kacho Feroz Khan stressed the need for such initiatives to bolster the smooth execution of the JJM Scheme in the region. Despite facing the harshest of terrains and geographical intricacies, Mr. Khan lauded the relentless efforts of the Public Health Engineering (PHE) Department engineers for effectively implementing the scheme on the ground. This implementation has resulted in the maximisation of benefits for a significant portion of the district's populace, he added.

Expressing gratitude, Deputy Commissioner Kargil, Shrikant Balasahab Suse, extended appreciation to the All India Institute of Local Self Government (AIILSG) for choosing to conduct the training amidst the challenging winter conditions.

Metrowater Clears Encroachments Along Conduit Lines Transporting Water to Chennai's Kilpauk Treatment Plant

The Union Minister for Jal Shakti, Shri Gajendra Singh Shekhawat today inaugurated 14 MLD Sewage Treatment Plant (STP) and 2.4 km long Interception & Diversion (I&D) Network in Baghpat, Uttar Pradesh. The centerpiece of the project is the establishment of a cutting-edge Sewage Treatment Plant with a capacity of 14 Million Liters Per Day (MLD) under DBOT mode with 100% central funding under the Namami Gange Programme. The estimated cost of the project is Rs. 77.36 crores. The event was graced by Shri Swatantra Dev Singh, Jal Shakti Minister of Uttar Pradesh; Shri Satya Pal Singh, Member of Parliament from Baghpat; Shri Jaswant Singh Saini Minister of State for Industrial Development and Parliamentary Affairs; Shri Yogesh Dhama MLA, Baghpat and Shri G. Asok Kumar, Director-General, NMCG.

Union Minister for Jal Shakti, Shri Gajendra Singh Shekhawat, addressing the August gathering asserted that significant strides have been made towards fulfilling Prime Minister, Shri Narendra Modi's commitment to purify the waters of Ganga and Yamuna. He emphasized on the vital role of water as the foundation of life, underscoring that life itself is inconceivable without it.

Lauding the leadership of Prime Minister, Shri Narendra Modi, the Union Minister highlighted the comprehensive conservation and promotion work being carried out from Himachal to Bengal through the Namami Gange Mission. Reflecting on a decade of NMCG's endeavors, Shri Shekhawat expressed pride in witnessing successful river conservation efforts. Notably, the rejuvenation has led to the return of aquatic life in the Ganga, with increased numbers of fishes, turtles, and dolphins, affirming the sustained vitality of the river.

Shri Shekhawat took pride in Namami Gange being recognized as one of the top 10 World Restoration Flagships to revive the natural world at the United Nations Biodiversity Conference in Montreal, Canada. He emphasized that the Ganga and Yamuna are not only symbols of faith but also essential sources of sustenance and livelihood. The Ganga River Basin, one of the country's largest, houses 43% of the total population. Shri Shekhawat expressed concern for the endangered existence of rivers due to changing circumstances and urbanization. In response, he highlighted the crucial efforts that are underway, led by Prime Minister Shri Narendra Modi, as vital initiatives in the face of these challenges. He said that in a remarkable achievement, the waters of the Ganga have now reached the standard of potability. Discussing the ongoing challenges regarding the pollution of the Yamuna, he noted that Asia's largest Sewage Treatment Plant (STP) has been successfully established in Okhla, boasting an impressive capacity of 564 MLD.

Shri Shekhawat concluded by underscoring the commitment to combat Yamuna's pollution with a firm pledge to ensure 100 percent cleanliness in the Yamuna water of Delhi by the year's end.

DG, NMCG, Shri G. Asok Kumar addressing the gathering highlighted that the newly inaugurated 14 MLD Sewage Treatment Plant (STP) in Baghpat is designed to harness sewage effluent from 4 nalas through a 2.345 km interception line. He mentioned that this intervention aims to redirect household wastewater away from open drains along the roadside, making the discharge into nalas more efficient. Shri Kumar

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also emphasized the unwavering commitment of NMCG in the extensive cleaning and rejuvenation efforts focused on the tributaries of the Ganga.

The project encompasses the strategic interception of four major Nalas in the region, effectively curtailing the discharge of sewage into the sacred waters of the Yamuna River. An Intercepting Sewer Line, utilizing Reinforced Cement Concrete (RCC) NP3 pipes spanning 2.345 kilometers, is installed to ensure efficient sewage interception. The deployment of Ductile Iron (DI) K-9 pipes covering a distance of 600 meters facilitates seamless vertical conveyance through the Rising Main. Additionally, the installation of one Master Pumping Station (MPS) regulates the efficient flow of sewage within the system. Complementing these advancements, the comprehensive initiative includes a robust Operation & Maintenance plan, committed to ensuring the facility's optimal functionality for the next 15 years.

The Baghpat STP, one of the key components of the Government of India's efforts to address Yamuna's pollution concerns, embodies a commitment to environmental stewardship. The Yamuna Action Plan (YAP I, II & III), initiated in 1993, has seen the government providing financial assistance to states along the Yamuna, including Haryana, Delhi, and Uttar Pradesh, to combat the rising pollution levels. Nestled within this broader context, the Baghpat STP stands as a beacon of progress, addressing the pressing need for enhanced sewage treatment and sustainable water management.

The largest tributary of the Ganga River, the Yamuna flows through Uttarakhand, Himachal Pradesh, Haryana, Delhi, and Uttar Pradesh before merging into the Ganga at Prayagraj. The Government of India, in collaboration with NMCG, has recently approved 34 projects, allocating Rs. 5834.71 crore to create 2110.25 MLD STP capacity. These projects are strategically distributed across Himachal Pradesh (01), Haryana (02), Delhi (11), and Uttar Pradesh (20), under the Namami Gange program, aiming to mitigate pollution in the Yamuna and Hindon Rivers. Notably, 15 out of these 34 projects have already been completed, including one in Paonta Sahib, Himachal Pradesh, two in Sonipat and Panipat, Haryana, six in Vrindavan, Etawah, Firozabad, Baghpat, and Mathura (involving both STP & CETP) in Uttar Pradesh, and six in Delhi.

Cabinet approves construction of New 4.56 km long, 6-Lane Bridge across River Ganga connecting Digha and Sonepur in Bihar

The Cabinet Committee on Economic Affairs chaired by the Prime Minister, Shri Narendra Modi, today gave its approval for the Construction of New 4556 m long, 6-Lane High Level/ Extra Dosed Cable stayed Bridge across River Ganga (Parallel to Western Side of Existing Digha-Sonepur Rail-Cum Road Bridge) and its approaches on both sides in the Districts of Patna and Saran (NH-139W) in the State of Bihar on EPC mode.

Expenditure involved:

The Total cost for the project is Rs.3,064.45 crore which includes civil construction cost of Rs.2,233.81 crore.

No. of beneficiaries:

The Bridge will make the traffic faster and easier resulting in overall development of the State, especially North Bihar.

Details:

Digha (situated at Patna & South Bank of Ganga River) and Sonepur (North Bank of Ganga River in Saran District) are presently connected by a Rail Cum Road Bridge for movement of light vehicles only. Therefore, the present road cannot be used for transport of goods and commodities which is a major economic blockade. The constraint will be removed by providing this bridge, between Digha and Sonepur and; goods and commodities can be transported once the bridge is constructed, unleashing the economic potential of the region.

This bridge will provide direct connectivity from Patna to Golden quadrilateral corridor via NH-139 at Aurangabad and Sonepur (NH-31), Chhapra, Motihari (East-West corridor old NH-27), Bettiah (NH-727) in the Northern side of Bihar. This Project is a part of Buddha circuit. It provides better connectivity to Buddha Stupa at Vaishali and Keshariya. Also, NH-139W provides connectivity to very famous Areraj Someshwar Nath Temple and proposed Viraat Ramayan Mandir (largest religious monument in the world) at Kesariya in the East Champaran District.

This project is falling in Patna and will provide better connectivity to North Bihar and South part of the Bihar through State Capital. The Bridge will make the movement of vehicles faster and easier resulting in overall development of the region.

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The Economic analysis results have shown an EIRR of 17.6% in base case and 13.1% is worst case which may be attributed to the savings in distance and time travelled.

Implementation strategy and targets:

The work is to be implemented on EPC Mode with the use latest technology like 5D-Building Information Modelling (BIM), Bridge Health Monitoring System (BHMS), monthly drone mapping to ensure quality of construction and operations.

The work is targeted to be completed in 42 months from the appointed date.

Major impact, including employment generation potential:

i. This project is aimed at providing faster commute and to provide better connectivity between North and South Parts of the Bihar. Thus, promoting the socio-economic growth of the entire region.

ii. Various activities performed during the construction and maintenance period of the project are expected to generate direct employment for skilled and un-skilled workers.

States/districts covered:

The Bridge will connect two Districts namely Patna at Digha on South side and Saran on North Side across River Ganga, Bihar.

Background:

Government has declared the stretch "the Highway starting from its junction with NH-139 near Patna (AIIMS) connecting Bakarpur, Manikpur, Sahebganj, Areraj and terminating at its junction with NH-727 near Bettiah in the State of Bihar" as NH-139(W) vide Gazette Notification dated 8th July 2021.

From water conservation to cleanliness: PM puts forth 9 'requests' before people

Prime Minister Narendra Modi on Monday put forth a set of nine "requests" before people, urging them to work towards fulfilling them. The PM made these "aagrahas" (requests) while addressing the inaugural function of the Swarved Mahamandir on the second and final day of his visit to his parliamentary constituency Varanasi.

"My first request is save every drop of water and make more and more people aware about water conservation. Second: Go from village-to-village and make people aware about digital transactions, teach them about online payment. Third: Work to make your village, your locality, your city number one in cleanliness," he said.

"Fourth – Promote local, local products as much as possible, use only Made in India products. Fifth – As much as possible, first see your own country, travel around in your own country and if you want to go to another country, then you should not feel like going abroad until you see the whole country.

"And these days, I keep telling even big rich people that why are they getting married at destinations in foreign countries, so I said 'Wed in India', 'Get married in India'," he said.

"I say the sixth thing is keep making farmers more and more aware about natural farming. I had made this request to you last time also, now I am repeating it. This is a very important campaign to save Mother Earth. My seventh request is: Include Millets as Shri-Ann in your daily eating life, promote it widely, it is a super food," Modi said.

"My eighth request is: be it fitness, yoga or sports, make it an integral part of your life. And the ninth request is: Be a supporter of at least one poor family, help them. This is necessary to remove poverty in India," the prime minister said.

Mushrif inaugurates sewage treatment plant in Kolhapur

Guardian minister of Kolhapur Hasan Mushrif on Saturday inaugurated a 4MLD sewage treatment plant of the Kolhapur Municipal Corporation (KMC) at Kasba Bawda area of the city. The sewage treatment plant has been constructed with the funds provided by the central government, state government and KMC under Amrit Yojana. Mushrif said the remaining three STPs will also be approved and completed soon.

MLA Jayashri Jadhav, KMC administrator K. Manjulekshmi, additional commissioner Keshav Jadhav, deputy commissioner Ravikant Adsul, health commissioner Dr. Vijay Patil, water engineer Netradeep Sarnobat, City Engineer Harshjit Ghatge, deputy regional officer of Maharashtra Pollution Control Board Pramod Mane, environment activist Uday Gaikwad, deputy engineer of Maharashtra Life Authority

Rajendra Tade etc were present on the occasion.

Mushrif said, "Around 123 MLD of impure water is released daily from Kolhapur city. Of this, 107 MLD of wastewater is treated by the KMC and released after purification. The remaining 16 MLD wastewater needs to be treated." MLA Jaishri Jadhav said, "The wastewater from Bapat Camp Nullah, Kasba Bawda, Jadhavwadi, Bhosalewadi, Kadamwadi, Kapoor Colony, Sadar Bazar, Mukt Sainik Colony, Kavala Naka, Market Yard area will be treated from this centre." Mushrif said, "Common citizens are upset because of poor road condition. People are pointing fingers at the guardian minister. KMC officials should carry out the road works immediately."

Union Minister for Jal Shakti chairs Annual General Meeting of NWDA Society and 21st Meeting of Special Committee for Interlinking of Rivers

The Union Minister for Jal Shakti, Shri Gajendra Singh Shekhawat chaired the 37th Annual General Meeting of NWDA Society and 21st Meeting of Special Committee for Interlinking of Rivers (SCILR) at Dr. Ambedkar International Centre in New Delhi today. The Union Minister also launched the 8th India Water Week – 2024, an international level mega event and inaugurated its website during the meeting. The 8th India Water Week will be held from 17th to 21st September, 2024 in New Delhi, on the theme "Partnerships and Cooperation for Inclusive Water Development and Management".

The meeting was attended by the Minister of State for Jal Shakti Shri Bishweswar Tudu, and the Minister for PWD, Govt. of Puducherry Shri K. Lakshminarayan along with the Secretary, Department of Water Resources, River Development and Ganga Rejuvenation; Chairman, CWC; ACS/Principal Secretaries of various states, Advisor to the Union Minister for Jal Shakti, representatives of various ministries / departments of Centre and States, nominated experts etc. The Minister of WRD, Govt. of Bihar Shri Sanjay Kumar Jha also addressed the meeting virtually.

The Union Minister for Jal Shakti, in his opening remarks, informed that water is one of the most important drivers for the Socio-economic development in the country and the development and management of the Water Resources has been one of the key priorities of the Government of India. Interlinking of Rivers (ILR) Programme is very important for enhancing water and food security of the country and would be helpful in providing water to drought prone and rainfed areas.

Shri Shekhawat highlighted the remarkable achievement of initiation of implementation of Ken Betwa Link Project (1st ILR Project under NPP) in December, 2021. The project would be a boon for the Bundelkhand region. This will encourage states to come forward for the implementation of other link projects. He expressed satisfaction that States of Rajasthan and Madhya Pradesh have come nearly on board and MoU amongst these two States and Centre for the implementation of the Modified Parbati-Kalisindh-Chambal Link project is also likely to be signed soon. He requested all the states to be magnanimous towards arriving at a consensus for implementation of other link projects particularly the priority project i.e. Godavari-Krishna-Pennar-Cauvery link.

During the meeting, a detailed presentation was made on the agenda items of 37th Annual General Meeting of NWDA Society and 21st Meeting of Special Committee for Interlinking of Rivers (SCILR) by Director General, NWDA. The status of various works and the pending issues/bottlenecks etc. for Interlinking of Rivers (ILR) projects, Annual Report & Audited Accounts for the year 2022-23 of NWDA and Intra State links were discussed at length.

The representatives of states expressed their views/observations on interlinking of rivers projects discussed during the meeting. The meeting concluded with the closing remarks by chair and vote of thanks by DG, NWDA to the Ministers, participating members and the representatives of states.

National Mission for Clean Ganga Inks Pact for Sewage Treatment Plant Development at Gokul Barrage in Mathura

In a significant move towards enhancing sewage treatment infrastructure and combating pollution in the Yamuna, the National Mission for Clean Ganga (NMCG) has entered into a tripartite Concession Agreement with the Uttar Pradesh Jal Nigam and M/s. EIEL Mathura Infra Engineers Pvt. Ltd. This Special Purpose Vehicle (SPV), formed through a joint venture between M/s Enviro Infra Engineers Limited and M/s. Micro Transmission Systems, will spearhead the development of a Sewage Treatment Plant (STP) for the Gokul Barrage in Mathura. The Concession Agreement, executed under the Hybrid Annuity PPP mode, involves a contract valued at Rs. 240.01 Crores, marking a transformative moment in river conservation and urban sewage management.

The comprehensive project encompasses the construction of a 60 MLD STP, along with crucial components such as Interception & Diversion structures, I&D network laying, Sewage Pumping Stations, and Operation and Maintenance for 15 years. Aimed at addressing the existing gaps in sewerage management and treatment in Mathura city, the initiative is poised to significantly reduce sewage pollution in the Yamuna. Upon completion, the project will eliminate the discharge of untreated sewage from Mathura City into the River Yamuna, aligning with NMCG's commitment to the rejuvenation of the Ganga and its tributaries.

This groundbreaking initiative not only accelerates STP construction but also rejuvenates private sector interest in NMCG projects, fostering a collaborative model for efficient and sustainable sewage management. The Hybrid Annuity model ensures a balanced and mutually beneficial arrangement for all stakeholders, emphasizing the long-term operation and maintenance of the STPs to meet the desired standards.

During the event, Shri G. Asok Kumar, Director General of NMCG, conveyed his satisfaction at the successful conclusion of the award process, emphasizing its significance as another noteworthy step in the continuous endeavours to purify and rejuvenate the Yamuna and Ganga rivers.

Shri Lokesh Sharma, Superintending Engineer, UP Jal Nigam (Rural), Shri Manish Jain, Authorized Signatory, M/s. EIEL Mathura Infra Engineers Pvt. Ltd., and Shri Binod Kumar, Director (Projects), NMCG, were signatories to the contract. and Shri Brijendra Swaroop, Executive Director (Projects) and Shri Nalin Kumar Srivastava, Deputy Director General – NMCG, along with representatives of state agencies and the concessionaire, were present at the occasion.

Bihar receives global acclaim at COP-28 for afforestation initiatives

The actions undertaken by the Bihar government in the field of afforestation, particularly through the Jal-Jeevan-Hariyali Abhiyan (Rural Development Department), received praise on Saturday from the international community at the ongoing United Nations Climate Change Conference of the Parties (COP-28) in Dubai.

The Bihar delegation, led by Department Of Environment, Forest and Climate Change (DoEFCC) Secretary Bandana Preyashi, Director (Ecology) Surendra Singh, and Principal Chief Conservator of Forest Ashutosh, participated in the prestigious COP-28 event, which gathers nations as signatories to the United Nations Framework Convention on Climate Change (UNFCCC). COP-28 commenced on November 30, marking its opening with an agreement on a loss and damage fund to assist developing countries in coping with the impact of climate change.

During a dedicated "Building Climate Resilience" session at the Indian Pavilion, Ms Preyashi and Mr Singh delivered a detailed presentation titled "Afforestation Activities in Bihar to Combat Climate Change."

Ms Preyashi provided opening remarks, highlighting the larger policy framework and inter-departmental coordination under Jal-Jeevan-Hariyali Abhiyan.

She emphasised Bihar's holistic approach, stating, "The 'Jal-Jeevan Hariyali Abhiyan' initiated in 2019 reflects the inherent interconnectedness between water management, vegetation coverage, and the existence of life. With an 11-pronged strategy involving 15 government departments, the programme showcases a promising way to mitigate the adverse impacts of climate change."

She further said, "The programme has resulted in the creation and restoration of over one and a half lakh water bodies in a span of four years." Discussing the positive outcomes, Ms Preyashi stated, "The green cover in the State has increased from 9.9% in 2019 to 14.75% in 2021, with a total of 381.008 million plantations since 2012-13."

She also asserted that the experience of Jal-Jeevan-Hariyali Abhiyan could be replicated in regions vulnerable to climate change, such as South Asian countries and Sub-Saharan Africa, facing irregular floods and droughts, respectively.

Furthermore, Ms Preyashi highlighted the implementation of the green budget in Bihar since the fiscal year 2020-21. "Bihar is among the first States in the country to introduce a green budget, aiming to allocate budgetary provisions to address climate change, conserve the ecosystem, and protect biodiversity," she said.

Mr Singh further delved into the efforts of DoEFCC, elaborating on its initiatives, ongoing programmes, achieved results, challenges faced, and the envisioned way forward. Other States participating in the session included Sikkim and Jharkhand, and the session was moderated by Ramesh Kumar Pandey, Inspector General of Forests, Ministry of Environment, Forests and Climate Change, Government of India. The Bihar delegation's participation at COP-28 underscores the State's commitment to sustainable practices and its pivotal role in addressing climate change challenges. The global community recognised and appreciated Bihar's holistic approach, offering hope and inspiration for other regions grappling with the impacts of climate change. Experts claim that Bihar has undertaken several pioneering measures for climate change resilience.

"Ahead of almost all major states in the country and many parts of the world, the Bihar government decided to work towards long-term low carbon development and build climate resilience for its people and its system. Accordingly, a Memorandum of Understanding (MoU) was signed between the Bihar State Pollution Control Board (BSPCB) and the United Nations Environment Programme (UNEP) in February 2021 to develop climate-resilient and low-carbon development pathways for the state," Piyush Tripathi, Manager – Communication, Climate, World Resources Institute (WRI) India told The Hindu.

He further said, "Over the last two years, a technical consortium of internationally renowned organisations, including WRI India, has extensively collected data from more than 20 line departments, visited all 38 districts of the State to gain on-ground immersive experience, organised over 350 meetings, and conducted over 30 stakeholder consultations to develop the long-term climate strategy for the State."

A village near Mumbai, revolutionising water management in Maharashtra

Located within the arid terrains of Maharashtra's Ahmednagar, 250 kilometres away from Mumbai, the village of Hiware Bazar stands as a beacon of hope and innovation in the field of water conservation. In an area frequently beset by droughts and severe shortages of drinking water, Hiware Bazar has risen as an exemplar of sustainable living, reshaping the storyline of rural resilience. Previously contending with the harsh challenges posed by water scarcity, the village has transformed into a prime illustration of how deliberate water management can uplift an entire community.

Cultivating Sustainability through Innovative Water Management Central to Hiware Bazar's triumphant narrative lies its innovative irrigation system. Guided by the dynamic leadership of Sarpanch Popatrao Pawar, the villagers have executed watershed development initiatives, utilizing rainwater to replenish groundwater levels. The strategic construction of traditional water harvesting structures, including check dams and contour trenches, ensures a consistent supply for agricultural needs throughout the year.

The metamorphosis extends beyond water conservation. Embracing afforestation, the villagers regularly plant trees to combat soil erosion and augment water retention. The once-barren landscape now showcases abundant greenery, a stark departure from the dry conditions prevalent in many neighbouring villages.

What distinguishes Hiware Bazar is its unwavering dedication to community involvement. Villagers actively contribute to preserving and maintaining water resources, fostering a collective sense of ownership that surpasses individual interests. Collective responsibility forms the bedrock of their success, transforming Hiware Bazar into a closely-knit, water-conscious community.

The village not only secured its agricultural sustenance but also addressed the pressing issue of drinking water. Every household in Hiware Bazar now enjoys access to potable water, a privilege in numerous rural areas grappling with the persistent threat of water scarcity. This accomplishment stems from the community's strict adherence to water usage norms and efficient water source management.

As Hiware Bazar celebrates its remarkable journey, it stands as a living testament to the power of local initiatives in combating environmental challenges. The village serves as an inspiration for neighbouring communities and beyond, proving that with unity, innovation, and a deep-rooted connection to the land, even the harshest landscapes can be transformed into thriving oases of sustainability. Hiware Bazar's success resonates not only in Maharashtra but as a beacon of hope for regions grappling with the global issue of water scarcity.

Flow of Treated Water From Mangaluru STP to Dam to be Stopped

Mayor Sudheer Shetty Kannur who visited the sewage treatment plant (STP) of the Mangaluru City Corporation (MCC) at Pachanady assured that complaints regarding the release of secondary treated water to the drinking water dam across the Phalguni River will be solved soon. He said a spot visit was conducted based on complaints raised by corporators from the ruling party and opposition regarding various problems pertaining to MCC's STPs.

The mayor told reporters that there was an allegation that the treated water from the STP at Pachanady was being released into the drinking water barrage built across the Phalguni River. "The STP receives 8.8 MLD of sewage, and it is being treated at the secondary level regularly. Nearly 6.5 MLD of secondary treated water is being pumped to the tertiary treatment plant (TTP) at Pilikula.The remaining 2.3 MLD of secondary treated water from the STP at Pachanady was flowing to the river. To address this issue, a new pipeline has been laid at a cost of Rs 2.8 crore, and it has already been commissioned. Meanwhile, a tender has been invited to build a pumphouse with two pumps of 60 HP capacity each, at an estimated cost of Rs 50 lakh under the 15th Finance Commission funding to release the excessive secondary treated water from the STP. Soon, the work will be completed, so that not a single drop of secondary treated water from the STP will go into the drinking water barrage," the mayor said.

He added that with the new arrangements, the excessive secondary treated water from the STP will be released downstream of the dam. Another tender will be invited for the recruitment of manpower on contract for one year, for the technical maintenance of the STP.

An engineer will also be appointed for the proper maintenance of the STP, he said, adding that a Rs 1.3 crore tender will be invited soon. Initiatives will also be taken to upgrade facilities at the STP, and thereby maintain a better biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in the treated water. A detailed project report (DPR) for the upgradation of the STP will also be prepared soon, the mayor said.

Dakshina Kannada Sets up Committee for Water Management

Mangaluru's Dakshina Kannada district administration has constituted a committee, headed by the Assistant Commissioner (AC), to manage various water resources and thereby prevent a drinking water crisis during peak summer. Deputy Commissioner Mullai Muhilan MP said initiatives will be taken to ensure judicious use of water available in check dams and various other water resources in the district.

"Directions have been given to impound water stored in Thumbe vented dam, multi-village water scheme sources, and all dams in the district and manage the supply cautiously. A decision in this regard has been taken in the wake of deficit rainfall in Dakshina Kannada district," the DC told reporters. On the new bridge-cum- barrage built across the Nethravati River at Harekala, which is yet to be commissioned, the DC said there will be no water scarcity in Mangaluru city once the water

storage commences in the dam. However, storing water to its maximum level will submerge surrounding areas. Hence, maximum water storage can be ensured only if land in surrounding areas is acquired.

"I have directed officials from the minor irrigation department to submit a detailed proposal in this regard," he said. "Water from the Thumbe vented dam of the Mangaluru City Corporation (MCC) is also supplied to Ullal City Municipality areas, Mulki town panchayat, and gram panchayats on the stretch between Thumbe and Mangaluru. Silt from the Thumbe vented dam was removed in 2018-19. The water storage in the dam can be increased if the silt removal work is undertaken again. To ensure better coordination in water supply, the committee headed by the AC will hold meetings," he added. To a query, the DC said that since the Mangalore Refinery and Petrochemicals Ltd., (MRPL) has set up a desalination unit, pressure on the Thumbe dam has been reduced.

Surat's Hi-Tech Sweet Water Technology Eyes Europe Market

Hi-Tech Sweet Water Technologies in Surat has become a frontrunner in the industry by fulfilling Prime Minister Narendra Modi's goals of Swachh Bharat, Clean Water, and Make in India via its dedicated efforts to supplysafe drinking water. At the recent Aquatech Trade Exhibition in Europe, it solidified its focus on the European market.

"It is our ongoing goal to expand the family, and the firm is directly and indirectly linked to more than 2,000 families of our workers," said Vijay Shah, owner of Hi-Tech Sweet Water. In his statement, Shah assured the audience that the business was well-positioned to enter the European market.

Metrowater Clears Encroachments Along Conduit Lines Transporting Water to Chennai's Kilpauk Treatment Plant

The Chennai Metropolitan Water Supply and Sewerage Board or Metrowater has started clearing encroachments on British-era conduit lines, which carry water from the Red Hills reservoir to Kilpauk Water Treatment Plant. The water agency has identified nearly 1,300 encroachments from Rajamangalam to Kilpauk water works. It carried out an analysis using differential global positioning system (DGPS) and drone survey in the stretch to identify the changes in land use and the extent of encroachments of the boundary.

The three conduit lines, the oldest of which was built with brick masonry in 1914, are under constant threat of encroachments. The third dilapidated line is now being reconstructed. The lines, running for a distance of 10 km-12 km, carry nearly 224 million litres of raw water a day drawn from the Red Hills reservoir. While these lines run underground, at a depth of around 2 m, the land they pass through, spread over nearly 165 acres, faces the risk of being encroached upon owing to rapid urbanisation. The conduit lines go through Surapet, Korattur, Villivakkam, New Avadi Road, among others.

Metrowater officials said the land was transferred to the water agency in 1978. The vacant land is essential for the construction of additional conduit lines, considered to be the backbone of the city's water distribution network, to meet growing drinking water demands in the coming years. To protect the lands, Metrowater has started earmarking boundaries of the three conduits and clearing encroachments in phases. Conduit line-I's alignment has been demarcated for 536 m, after 10 encroachments were removed in Surapet. Demarcation of boundaries of the two other lines in Surapet will also be carried out.

Metrowater is in the process of evicting commercial encroachments along with the Special Tahsildar, Madhavaram taluk, and fencing off the portions of lands retrieved. It had recently cleared 10 encroachments on Water Canal Road in Korattur and in Thathankuppam. It is also involved in fencing off portions of land and building compound walls in Surapet and Puthagaram. Notices have been issued to 12 more commercial structures on R.K. Link Road in Thanthankuppam. Officials noted that several residential colonies have developed and unauthorised temporary roads have formed over conduit lands, particularly on Water Canal Road. Besides dumping of debris, the lands are being used for various infrastructure works.

GLOBAL W

DROPLETS

Singapore's collective climate action through its second pavilion at COP28

Singapore has launched the Singapore pavilion at the 28th conference of the parties of the UN framework convention on climate change (COP28), which will run from 30 Nov-12 Dec 2023 in Dubai, UAE. This is the second Singapore pavilion held at COP.

Themed 'Accelerating Collective Climate Action', the pavilion showcases how Singapore is convening players across sectors and domains, and from around the world, to achieve net zero emissions by 2050 and build a climate-resilient future.

The pavilion is a partnership with around 100 entities, including corporates, academia, international organisations, and NGOs. Its daily programmes span Memoranda of Understanding (MoU) signings, initiative launches by partners, showcases, panels and fireside chats. This includes programmes by youth delegates from the inaugural Climate Youth Development programme, which was launched earlier this year.

This year's Singapore pavilion will also present the inaugural Climate Leaders' Assembly (CLA), in collaboration with Bain and Company and Amazon Web Services. The event will gather around 150 global leaders from finance, business, philanthropy and other domains. Participants will discuss the nature, energy and industry, with the aim of accelerating the global movement toward net zero emissions, and with a focus on Asia.

In her welcome address at the pavilion's launch event, minister for sustainability and the environment Grace Fu said, "The Singapore pavilion is not just a physical space. It represents our commitment to climate action. It allows Team Singapore — made up of the public, private and people sectors — to show what we are doing to tackle the challenge of our generation."

The pavilion's daily programming themes: 'Cities, Water' is on 9 Dec 2023, 'Food, Water' is on 10 Dec 2023 and 'Water, Youth' is on 11 Dec 2023.

Drinking toilet water may be the future of drought-stricken California

As climate change and water scarcity become increasingly urgent issues around the world, governments are turning to new options to ensure adequate water supplies — including turning sewage waste into drinking water. And if you're in California, this may soon be flowing from your kitchen tap. The State Water Resources Control Board on Tuesday voted to allow water companies to pump treated wastewater into residents' taps in the populous, drought-prone state. In a statement, the board said the decision would give California "the most advanced standards in the nation for treating wastewater to such an extent that the finished product meets or exceeds current drinking water standards."

"This is an exciting development in the state's ongoing efforts to find innovative solutions to the challenges of extreme weather driven by climate change," said E. Joaquin Esquivel, the chair of the board. Members unanimously approved the new regulations on Tuesday, after years of discussions and just before a deadline set six years ago for the state to adopt regulations for reusing wastewater by the end of 2023. After the new rules are finalized next year, water companies will be able to submit plans for projects to be approved by the board.

The new steps will save energy and benefit the environment, Esquivel said, adding that "these regulations ensure that the water produced is not only safe, but purer than many drinking water sources we now rely on." Many people are already drinking treated wastewater, Esquivel said, the Associated Press reported. What exists now is wastewater treated by what's known as "indirect potable reuse," a process where wastewater is released into natural water bodies, such as reservoirs and rivers, before being turned into drinking water.

Puducherry makes it mandatory for government offices to use treated sewage water for bathrooms, gardening

ATER NEWS

Keen on saving 17 million litres per day (MLD) of treated sewage water from draining into the sea, the Puducherry government has made it mandatory for all government offices in Puducherry to use treated water for toilet flushing and watering gardens, among other non-potable purposes. The Public Works Department (PWD) has laid pipelines from its Sewage Treatment Plant (STP) in Dubrayapet for use of the ultra-filtered water for gardening in Bharathi Park and the Government Botanical Garden, located in the Boulevard. The notification for reuse of Secondary Treated Effluent Water (STEW) for government offices will be formally released by Lt. Governor Tamilisai Soundararajan and Chief Minister N. Rangasamy on Wednesday, December 20, 2023. According to PWD Secretary D. Manikandan, "The decision has been taken to ensure that no drinking quality water is used for non-potable purposes. Owing to over-exploitation of groundwater, the water level has depleted to a great extent in Puducherry. To overcome the shortage of water for different purposes and to avoid over extraction, the Government has decided to reuse water up to a certain quantity, after proper treatment, for non-potable purposes."

"An ultra filtration unit has already been installed at the 17 MLD STP in Dubrayapet and the treated water confirms to the standards prescribed by the Central Public Health and Environmental Engineering Organisation (CPHEEO). The treated water is chlorinated and the Biological Oxygen Demand (BOD) was found to be 3 mg/litre as against the permissible 6 mg/litre," he said. Initially, the PWD has decided to use about 50,000 litres per day of treated sewage water for horticulture in the Bharathi Park, the Government Botanical Garden and government offices located near Dubrayapet. By using treated effluent, around 50,000 litres of groundwater per day will also be saved, making this an environmentally sound practice. There are no issues like quality or smell as the water is thoroughly chlorinated and meets all parameters, Mr. Manikandan said.

All government offices have been directed to utilise the ultra filtered water from Dubrayapet STP to the maximum extent possible and to recommend all stakeholders under their control for efficient use of treated sewage so as to conserve water. The executive engineer of the public health division of PWD has been appointed as the nodal officer for this purpose, an official said. The PWD is also coming up with a waste water management policy, aimed not only at treatment of water but also its utilisation. As part of the policy, the PWD would be closing all open drains and shifting to underground drainage in the city.

Azerbaijan's commitment to water sustainability takes center stage at COP 28 in Dubai

On the sidelines of the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP28) in Dubai, the UAE, an Azerbaijani delegation of the Ministry of Ecology and Natural Resources and the State Water Resources Agency has conducted several meetings at the Azerbaijan pavilion. During the meetings, the event participants were informed about Azerbaijan's water resources, future prospects, the progress of ongoing restoration and reconstruction projects in the Karabakh and Eastern Zangazur economic regions, and the planned initiatives in utilising alternative water sources.

DROPLETS

CIDCO-MIDC agreement promises relief for water-starved Taloja industries

Industries in Taloja grappling with severe water shortages, but relief is on the horizon as CIDCO and MIDC have now joined forces to address the issue. The collaboration involves supply of treated water to industries in the Taloja belt

Panvel Industries in Taloja grappling with severe water shortages, but relief is on the horizon as CIDCO and MIDC have now joined forces to address the issue. The collaboration involves supply of treated water to industries in the Taloja belt.

With 866 hectares acquired by MIDC for industrial use, the Taloja region hosts a mix of multinational corporations and numerous small-scale industries. The escalating water crisis, exacerbated by rapid urbanisation, had prompted the diversion of water meant for industries to residential areas. The agreement was signed in this context.

CIDCO is setting up a 40 MLD (million liters per day) Sewage Treatment Plant (STP) in the area to treat industrial sewage water. According to the agreement, CIDCO would provide treated water to MIDC's water tank in Taloja. MIDC will be responsible for laying pipelines and constructing storage tanks from the water tank. The water will not be potable but will be used for various other purposes by the industries.

Anil Diggikar, vice chairman, and managing director of CIDCO said, "CIDCO, following Chief Minister Eknath Shinde's directive, is executing a sewage water treatment project in Taloja industrial belt, offering 40 MLD of treated water for industries. The agreement with MIDC involved CIDCO supplying 20 MLD treated water, and in return, MIDC would provide 20 MLD of drinking water to CIDCO."

In the initial phase, CIDCO delivered 20 MLD of treated water to MIDC, with plans for further expansion. Satish Shetty, president of Taloja Industries Association (TIA), highlighted the shortfall, stating, "The industries required 62 MLD of water, but we received only 52 MLD from MIDC, leaving us 10 MLD short. This had led to reduced supply to industries due to increased demand from Thane district."

Shetty emphasised the potential benefits of treated water for industrial use, including cooling towers, sanitation, and gardening, all at a more economical rate compared to the regular water supply. While acknowledging the positive development, he had urged swift implementation, emphasising the industry's history of receiving assurances without timely action.

France Loans $218 Million to Mauritius for Water-Sector Projects

France's Development Agency will provide a 200 million euro ($217.7million) budgetary loan to Mauritius to finance an overhaul of the country's water sector. "Water resources management is a challenge that the Republic of Mauritius, like other small island states highly exposed to climate change, must take up," said the island nation's Finance Minister Renganaden Padayachy.

The loan relies on five pillars including a new water policy integrating development objectives and the Paris Climate accord, to improve services through short and medium term, and operational solutions to consolidate social and gender inclusion. Mauritius relies on tourism and the export of manufactured goods ,and grapples with drought and water cuts ahead of the summer rains. In December 2022, the average capacity in reservoirs fell to a "critical level" of 35%, resulting in rationing of water to six hours per day in some regions, according to a statement published by the Central Water Authority.

"Water can be a lever for sustainable development, but it can also become a limiting factor for development," Padayachy said in a speech delivered at the signing ceremony on Friday in Port Louis, the capital. Financing from the French Development Agency adds to a $70 million loan from the Saudi Fund for Development for the construction of a dam in the southern part of the island nation. Last year, the island of Mauritius received 4.105 trillion cubic meters of rain, a 8.7% increase from a year earlier. While ground water recharge accounted for 411 million cubic meters, 2.46 trillion cubic meters or 60% "went as surface runoff," the data agency said in a June report.

Green Credit Initiative, launched by PM Modi at COP28 climate summit in Dubai

Prime Minister Narendra Modi on Friday attended the World Climate Action Summit of the Conference of Parties-28 (COP28 summit) in Dubai, wrapping up his day-long visit to the United Arab Emirates (UAE) by launching the Green Credit Initiative. Modi, along with Sweden's PM Ulf Kristersson, President of Mozambique Filipe Jacinto Nyusi and European Council president Charles Michel, launched the web portal of the Green Credits Programme at the COP28 World Climate Action Summit in Dubai. The prime minister highlighted the impact of climate change on the Global South and said at COP28, "The manner in which we give importance to our Health Card in life, we have to similarly start thinking in the context of environment. We will have to see what is to be done to add positive points to Earth's Health Card. I think this is what Green Credit is."

What is Green Credit Initiative?
The Green Credit Initiative was first introduced by the ministry of environment, forest and climate change on October 13, 2023. There are two main priorities of the initiative – water conservation and afforestation. The environment ministry defined the initiative as a "market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors by various stakeholders like individuals, communities, private sector industries, and companies." Under this scheme, green credits will be assigned to specific environmental activities, and will be treated as tradable commodities. These green credits will be able to be sold on domestic market platforms.

The main purpose of this initiative is to boost voluntary environmental activities like tree plantation, water conservation, sustainable agriculture, and waste management by incentivizing it for big corporations and private companies, bringing about a change in the climate issues faced by the country. While launching the web portal for the scheme at COP28, PM Modi said, "The manner in which we give importance to our Health Card in life, we have to similarly start thinking in the context of environment. We will have to see what is to be done to add positive points to Earth's Health Card. I think this is what Green Credit is."

World Bank Support to Accelerate Access to Safe Water Supply and Sanitation in Cambodia

The World Bank has approved a $163 million project to support

Cambodia's efforts to strengthen water supply and sanitation services in four provinces, benefiting over 175,000 people. While Cambodia has made substantial progress on increasing access to improved water supply and sanitation, further efforts are needed to achieve the country's targets and meet the UN's Sustainable Development Goal (SDG) 6 of clean water and sanitation for all by 2030. In 2022, less than a third of Cambodians had access to a safely managed water supply, and just over a third used safely managed sanitation. "Access to safe water supply and sanitation is a fundamental human right," said Maryam Salim, World Bank Country Manager for Cambodia. "This support will help the government build a strong foundation for making these essential services available to all Cambodians and will bring rapid benefits to women and people in poor and rural areas, which are currently particularly underserved."

The six-year Water Supply and Sanitation Acceleration Project will support government actions to increase access to safe water supply and sanitation, improve the operation and maintenance of existing systems, and ensure the sustainability of services. The project includes an activity to maximise finance for development, working with the private operators that provide over half of all piped water connections in Cambodia to mobilize another $17.6 million in private funding to expand water supply services. "This project will help the government implement its vision and overall development strategy, and we are committed to ensuring sustainable growth in the sector and to achieving SDG 6," said Hem Vanndy, Minister of Industry, Science, Technology & Innovation. The Ministry of Industry, Science, Technology & Innovation will implement water supply activities and the Ministry of Public Works and Transport will implement urban sanitation activities under the project. The targeted provinces are Battambang, Pursat, Mondul Kiri and Kandal.

Finland Team Visits Rs 1 Cr Water Project in Gurugram

A parliamentary delegation of Finland, headed by Finnish Ambassador Kimmo Lahdevirta and Environment Committee Chairperson Jenny Pitko, visited the Sukhrali pond in Gurugram to review the progress of the water purification programme. The Finland authorities are spending around Rs 1 crore for purification of pond water and making it potable.

South East Water wins Ireland Kaizen Institute Award

South East Water is the first water company to have been presented with the UK and Ireland Kaizen Institute Award for the development of its operational excellence initiatives and framework over the past three years. In receiving the award, Douglas Whitfield, Operations Director said this was well deserved recognition for the outstanding efforts of frontline teams across South East Water through an unprecedented period of challenge. It comes after the company received the Infrastructure Delivery Award from the water industry's trade publication Utility Week. This was for a complex three-year project to restore the drinking water storage tanks after they were damaged by a sink hole on the site.

Although the Kaizen Awards have been running world-wide for the past 12 years, it is the first year they have been run in the UK and Ireland. The Kaizen Institute said: "This category for Operational Excellence encompasses projects that accomplished better productivity and effectiveness levels, simplified processes and lead time reduction." To gain the award, South East Water proved how it had directed its efforts on maximising operations performance, securing efficiency and effectiveness in terms of productivity, quality, and costs reduction.

Douglas said: "This included the development of visual management standards for production sites, summary dashboards for managers to track improvements, and relevant local performance metrics that link through to wider company measures. "These processes have encouraged the adoption of best practice across operations and help us to embed a culture of operational excellence and continuous improvement."

Douglas added: "It is a really challenging time for anyone working in the water industry due to the impact of accelerated climate change and operationally it has been an incredibly demanding three years. "That makes this well-deserved recognition for our teams by both the Kaizen Institute and Utility Week so important."

Scottish Water invests nearly £2 million to replace critical pipe at Kettleton Reservoir

The old cast iron pipe, which takes raw water from Kettleton Reservoir to Kettleton Water Treatment Works, has reached the end of its lifespan. It is prone to bursts and leaks that could cause disruption to customers and a new 450mm pipe will replace it. Kettleton Reservoir, built in 1939, collects water from the Kettleton Burn and supplies Kettleton Water Treatment Works.

The treatment works supplies almost 4,500 properties in the region, from Tynron in the southwest to parts of Dumfries and Lochmaben to the southeast. In order to carry out the replacement work, the pipe will have to be taken out of use for a period of time. To ensure a continuous raw water supply to the treatment works, Scottish Water has installed an overland pipe, which uses a syphon to draw the water up and over the wall of the reservoir.

Colin Smith, Scottish Water's project manager, said: "This is a complex and challenging project from an engineering and health and safety perspective. "One of the sections of the pipe being replaced is within a tunnel below the reservoir and the dam. While working in this area we will need to control any overflow from the reservoir as this could impact on the team's ability to safely access the pipe. To achieve this, we may need to reduce the level of water in the reservoir. At this time of year, that is no easy feat with all the rain!" Current pipe running through a tunnel beneath the reservoir. The project is being done at this time of year to reduce the risk of lowering the amount of water in the reservoir during the summer, when the demand for water and the risk of drought is higher. The reservoir will be lowered by about half a metre below the spill level, which is the level at which the water overflows the dam.

Colin continued: "The team carrying out the works will have to work through some pretty bleak conditions this winter, however, we are determined to deliver the work to ensure we can continue to provide a secure and sustainable water supply for our customers in Dumfries and Galloway." Scottish Water is working with its delivery partners George Leslie to deliver the project and expect the job to be complete in Spring 2024.

Portsmouth Water publishes Contract Notice for £40 million contract to provide smart water meters for all customers

The project, valued at approximately £40 million over 20 years, represents a significant investment in cutting-edge smart meter technology aimed at enhancing operational efficiency, improving customer service, and promoting water conservation for the Portsmouth Water area of supply which was classified by government as 'severely waterstressed' in 2021. Jim Barker, Head of Water Resources at Portsmouth Water, said:"Our universal metering programme represents Portsmouth Water's unwavering commitment to innovation and sustainability in water. By embracing smart metering technology, we aim to empower our customers with greater control over their water usage, while simultaneously fostering operational efficiency and environmental stewardship." Prospective suppliers are invited to apply through a Selection Questionnaire (SQ) to prequalify for the tender. The chosen partner will be responsible for supplying and installing the latest smart water meter technology for both domestic and non-household customers.

This procurement seeks to deliver two key components: Meter Asset Supply: Providing and managing smart water meters for both domestic and non-household connections, ensuring adherence to strict water quality, flow, and measurement standards, and integrating with the current network seamlessly.Smart Data Network Provision: Establishing a robust network for secure and consistent data transmission, enabling over-the-air meter reading collection. This will help provide customers with valuable insights into their water use, fostering more informed and sustainable water saving practices.
The contract is anticipated to commence in December 2024; with the initial eight years focusing on smart meter installation, followed by ongoing meter maintenance and data services requirement to support water efficiency targets.

Ruth Clarke announced as Xylem UK head of digital

Ruth, a civil engineer, has supported water companies with software systems for more than 25 years. Having led successful projects in areas including hydraulic modelling, operational forecasting and data analytics, she has been a driving force in shaping the sector's digital landscape. Ruth's focus at Xylem will be to help utilities optimise the operation of their assets using data-driven solutions, such as the integrated software and analytics platform Xylem Vue powered by GoAigua. Just how the technology is enabling water companies to manage their sewer networks, reducing CSO discharges and stabilising flow to treatment, is the topic of a presentation she will deliver at the WWT Wastewater Conference 2024 in Birmingham on 30 January. Ruth said: "I am thrilled to take up the post of head of digital at Xylem UK and Ireland. Working with water companies to help them meet their operational goals using innovative, data-driven approaches is something that I am very passionate about."With such huge challenges currently being faced by the water industry, this really is a pivotal moment in the adoption of wide scale digital solutions. I look forward to showcasing some of the exciting developments in our digital portfolio in the coming weeks, in particular at the WWT Wastewater Conference 2024."

Inauguration of biological wastewater treatment plant at LANXESS

LANXESS has commissioned a new wastewater treatment plant at its Belgium Kallo/Antwerp site. The special chemicals company invested around EUR 12 million in the plant, which has a treatment capacity of around 260,000 litres of wastewater per hour. LANXESS thoroughly modernized and expanded the existing water treatment plant to comply with the stricter environmental legislation. It was a challenging job because the plant had to remain operational throughout the renovation. The wastewater treatment plant not only processes the wastewater from the LANXESS plants on the site, for the production of rubber chemicals and glass fiber but also from two neighbouring companies.

Investing in sustainability

"The renewal and improvement of the wastewater treatment plant enable us to meet the highest environmental standards. We take responsibility for our local sites and this includes investing in sustainable and innovative processes that protect the environment," said Anno Borkowsky, board member of LANXESS, in his welcome speech. "Using energy, raw materials and water sparingly and efficiently is in the DNA of the chemical sector. As the largest chemical cluster in Europe, it is our responsibility to also be an innovation leader in cutting-edge environmental and climate technology. With this investment, LANXESS is putting its money where its mouth is in challenging economic conditions. It illustrates the chemical sector's ongoing commitment to a better environment and additional water savings. Compared to 10 years ago, chemical and pharmaceutical companies already consume almost a quarter less drinking water. Together with Flemish minister Zuhal Demir, we are working on a sectoral Blue Deal to save even more water," said Yves Verschueren, managing director of essenscia, the Belgian sector federation of the chemical industry and life sciences.

Social commitment

"Today, the precipitation deficit in Flanders is greater than during the historically dry summer of 1976. Water managers, water companies, governments, citizens and companies are taking measures to mitigate the effects of the current drought period, but it is clear that we need to arm ourselves in a sustainable way against periods of drought. This investment by LANXESS demonstrates a social commitment to daring and willingness to invest in such measures in economically challenging times, in order to make their company, but also the sector, future-proof," said Carina Van Cauter, Governor of the province of East Flanders.

Bacteria do the work

The installation is home to bacteria that process and purify the wastewater. The different wastewater streams are mixed and end up in aeration towers. The water is fed with activated sludge, in which the bacteria reside. The environment of the biological wastewater treatment plant is constantly monitored, for example to ensure balanced acidity and the right temperature. The bacteria are finally separated and returned to the purification process, the purified water is fed into the Scheldt. The plant operates day and night. An independent laboratory analyzes water samples daily for quality control.

Substantial improvement of environmental protection standards at port sites

The project is part of an investment program in the mid double-digit million euro range with which LANXESS has significantly improved environmental standards at its sites in the port of Antwerp in recent years. At the Lillo site, LANXESS commissioned a plant to reduce nitrous oxide emissions in 2021. This will reduce the emission of CO2 equivalents by 150,000 tons annually. In the autumn 2024, construction will start on a second plant that will eliminate another 300,000 tons of CO2 equivalent annually.

Ovarro launches logger to increase water savings

Responding to the current market need for products that are lower in cost and simple to use, monitoring solutions company Ovarro has launched XiLogFlow, a plug-and-play flow logger for both large and small facilities. The loggers can support multiple applications in commercial, industrial and public sector facilities, including utilities, hospitality and healthcare. They can also be deployed in residential buildings, where they can used for sub-metering and tenant billing in apartment blocks, domestic water use analysis, and smart home integration, providing real-time information for residents and building managers to make decisions about water usage. More efficient water use in agriculture is also supported by integrating XiLogFlow dataloggers into irrigation systems and for livestock watering

systems, where usage can be monitored to ensure consistent supply for livestock. By understanding water usage over time, they help individuals and organisations find opportunities to use water more efficiently, reduce their consumption and costs. This kind of analysis gives facilities managers better understanding of how much water is being used at their premises. It also allows them to identify potential water saving opportunities, where consumption is high, and where leaks have gone undetected. The advances in battery technology give Ovarro loggers a 10-year battery life, reducing maintenance visits. The improvements in battery power mean the XiLogFlow can capture metre readings every 15 mins, which are uploaded once a day. The records are accessible anytime, from any device, via the app. The logger is fitted with a universal SIM card, allowing connection to multiple mobile networks as well as the LTE-CATM1 Internet of Things (IoT) cellular network with 2G fallback.

By having Ovarro's tools to monitor water use and reduce the runtime of leaks, wasted water and associated repair costs, organisations have more visibility and therefore better management of their water usage. This approach reportedly ensures an efficient use of resources, reduces excess consumption and ensures improved budget control, while contributing toward critical business sustainability goals. "Industrial companies and commercial building owners wanting to reduce waste to improve cost efficiency and save water, must become smarter in their operations", said Ovarro CCO Paul Hartley.

IWRA inaugural Islands Water Congress calls for proposals,

The nonprofit organisation International Water Resources Association (IWRA) is hosting its Islands Water Congress from 4-6 Sep 2024. It has extended its submission of proposals deadline to 15 Feb 2024, seeking papers, special sessions and other creative contributions from academics, water professionals, and stakeholders on the three themes of administration, collaboration and innovation, both in relation to the Faroe Islands and beyond. As a high-level global event organised in collaboration with a different island host every two years, IWRA will develop a body of learning to boost freshwater opportunities and advance solutions to freshwater challenges. For its first edition, IWRA has partnered with Jarðfeingi Faroese Geological Survey. It will be in Tórshavn, Faroe Islands, with the theme 'Freshwater and islands: administration, collaboration and innovation'. The congress seeks contributions reflecting the challenges experienced in islands from all geographic contexts to enable a broad discussion reflecting the diverse water challenges faced by islands.

Local water challenges drive US water utility rates up 4%, according to Bluefield Research

The combined water and sewer bill for a typical US household has increased by 54.8% since 2012, according to a new Bluefield Research report, the US municipal water and sewer annual utility rate index 2023. Across 50 of the largest US metropolitan areas, an average monthly household water bills reportedly increased to US$49.53, and monthly sewer bills reached $71.16, based on average household water consumption. Two cities demonstrating some of the largest rate increases from 2022–2023 were El Paso, Texas and San Jose, California. El Paso residents recorded an 8% increase in their water rates to secure future water supplies.

In San Jose, California, residents saw a 12% increase due to the utilities' rising costs for purchased water, drought conditions, and planned infrastructure projects. Among the 50 cities analysed, three reported rate declines in 2023. "While the reasons for rate increases vary city by city, many have been in response to rising costs such as inflation and labour for ongoing system operations and maintenance (O&M), along with large capital investments to address ageing infrastructure," said Bluefield Research senior analyst Charlie Suse. "Across the board, higher costs for labour, chemicals, and materials have been among the most cited reasons for water utility rate increases. "At a local level, the differences become more apparent. Monthly water bills range from a low of $19.51 in San Antonio, Texas, to a high of $114.25 in San Francisco, California. This is in contrast to monthly sewer bills that range from a low of $11.24 in Long Beach, California, to a high of $170.40 in Seattle, Washington. Bluefield's analysis highlights new programmes targeting drought resiliency in California, as well as debt services for capital programmes in Detroit, Michigan, and Washington that are driving up rates in the near term. In the wake of COVID-19 and the end of rate relief programmes, cities like Riverside, California, have implemented and resumed new rate schedules after several years of postponements.

"Utilities in the western US rely more heavily on seasonal rate structures to help stabilise revenues and encourage conservation, in Los Angeles, California and Phoenix, Arizona," said Suse. "In 2023, households in the northeast faced the highest average combined water and sewer bills, with an average combined monthly bill of $142.49, in part due to O&M and energy prices." Overall, the financial dynamics of water utilities have been changing. The combination of rising capital expenditure, surging operating expenditure, and a decrease in federal spending for water infrastructure have created challenges for water utilities. To address ageing infrastructure and escalating financial requirements, many utilities have had to pass on increases to their ratepayers. Amid rising household water and sewer rates, affordability looms large for all utilities and city managers, according to the report. In many cases, utilities have implemented

assistance programmes for low-income or elderly resident households, including the cities of Albuquerque, Austin, Seattle, Omaha, Columbus, and Memphis.

Abu Dhabi DoE and IDRA lead water sustainability dialogue at COP28

Host of the International Desalination and Reuse Association (IDRA) 2024 world congress Abu Dhabi Department of Energy (DoE) has joined hands with IDRA to lead a conversation addressing water scarcity in the face of climate change. The panel discussion, led by Shannon McCarthy, IDRA secretary-general, featured experts from stakeholder organisations such as IDRA president Fady Juez; Dr Shamma Al-Malek, Abu Dhabi DoE director of strategy development; Ahmed Othman, executive director for strategy and policy, Abu Dhabi Agriculture and Food Safety Authority (ADAFSA); Dr Shadi Hasan, director at the Centre for membranes and advanced water technology, Khalifa University; and Bruce Smith, director of strategy and planning, Emirates Water and Electricity Company (EWEC).

The dialogue centred around the interconnectivity of water, energy, food, and climate and highlighted the imperative for cross-sectoral collaboration to address water scarcity. Panelists delved into innovation in desalination and water reuse, focusing on reducing costs, minimising carbon footprints, managing brine discharge, ensuring water resources for food production, and enhancing water reuse by industries to foster a circular water economy. As part of this initiative, IDRA invites industry experts, researchers, and innovators to submit extended abstracts for the IDRA 2024 world congress, scheduled to be hosted by the Abu Dhabi DoE from 8-12 Dec 2024 at Abu Dhabi National Exhibition Centre (ADNEC). The submission deadline is 15 Jan 2024. "Over the last 50 years, the IDRA has been helping safeguard water sources and impact water for food security, industrial processes, and municipal requirements through the use of desalination coupled with renewable energy. We look forward to working with them to prepare a spectacular gathering in December 2024," said IDRA executive director Shannon McCarthy.

Scottish Water reduces energy consumption by 60% with Xylem technology

Scottish Water has dropped its greenhouse gas (GHG) emissions by deploying Xylem technology at 200 pumping stations across its network. By combining pumps and advanced digital technologies, the utility has reduced energy consumption by up to 60%, accelerating its goal of becoming carbon neutral by 2040. As Scotland's publicly owned water supplier, Scottish Water provides water and wastewater services to more than 2.6 million homes and 150,000 business premises across Scotland. Its pump stations move water across a large geography, including remote villages and islands, so the utility was challenged to keep energy consumption and emissions down. In collaboration with global water technology company Xylem, Scottish Water began a smart pumping solution trial at two pilot sites, Maple Grove and Cross Dene. The trial delivered cost savings, including a 99% reduction in unplanned maintenance and a 40% reduction in energy, prompting the utility to adopt the technology across its network. "Moving a treating wastewater is energy intensive. Around 17% of transport emissions in Scotland are from the water and wastewater operations sector, so anything we can do will have a big impact for both Scottish Water and the country," said Nathan Wield, wastewater operations west manager for Scottish Water, said. "By deploying smart technology, we can prolong the lifetime of our equipment, prevent callouts, and reduce downtime, so there is less service disruption and reduced risk of environmental impact. This delivers real cost savings for the Scottish people."

Scottish Water combined several Xylem technologies — Avensor monitoring and Flygt Concertor intelligent pumps — to deliver cost and energy savings. The utility now has real-time visibility and control across its network. Remote monitoring has enabled the Scottish Water team to replace weekly callouts with monthly inspections. As a result, the utility saved more than 400,000 miles of reactive travel and 37,000L in diesel consumption, reducing its annual carbon output by 160 tonnes of CO2 emissions. "Reducing GHG emissions across the water sector presents an opportunity to rethink water management. New approaches and advanced technologies can help water utilities go further, faster," added Ian Thompson, Xylem vice-president, the UK and Ireland. "Innovative utilities like Scottish Water are a prime example of what can be achieved by harnessing the power of digital to decrease the sector's impact on the environment — and still deliver a resilient, cost-effective, and reliable service for communities." Data from the inspection showed that 2% of the pipeline needed maintenance attention. Scottish Water achieved cost savings by extending the life of the remaining pipe sections resulting in fewer disruptions to customers. That approach to monitoring and targeted maintenance also further reduced the utility's GHG footprint by avoiding emissions associated with unnecessary pipeline replacements. Scottish Water also deployed advanced monitoring systems to extend the life of critical assets, including a main pipeline that runs more than 10 miles from the Blairlinnans Water Treatment Works (WTW) to a reservoir in west Dunbartonshire. Using Xylem's SoundPrint Acoustic Fibre Optic System — reportedly the first of its kind in Europe — Scottish Water carried out inspections of the pipeline, allowing the utility to reduce the possibility of failure by maintaining areas found to be at risk.

SELF- SUFFICIENT COMMUNITY RUN WATER SUPPLY SCHEME AT THE FOOTHILLS OF HIMALAYAS: SWAJALDHARA PIPED WATER SUPPLY SCHEME, SISODANGI GULMA TEA ESTATE, DARJEELING

Dr. Debasri Mukherjee, Dr. M.N.Roy, Er. Sohini Tarafdar, Rupam Mandal, Kabirul Islam

BACKGROUND:

The Swajaldhara scheme was launched by the Department of Drinking Water Supply & Sanitation (DDWS), Government of India (GOI) as a reform in the water sector. This allows establishment of village-based schemes with involvement of the Panchayats and the community. Installation of one such scheme was facilitated by the NGO, Child in Need Institute

(CINI) in the Sisodangi area of the Gulma Tea Estate in Siliguri, West Bengal, India in the year 2008. The project aims to provide not only clean drinking water but also sanitation facilities and healthcare to the communities living in the area. The activities included installation of water treatment plants, construction of water storage tanks and the laying of pipelines to distribute water to the households. Overall, the Swajaldhara project has helped to improve the living conditions of the people in the Sisodangi area, and has provided them with access to basic amenities of clean water and sanitation facilities. The project began to supply water in 2009 after its launch in 2008 and a committee was established to manage the water supply. The first two years went smoothly, but after that, the project ran into trouble as the electricity bill accumulated to Rs. 3.00 lakhs, and the committee was unable to pay the amount resulting into a temporary shutdown of the scheme.

Later on, Mr. Om Pradhan was given the responsibility of operation and maintenance of the Swajaldhara project. He formed a committee consisting of the President, Vice President, Cashier, and Secretary, along with other 16 members. He, thereafter, contacted the Panchayat Pradhan Ms. Sangita Chikbaraik for support. She was of great help and extended all possible support to make the PWSS functional. She paid off all the pending electricity bills and which helped to resume the water supply. The performance of the PWSS is monitored by the committee members. The entire committee actively participates in the functioning of the PWSS. They monitor the supply and distribution of water, ensure regular payments of the electricity bills, and take up maintenance works like repair of leakages, replacement of check valve and other maintenance activities in a systematic manner. They also ensure that there is no theft or misutilization of water in the area.

COMMUNITY BENEFIT FROM THE SWAJALDHARA SCHEME:

The Swajaldhara Pipe Water Supply Scheme at Gulma Tea Estate has made a notable difference in the lives of the community. It has provided them with reliable access to clean water, improved health outcomes, and alleviated financial burdens. The major changes include the lessening of waterborne disease, enhanced hygiene practices, better overall health and well-being, and increased availability of water for domestic and livelihood purposes in the community. Previously, the community faced various health issues such as skin diseases, frequent diarrhea, and stomach illness. With the implementation of the scheme, these health issues have noticeably reduced. The committee's dedication and proactive approach to addressing challenges have contributed to the scheme's overall performance and success in serving the community's water needs. People receive water twice a day. The Swajaldhara committee collects Rs. 100.00 per household per month and cumulatively it makes their total income of Rs. 1.32 lakh from 110 households per year. In last 5 years the committee has spent a total of Rs. 4.5 lakhs on electricity bills and Rs. 27,000 on maintaining leakages and replacing check valves. The fund arranged from the consumers is primarily used to pay electricity bills and repairs-related expenses. There are no commercial connections in the village, so therefore, no meters are installed for commercial purposes

SOURCE SUSTAINABILITY:

The main source of water is the groundwater, which is abstracted using a submersible pump at a depth of 114 feet. There is not much seasonal variation in yield of water during summer. However, during that period, the pump running timing is slightly more due to more demand. There has been no theft or misutilization of water of the PWSS. The committee members keep a constant vigil to check any such illegal withdrawals. The committee members also monitor the water usage in the area frequently.

OPERATION & MAINTENANCE OF THE PLANT:

The operation and maintenance (O&M) of the PWSS are primarily managed and monitored by dedicated committee members. Everyone on the committee is responsible for different types of maintenance. Specially, Mr. Om Pradhan and Mr. Kishore Pradhan actively participate in all kinds of maintenance activities on behalf of the committee. The committee's proactive approach and self-monitoring efforts ensure the smooth functioning of the water supply system. An Overhead Reservoir (OHR) was constructed in this scheme which is cleaned periodically. Filtration processes are conducted only once a month, indicating limited attention to this aspect of maintenance. The OHR is filled twice a day to ensure a continuous water supply to the community. In terms of checking the inlet, delivery, and wash-out valves, the operator performs daily inspections. There is also a sample checking system to check the water quality. In such cases, samples are collected twice a year by the Panchayat, and instant result is declared through using of a green light indicator. There is no formal documentation process for grievances redressal, and everything is handled verbally. When consumers face any problems, Mr. Om Pradhan suggests them specific solutions or asks them to arrange a mechanic from outside at their own expense. The committee members keep an eye on the amount of water supplied per day, the frequency of supply, and the status of the tanks and pipelines. They also keep track of the amount of money collected from the households and the expenses incurred on various maintenance activities.

LESSONS LEARNT:

There are several lessons to be learnt from the Swajaldhara project. These are:

- Ownership and participation by the consumers of any PWSS is very critical for ensuring continuous services.
- There is need for proper training of the personnel engaged for managing any water supply system along with availability of manual for such maintenance.

- For any PWSS serving a small number of households, even a monthly subscription of Rs 100/ is inadequate to meet the O&M cost. The GPs should come forward to fund major repair and upgradation through GPDP since the GP would have to spend for water supply in absence of the community-based water supply.

- There should be a system of supervision of community-based schemes by the GP and the Block office to monitor performance and guide for improvement.

- These schemes should conform to the service delivery norms of Jal Jeevan Mission for which the GP and the PHED should come forward to extend required support.

DID YOU KNOW?

The deepest part of the world's oceans, the Mariana Trench, reaches depths of over 36,000 feet (10,994 metres), where immense pressure and cold temperatures make exploring it a significant challenge.

About the Author

Dr. Debasri Mukherjee is a Senior Research Officer in SIGMA Foundation a 'Not for Profit Organization' based in Kolkata, India. Before this She was a Research Officer (WQMS) from the day of inception of the WSSO, Public Health Engineering Department, Govt. of West Bengal for eight years. Prior to that she was with UNICEF Kolkata office for one year.

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Er. Sohini Tarafdar did her M.E by Research in Chemical Engineering from CSIR- NEERI, Nagpur and is specialised in water management technology. She has worked in various organisations including CSIR-NEERI (Nagpur and Kolkata Zonal Laboratory), CMPDI (Coal India Ltd.), SOS Children's Village Kolkata, Riddhi Foundation and SIGMA Foundation.

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Dr. M.N. Roy did his M.Tech in electronics from Calcutta University and served the Government of India as a member of the Indian Engineering Services for around 2 years. He studied Sustainable Development at the University of Birmingham in 1996. Thereafter, he did his Ph.D from the Tata Institute of Social Sciences, Mumbai and the research topic was Women's Empowerment.

Dr. M.N. Roy
President, SIGMA Foundation

Mr. Rupam Mondol did his Masters of Arts in Adult Education and Extension from Kalyani University, West Bengal. He has been associated with Kalyani Srijani Institute of Research and Management, Pratichi Institute and currently SIGMA Foundation. He is skilled in field investigation and supervision.

Mr. Rupam Mondol
Field Officer, SIGMA Foundation

Mr. Kabirul Islam did his M.Sc in Environmental Science from Global Open University, Nagaland with Diploma in computer application and programming. He has vivid field experience of more than 20 years and has been associated with various organisations like Engo Tea Estate and Sahara India pariwar.

Kabirul Islam
Field Officer, SIGMA Foundation

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TRANSFORMING URBAN WATER MANAGEMENT: THE IMPACT OF WATER METERING IN RESIDENTIAL COMMUNITIES

Jitender Thirwani, Chief Operating Officer, Smarterhomes Technologies Pvt. Ltd

INTRODUCTION

India's population is projected to surpass 1.7 billion by 2050, putting immense pressure on the available water resources. Amid India's burgeoning urbanization and the escalating water crisis, there's a critical need for transformative solutions to ensure sustainable water management in India cities.

THE URGENCY OF WATER CONSERVATION IN URBAN AREAS

Urban India is witnessing a relentless surge in population. The top 24 cities have a population of approx. 98.4 million with an estimated 8 million apartments. With job opportunities increasingly concentrated in these cities and with the resultant migration, this is leading to an unprecedented pressure on water resources to meet the demand. Depleted borewells and inability of the municipal water systems to meet this demand increases reliance on costly private tanker water, priced between INR 1030-00 per kl in various cities. There is therefore an urgent need for establishing an emotional connect between citizens and water consumption and the best way to do this is through reliable measurement and volumetric pricing. As this article will show, measurement and pricing are levers to signal the importance of water as a resource, leading to conservation.

THE LINK BETWEEN WATER MEASURED AND WATER SAVED

One of the key paradigms in water management is the direct correlation between measuring water consumption and saving water. The implementation of water metering systems allows for accurate measurement of usage, leading to heightened awareness among residents about their consumption patterns. Studies have shown that in areas with water metering, there is a notable decrease of up to 35% in water wastage, highlighting the efficacy of this approach in promoting conscious water use.

LESSONS FROM ELECTRICITY BILLS - PAYING FOR WHAT YOU USE

Drawing inspiration from electricity billing models, where consumers pay only for the energy they consume, water metering aims to instill a similar ethos in the realm of water consumption. This shift towards fair billing policies aligns with the principles of sustainability and encourages individuals to consider the environmental impact of their water usage.

THE RESIDENTIAL SEGMENT [APARTMENTS + VILLA COMMUNITIES] - A CRUCIAL PLAYER IN WATER CONSERVATION

Residential areas, often the largest consumers of water in urban landscapes, stand at the forefront of the battle against water scarcity. The integration of water metering systems in residential complexes offers a powerful tool for promoting responsible water use and fostering behavioral change.

fFAIR WATER BILLING: WHY EQUAL DISTRIBUTION FALLS SHORT?

Residential Welfare Associations (RWAs) employ the general practice of equal distribution, where the total cost of water services is divided uniformly among all residents, regardless of individual consumption. This has been criticized for its inherent unfairness.
Equal distribution of water charges lacks granularity and fails to reflect the actual water usage patterns of individual households.

BENEFITS OF FAIR BILLING POLICIES FOR RWAS

Fair billing policies, based on actual water consumption, ensure that residents pay for the water they use, creating a transparent and equitable system. This not only encourages individual responsibility but also establishes a collective commitment to sustainable water practices.

ASSOCIATING WATER BILLS WITH CONSCIOUS CONSUMPTION

Water metering extends beyond mere measurement; it serves as an agent of behavioral change. By associating water bills with conscious consumption, residents are prompted to reflect on their water use patterns, leading to a more conscientious approach towards this finite resource.
Moreover, metered billing promotes conservation through price signaling on actual consumption.

LEAK DETECTION AND CONTROL: AN ADDED BENEFIT

The integration of smart technologies, including sensors and analytics, has revolutionized leak detection in water distribution systems. Automated systems can identify abnormal water flow patterns, allowing for swift identification and repair of leaks. This proactive approach significantly minimizes water loss, contributing to the overall sustainability of urban water supplies.
By preventing and swiftly addressing leaks, water metering systems contribute directly to quantifiable water savings.

CHALLENGES FOR INSTALLATION OF WATER METERS IN APARTMENTS/VILLA COMMUNITIES

While the benefits of water metering are substantial, challenges exist that require strategic solutions to ensure widespread adoption and success.
Infrastructure Upgradation and Financial Considerations
Upgrading existing infrastructure to accommodate water metering systems might pose challenges. However, the long-term benefits, including reduced water wastage and improved distribution efficiency, outweigh the initial investment.
Promoting Public Awareness and Acceptance
Public awareness and acceptance are crucial for the success of water metering initiatives. Community engagement, educational programs, and transparent communication about the benefits of fair billing policies and water conservation can address potential resistance and foster acceptance.

WAY FORWARD

- RWAs to encourage residents to adopt payment for water use based on actual consumption.
- Progressive residential developers to implement IoT based water metering as part of the building design.
- Governments to create an enabling framework for adoption of sub metering in apartment communities and adopt in a wide scale IoT based metering systems in urban areas.

DETECTION

Abstract: This case study delves into the transformative journey of a 192-flat apartment complex located on Sarjapur Road, Bengaluru, facing severe water scarcity challenges. Through the implementation of an innovative water metering system – WaterOn by SmarterHomes, the society not only overcame water shortages but also achieved remarkable efficiency in consumption. This solution not only benefited the residents by offering accurate billing but also contributed to a significant reduction in water usage.

In 2020, the apartment complex confronted a critical water crisis with five out of six borewells running dry and a diminishing yield from the last functioning borewell. This prompted the community to explore alternative water management strategies, ultimately leading to the installation of individual water meters for each flat.This case study delves into the transformative journey of a 192-flat apartment complex located on Sarjapur Road, Bengaluru, facing severe water scarcity challenges. Through the implementation of an innovative water metering system – WaterOn by SmarterHomes, the society not only overcame water shortages but also achieved remarkable efficiency in consumption. This solution not only benefited the residents by offering accurate billing but also contributed to a significant reduction in water usage.

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CHALLENGES FACED:

1. Dependence on borewells and water tankers.
2. Diminishing yield from the last functioning borewell.
3. Excessive water bills due to tanker reliance.

THE SOLUTION:

To address these challenges, the society opted for a comprehensive approach by installing 192 water meters, providing the following key benefits:

- Individual Billing: Residents are now billed based on the actual water consumption of their households.
- Conscious Water Usage: Meter readings promote awareness, encouraging residents to use water more efficiently.
- Volumetric Pricing: Introducing a tiered pricing system incentivizes reduced water consumption.

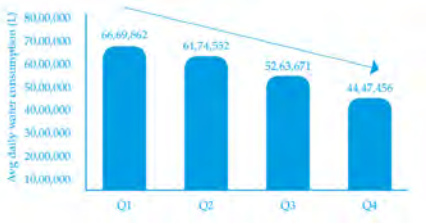
IMPLEMENTATION AND TECHNOLOGY: THE IMPLEMENTED SOLUTION INCLUDED:

1. Installation of 192 water meters.

1. Real-time monitoring and control through a dedicated software and smartphone app.
2. Detection of leaks or abnormal consumption to prevent water wastage.
3. Comprehensive coverage, including the cost of meters, installation, billing services, software, and the smartphone app.

VALUE DELIVERED:

1. Accuracy: Residents receive accurate readings of their water usage.
2. Efficiency: Real-time monitoring and control contribute to efficient water management.
3. Prevention: Detection of leaks or abnormal consumption to avoid water wastage.
4. Cost Coverage: The entire solution, including meters, installation, and software, is a complete package.
5. User Empowerment: Smartphone app-based control, allowing residents to remotely manage water supply to their homes.
6. Result: A remarkable 35% reduction in water consumption.



DID YOU KNOW?

The hydroinformatics combines information technology, computer science, and water engineering principles to model, analyse, and manage water resources?

This interdisciplinary approach is becoming essential in modern water management.

The successful implementation of the water metering system in the Bengaluru apartment complex serves as a beacon for sustainable water management practices. This case study not only highlights the technical aspects of the solution but also emphasizes the positive impact on residents, fostering a sense of responsibility towards water conservation.

CONCLUSION

In conclusion, the integration of water metering systems in India's urban areas represents a transformative step towards sustainable water management. From fostering conscious consumption and behavioral change to actively contributing to leak detection and prevention, water metering plays a central role in the fight against the urban water crisis.

As Residential Welfare Associations champion fair billing policies and communities embrace the ethos of paying for what is consumed, the impact on water conservation becomes not only measurable but also a collective effort towards securing a water-secure future for urban India. The journey towards sustainable water management is an ongoing one, and with the continued integration of advanced technologies and concerted community efforts, India can forge a path towards a resilient and water-conscious future.

About the Author

Jitender Thirwani
Chief Operating Officer,
Smarterhomes Technologies Pvt. Ltd

Jitender Thirwani has been part of the journey of SmarterHomes over the last decade. Jitender has over 18 years of experience in Business Development, Channel Sales, and Project Management.

About SmarterHomes:

SmarterHomes is a response to a real-world problem of lack of water metering in apartment buildings. Revolutionizing water management with IoT innovation. Empowering communities to measure, conserve, and thrive in the face of water scarcity challenges.

DID YOU KNOW?

The water infrastructure often faces the threat of cyberattacks, ensuring the cybersecurity of water supply systems is becoming increasingly critical to prevent disruptions and protect public health.

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WATER TREATMENT SOLUTION: EMPOWERING PROGRESS, ENSURING PURITY

Mohammed Abdul Rahman, CEO, Sahara Industry

India has become the most populous country in the world, surpassed China by 10 million people at the end of 2023. With healthy economic growth, it is expected to be the world's third-largest economy by the end of the current decade. This rapid economic growth, however, comes with challenges, particularly in the realm of water resources.

As the population continues to grow, demand for water is escalating, placing immense pressure on existing water sources. Rapid urbanization, industrial expansion, and agriculture needs contribute to pressure on the declining water availability. Climate change events further worsens the situation, leading to unpredictable rainfall patterns, frequent flooding and water scarcity in various regions.

The challenges posed by water scarcity are multifaceted. Adequate and equitable distribution of water resources becomes crucial to ensure the well-being of both urban and rural populations as well as for industrial and agriculture production. Efficient water management practices, conservation efforts, and the development of sustainable technologies are imperative to address the growing demand.

Moreover, the depletion of groundwater levels and contamination of water sources add layers of complexity to the issue. It requires a comprehensive approach involving policy reforms, technological innovations, best practices and wide awareness to ensure the sustainable use of water resources. In the face of these challenges, India's journey towards becoming a major global economy must include a concerted effort to manage its water resources effectively. Strategic planning, investments in water infrastructure, and judicial use are essential components of a sustainable approach to address the impending water crisis and secure a prosperous future for the nation.

> Ensuring sufficient and fair allocation of water resources is essential for the welfare of urban and rural population, as well as for sustaining industrial and agricultural production.

WATER MANAGEMENT: INSTITUTIONAL PRACTICES

Institutional water management in India needs structured and organized efforts by various stakeholders, such as government bodies, regulatory agencies, and organizations, to oversee and regulate the utilization, distribution, and conservation of water resources. This involves the development and implementation of policies, regulations, and strategies to ensure sustainable and efficient water use.

With growing population and economic development, effective institutional water management is crucial for addressing challenges related to water scarcity, pollution, and equitable distribution. This includes defining policies, guidelines, and procedures to govern water-related activities in any institution.

Monitoring water quality is a critical aspect of water management, involving regular assessment and measurement of various parameters to ensure that water meets specified standards for human consumption, food preparation, and other intake. This may include testing for contaminants, pollutants, and overall water quality indicators.

CASE STUDY

The institutional and corporate sectors have traditionally directed their resources primarily towards production and business expansion, often ignoring water-related concerns. However, this scenario is undergoing a transformation due to the escalating water crisis, leading to production delays and business losses. Institutional water management encompasses activities such as raw water procurement, effective treatment, and the management of water supply to meet specific quality and quantity requirements. Institutions responsible for efficient water management play a pivotal role in coordinating efforts among different stakeholders, including communities, industries, and service provider.

CASE STUDY

The Project
Client: Newtech Buildhome Private Limited

Project Brief: Le Meridien, the luxury hotel with 240+rooms and amenities in Hyderabad, Telangana has several facilities including 2 banquet halls, 5 dining halls, spacious rooftop swimming pool, gym, spa centre, and various modern amenities including large space for vehicles parking. The hotel, operating at nearly full capacity, has encountered challenges due to the water treatment plant not functioning at its designated level, hampering the services.

The Challenges:

Mineral scale deposits such as calcium carbonate and phosphate, calcium oxalate, barium and strontium sulphate, magnesium silicate and others and colloidal inorganic species such as silica present important challenges for process water applications. When silica is left uncontrolled it forms hard and tenacious deposits that are difficult and hazardous to remove.

There was a disruption in the water treatment facilities installed by the hotel, attributed to the filter media not performing as expected. The equipment set up at the project site was a sand filter with a size specification of 3672. The fundamental concept behind any sand filter involves the use of various sizes of pebbles and quartz to effectively filter water contaminants.

Institutional water management fosters sustainable practices and equitable distribution, ensuring the responsible stewardship of vital water resources.

In the initial layer, larger pebbles are arranged to enable unobstructed water flow. However, in the current sand filter, only pebbles of 10-20 mm size were present, leading to insufficient water passing through the filter.

The identified issues were as follows:

- The sand and pebbles within the sand filter vessel transformed into large rocks, rendering them impossible to remove from the vessel. Upon investigation, it was detected that only the suspended solids, which were halted by the media from the flowing water, are visible, while the remaining media has been crushed and transformed into rocks.
- The media of the sand filter solidified into a rock-like substance because the necessary backwashing of the sand filter was neglected. It continued to be utilized in filter mode for over a year without considering media maintenance and cleaning. With ongoing use, the rocks grew in size, leading to complete blockage, and even after this occurred, the sand filter continued to operate in bypass mode.
- The distribution system or strainer, through which the raw water is meant to pass, was entirely obstructed with suspended solids due to the continuous operation of the sand filter without backwashing.
- The problem gradually escalated, ultimately causing the filter to cease functioning entirely

The Remedies:
Engineers from Sahara Industry examined the filtration plant and determined that the filter media had ceased functioning entirely. Addressing this issue required extraordinary solutions due to substantial complications. Attempts to extract the filter media from its designated location were unsuccessful, necessitating the cutting open of the vessel from outside. However, the water contamination had caused the media to become jammed and rigid. Even after cutting the vessel, the media could not be removed. To dismantle the giant rock formed inside the vessel, a high-capacity jackhammer machine was used, resulting in the complete destruction of the vessel.

To restore functionality to the water treatment plant, a new vessel and sand filter were installed. The re-establishment process involved various remedial and retrofitting measures:

- The existing sand filter was cut down, jackhammered, and removed from its space to accommodate the installation of the new one, restoring the water treatment system's functionality.
- The lower and upper pipes and fittings of the multi-port valve were meticulously removed without disassembling the entire set, maintaining the integrity of the pipeline.
- A new FRP Vessel from Alfa Aerosol of the same size (3672) was installed with the same pipeline diameter.
- The sand filter vessel was filled with media comprising multiple-sized pebbles, quartz, and fine sand.
- A new distribution system was incorporated at the bottom of the vessel to facilitate unimpeded water flow.
- The filter underwent open backwashing before installation and was programmed to operate in filter mode after the completion of pipeline adjustments, ensuring functionality.

- The stretched 'O' Ring of the air release valve, caused by extraneous pressure, was repaired and reinstated to ensure proper functioning.
- The running pressure of the sand filter, assessed at 5-6 kg/cm2, revealed leaks from the pipeline system. Engineers determined that the multi-port valve and carbon filter were broken and needed replacement.
- All leaks and tears were sealed and repaired, ensuring the proper functioning of the sand filter without errors.

The success of effective institutional water management relies on collaboration, transparency, and adaptive governance to address the dynamic and complex nature of water challenges. By fostering sustainable practices and ensuring responsible water governance, institutions contribute to the long-term health of ecosystems, human well-being, and economic development.

Sahara Industry has successfully managed numerous critical water treatment projects, showcasing their expertise in addressing complex challenges within the field. The company's portfolio reflects a commitment to delivering effective solutions, indicating a comprehensive understanding of various aspects of water treatment, from system evaluation to the implementation of advanced technologies.

With a proven track record, Sahara Industry has emerged as a reliable partner in the realm of water treatment, has consistently delivered dependable and efficient solutions in its diverse portfolio of water treatment endeavors.

About the Author

Mohammed Abdul Rahman
CEO, Sahara Industry

With marketing and finance background, the young entrepreneur has skillfully guided the company to become a prominent manufacturer and provider of advance, high-quality water and wastewater treatment solutions in India. Through a combination of modern business strategies, technological innovation, and dynamic leadership, he has propelled his group companies to achieve remarkable growth, surpassing a turnover of INR 1200 million.

His visionary approach and expertise have been instrumental in establishing the company as a leader in the industry, delivering efficient and effective solutions to meet the evolving needs of the market.

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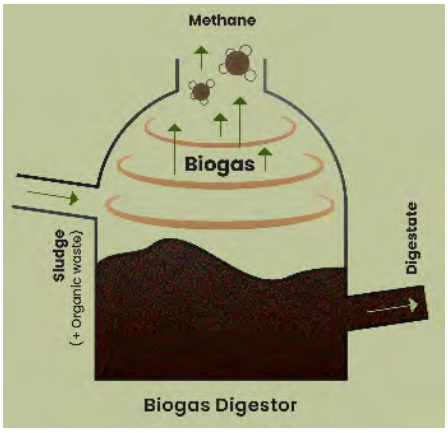
ENHANCING UASBR PERFORMANCE WITH MICROBIAL POWER

Sanjay Bahl, Sanjay Bahl, CEO at Superweld Ecosolutions

Ensuring clean water and a healthy environment necessitates effective wastewater treatment. However, when the conventional reliance on oxygen is disrupted, an alternative solution emerges – anaerobic treatment. This captivating process delves into the realm of an unseen microbial world, offering a unique approach to wastewater treatment that goes beyond the typical oxygen-dependent methods. In contrast to conventional aerobic treatment, which relies on the presence of oxygen for bacteria to degrade organic matter, anaerobic treatment excels in environments devoid of oxygen. Within enclosed bioreactors, an assorted consortium of anaerobic bacteria assumes a prominent role. These robust microorganisms actively consume the organic pollutants existing in wastewater, undergoing a series of intricate processes to break them down.



In pursuit of environmental friendly solutions for our pressing climate challenges, Anaerobic wastewater treatment emerges as a revolutionary technology which has far-reaching implications.

Its importance stretches over energy generation, reduced greenhouse gas emission, sludge reduction which makes the foundation of sustainable development. Effective wastewater treatment is an essential element of responsible industrial practices and environmental stewardship. In this context, anaerobic wastewater treatment stands out as a transformative and highly significant technology, providing a range of benefits that surpass those offered by traditional treatment methods. This treatment is pivotal in promoting environmental responsibility by mitigating the impact of industrial activities on the environment. Its innovative approach addresses wastewater treatment with a focus on sustainability and reduced ecological footprint. Its unique processes and outcomes contribute to a paradigm shift in the way industries approach wastewater treatment, emphasising efficiency and environmental sustainability. Its transformative nature and the diverse array of benefits it provides underscore its significance as a progressive solution for the challenges posed by wastewater treatment in various industries. Embracing anaerobic wastewater treatment reflects a commitment to both efficiency and environmental well-being, marking a positive step towards a sustainable future.

This clearly showcases that Anaerobic wastewater treatment has proved to be a technology which is versatile for various industries. However, employing such systems in cold areas or winter, especially in high altitudes, presents a difficult challenge. In this case study, we are going to talk about the case of distillery UASBR (Upflow Anaerobic Sludge Blanket Reactor) in Solan, Himachal Pradesh, facing substantial problems in the generation of biogas and the reduction of COD.

BACKGROUND

The distillery, located in Solan, Himachal Pradesh, operates in a high-altitude area with a cold climate. The Upflow Anaerobic Sludge Blanket Reactor (UASBR), which was initiated using traditional cow dung, encountered a significant setback as there was minimal biogas generation and chemical oxygen demand (COD) reduction even after 15 days of operation. The characteristics of the plant included it being a distillery, with an inlet of COD of 22,000 pm and a UASBR inflow of 50 kilo-litres per day. Challenges such as frequent temperature shocks, with the digester temperature dropping to 21 degree Celsius at night, and pH fluctuations were identified as major issues disrupting the activity of methane-producing microbes.

PROBLEMS IDENTIFIED

The issues encountered by the distillery UASBR were diverse. Initially, the combination of cold climate and high altitude introduced temperature shocks, impacting the efficiency of the anaerobic digestion process. Additionally, fluctuations in pH levels were disrupting the methane-producing microbes, which are essential for biogas generation. Furthermore, the addition of soda ash for alkalinity exceeded 200 kgs per day, leading to substantial daily operational costs exceeding Rs. 10,000.

INTERVENTIONS MADE BY SUPERWELD ECOSOLUTIONS TEAM

Recognising the urgent necessity for intervention, the Superweld Ecosolutions Team conducted a

comprehensive analysis and implemented strategic changes to address the challenges encountered by the distillery's Upflow Anaerobic Sludge Blanket Reactor (UASBR).

Temperature Management:
To counteract the impact of the cold climate and frequent temperature shocks, the team recommended maintaining a consistent temperature range of 32-35 degree celsius. Introducing steam infusion into the system emerged as an effective solution, ensuring optimal conditions for the anaerobic digestion process.

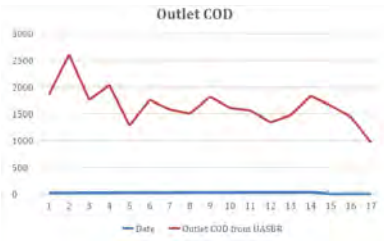
Biological Enhancements:
A pivotal strategy involved the introduction of SUPER CH4 and SUPER Nutrients at a daily and regular rate of 2mg/L into the UASBR inflow. These additives were designed to boost microbial activity, thereby facilitating more efficient Chemical Oxygen Demand (COD) reduction and biogas generation.

RESULTS AND OBSERVATIONS

The effects of these interventions were immediate and transformative. In just one week, the performance of the digester exhibited a substantial improvement, achieving an impressive 80-85% reduction in Chemical Oxygen Demand (COD). Within a fortnight, a notable development was the stabilisation of microbial chemistry, rendering the system resilient to fluctuations in pH and temperature. Importantly, there was a significant reduction in the alkalinity addition requirements, as the influent pH of 4.5 transformed into an effluent pH of 7.2.

BENEFITS ACHIEVED

- **85% COD Reduction**
- **Alkalinity addition reduced from 200kgs per day to 0 kgs per day**
- **Brilliant digestor performance**
- **Stability to shock loads**



SUSTAINABILITY BENEFITS

Beyond the immediate resolution of problems, the interventions yielded sustainable benefits for the distillery. The decreased dependency on chemical additives led to reduced operational costs, aligning with environmental stewardship by minimising the ecological footprint linked to excessive chemical use. The improved efficiency in Chemical Oxygen Demand (COD) reduction and biogas generation contributed to the overall sustainability of the distillery's operations.

ADOPTION OF SUPER CH4

Following the intervention, the distillery persisted in the daily use of SUPER CH4. Acknowledging the effectiveness of the product, the client took a proactive approach by keeping extra stock. This strategic decision was intended to alleviate potential supply chain delays and guarantee uninterrupted performance of digester in the event of unforeseen shocks.

In conclusion, the case study of the distillery UASBR in Solan, Himachal Pradesh, stands a compelling illustration of the challenges and considerations involved in enhancing anaerobic digestion performance in cold regions. The strategic interventions implemented by the SUPERWELD Ecosolutions Team not only addressed immediate issues but also demonstrated the potential for sustainable improvements. This success story offers valuable insights for similar facilities grappling with challenges in cold climates, underscoring the effectiveness of temperature control measures and the utilisation of specialised microbial solutions such as SUPER CH4. Overall, this study contributes to the ongoing discourse on sustainable industrial practices, advocating for the adoption of eco-friendly approaches in wastewater management and renewable energy production, particularly in demanding environmental conditions.

About the Author

Sanjay Bahl
CEO at Superweld Ecosolutions

Sanjay helps businesses and their leaders by providing Eco-logical solutions for pollution control and waste management problems. At Superweld Eco-Solutions, they create innovative products to treat Wastewater, Malodors, Solid waste, Algae Treatment, Lake and Pond remediation. Sanjay has helped clients like Paper Mills, Pharma Companies, Hospitality Industry, Food and Beverage Industries to meet stringent wastewater discharge parameters.

A Post Graduate from Symbiosis College, Sanjay and his team act as technical advisors and trouble shooters to 900+ clients. They help companies Like CETPS, Dairy, companies improve their biological wastewater treatment , he strongly believes Indian biotechnology is among the best in the world. Along with his passion for transforming the course of companies, he likes to read about the latest technologies and does social work in his free time.

IMPROVED RESOURCE RECOVERY FROM ZERO LIQUID DISCHARGE (ZLD) PROCESSES USING NOVEL FORWARD OSMOSIS (FO) MEMBRANES

Mark Perry, Zach Thye, Zuo Jian

WHY ARE ZLD PROCESSES ON THE RISE?

Access to water is no longer assured. Cape Town narrowly averted "Day Zero" amid intense public scrutiny during a 2018 drought. In June 2019, the 11 million residents of Chennai, India, endured a day without drinking water, and in 2020, the towns of Stanthorpe and Clifton in Queensland, Australia, both experienced water depletion. These incidents are not isolated and are projected to escalate as climate change effects intensify.

When faced with systemic risks to economic growth and public health, the economic implications of enforcing stricter water treatment and recycling regulations far outweigh maintaining the status quo. Given that industries account for about 20% of global freshwater consumption—and are typically well-funded compared to other consumers—governments are increasingly tightening controls on industrial wastewater disposal. In addition to bolstering water reserves, limitations on wastewater disposal offer the added benefit of safeguarding aquatic environments.

At the pinnacle of wastewater management is Zero Liquid Discharge (ZLD), a method that eradicates all liquid waste exiting an industrial facility, albeit with the highest associated capital and operational costs.

As detailed in "The Global Rise of Zero Liquid Discharge for Wastewater Management: Drivers, Technologies, and Future Directions" by Elimelech and colleagues, countries leading the charge in implementing ZLD regulations include the United States, China, and India. While the power sectors dominate ZLD markets in the United States and China, the textile industry emerges as a key driver in India's

THE POTENTIAL FOR LOWERING THE CAPEX AND OPEX COST OF ZLD

Traditional ZLD processes are based on water evaporation, including multistage evaporative distillation (MED), multistage flash distillation (MSF),

Fig 1: Current ZLD systems. Copyright SideStroem

crystallizers and evaporation ponds. However, MED, MSF and crystallizers suffer from high energy consumption due to the use of electricity or fossil fuel. In addition, the construction of corrosion resistant containers in these brine concentrators and crystallizers is costly and brings the capital cost high. On the other hand, evaporation ponds demand extensive land space, and their evaporation efficiency is generally low (Figure 1).

Addressing the challenges of high energy demand, high capital cost, and large footprint, membrane technologies have demonstrated great potential. This is attributed to their low energy demand, excellent corrosion resistance, and compact design. A few membrane technologies have been investigated, including osmotically assisted reverse osmosis (OARO), membrane distillation (MD), electrodialysis (ED), and forward osmosis (FO).

Few technologies, if any, have targeted eliminating the need for evaporators. The remainder of this article will focus on how SideStroem's nano-selective forward osmosis technology (FO_{ns}) can potentially replace evaporators in greenfield zero liquid discharge systems (Figure 2).

SIDESTROEM WATER TECHNOLOGIES

SideStroem Water Technologies Pte. Ltd. is a Singapore-based water tech company obsessed with efficiency in resource recovery from industrial wastewater and industrial processes.

We are reinventing resource recovery through a technology platform that enables selective recovery of water and salt, which decreases energy consumption of zero liquid discharge systems by up to 55%.

In addition, our technology platform will enable gentle extraction of inhibitory biproducts from fermentation broths, which unlocks continuous fermentation and a reduction of unit production costs of up to 80%.

Our beachhead market is India's textile industry where Zero Liquid Discharge (ZLD) has become the gold standard in wastewater treatment.

NANO-SELECTIVE FORWARD OSMOSIS (FO_{NS}) CAN IMPROVE ZLD PROCESSES

SideStroem recognizes that forward osmosis membrane technologies hold several advantages over traditional pressure driven membrane technologies and we are the only company developing novel nano-selective forward osmosis (FO_{ns}) technology tailored to selectively recover & recycle both water and salts from wastewater streams in textile and tannery industries. Forward osmosis doesn't require external pressure; its energy consumption can be significantly lower than pressure-driven processes; it has lower fouling tendency, and it is suitable for pressure- or heat-sensitive solutions.

SideStroem's Fo_{ns} technology employs special membranes, that enable simultaneous recovery of both water and valuable solutes from wastewater streams.

Conventional ZLD systems have three stages of treatment, namely, primary, secondary, and tertiary treatment. The tertiary treatment involves extensive pre-treatment and evaporator, which is energy intensive.

SideStroem's FO_{ns} technology has the potential to eliminate the entire tertiary treatment units, and provide a simplified solution for resource recovery of existing and new ZLD systems. This unlocks CAPEX & OPEX savings of more than 50% (Figure 3 & Figure 4).

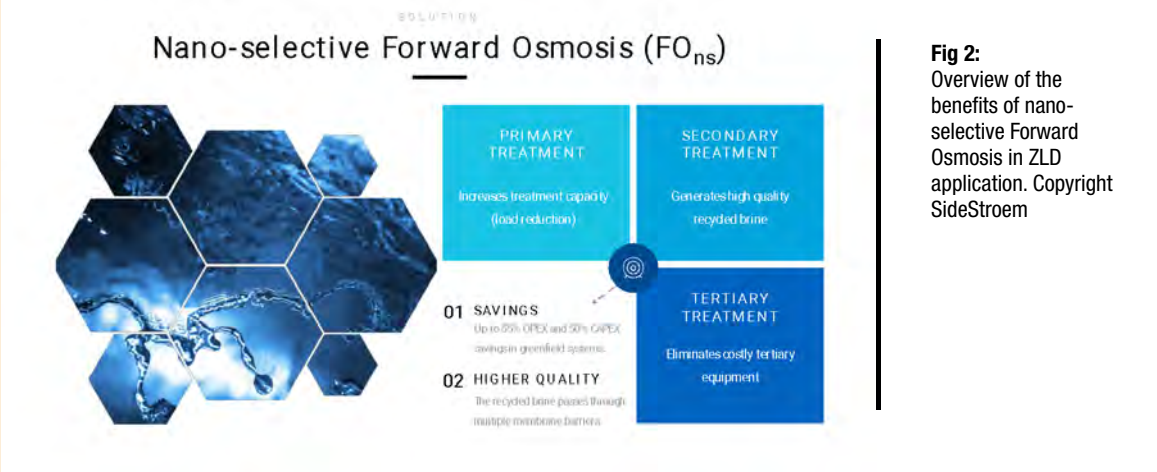


Fig 2: Overview of the benefits of nano-selective Forward Osmosis in ZLD application. Copyright SideStroem

No.	Equipment	CAPEX W/O FO_{ns} (USD)	CAPEX W FO_{ns} (USD)
1	Equalisation basin	250000	250000
2	Coagulation tank	180000	180000
3	Cooling tank	160000	160000
4	Primary clarifier	200000	200000
5	Biological tank	1300000	1300000
6	Secondary clarifier	200000	200000
7	Ultrafiltration	300000	x
8	Reverse osmosis	350000	x
9	Nanofiltration	300000	x
10	Degassing tank	280000	x
11	Thermal evaporator	2000000	x
12	FO_{ns}	x	300000
	Total	5520000	2590000

Fig 3: CAPEX savings potential of nano-selective FO. Copyright SideStroem.

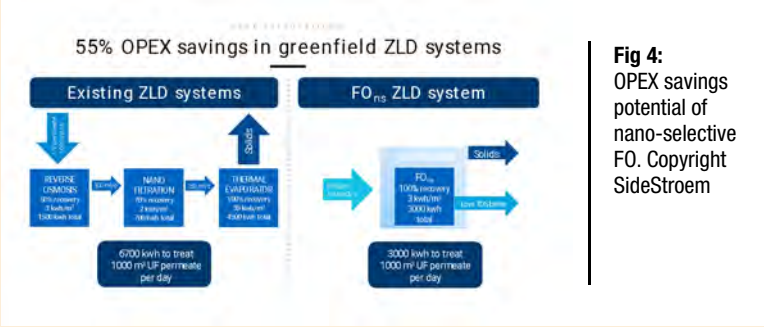


Fig 4: OPEX savings potential of nano-selective FO. Copyright SideStroem

FO$_{NS}$ MEMBRANE CONCEPT

Conventional FO membranes are designed to extract water from feed streams while rejecting virtually all other compounds. These membranes feature reverse osmosis-type (RO-type) rejection layers, categorizing them as RO-type FO membranes. The primary drawbacks of this membrane type include low water flux and non-selectivity to ions.

In contrast, NF membranes exhibit increased water permeability and the ability to separate monovalent ions from wastewater solutions, offering opportunities for resource recovery. However, conventional NF membranes perform poorly under FO operation due to compact support layers and significant internal concentration polarization (ICP), making them unsuitable for FO applications.

Recognizing these challenges, Sidestroem has innovatively combined the strengths of FO and NF membranes to create a unique nano-selective FO membrane.

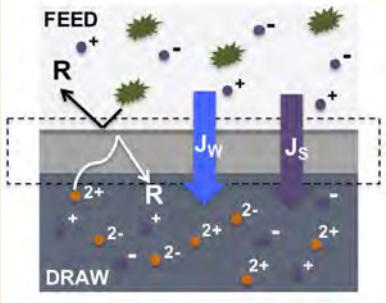


Fig 5: Schematic of SideStroem's nano-selective FO technology. Copyright SideStroem.e FO. Copyright SideStroem

This technology integrates the best features of NF and FO, providing low fouling, precise selection, and high operational stability. It facilitates the selective recovery and recycling of both water and valuable salts from wastewater streams. Our technology offers a significant advantage in reducing operational expenses for wastewater treatment while increasing the yield of recovered resources—an improvement over current treatment methods (Figure 5).

FONS MEMBRANE WHAT'S NEXT?

SideStroem recognises that in the current conservative landscape of the water industry, the commercialization of forward osmosis technologies involves strategically pinpointing applications characterized by significant customer challenges—the low-hanging fruits. These are areas where existing technologies are either inapplicable, highly inefficient, or excessively costly.
Hence, reducing the OPEX & CAPEX costs of zero liquid discharge systems represents an ideal opportunity both from a commercial and environmental point of view.

We welcome water system integrators and industrial end users to contact us for more information about piloting and collaboration opportunities.

Contact SideStroem at
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About the Authors

Mark Perry

15 years of experience in developing new membrane technologies and commercialising green technologies in Asia.

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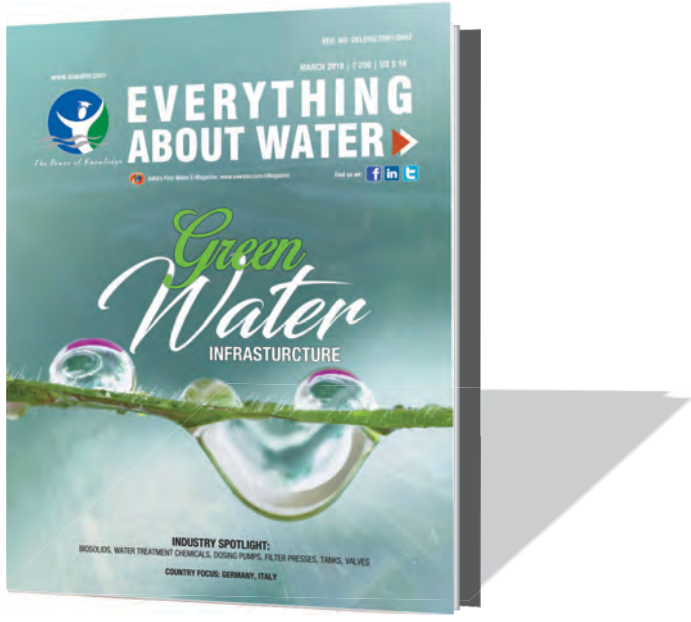
10 years of experience in developing new membrane technologies and fabrication methods.

The only bad thing about good luck is..
you never know when it will favor you.

That's why smart professionals make informed decisions.



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WATER: NURTURING HEALTH, ENHANCING WELL-BEING

Mohammed Naser Azeez, Managing Director, Aquality Water Solutions Pvt. Ltd.

As we begin the year 2024, we have the same feeling as when the last year started - water has become scarcer and it is on the top of the agenda for nations and industries across globe. More countries are realizing that there is a huge risk in doing nothing to address the challenges related to water supply and the industry facing with declining production.

As a fundamental natural resource, water plays a vital role in the development of any region. The amount of water accessible to a country and its equitable distribution are crucial elements of sustainable development. Water stress has the potential to impact regions, industries, and households extensively, ranging from drought and flooding to compromised water quality. In 2023, almost 2.2 billion people were left without clean water and this trend is escalating. It is therefore, essential to evaluate the effectiveness of water resource management for fostering economic growth in an environment friendly manner.

With the rapid pace of urbanization in almost all regions of the world, an escalating number of individuals reside in urban areas. This surge in urban population has heightened the demand for water, placing additional pressure on city's water supply system. The growing concerns surrounding declining water supplies also pose significant challenges to industrial productions. The dwindling water supply for industries has become a pressing issue.

Industries often rely on groundwater sources for their water needs. Over-extraction of groundwater for industrial purposes further depleting the aquifers and reduce the overall availability of water, especially in regions heavily dependent on groundwater resources. operations, leading to production delays and financial losses. Industries relying heavily on water-dependent processes, such as manufacturing and energy production, are particularly vulnerable. Industrial processes also results in water pollution, affecting the quality of available water sources. Contaminated water not only poses environmental risks but also limits the usability of water for various industrial activities.

Industries can adopt efficient water management practices, such as optimizing processes, fixing leaks, and implementing water-saving technologies. It is vital for industries to adopt responsible water management practices, invest in innovative technologies, and collaborate with stakeholders to ensure a resilient and sustainable water future for industrial operations. By addressing these challenges proactively, industries can not only secure their water supply but also contribute to broader environmental conservation efforts.

WATER IS VALUABLE

Water is significant both as a social and economic commodity. Beyond its crucial role in sustaining life, water is vital for all commercial activities and economic progress. It is a market commodity, and its efficiency and benefits can be optimized through effective allocation and intelligent demand-supply management.

Ensuring the sufficient availability of water meeting specified quality standard is crucial not only for industrial production but also for institutions and various establishments.

The global recognition of the value of water is increasing, and it might soon be traded internationally alongside other commodities. Water is turning to be the new oil of future. Recognizing its significance is essential for ensuring sustainable development and responsible management of this invaluable resource.

As conventional water resources face depletion and escalating pollution, it is imperative for the domestic, institutional and industrial users to assess their water consumption and implement necessary changes, including effective treatment and reuse facilities. Aquality Water Solutions has been spearheading water efficiency solutions and it has successfully installed technologically advanced, high-quality water treatment plants that support the cause.

CASE STUDY

Project: Clean Water Supply for Drinking and Production

Client: Facebook India
Facebook India has evolved from a singular online operations team to a network of five extensive offices situated in cities including Hyderabad, Delhi, Gurgaon, Mumbai, and Bengaluru. Its expansion goes beyond initial tasks, now encompassing teams dedicated to sales, marketing, partnerships, policy, and various other domains that significantly influence different aspects of businesses. The company has experienced remarkable growth in India, investing in its workforce to foster career development and enable individuals to deliver their best work.

Project Challenges: The requirements were to place the water treatment plant within space constraints in a modular commercial kitchen with imported ice machines, steam makers, coffee machines, dishwashers and other facilities.

Project Scope: All equipment having NSF certification/ IS standards for drinking water quality have been supplied, installed and commissioned by Aquality Water Solutions Pvt. Ltd. All equipment and treatment machineries were procured of reputed brand made internationally. The company installed the following system at four institutional premises of Facebook India.

- 11 systems each of 600 gallon per day with hydro-pneumatic storage facility at Gurgaon facility
- 14 systems each of 600 gallon per day with hydro-pneumatic storage facility at Hyderabad facility
- 9 systems each of 600 gallon per day with hydro-pneumatic storage facility at Bengaluru facility
- 7 systems each of 600 gallon per day with hydro-pneumatic storage facility at Mumbai facility
- Water treatment system at all places is being maintained under operation & maintenance.

Some key components and features under the scope of AQUALITY include:

Filtration System: Multi-stage filtration system to

remove impurities, sediments, and particles from the water supply.

Water Softening: Best quality water softeners are used to reduce the hardness of water by removing minerals like calcium and magnesium, preventing scale buildup in appliances.

Reverse Osmosis: The RO system is used for removing contaminants at a molecular level, providing high-quality, pure and safe water.

Carbon Filtration: Employing activated carbon filters to absorb and remove chlorine, odors, and organic compounds, improving the taste and odor of the water.

Smart Monitoring Systems: Smart sensors and monitoring systems are integrated in all treatment systems to continuously assess water quality and system performance, allowing for proactive maintenance and swift issue resolution.

Energy Efficiency: The system is fitted with energy-efficient components to minimize operational costs and environmental impact.

Compliance with Regulations: Ensuring that the water treatment system complies with water quality regulations and standards as per the guidelines.

Regular Maintenance and Service: A fully trained professional team of engineers and technicians are deployed for routine maintenance to keep the system running efficiently and addressing any issues promptly to avoid disruptions in water supply.

Service delivery: Clean and safe drinking water for approximately 3000 officials and employees along with water for ice machines, steam makers, coffee machines, dishwashers etc.

Implementing water treatment system for Facebook offices is essential to guarantee a secure and dependable water supply. The system incorporates cutting-edge technologies and processes to purify water, rendering it suitable for diverse uses within the office environment. This initiative not only enhances the well-being of employees but also contributes to the longevity of plumbing infrastructure and supports overall sustainability efforts within the organization.

About the Author

Mohammed Naser Azeez
Managing Director,
Aquality Water Solutions Pvt. Ltd

A first-generation entrepreneur, he personifies a strong passion for innovation and a willingness to take risks. His visionary drive led him to establish the renowned Aquality Water Solutions, driven by the idea of offering technologically advance water treatment solutions to domestic, institutional, and industrial clients.

Driven by a strong desire to improve access to clean drinking water, he has made significant contributions in enhancing the lives of people through unwavering commitment, groundbreaking technological innovations, and a steadfast pursuit of quality excellence.

AN INTEGRATED WATER MANAGEMENT FOR URBAN AND INDUSTRIAL SECTORS

Dilip Yewalekar, Senior Vice President, Jain Irrigation and Manisha Kinge (M.Tech-Agri Engg), Jain Irrigation

Rapid urbanization-industrialization in Bharat have a considerable impact on water demand. Changes in food consumption, lifestyle, and land use patterns also play a major role in water requirements and management. Although Bharat received plenty of water as rainfall during monsoon, due to lack of storage only a small percentage of that water is added to the reserve. There is a significant mismatch between the spatial distributions of available water with the population, the situation becomes alarming, and ironically less water is available where more people live. As per the international norms, countries with per capita water availability of less than 1,700 m3 per year are categorized as water stress, Bharat falls under water stress country because 1,545 m3 water per capita available. Studies show that the projected water availability will become 1401 m3 in 2025 and 1191 in 2050. Average domestic water demand would also increase from 86 litre per capita per day in 2000 and 125 litre per capita per day in 2025 and 170 lpcd in 2050. Total industrial water demand is also increased 92 bcm by 2025 and 161 CMC 2050. Therefore, it is necessary to implement integrated urban and industrial water management policy.

WHAT IS INTEGRATED WATER MANAGEMENT FOR URBAN AND INDUSTRIAL?

Integrated Urban and Industrial water management is the practice of planning and managing freshwater, wastewater, and rainwater for various applications and uses. This means consideration of water supply and sanitation within an urban and industrial sector by incorporating various scopes of utility technology. By introducing various water management techniques, urban and industrial areas can contribute to the sustainable use and conservation of water resources, helping to create resilient and water-secure communities.

Table 1. Shows the water demand for various sectors in Bharat.

Sector	2010		2025		2050	
	High	Low	High	Low	High	Low
Irrigation	543	557	561	611	682	807
Drinking	42	43	55	62	90	111
Industry	37	37	67	67	81	81
Energy	18	19	31	33	63	70
Others	54	54	70	70	111	111
Total	**694**	**710**	**784**	**843**	**973**	**1180**

WATER FOR SURVIVAL

Water is essential for human, plants, live beings for survival and plays an important role in many sectors of the economy. However, water resources are irregularly distributed in space and time, and they are under pressure due to human activity and economic development. Accelerated urbanization-industrialization and the expansion of municipal water supply and sanitation systems also contribute to the rising water demand. Furthermore, climate change scenarios project spatial and temporal variations of water cycle dynamics, which exacerbate the discrepancies between water supply and demand. Water for irrigation and food production constitutes one of the greatest pressures on freshwater resources, with agriculture accounting for over 70 percent of global freshwater withdrawals and up to 90 percent in some fast-growing economies.

Managing water is a global challenge that impacts the environmental, social, economic, and political cornerstones of our existence on Earth. Effluent reclamation and reuse provide opportunities to conserve water and maintain the quality of the existing freshwater suppliers. Water reuse for various purposes is increasing practically throughout the world. It is meant to help close the anthropogenic water cycle and enable sustainable reuse of available water resources. When integrated into water resources management, it can be considered an integral part of pollution control and water management strategies.

As freshwater supplies become more limited and economic development comes with increasing water demand, technologies such as desalination and water reuse are often recognized as solutions with great potential to reduce the gap between availability and demand. However, on a larger scale, brine released from desalination plants includes chemical residues that negatively affect ecosystems. Furthermore, although desalination may solve the problem of water

scarcity in water-stressed areas, there still lies the problem of associated wastewater management and the costs involved. The ability to reuse water, regardless of whether the intent is the augment water supplies or manage nutrients in treated effluent has positive benefits that are also the key motivators for implementing reuse programs. These benefits include improved agricultural production, reduced energy consumption associated with the production, treatment, and distribution of water, and significant environmental benefits. Even though reclaimed water reuse is currently implemented in many countries, its potential has not yet been exploited in many areas, and the proportion of water reuse in total wastewater generation is still small. This emerging worldview that considers that a third industrial revolution is underway, supported by the age of the internet, IOT, IT facilitates the exchange of ideas to use finance to create a circular economy in water cycle-recycle-reuse.

Integrated Urban & Industrial Water Management aims at designing, managing the urban water system holistically. This section provides a basic introduction to the notion of integration water management and describes how it can help in the long run to use water resources more sustainably. Urban and Industrial sustainable water management is crucial for ensuring the availability and quality of water resources in the face of growing urbanization and industrial activities. Integrated water management involves the responsible use, conservation, & protection of water sources to meet current needs without compromising the ability of future generations to meet their own needs. Table 2. Indicates types of water, treatment before use and its uses/application for various purpose

Table 2. Water types-Treatment-Uses.

Sr.	Type of water	Treatment before use	Uses/applications
1	Surface water	Pre-filtration, Sedimentation, coagulation, UV treatment, Chlorination	Domestic, industrial, agricultural.
2	Groundwater	Filtration, UV Treatment, chlorination	Domestic, industrial, and agriculture.
3	Salt water [sea water]	Desalination	Domestic, Industrial
4	Frozen water	Heating, Filtration, UV Filter	Domestic, Industrial
5	Atmospheric water	Filtration, UV treatment	Domestic, Agriculture
6	Waste water	Pre-filtration, Sedimentation, Coagulation, UV treatment, Chlorination	Landscape, garden.
7	Brackish water	Pre-filtration, Sedimentation, Coagulation, UV treatment, Chlorination	Landscape, Garden
8	Mineral water	Filtration, UV treatment	Drinking water.
9	Distilled water	UV treatment, add mineralization	Drinking water, battery, Nuclear reactor.
10	Rain water	Filtration, UV treatment, chlorination	Domestic, agriculture

WATER REUSE AND RECYCLE-CIRCULAR ECONOMY

Fig.1. Water Cycle-Re-cycle-Re-Use Circular Economy

Water reuse and recycling offer several benefits, both to us and to the world (fig.1). The biggest benefit comes from preventing water shortages. That offers protection to the world's water resources, which would get drained to ensure that humans can continue to prosper while we run out of water. Recycling also ensures that we have enough water to grow crops, maintain our hygiene, and simply stay hydrated and run industries. Almost every aspect of human life uses water at some point, so running out could cause our entire civilization to collapse.

Recycling also helps to prevent pollution, especially in an industrial context. Many machines and appliances produce wastewater that carries some pollutants. If that water enters the environment without treatment, it can spread those pollutants across a surprising distance and give them a chance to kill plants and animals. Wastewater treatment and water recycling prevent the water from contamination our rivers, lakes, and groundwater.

Here are some key considerations for urban and industrial water management;

1. Water Efficiency and Conservation

- Implementing water-efficient technologies and practices in urban and industrial settings can significantly reduce water consumption.

- Encouraging the adoption of water-saving appliances and fixtures in urban areas and promoting water recycling and reuse in industries.

2. Stormwater management

- Designing and implementing effective stormwater management systems in urban areas to reduce runoff and prevent flooding.
- Incorporating green infrastructure, such as permeable pavements and green roofs, to enhance storm water absorption and reduce the burden on conventional drainage systems.

3. Wastewater Treatment and reuse

- Developing advanced wastewater treatment technologies for both urban and industrial to ensure that treated meets high-quality standards.
- Promoting the safe and sustainable reuse of treated wastewater for non-portable purposes, such as irrigation, industrial processes, or cooling

4. Integrated Water Resource management

- Adopting an integrated approach that considers the interconnectedness of water resources, including surface, groundwater, and rainwater harvesting.
- Collaborating with stakeholders across sectors to develop comprehensive water management plans that address the needs of both urban and industrial areas.

5. Community Engagement and education

- Raising awareness among urban residents and industrial stakeholders about the importance of water conservation and sustainable practices
- Involving local communities in planning and decision-making processes related to water management to ensure their needs and concerns are considered.

6. Policy and Regulations

- Implementing and enforcing water related regulations and standards to ensure responsible water use in both urban and industrial contexts.
- Encouraging the development of policies that promote sustainability, innovation, and responsible water stewardship.

7. Technological innovation

- Investing in research and development of new technologies that improve water management efficiency, such as smart water meters, sensors, and data analytics for real-time monitoring.

8. Climate change adaption

- Considering the potential impacts of climate change on water resources and developing adaptive strategies to address changing precipitation patterns, rising temperatures, and extreme weather events.

9. Public-Private Partnerships [PPP]

- Facilitating collaborations between public and private entities to fund and implement sustainable water management projects.

10. Research and innovations.

- Invest in research and development to explore new technologies and innovative solutions for water management
- Foster a culture of innovation to continuously improve water efficiency and sustainability.

CLIMATE CHANGE AND ITS IMPLICATIONS ON WATER

Changes in temperature and precipitation due to global warming and related processes have serious impacts on hydrologic processes and the regional water resources of Bharat. Climate affects the supply and demand of water and its quality, especially in arid and semi-arid areas. IPCC AR5 reports that the mean annual temperature is increasing all over Asia and it is projected to increase by 200C till the end of the 21st Century (BAU Scenerio-Hijioka-2014). Rising temperature contributes to glacial melts resulting in glacier retreat and affecting the water availability in the Himalayan River thus threatening the water supplies on which hundreds of millions of people depend. Almost 67 percent of the glaciers in the Himalayan mountain ranges have retreated in the past decade due to warming effects. Any shortfall in the supply of water will have a multi-fold impact on the social, environmental, industrial, and economic well-being affected area. As water availability is becoming less predictable, drought situations in some parts of India are more likely in the future. Water scarcity not only has an immediate effect on agricultural productivity but also has an impact on industries and a long-term impact on the socio-economics of the affected area. In a nutshell, considering reports from various agencies, it is necessary to plan and implement integrated water management for urban and industrial sectors from today!

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LIFT STATION REPAIRS DEMONSTRATE EFFICACY OF NEW CHEMICAL GROUT INJECTION TECHNOLOGY

Suzan Chin-Taylor

Injecting chemicals to stabilize, lift, seal or compact weak soils and rocks is not new. Polyurethane grout material has been used for this purpose since the 1960s. However, the limitations of this process have often been frustrating, not only for asset owners but installers, as well. Historically, material injection has been limited to shallow depths of twenty feet or less, due to the technology, means, and methods of application.

As the material is injected, it begins to synthesize (cure) inside the injection tube. While the synthesis rate can be accelerated or retarded by controlling the chemical temperature, that control is short-lived. The deeper or longer the injection tube, the longer time the chemical has to cure before exiting the tube. While this is happening, the diameter of the injection tube effectively shrinks in diameter as the cured material bonds to the tube wall. This limits the depth at which successful injection can occur, using the old technology. Another side effect is that the chemical being injected can lose its desired effect the deeper it is injected, as it cools once leaving the tube.

This frustration is being abated by Deep Horizons Injection Grouting (DHIG), a process developed by Polymer Technologies Worldwide, Inc (PTW). Their innovative method of injecting chemical grout allows the ability to inject at depths far exceeding previous limits. The following case studies describe how Polymer Technologies WW successfully injected their product to seal a leaking effluent line, with an invert depth of approximately 35 feet and an injection depth of 45 feet, at two Florida sanitary lift stations.

MULTIPLE REPAIR ATTEMPTS

Lift Station 87 was under construction to replace existing Lift Station 7 on the wastewater collections system of the City of Sarasota, Florida. It would eventually forward about a third of the City's wastewater flows to its WWTP. While testing the 36-inch influent line, which crosses Hudson Bayou, City crews discovered significant groundwater intrusion through several holes, breaks, and joint failures. This infiltration would cause the sanitary system to unnecessarily work harder, putting more stress on the system. That would not only waste capacity but also shorten the life of WWTP equipment over time, so it had to be eliminated.

The first repair effort was a trenchless epoxy-impregnated liner installation (CIPP). While this type of largely non-disruptive repair has worked in similar circumstances, it failed to stop this water intrusion. A second effort to repair the pipe involved injection of a two-component, fast-reacting chemical grout, intended to seal the pipe from the exterior, in-situ. This historic method failed for reasons previously described, as the pipe is situated deeper than 20 feet.

THIRD TIME'S THE CHARM

The method considered for a third try was traditional dig-and-replace, but that would have caused extensive disruptions to surrounding infrastructure

and the local population, which was why previous attempts had been trenchless. This more traditional option was estimated to add an additional $9-12 million to an already-over-budget project, along with extending completion time approximately another year for the already severely delayed project.

Highly motivated to avoid these major issues, the City took a chance on engaging the patented new DHIG process. Not only did this effort seal the pipe leaks, it also enhanced and further stabilized the foundation of the lift station structure.

Best of all, because the process is trenchless and requires a small physical footprint, it not only didn't disrupt the surrounding area, but was actually accomplished while the facility construction continued. Another nearby lift station project at Symmes Rd. in Hillsborough County, Florida, also proved out other advantages of this new injection method.

Station well inlet pipe cracks and some other damage was found to be caused by approximately 4 inches of settling of the cover slab. Using the standard testing procedure, soils in proximity to the station—ten feet between 18.5-28.5 feet below ground surface—were found to be very loose, displaying weight-of-rod conditions, in which the boring tube drops under its own weight, without any force applied.

The wet well for the station measures 8 feet in diameter and 30 feet in depth. To excavate and repair the station would again result in a large area of disturbance that could have possibly affected an adjacent residential community, underground utilities (electric, cable, etc.), and possibly Symmes Road itself. Again, the decision was made to take a chance on the still-new DHIG technique.

POST-INJECTION TESTING

Standard ground borings (STP data) demonstrated that injected material did not expand beyond the lift station property. Injecting 2,623 gallons of polymer through four injection points, with injection depths between 1-45 feet below grade, yielded the following results:

- Soils around the wet well were strengthened to the point where weight-of-rod conditions no longer exist.
- Soils outside the lift station footprint were shown to have insignificant change in soil stiffness. This indicated no adverse effects to surrounding properties or structures from the injection.
- The grout filled voids, stopping leaks from eroding the area around the system, and water intrusion into that system that had also caused erosion.
- A post-injection analysis and report was rendered on the Symmes Rd. project by Integrity Drilling & Geophysical Services, LLC, of Groveland, Florida. During the project covered here, testing showed good control of the material, in that none of it encroached on neighboring properties. Also revealed was that soil adjacent to the grout was compacted and stabilized, despite no presence of material in those sampled soils.

RIG OPERATION

The DHIG rig is used, in part, to advance injection casing to the desired depth. The three-inch diameter steel casing, threaded on each end, is advanced, with new sections threaded on as needed.

While skin friction is considered negligible, it takes increasing power to turn the casing as it advances more deeply. Turning power is also affected by the strength and adhesive properties of the material being advanced through the casing.

Upon reaching the desired injection depth, the rig withdraws the casing as the polymer is injected. Care must be used to advance at an appropriate rate that avoids fouling the casing with the polymer; but not so fast that the polymer is under-injected.

To inject the polymer, a special nozzle is advanced through the casing and attached to the drilling head at the tip of the casing. This is the third use of the rig, to lower the casing head and attached chemical feed lines in a careful manner, to avoid fouling the lines or damaging the injection nozzle. Upon carefully lowering the equipment by attaching a lowering/turning bar, that bar is then rotated to lock the equipment to the head. As the casing is withdrawn, the lowering bar is removed in sections, just as the casing is removed.

HOW IT WORKS

The injection method of the DHIG chemical is like any other. Pumps that feed the chemical must be powerful enough overcome the strength of the soil materials, as well as the line friction. Line friction will most likely be the controlling factor relating to possible depth efficacy. This limiting factor can be overcome by increasing the pumping power, feed line and casing diameter, and subsequently the rig size and associated power, so it's adaptable to the needs of many applications.

The significant advantage of the DHIG process is that, theoretically, there is no limit to the depth at which the material can be successfully injected. This is due to the material being combined at the tip of the casing—which allows for full material strength to occur where needed at the tip—as opposed to inside the feed line, which is standard practice using most existing systems.

Another benefit is that the material can be injected from a lateral point, to avoid interference with nearby surrounding project activity. This results in reduced time, cost and impacts to the public and the environment. For example:

- A leaking cross drain can be sealed without closing down a busy highway or interstate system.
- A sanitary lift station can remain in operation while a leaking influent line is sealed.
- A building can remain in operation while a basement wall is sealed.
- A leaking earthen dam can be sealed without lowering water levels.
- Retaining walls can be sealed at depth, without excavation or injection from the face, which can further weaken the wall.
- Stabilizing embankments—bridges, railroads, roadways, canal banks, etc.
- EPA-related concerns such as underground oil, frack well, hazmat or radioactive leaks at any depth can be sealed, preventing catastrophic contamination of surrounding freshwater aquifers or ecosystems.
- Sealing abandoned wells and mine shafts, while allowing for future material removal so that the well or shaft can be put back into service.

The suitability of this process and material has been successfully applied up to 100 feet below ground surface without unforeseeable limitation.

About the Author

Suzan Chin-Taylor
International Entrepreneur, Published Author, Course Creator, Podcast Host and Speaker

Suzan Chin-Taylor, MSc is an international entrepreneur, published author, course creator, podcast host and speaker who helps businesses in the wastewater infrastructure, treatment and related civil infrastructure sectors take the mystery out of digital marketing and PR in order thrive in the new online selling environment.

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MARSELISBORG WASTEWATER TREATMENT PLANT ACHIEVES SURPLUS POWER GENERATION

Mandar Vaijanapurkar, Head of Drives Sales, Marketing & Services, Danfoss India Region

INTRODUCTION:

The Marselisborg Wastewater Treatment Plant, located in Aarhus, Denmark, has undergone a remarkable evolution in its approach for energy management, symbolizing a paradigm shift in its operational strategies. Transitioning from a primary goal of minimizing energy usage to maximizing net energy surplus starting in 2010, the plant has redefined its operational framework. Currently, it operates with a surplus in both electricity and heat production, actively contributing energy to power Aarhus' district heating system. This shift towards surplus energy generation has led to a substantial reduction in the plant's carbon footprint by an impressive 35%.

This transformation signifies a significant departure from traditional wastewater treatment plant operations, marking Marselisborg as a pioneering example of efficient and sustainable energy practices within the wastewater treatment domain.

CHALLENGES:

i. **Energy-Intensive Operations:** Wastewater treatment processes are inherently energy-intensive, demanding substantial electricity for pumping, aeration, and sludge management. The continuous 24/7 operation cycle, essential for treating wastewater effectively, posed a significant challenge due to its high energy consumption.

ii. **Quality versus Energy Balance:** As the facility aimed to improve treatment quality, especially concerning nutrient removal, it encountered a paradoxical situation. The increasing demands for better treatment quality, essential for environmental standards, resulting into escalated net energy consumption. Balancing the need for improved treatment quality against the rising energy consumption became a challenge.

iii. **Load Variations and Seasonal Changes:** Water and wastewater treatment processes exhibit high load variations throughout the day and across different seasons. Managing these variations efficiently to match energy consumption and treatment needs posed a significant operational challenge.

iv. **Process Optimization Complexity:** Implementing advanced control strategies and process enhancements required comprehensive planning and precise execution. Optimizing nitrogen removal, upgrading blower technology, and controlling sludge age demanded sophisticated technologies and careful calibration to ensure optimal performance without compromising treatment quality.

v. **Investment and Technological Transition:** The transition to energy-efficient technologies, such as frequency converters and advanced blower systems, involved significant investment. Adopting and integrating these new technologies into the existing infrastructure required planning, investment, and specialized expertise, which posed financial and operational challenges.

vi. **Variable Inputs and Process Instability:** Biological processes, like those involved in wastewater treatment, are subject to variations in input volume, content, and occasional unpredictability in chemistry. This variability led to challenges in stabilizing power production and energy consumption, requiring careful monitoring and adjustment to maintain consistent results.

STRATEGIES AND SOLUTIONS:

By implementing the following strategies and solutions, Marselisborg not only optimized its energy consumption but also significantly enhanced its energy production capabilities. The integration of advanced technology, precise control mechanisms, and process innovations played a critical role in transforming the wastewater treatment plant into an energy-neutral and sustainable entity.

i. **Control Strategies with Frequency Converters:** Marselisborg utilized frequency converters across various equipment,

i. including blowers, pumps, and motorized machinery. These converters allowed for precise control, enabling the facility to adapt swiftly to fluctuating demands and load variations. This adaptability was crucial for optimizing energy consumption based on specific operational requirements, thereby ensuring more efficient energy usage round the clock and across different seasons.

ii. **Process Enhancements for Energy Efficiency**iii. **Combined Heat and Power**

- **Nitrogen Removal Process Optimization:** Strategies focused on enhancing the nitrogen removal process. By leveraging frequency converters, precise aeration control was achieved, minimizing energy consumption while maintaining optimal treatment quality. This approach effectively increased the retention of carbon within the system, contributing to improved energy efficiency.
- **Upgraded Blower Technology:** Marselisborg implemented advanced blower technology upgrades. This innovation significantly reduced energy consumption in the aeration process, representing a substantial leap in energy efficiency while ensuring proper treatment processes.
- **Aerobic Sludge Age Control:** The facility employed precise control mechanisms using frequency converters for return sludge pumps. This control strategy optimized energy utilization by adjusting sludge age based on temperature and plant load, leading to increased carbon retention within the system and lowered energy consumption.

Marselisborg WWTP Motor Pumps

iii. **Combined Heat and Power (CHP) Process Upgrade:** Marselisborg undertook a significant upgrade to its CHP process. This enhancement aimed at maximizing energy production efficiency, achieving an impressive 90% energy efficiency rate. The upgraded CHP process played a pivotal role in generating surplus power while minimizing wastage, contributing significantly to the plant's sustainability and energy autonomy.

OUTCOMES:

The foundation of this achievement is a two-tier strategy:
Reduce energy consumption while increasing energy production.

In 2005, Aarhus Vand began to improve energy efficiency at Marselisborg WWTP. Almost all equipments with a motor in the water cycle, 290 in total, were fitted with variable speed drives which offer the controllability that help secure just the right amount of energy needed for optimal performance. The plant achieved an exceptional milestone by surpassing its initial objective. It produced 130% more electricity than its operational needs, resulting in a 30% annual net surplus. This surplus electricity has been integrated into Aarhus' district heating system, benefitting the city and significantly reducing its dependence on external energy sources.

Marselisborg WWTP Motor Pumps

A series of online sensors are mounted throughout the WWTP. They provide critical information in real-time, which allows for automatic calculation of setpoints for the variable speed drives. As a result, the Marselisborg WWTP is a highly energy efficient operation. In addition to surplus electricity, the plant generated an excess of about 2.5 GWh/year in heat production. This surplus heat holds the potential to be channeled into district heating systems or industrial applications, further enhancing the plant's overall sustainability.

But the Marselisborg WWTP is also a biorefinery that produces energy. In 2010, Aarhus Vand began to improve that side of the wastewater equation. The plant generates energy from the biogas it creates out of household wastewater sludge is extracted from the wastewater and pumped into digesters. These produce biogas - mostly methane - that is then burned to make heat and electricity. The transformation resulted in a substantial reduction of the plant's carbon footprint, with a reported decrease of 35%. This reduction in greenhouse gas emissions aligns with global sustainability goals, showcasing the potential of wastewater treatment plants to act as environmentally responsible entities.

Marselisborg WWTP VLT Aqua Drive

In the period from 2016 and 2021, Marselisborg WWTP produced close to 100% more energy than needed for treating wastewater. The energy produced can be used to supply the area with drinking water as well. This means that Marselisborg WWTP produces enough energy to match the needs for the full water cycle of the entire catchment area, including both drinking water and wastewater, essentially decoupling water from energy. Process optimization and digitalization is estimated to have contributed to 70% of the improvements.

With a return on investment (ROI) of 4.8 years, it demonstrated the economic viability and sustainability of these energy-saving measures. Moreover, the continual improvement in ROI over time ensures the long-term financial sustainability of the plant's operations.

DECOUPLING WATER FROM ENERGY

Energy Production from Marselisborg WWTP almost covers the entire water cycle

Energy Consumption	2016-2021 Average
Water treatment, distribution (kWh)	3.3 Mill
Wastewater transport (kWh)	0.7 Mill
Marselisborg WWTP (kWh)	3.3 Mill
Total energy consumption (kWh)	7.2 Mill
Energy Production	
Electricity production (kWh)	4.7 Mill
Heat production (kWh)	2.1 Mill
Total energy production (kWh)	**6.8 Mill**
Own energy supply degree	
Wastewater treatment process, electricity, and heat (%)	208%
Total water cycle, Marselisborg catchment area	**94%**
Return on Investment Estimated to be 4.8 Years on average between 2005 and 2016	

FUTURE VISION:

The future vision for Aarhus City regarding its wastewater treatment plants represents a bold and progressive step towards energy sustainability and self-sufficiency. Here's a more detailed elaboration on this future vision:

i. **Energy Surplus for City-wide Needs:** Aarhus City envisions surpassing its current achievements in energy production from wastewater treatment. The goal is to generate a surplus of energy significant enough to not only fulfill the electricity demands of the district but also provide for the city's potable water supply. This ambitious plan strives to ensure that the energy generated exceeds the total energy requirements of the entire city, creating a surplus that can be shared across different sectors.

ii. **Transforming Energy Consumption Patterns:** The aim to transform the municipality's largest electricity consumer into an energy-neutral entity involves a fundamental shift in energy consumption patterns. By harnessing surplus energy from wastewater treatment plants, the vision is to offset or exceed the total energy consumed by the city, fundamentally altering the dependency on external energy sources.

iii. **Energy Independence and Sustainability:** The broader objective of this vision is to achieve greater energy independence and sustainability for Aarhus City. By generating surplus energy from wastewater treatment, the city can potentially reduce reliance on traditional energy grids and external suppliers, moving towards a more self-reliant and eco-friendly energy model.

iv. **Community-wide Impact:** This future vision isn't confined to the operations of wastewater treatment plants alone. It aims to have a profound impact on the entire community by revolutionizing energy management practices, inspiring innovative technological solutions, and fostering a culture of environmental stewardship among residents and stakeholders.

v. **Pioneering Energy-Neutral Practices:** Achieving an energy-neutral status for a municipality the size of Aarhus City would mark a pioneering milestone in sustainability practices. It would set an example for other cities and municipalities, encouraging them to explore and adopt similar strategies to minimize their environmental footprint and work towards a more sustainable future.

vi. **Continued Innovation and Collaboration:** Fulfilling this future vision requires ongoing innovation, technological advancements, and collaborative efforts between local authorities, environmental agencies, and technology providers. It necessitates a commitment to research, development, and implementation of cutting-edge solutions to realize the goal of energy surplus from wastewater treatment.

CONCLUSION

In conclusion, the journey of the Marselisborg Wastewater Treatment Plant stands as a proof to the relentless pursuit of energy efficiency, innovative control strategies, and technological advancements within wastewater treatment. This concerted effort has yielded transformative outcomes, notably in the reduction of carbon footprints and the achievement of surplus energy generation. By prioritizing sustainability and pioneering surplus energy production, Marselisborg sets a remarkable example for the global water management sector. It demonstrates the potential for an energy-neutral future, highlighting how such initiatives can redefine the conventional norms of energy consumption and production in wastewater treatment, thus paving the way for more environmentally conscious and sustainable practices worldwide.

About the Author

Mandar Vaijanapurkar
Head of Drives Sales, Marketing & Services, Danfoss India Regionr

Mandar Vaijanapurkar is an experienced business manager in the mechanical and industrial engineering industry. With a strong background in product management, business strategy, key account management, and business development, he has proven himself as a skilled sales professional.

Mandar has been an integral part of Danfoss India close to two decades, specializing in the sales and marketing division for Danfoss Drives. With his expertise and dedication, he has played a crucial role in driving the success of the company in the India region.

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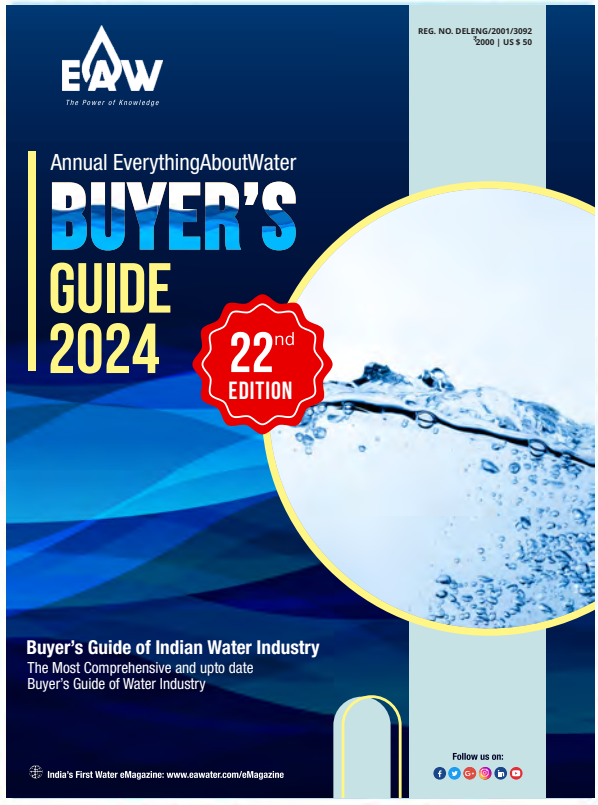

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CNIG DIGITALLY RECONSTRUCTS LA PALMA ISLAND LANDSCAPE AFTER A DEVASTATING VOLCANIC ERUPTION

Aude Camus, Senior Product Marketing Manager, Bentley Systems

Context capture optimizes data processing and integration, delivering a digital twin to plan new infrastructure and safeguard citizens.

A MILESTONE ERUPTION IN THE CANARY ISLANDS

After 50 years of dormancy, the volcano that forms the Cumbre Vieja Ridge on the island of La Palma in the Spanish Canary Islands erupted in September 2021, resulting in one of the archipelago's most destructive volcanic events in 500 years. Lasting 85 days, it is estimated to have caused up to EUR 843 million in damage to the island's infrastructure. Spewing lava as high as 500 meters and with a flow traversing the island, the volcano destroyed buildings, towns, and approximately 350 hectares of banana plantations. It also destroyed more than 2,500 homes, forcing 7,000 residents to evacuate. While no deaths resulted from the eruption, the challenges at hand include rebuilding the communities and determining how best to protect the thousands of people who live on the slopes of the ridge from future catastrophic events.

Responsible for producing the official cartography of Spain and managing, maintaining, and communicating geographic and spatial data, the National Geographic Institute (CNIG) was tasked with ascertaining the current state of La Palma after the 2021 volcanic eruption. "The project involved obtaining a realistic landscape of the new orography of the island of La Palma following the changes caused by the last eruption of the Cumbre Vieja ridge between September 19 and December 13, 2021," said Celia Sevilla, head of international projects at CNIG. While the initial project objective was a digital cartography model to help reconstruct the island, another objective was to develop the virtual model as a tool to help define protection and management plans aimed at safeguarding communities and infrastructure, which will help increase the island's resiliency to natural disasters.

INTEGRATING MULTISOURCED DATA AND MODELS

To obtain an accurate digital representation of the new orography of La Palma, CNIG had to merge two models. The first model was obtained from existing aerial photographs of the island with a ground sample distance of 25 centimeters, while the second model was created from 14,000 drone-captured images with a high-resolution ground pixel size of 5 centimeters that focused on the affected area, including craters and lava flow. Integrating the two different types of data with very different geometric resolutions presented challenges, compounded by the surface irregularity and disappearance of identifiable points on the ground due to the lava. "The biggest challenge was integrating very disparate resolutions, as well as searching and locating identifiable points for georeferencing, because the lava flows had caused much of the land in the area to disappear," said Sevilla.

In addition to the lava-affected topography and data integration issues, CNIG also faced time constraints. They needed to generate an accurate reality model and digital twin in a short period of time. From the digital twin, they also had to create updated digital elevation models to correct the official cartography published by the Spanish National Geographic Institute, accessible both digitally via CNIG's download center, map viewers, and mobile applications, and as printed versions. To quickly integrate the large survey data and models with varying resolutions into a realistic, multipurpose digital landscape, CNIG required comprehensive and flexible reality modeling technology.

LEVERAGING CONTEXTCAPTURE FOR LANDSCAPE MODELING

Based on prior experiences with other projects, CNIG

selected ContextCapture to integrate the aerial photos covering the entire island pre-eruption with the drone images captured during the period that the volcano remained active. This process would allow them to digitally reconstruct the new island landscape. Using Bentley's reality modeling application allowed the different resolutions to be integrated into a single landscape. "ContextCapture has perfectly resolved the development of models from a large number of photographs while allowing the integration of different data sources, along with different resolutions," said Sevilla.

The software's flexibility, interoperability, and advanced processing capabilities enabled CNIG to quickly merge the 14,000 high-resolution, drone-captured images with the lower resolution photographs into an accurate single-landscape digital twin model to virtually study the area and plan new infrastructure development.

DIGITAL TWIN DRIVES VIRTUAL PLANNING AND RECONSTRUCTION

Using ContextCapture provided a quick, simple, and cost-effective solution that met CNIG's landscape reconstruction objectives, as well as their ongoing cartographic requirements. The creation of a digital twin offers a multipurpose solution, making information easily accessible to agencies and the public for various applications. Easy digital reconstruction of the territory now makes it possible for the government to keep citizens regularly informed.

"The fact that a reality model of the new appearance of the island of La Palma is available is the fastest, closest, and most accurate way of showing it to citizens," said Sevilla. The Bentley-based digital solution reduces the environmental impact of manual on-site methods while saving time and costs, as well as providing citizens with a glimpse into the current state of their plots and homes in a safe and agile manner.

Digitization of the project enabled virtual access to the study area, which is not physically permitted due to safety and environmental protection issues. The model facilitates virtual reconstruction and planning to rebuild infrastructure and respond to events similar to the Cumbre Vieja eruption. It enables the implementation of proactive protection and management plans to safeguard people and property from future natural disasters. "The speed in obtaining the data, the simplicity of its processing, and its subsequent integration into the existing model make this methodology an option for any future episodes," said Sevilla.

Project Summary

Organization: The National Geographic Institute (CNIG)**Solution:** Survey and Monitoring
Location: La Palma, Santa Cruz de Tenerife, Spain

Project Objectives:

- To create a digital twin of the island to help plan reconstruction and infrastructure redevelopment.
- To promote digitization for defining disaster protection and management plans, increasing resilience.

Project Playbook: ContextCapture, MicroStation

Fast Facts

- In 2021, Cumbre Vieja erupted on La Palma, resulting in the island's largest volcanic eruption on record.
- CNIG was tasked with obtaining a digital realistic landscape of the island following changes caused by the volcano.
- CNIG used ContextCapture to integrate 14,000 drone-captured images with low-resolution photographs into a single, accurate digital twin.

ROI

- Using Bentley's reality modeling application saved time and costs while reducing the environmental impact.

Callout Quote: "ContextCapture allows different resolutions to be integrated into a single landscape." – Celia Sevilla, Head of International Projects, Spanish National Center for Geographic Information

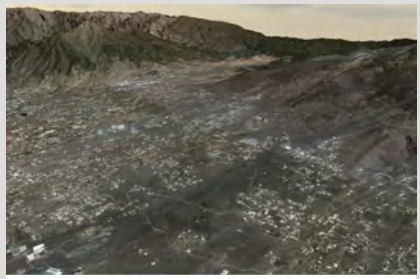

Image courtesy of Spanish National Center for Geographic Information

CNIG was tasked with obtaining a digital realistic landscape of the island following changes caused by the Cumbre Vieja volcano on La Palma.

Image courtesy of Spanish National Center for Geographic Information

CNIG used ContextCapture to integrate 14,000 drone-captured images with low-resolution photographs into a single, accurate digital twin. Image courtesy of Spanish National Center for Geographic Information.
The digital twin enabled CNIG to virtually study the area, plan new infrastructure development, and define protection and management plans to safeguard people in the area from future eruptions.

About the Author

Aude Camus is the senior product marketing manager for reality modeling, roads, and bridges with Bentley Systems. Graduated from SKEMA Business School in France, she has nearly 15 years of experience in selling and marketing engineering and geospatial software.

Aude Camus
Senior Product Marketing Manager
Bentley Systems

NEW LIFE FILTER TECHNOLOGY

Jørgen Løgstrup, Founder and managing director, TransForm af 1994 ApS / Danish Rootzone and Bacess A/S

Over the last decades a new wastewater treatment and recirculation technology has been developed and verified by EU-Environmental Technology Verification. It is based on high active life biofilter technology. This means the filter is special constructed of light soil or nature found materials with high absorption capacity. This is supporting high bioactivities. To hold the filter open it is covered with specific vegetation called hydrophytes. It is very strong plants building up high volume of organic materials, that hold the filter light and water-bearing. In support hydrophytes are able to transfer air from there leaves and steams dawn to roots from where it leaks out in filter material. This transport of air is given oxygen to the filter that open up for aerobic bioactivities. In this way the filter has 3 different bio-sectors: aerobic areas, anerobic areas and in between we find the macrophile areas – that is where the fungi are living. This comprehensive filter open up for potential very high bacterial, fungi and biochemical activity that can treat a lot of different pollutant. At the same time the high absorption can bind and transfer heavy metals over time to crystalline structure and in this way withdraw the poisonousness. The vegetation has also a climate function in building up organic material, taken carbon in form of CO2, Methan (NH4) and laughing gas (N20) from air.

This filter technology can treat up to 10-20m3 /m2, depending of load of organic material. The filter is 0,8m high and is constructed in standard containers from 1m3 and up to the needed size. There is limit of yearly load of organic material (COD), depending of species of hydrophytes. Up to date more than 400 different chemicals has been tested. Depending of climate part of the water will evaporate. Evaporation or more correct evapotranspiration from hydrophytes is in level of 6-8 time more than pan-evaporation, means evaporation from free water table. In this way part of water is cleaned by evapotranspiration and part is cleaned by filtration. Filtrated water can be reused either for processing, washing, irrigation or outlet for stream or lake. On top of filter there will settle sludge coming from load as solids, BOD and COD.

The higher load of solids and organic materials the higher settle on surface – this is giving the limit of yearly load by the different species of hydrophytes.

RESULT FROM TEST IS:

- Biological Oxygen Demand in 5 days (BOD5) reduced with 97%.
- Oil in water reduced with 88%.
- BTEX refer to mixtures of benzene, toluene, ethylene and the three xylene isomers, all of which are aromatic hydrocarbons. The xylene in water inlet up to 108yg, in outlet under detection level at 0,1yg. All discharge was under detection level of 1yg.
- Phenol and methyl-phenols at inlet up to 320yg in outlet under detection level at 0,02yg.
- Polycyclic aromatic hydrocarbon (PAH) is a class of organic compounds that is composed of multiple aromatic rings was at inlet up to 7,8yg and rarely detected in the discharge water under 1yg.

RESULT FROM COMPANY PROJECT:

- Ferrosan A/S, Denmark. Inlet 8040g – outlet 682g of quaternary ammonium compounds and tertiary amines.

- Proctor & Gamble, Bhopal, India.
- Kimberly & Clark, Puna, India.
- Kimberly & Clark, Colpapel S.A., Bogota, Colombia.
- Trinidad, Kelt, Colombia S.A. Phenol treatment.
- Toroyaco, Argosy Energy Int. Phenol treatment.
- Cartagena, Esso Colombia LTDA, Hydrocarbon treatment.
- Tauramena, British Petroleum Exploration, Colombia, treatment of phenol and hydrocarbon.

LIFE FILTER CONSTRUCTION IN CONTAINER:

About the Author

Jørgen Løgstrup
Founder and managing director,
TransForm af 1994 ApS / Danish Rootzone and Bacess A/S

Specialisation in Company: Waste Water treatment and recirculation. Waste management recirculation and Bio-Fertilizer producti Air treatment, Indoor climate and Urban eco planning.

Education:
Degree: M. Sc. Agricultural economics, 1968
Institution: Royal Veterinary & Agricultural University, Copenhagen

Key Qualifications:
35 years' experience in consulting services regarding environmental issues. Specialised in development of new biological technologies for treatment of sludge and wastewater. Has introduced and initiated biological wastewater and sludge treatment, in many countries worldwide. Elaboration of reports concerns "Biological methods for treatment and re-cycling of sludge products", for The Danish Ministry of Industry and long termed participation in various investigation programmes concerning wastewater and sludge treatment. Consultant and project manager for Danish Gourverment in Urban Ecology Lectures at: KVL, DTU, Københavns Kunstakademi, Arkitektskolen i Aarhus, Aalborg University, Arctic, Kassel University, Seoul University, Indore University (India), Beijing University of Chemical Technology, Beijing EPA Waste Water section, ADIPEC 2018.

Countries of Work Experience:
China, Czechoslovakia, Colombia, Argentina, Brazil, Venezuela, Jordan, Saudi Arabia, Sultanate of Oman, UEA, Israel, Kenya, Uganda, Botswana, Namibia, South Africa, India, Malaysia, Australia, USA, Poland, Switzerland, France, UK, Holland, Sweden, Norway, Germany, Denmark

2017: Founder and board member of Rootzone Africa Ltd & Biofertilizer Africa Ltd, Uganda.
2000: Founder and managing director of Bacess A/S. Production of air treatment system.
1994: Founder and owner of TransForm af 1994 Aps. Design and development of Eco housing.
1988: Founder and board member of Dansk Bio Teknik Aps.
Composting systems development firm. Development and design of container composting systems for sludge and other organic wastes.
1983: Founder and managing director of consulting biological engineering firm, Dansk Rodzone Teknik ApS. Development and design of more than 1000 root zone/filter plants and other environmental technology plants. In 1995 merged into TransForm af 1994 Aps.

1979-1983: Independent consultant associated with Virksomhedsrådgiverne. Consulting in corporate management. In this regard managing director for:
Esbjerg Ugeavis A/S (1980-81)
Scarlet Møbler ApS (1982)
Herning Køkkenet (1983)
1978-79: Senior consultant at Centralanstalten for Revision (auditors).
1977- Owner and manager of Villumbjerggård, 80 hectares dairy (120 milk cows) and pig production farm.
Present owner of Postgaarden 100 hectares.
1976-77: Marketing director and head of division in A. P. Møller Industrigruppe c/o Pharma-Plast A/S.
1973-75: Marketing director of Astra-Gruppen A/S, Albertslund and director of Astra-Ewos.
1968-73: Head of National Department for Pig Breeding. Landsudvalget for Svin.

Selected Publication and reports:

Løgstrup Jørgen, Identification study for Constructing Root Zone Plants in Ovamboland, Namibia for Rössing Foundation 1986
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EU Environmental Technology Verification: Rootzone treatment of oil contamination 2018.

TRENCHLESS TECHNOLOGY FOR INSPECTIONS

Riley Kooh, Content Manager, Pipe Trekker

Across any industry, staying on top of asset conditions is vital for safety, efficacy, and budget forecasting. Stormwater systems are no exception. Visual inspections of material storage and outdoor processing areas, as well as discharge areas and their surrounding environments are essential to a well functioning stormwater system. Over time, asset integrity begins to dwindle, and having consistent condition intel is the only way to minimize risks of contamination, flooding, blockages, and collapsed pipes.

With the potential to affect millions of citizens or contaminate massive plots of land in the event of a system failure, detailed inspections are vital. When inspecting a stormwater system, there are a variety of potential issues that can be cause for concern.

- Cracks
- Leaks
- Offsets/Disjoints
- Ovality
- Blockages in Pipes/Sediment Build-up

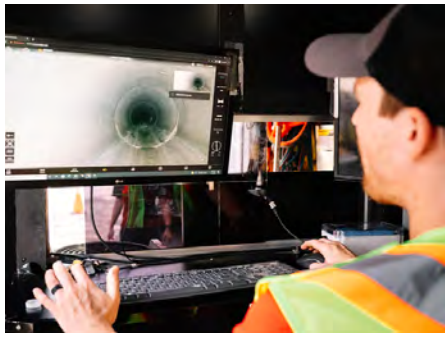
WHAT IS EXAMINED IN A STORMWATER INSPECTION?

Depending on the size of the site location, stormwater systems can be immense.

- Foreign Debris
- Corrosion
- Collapses
- Status of previous repairs

WHY IS A STORMWATER INSPECTION IMPORTANT?

It is crucial to manage stormwater for several key reasons. With the proper tools, inspections are a non-invasive, low-risk preventative measure against issues, from the health of local waters and aquatic life to flood risk mitigation.



1. Maintain the Hydrologic Cycle
Improperly managed stormwater can reduce moisture replenishment in the soil and minimize groundwater recharge. Soil moisture is essential for vegetation, while loss of groundwater recharge can severely reduce stream baseflow, necessary for aquatic life. By managing stormwater correctly, the hydrologic cycle can be maintained to ensure healthy plant and aquatic life.

2. Prevent Flooding
Without adequate stormwater maintenance, the risk of flooding, especially in urban areas, is greatly increased. As water cannot be absorbed into the concrete that covers large swaths of towns and cities, the excess water from rain and thunderstorms must be managed to prevent loss of life and property damage by flooding.

3. Prevent Stream Erosion

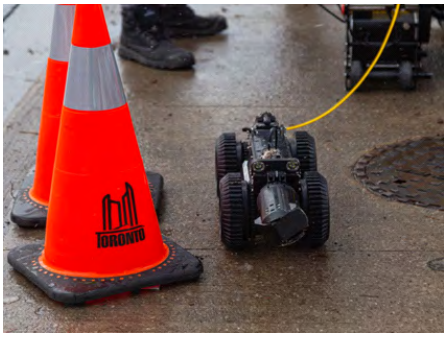
While erosion is a normal part of stream behavior, excess stormwater can greatly increase the amount of erosion as abnormal amounts of water enter streams during storms. This extra water increases both the volume and rate at which water - and the sediment in the water - is delivered to streams. This extra water can increase erosion on stream banks and beds, damaging the natural form of these streams. The degradation of these streams can lead to a massive decline in plant and animal diversity. Proper stormwater management can effectively mitigate these risks.

4. Forecasting for Maintenance Budget Optimization

While no future outcome is 100% predictable, inspection report data is a beneficial tool for educated predictions of budget allocation. By following a dedicated asset health grading system, facilities should be able to narrow down to the year when maintenance will be required. Having this information on hand lowers the risk for costly surprise repairs or large-scale collapses.

HOW IS A STORMWATER INSPECTION CONDUCTED?

In order to conduct a proper inspection, a full visual inside the length of the pipeline is required. Depending on the pipe dimensions and water levels, this can either be done by manned entry or remotely using ROVs or Pipe Crawlers. Generally, in order for a pipe to be entered safely, the diameter must measure a minimum of 48" (122cm). In modern practice, portable robotic solutions streamline visual inspections for safety, access a wider variety of pipes, and instantaneously run reports.



THE TOOLS USED

Pipe Crawler

Pipe Crawlers are an extremely effective way to inspect dry or partially submerged stormwater pipes. Stormwater pipes are often corrugated steel, HDPE, or concrete. Opting for pneumatic tires, tracks, or rubber wheels are ideal for traction on these materials, being adept at traveling through mud, sand, or for getting over debris.

ROV

For fully submerged large diameter pipes, ROVs are the most effective tool for visual inspections, offering intuitive controls and tilt cameras to make it incredibly easy to get crisp visuals of the entire pipeline. One of the drawbacks of a ROV inspection is that the entire pipe must be filled with water for a full survey.

Floats

For partially submerged, large diameter (900mm/36"+) pipes, floats can be a viable option. Floats can provide multi sensor capability and can travel long distances, but generally need significant flow to operate. For extremely large tunnels that are dry, manned entry is still a reasonable option. However, deploying a crawler is the safest alternative.

Reporting Software

Visual inspections provide integral information to municipalities or organizations about the status of their storm and sewer infrastructure. Using tested and validated reporting programs ensure that teams are provided a convenient import and export using the NASSCO file.

There are several NASSCO certified software options that are used to document PACP inspections. Pipe Trekker offers straightforward WinCan and POSM software compatibility, and integration with GraniteNet, ITPipes,and CTSpec, among others.

HOW PIPE TREKKER CAN MAKE A DIFFERENCE IN STORM WATER SYSTEM CCTV INSPECTION

Implementing a Pipe Trekker crawler or Deep Trekker ROV for stormwater inspections empowers operators to conduct inspections safer and easier than ever before. From 2011 - 2018, 61 fatalities were reported on the job inside a manhole, sewer system, or storm drain. With the use of remote inspection vehicles, operators never have to enter a confined space.

TOWN OF RENFREW - CASE STUDY

The town of Renfrew is a small municipality, with a storm and sanitary system including 89 km (55 miles) of pipe. In 2005, Renfrew hired a CCTV service company to inspect 75% of their system, totaling $400,000 to complete. The town used to call on a contractor 10 - 12 times a year to provide CCTV services.

MISSION OBJECTIVE

Renfrew understood that CCTV camera inspections of storm water pipes ensure the integrity of the system, and minimize risks of contamination, flooding, blockages and collapsed pipes, although the high cost of inspections limited their abilities to do so. Their mission was to reinvent this process in order to minimize these sunk costs for continuous inspections while maintaining employee safety.

EQUIPMENT USED

A Pipe Crawler was a perfect solution for Renfrew's high inspection costs. At the time,this system cost USD$13,000 to purchase, and gave their internal staff the ability to effectively inspect pipelines 8 - 36" in diameter.

Internal, on-board batteries mean that no generators or topside power sources are required. Traditionally, CCTV inspection systems require a dedicated truck for all of the components including a tether, winch, and power source. The crawler packs down into two carrying cases and can be set up and deployed in less than a minute.

RESULTS

Nearly immediately upon purchase, everyone on the municipality's team was able to operate the handheld controller, maneuver the CCTV camera and view the live video feed on the unit's super-bright integrated screen. The first day of ownership, Renfrew successfully used the crawler to inspect a 10" storm pipe that would have previously been contracted out. "Another reason we opted to purchase the equipment was to deploy the camera on our schedule rather than waiting on a contractor." - Lane Cleroux, Town of Renfrew

TORONTO WATER - CASE STUDY

Mission Objective

The goal of this particular mission was to evaluate the condition of a combined sewer and storm water tunnel for Toronto Water. PipeTek needed to provide a report of the tunnel and associated pump and intake structures to determine the best next steps for managing the structure.

Equipment Used

Since this was a 530m long, fully submerged tunnel, the REVOLUTION ROV was chosen for the task. Longer tunnels with sediment in the bottom proved to be more difficult for pipe crawlers, robots that PipeTek had significantly more experience with at the time.

The problem with pipe crawlers is that their wheels or tracks stir the sediment, obstructing the view of the tunnel. They also have a shorter range of view, because their cameras can only raise so far from the bottom of the tunnel. Human entry in this long of a tunnel would be far too dangerous. By utilizing a free swimming ROV with an imaging sonar, PipeTek was able to capture a thorough report of these tunnels and structures.

Results

Overall, this was a complete success despite having zero visibility for the camera. Using the imaging sonar combined with the flexibility of the rotating camera head on the REVOLUTION, PipeTek was able to identify several points of interest for Toronto Water to evaluate and plan to reinspect, such as protruding laterals, pits, cracks, and sediment levels. Not only were these points of interest located and photographed, they also were able to measure these with the sonar tools available.

SUSTAINABLE SOLUTIONS FOR EFFLUENT TREATMENTS

Whether the concern is to maintain water quality or supply consistent intel on asset conditions, key challenges can be identified easier by robotic CCTV inspections. The integrated sondes of the Pipe Trekker A-Series greatly improve efficiency. Offering a visual inspection alongside location identification, workers can pinpoint exact locations of concern for targeted section maintenance.

About the Author

Riley Kooh
Content Manager, Pipe Trekker

Riley has been the Content Manager at Pipe Trekker since late 2020. His experiences in the field working with dedicated customers in sewer, stormwater, general infrastructure, and other industries have shaped his work with various case studies and editorials about the use of robotics for pipe inspections. As a goal to limit the need for dangerous confined entry for workers around the world, Riley's work highlighting the benefits of remote inspections can be seen published in Trenchless Technology Magazine, The Journal of Ocean Technology, International Water Power and Dam Construction Magazine, Subtel Forum, and more.

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EVERGREEN LANDIA MIXERS ALL PART OF GARDNER'S HIGH STANDARDS

Christopher French, founder of POD Public Relations & Marketing Limited

Some might consider the relentless maintenance regime at a treatment plant in Kansas to be almost too pro-active. But the longevity and reliability of this site's equipment speaks volumes for the way this wastewater facility is run; not to mention the multiple awards it has won.

At Gardner, just south west of Kansas City, Site Superintendent Scott Millholland is a firm believer in keeping the Kill Creek Water Resource Plant clean, fully serviced and at optimum efficiency – at all times. Protecting the environment, waterways and his team are paramount.

Scott recently completed 25 years' service (the past 12 as Site Superintendent), seeing in the Kill Creek facility when it was built in 2002 by Kruger as a Bio-Denitro-phased oxidation ditch technology plant. Also there since the plant first opened are two mixers made by Landia, which help keep everything in suspension in the 'racetrack' nitrification/denitrification set-up. "These Landia mixers continue to keep everything moving and do a very good job for us," said Scott. "We pull them up every Spring and Fall to pull off any rags and make sure there's nothing on the magnetic plug rings – and after checking them over, put them right back into service. They're an integral part of what we do here."

In the corrosive world of wastewater treatment that Scott knows very well, his view on all that pro-active maintenance is partly summed up with the statement that 'oil is cheap! "We didn't have to carry out any type of rebuild on the first Landia mixer until it had completed 14 years of service," he said. "We look after them properly, but they're a strong, solid design

and very easy to maintain. Equipment should always be maintained properly, but clearly, the mixers made by Landia are truly built to last. After our rotors have been on for an hour and a half, we run the mixers for 45 minutes. At just 13 amps, they are super-low on energy usage, especially when compared to blowers.

We've just replaced 130-amp (125HP) blowers with new units that are just 50 amps, so it has been a very quick payback." Keeping 21-year-old mixers in tip-top condition is just one of the many reasons that Gardner has rightly been recognized as an outstanding wastewater treatment facility. Each of the 23 lift stations in and around Gardner are also checked every day to ensure that all of the wastewater is getting through properly. Serving a population that has leapt from 6,900 people (in 1998)

to a figure approaching 25,000 today, Kill Creek has won the Kansas Water Environment Association (KWEA) Wastewater Treatment Plant of the year seven times, and in 2020, Scott Millholland received the William D. Hatfield Award for Wastewater Operator of the Year. The coveted title honors operators who have contributed positively to preserving and enhancing the water environment through their leadership, example, enthusiasm and hard work. Scott not only oversees the entire facility, leading and mentoring his team, but also still works as an operator and mechanic/engineer.

NEVER COMPROMISE ON TREATMENT QUALITY

"Building a better community today for future generations really inspires me," added Scott, "and our team takes great pride in protecting the local environment and waterways. We haven't had a permit violation for over two decades. The plant here was originally designed to serve a population of 25,000 can, but never compromise on treatment quality."

In addition to significant population growth, Kill Creek Water Resource Plant is also having to meet the new he mixers from Landia, will play their part."task of reducing phosphorous and nitrogen outputs to meet ever stricter discharge permits.

A LONG WAY ON ITS JOURNEY

"We've made some operational process adjustments to tackle this," said Scott, "and will continue to keep on top of it. "Gardner has come a long way on its journey from lagoons, fixed film plant with trickling filter, rotating biological contactor, chlorine, package plant – and then full treatment plant. We used to do pretty much everything on an on-call basis, from checking the water and wastewater plants, water breaks, turning meters on and off, and anything and everything else that needed to be done. For new challenges such as reducing phosphorous and nitrogen, all of our equipment, no matter how new or old, including the mixers from Landia, will play their part."

About the Author

Mandar Vaijanapurkar is an experienced business manager in the mechanical and industrial engineering industry. With a strong background in product management, business strategy, key account management, and business development, he has proven himself as a skilled sales professional.

Mandar has been an integral part of Danfoss India close to two decades, specializing in the sales and marketing division for Danfoss Drives. With his expertise and dedication, he has played a crucial role in driving the success of the company in the India region.

Christopher French
Founder of POD Public Relations & Marketing Limited

APPLICATION OF ADVANCED AUTOMATION AN CHEMOSTAT BIOREACTOR IN THE DYES & CHEMICALS AND REFINERY SECTORS

Devendra Singh Fonia, Chief Marketing Officer for Bio Petro Clean Ltd.

Bio Petro Clean India Pvt Ltd (BPC India) stands as the wholly-owned Indian subsidiary of Bio Petro Clean Ltd in Israel (BPC Israel), a distinguished provider of wastewater treatment technologies and solutions. Over the past decade, BPC India has been at the forefront of delivering 100% "Made in India" solutions for wastewater treatment plants across multiple sectors in India. Additionally, these solutions have been successfully exported to Israel, South Africa, and Nigeria from India.

BPC's comprehensive technology and solutions portfolio includes:

a. Automation Packages: These packages are coupled with operational supervision for both new and existing wastewater treatment plants, facilitating consistent treatment quality while simultaneously reducing operational expenses.

b. Advanced Automated Chemostat Bioreactor: Designed for both new and existing wastewater treatment facilities, this technology enables the achievement of higher treatment quality, increased flow rates utilizing existing infrastructure, and the reduction of operational costs. It's particularly effective at treating challenging contaminants present in wastewater, such as phenols, glycols, BTEX, high shock loads of ammonia and sulphides, and volatile compounds like BTEX.

c. Digitization Solutions: BPC offers digitization solutions for water and wastewater treatment plants, including Reverse Osmosis (RO), Effluent Treatment Plants (ETP), and desalination sites. These solutions streamline data collection, centralize data analytics, and provide deep insights to reduce operating expenses, predict operational disruptions, and elevate treatment quality. Notably, these solutions can be implemented swiftly, typically within a week.

All these solutions are offered in a Build-Own-Operate (BOO) mode, with monthly billing, and come with a comprehensive guarantee of consistent treatment quality, even for challenging effluents.

This case study offers a brief insight into how the application of these technologies in the Dyes & Chemical Sector and Refinery sector yielded higher quality treatment and increased recovery rates using existing infrastructure.

DYES & CHEMICAL SECTOR:

The primary objective of a Dyes & Chemicals factory in Surat, Gujarat was to treat effluent to meet the inlet standards of the industrial zone's Common Effluent Treatment Plant (CETP). This endeavor was complicated by high Total Dissolved Solids (TDS) levels, persistent fluctuations in Chemical Oxygen Demand (COD), and pH.

Previously, the company had attempted two biological treatment technologies, SBR and MBR, but encountered difficulties due to the following issues:

- High TDS Levels: TDS levels fluctuated between 15,000 ppm and 30,000 ppm

- Fluctuating COD and BOD: High and fluctuating COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand) at the process inlet.

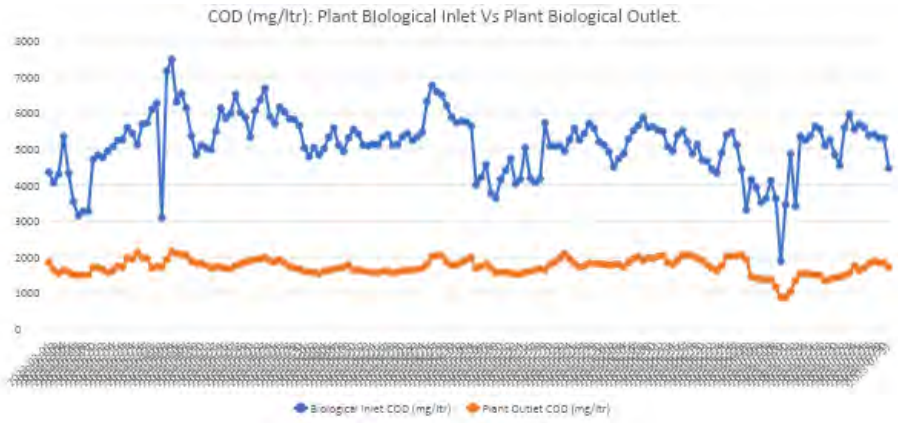
These challenges resulted in continuous upsets of the biological treatment systems, ultimately rendering the systems incapable of achieving the requisite treatment quality and quantity.

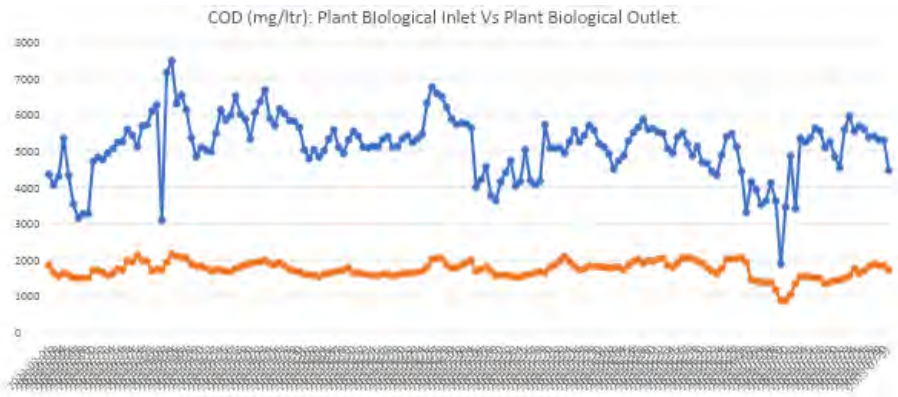
BPC India was entrusted with the task of upgrading the Effluent Treatment Plant (ETP), with the goals of:

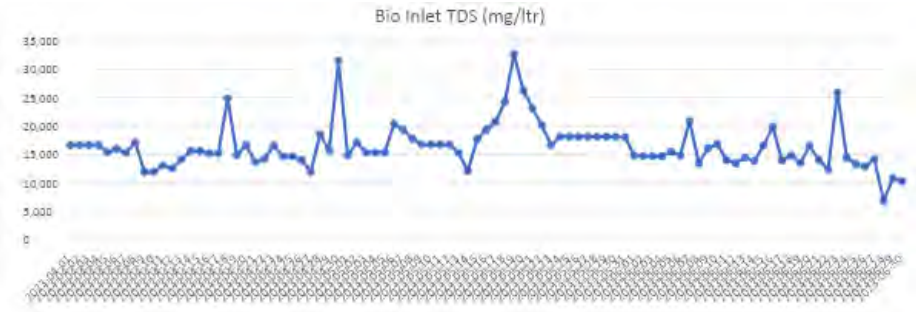
1. Treating 4 MLD (Million Liters per Day) flowrates within the available space.
2. Developing a biological treatment process capable of handling high and fluctuating TDS levels.
3. Maintaining COD levels below 2000 ppm in the treated effluent.

BPC's Automated Chemostat Bioreactor (ACT) system was instrumental in addressing these challenges, managing high and fluctuating TDS levels (averaging around 20,000 ppm with occasional spikes up to 35,000-40,000 ppm) and rapidly fluctuating COD levels. The ACT Bio-Process effectively treated elevated COD values with fluctuations and ensured that the outlet COD remained at approximately 2,000 ppm, even when dealing with high and fluctuating TDS levels in the wastewater.

An additional critical aspect of the project involved chemical dosing automation for pH adjustment. Inlet pH levels ranged from 0 to 2, making it a commercial challenge to maintain pH levels between 6 and 7. BPC's automated chemical dosing system, which utilized controlled dosing of lime slurry, played a pivotal role in stabilizing the process while simultaneously reducing the consumption of lime slurry through precise dosing, resulting in cost savings.







This Crude Oil Refinery Complex in India is equipped with two Effluent Treatment Plants (ETP's), each designed to handle a flow rate of 400 m³/hour. However, due to significant fluctuations in effluent parameters, these ETP's struggled to meet the required treated effluent standards for discharge and to supply the Reverse Osmosis (RO) feed, leading to excessive consumption of freshwater.

Both ETP's adhered to conventional designs,

encompassing inlet tanks, TPI separators, equalization tanks, Dissolved Air Flotation (DAF), pH Neutralization, Bio-towers, Activated Sludge Process (ASP), Bio-Clarifiers, and Sand & Carbon Filters. The Refinery had received a notice from the National Green Tribunal of India, necessitating an improvement in the ETP's performance within a 6-month timeframe.

In 2019, after careful consideration, the Refinery opted to partner with BioPetroClean (BPC) for this upgrade on a Build-Own-Operate (BOO) basis. The Refinery faced the challenge of sudden surges in Oil and Grease, Chemical Oxygen Demand (COD), Ammonia, and sulphides, leading to continuous upsets in the pre-treatment and biological treatment sections. This resulted in effluent failing to meet specifications and being rejected by the UF-RO unit, which was installed to recycle wastewater, thereby necessitating a significant intake of freshwater to compensate for the non-compliant effluent.

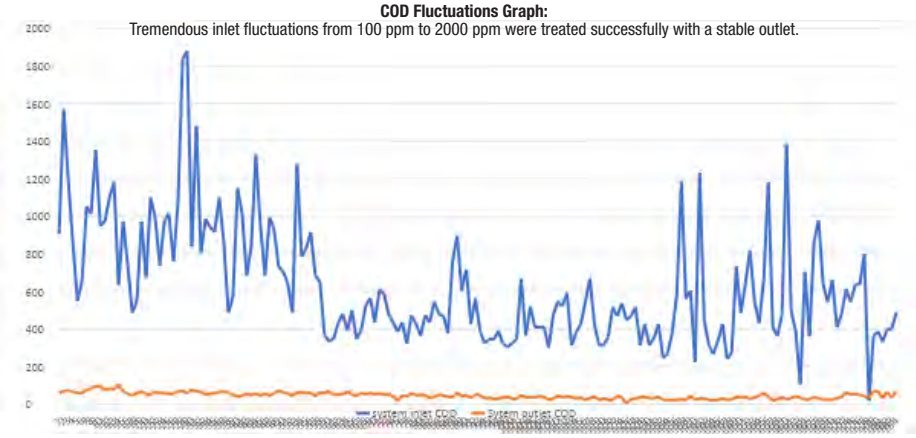
BPC successfully completed the upgrade of both ETP's within the allotted 6 months, seamlessly integrating its technologies into the existing infrastructure with minimal disruption to operations. The upgrade comprised the following key elements:

1. Implementation of BPC's Wastewater Treatment Plants Process Automation Package.
2. Application of BPC's advanced Bio-remediation technology.
3. Deployment of BPC's PureBI, a digitization platform for real-time data collection and predictive analytics in water and wastewater treatment plants. PureBI continually monitors and optimizes process efficiencies and treatment costs in real-time, utilizing integrated AI and ML to predict potential disruptions in treatment processes and costs, allowing for proactive prevention.

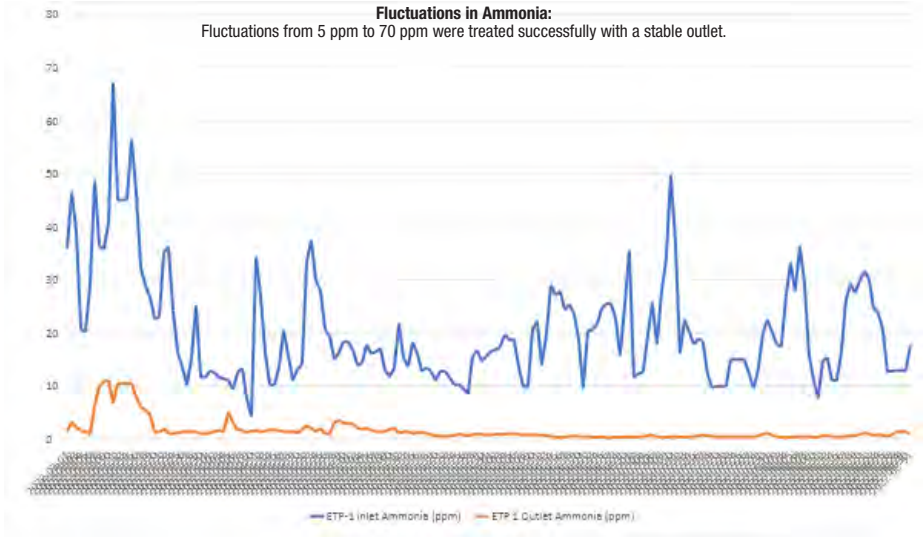
Following the upgrade, both ETP's consistently achieved high-quality effluent, even when faced with fluctuations and values exceeding their original design specifications. The treated effluent could be used directly as RO feed without requiring dilution or storage in off-spec effluent tanks. This led to a remarkable 90% reduction in freshwater consumption at the refinery complex, resulting in substantial operational cost savings.

BPC has been efficiently managing this BOO site for four years since 2019.

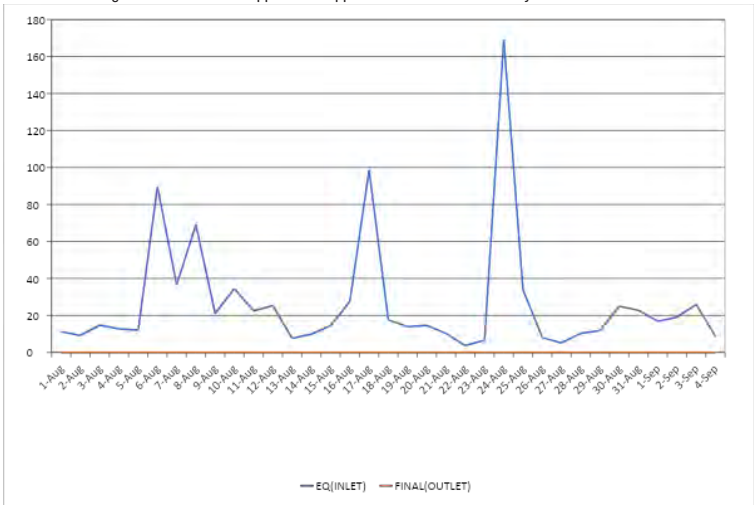
COD Fluctuations Graph:
Tremendous inlet fluctuations from 100 ppm to 2000 ppm were treated successfully with a stable outlet.



Fluctuations in Ammonia:
Fluctuations from 5 ppm to 70 ppm were treated successfully with a stable outlet.

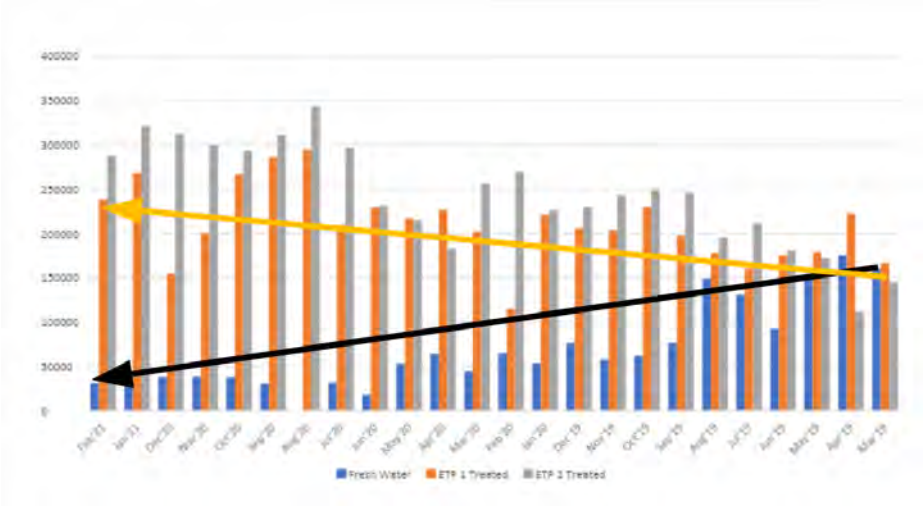


Fluctuations in Sulphides:
Huge fluctuations from 3 ppm to 170 ppm were treated successfully with a stable outlet.



Upgrade Accomplishments.

Re-use of Treated Effluent from ETP-1 and ETP-2 increased from 50 % to 100%. **(Yellow Arrow)**
Fresh Water Consumption was reduced by 90%. **(Black Arrow)**



PHOTOGRAPH OF THE SYSTEM

The following two case studies serve as compelling examples of how closed-loop automation, advanced biological treatment methods, and digitization can significantly enhance the quality and consistency of wastewater treatment, as well as boost the capacity of existing treatment facilities, all without the need for additional infrastructure. Moreover, these upgrades can be efficiently executed in a relatively short timeframe and often fit well within Build-Own-Operate models, reducing the need for upfront capital investments.

About the Author

Devendra Singh Fonia
Chief Marketing Officer for
Bio Petro Clean Ltd.

Bio Petro Clean is a wastewater treatment technology and solutions company from Israel, with it's focus firmly on developing and bringing disruptive technologies to the market.

Devendra Singh Fonia is the Chief Marketing Officer for Bio Petro Clean Ltd. Devendra has worked as an HSE professional for over 16 years and has been with Bio Petro Clean Team for over 12 years. He has worked in multiple geographies (India, Middle East, Africa, Europe, & Southeast Asia.

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DID YOU KNOW?

Water has a memory! Researchers have discovered that water can retain information even after exposure to various substances. This fascinating property is still being studied for potential applications in water treatment and storage.

ASSESSMENT OF KAILASANATHAR TEMPLE POND WATER QUALITY IN SEVILEMEDU, KANCHIPURAM, TAMIL NADU, INDIA

Dr. P. Meenakshi, assistant professor in department of Civil and Structural Engineering at SCSVMV University

INTRODUCTION

The Swajaldhara scheme was launched by the Department of Drinking Water Supply & Sanitation (DDWS), Government of India (GOI) as a reform in the water sector. This allows establishment of village-based schemes with involvement of the Panchayats and the community. Installation of one such scheme was facilitated by the NGO, Child in Need Institute

Ecological components of water are very significant for all existing organisms and the future of the earth. Every organism in the environment is linked to each other with a live connection. Thus, the deterioration that arises in a part of the system disturbs the whole structure over time. Water is the main source of life and cannot be replaced by other environmental components.

There are two main water bases on our planet. The first sources of water are surface sources called oceans, rivers, lakes and ponds. Surface water is a basic need for various classes of plants and animals that depend on the quantity and also depend on the quality of the water to live on the earth. The second source is groundwater, which is stored under the earth's surface in aquifers. This groundwater feeds our ponds, rivers and oceans and provides drinking water for biosphere.

These two sources of water resources are serious to life on earth, both can become contaminated in dissimilar ways. Maintenance of surface water quality is important for the earth's surface. It is caused by many factors, vegetation, atmospheric chemistry, geology, and anthropogenic activities. Mineral solubility in water causes extreme amounts of certain species of chemicals in natural waters. Carbonates are evaporating and dissolve rapidly and change the structure of water quicker, while other minerals silicates dissolve gradually and have fewer conspicuous effects on the structure of water. Most of the difficulties that people are facing in the current years are associated water quantity and water quality. Water should be preserved and protected from all kinds of contaminants. Water is an essential ingredient for the life. But today's water resources are polluted by various toxic substances, industrial impurities and anthropogenic activities that result in some difficulties, such as bathing and irrigation activities; moreover, this leads to water shortages for humans and the environment.

TEMPLE POND

- Temple ponds are the water reservoirs built as part of the temple complex. Most of the temple tanks having perennial water source help to keep the surroundings moist and cool. It recharges the underground water.

- Temple Ponds are traditional rain water storage structures built near the temples. In olden times, the water in the ponds was used for drinking purpose. In recent days it is used for bathing, washing and poojas.

- Temples serve as grounds for social and cultural interactions between peoples. The maintenance of healthy temple pond water needs proper monitoring of temple ponds. It will prevent the further deterioration of pond water.

IMPORTANCE OF TEMPLE POND WATER STUDY

- Temples provide a peaceful environment with Vedic chants and ringing bells. Water is the source of life, absorbing positive energy. The energy of Vedic chants and rituals reside in the temple pond water, touching or bathing in those sacred water will give new energy.

- The good quality of water will maintain the good eco system in and around temple pond.

- Kanchipuram is a temple city, now a day's temple ponds has reduced water level, increased pollution due to anthropogenic activities, seasonal variation. Hence, it is important to analyze the temple pond water.

TEMPLE POND

Temple pond pollution was primarily created due to anthropogenic activities, the main sources of pollution shown in Figure 1. Kailasanathar temple pond; the pollution created is due to poojas done in the pond, bathing and surrounding water discharged into the pond.

STUDY AREA

The study area was selected in Kanchipuram city. The study area temple pond has an elevation of 83.2 m (273 ft) above sea level. Kanchipuram is one of the prominent temple cities in South India. It is a conservative and tourist place, with a population of more than 1,70,000 people. This temple, whose presiding deity is Kailasanathar and whose mother is Kamakshi, is 1000 years old and constructed by pallavas. The place was called shiva linga medu in ancient times and corrupted to sevilimedu to the present day. The temple is located about 5.5 Kms from Kanchipuram. The pond present inside the temple is called Raahu Ketu theertham. It is on the north side of the temple. Two wells are present inside the pond. Poojas and thepam festival were conducted in the temple pond. This temple is called as Rahu Ketu sthalam.

TEMPLE POND DETAILS

Latitude	:	120 50' 32.20"N
Longitude	:	790 41' 23.16"E
Size	:	17m x 17m
Area	:	289 m^2
Activities	:	Temple usage, pooja activities, holy dip

SAMPLING OF WATER

The water sample was collected in the temple pond during the pre-monsoon (April), monsoon (September), and post monsoon (December) periods in the year 2018. The condition of pond water pre-monsoon, and post monsoon, as shown in Figure 2 and 3. A clean one litre polythene water bottle was taken, and it was immersed in pond water and rinsed two times. The sample water was collected up to the top level of the bottle, which was then tightly closed. The water sample was then transferred to the laboratory for testing of various water quality parameters. The standards and the measured water quality parameters are shown in Table 1 and Table 2.

FIG 2.
POND WATER CONDITION IN THE PRE – MONSOON PERIOD

FIG 3.
POND WATER CONDITION IN THE POST – MONSOON PERIOD

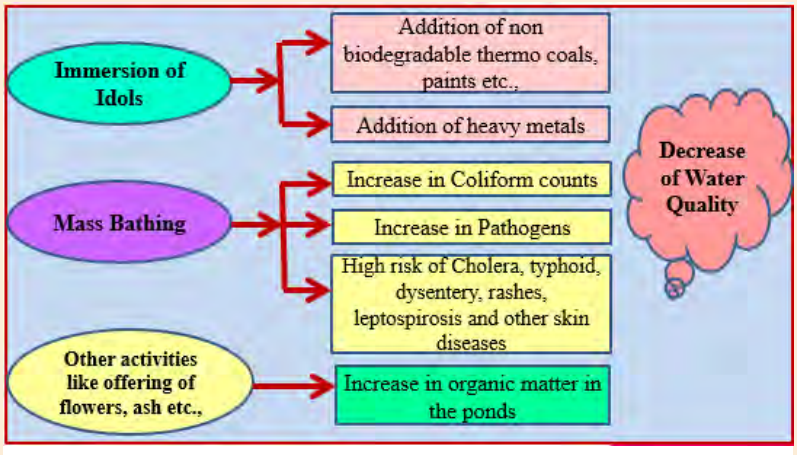

FIG 1. SOURCES OF TEMPLE POND WATER POLLUTION

DID YOU KNOW?

Water scarcity affects more than 2 billion people globally. Despite Earth's abundance of water, only about 2.5% is freshwater, and much of it is inaccessible in glaciers and ice caps.

ISI – IS 2296 – 1982 Tolerance Limits for Surface Water in Various Classes (A,B,C,D,E)								
Sl.No	Water Quality Parameters (WQP)		UNIT	A	B	C	D	E
1	pH	pH		6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5
2	Electrical Conductivity	EC	µmho/cm	-	-	-	1000	2250
3	Colour	Colour	Hazen	10	300	300	-	-
4	Dissolved Oxygen	DO	mg/l	6	5	4	4	-
5	Biological Oxygen Demand	BOD	mg/l	2	3	3	-	-
6	Total Dissolved Solids	TDS	mg/l	500	-	1500	-	2100
7	Chloride	Cl	mg/l	250	-	600	-	600
8	Sulphate	So4	mg/l	400	-	400	-	1000
9	Total Hardness	TH	mg/l	300	-	-	-	-
10	Calcium	Ca	mg/l	200	-	-	-	-
11	Magnesium	Mg	mg/l	100	-	-	-	-
12	Fluoride	F	mg/l	1.5	1.5	1.5	-	-
13	Ammonical Nitrogen	AN	mg/l	-	-	-	-	-
14	Total Nitrogen	TN	mg/l	-	-	-	-	-
15	Phosphate	P	mg/l	-	-	-	-	-
16	Silica	S	mg/l	-	-	-	-	-
17	Iron	Fe	mg/l	0.3	–	50	-	-
18	Arsenic	As	mg/l	0.05	0.2	0.2	-	-
19	Lead	Pb	mg/l	0.1	-	0.1	-	-
20	Copper	Cu	mg/l	0.1	-	1.5	1.5	-
21	Zinc	Zn	mg/l	1.5	-	15	-	-
22	Total Coliform Count	TCC	MPN	50	500	5000	-	-

Table 1. Water Quality Parameters and Surface Water Standards

Class A – Drinking water source without conventional treatment but after disinfection.
Class B – Out door bathing.
Class C - Drinking water source with conventional treatment but after disinfection.
Class D – Fish culture and wild life propagation.
Class E – Irrigation, industrial cooling or controlled waste disposal.

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Table 2. Measured Water Quality Parameters Values in Different in Seasons

WQP	PRM Values	Class of Water in Pre Monsson					MON Values	Class of Water in Monsson					POM Values	Class of Water in POST Monsson				
		A	B	C	D	E		A	B	C	D	E		A	B	C	D	E
pH	7.47						7.6						9.31					
EC	248						754						252					
Colour	Nil						Nil						Nil					
DO	7.3						6.3						6.3					
BOD	Nil						Nil						Nil					
TDS	161						428						164					
Cl	23						80						41					
So4	10						8.9						19					
TH	166						160						90					
Ca	22						32						13					
Mg	27						19						14					
F	Nil						Nil						Nil					
AN	1.7						Nil						4.2					
TN	7.5						Nil						12.9					
P	7.2						Nil						8.3					
S	Nil						Nil						Nil					
Fe	0.72						Nil						0.04					
As	<0.01						Nil						<0.01					
Pb	<0.01						Nil						<0.01					
Cu	<0.01						Nil						<0.01					
Zn	<0.01						Nil						<0.01					
TCC	500						Nil						1600					

	Measured values with in Standard limit
	Measured values greater than in Standard limit
	Measured values with in Safe limit

RESULT AND DISCUSSION

- The pH of a water indicates the concentration of hydrogen ion. pH is a sign of the survival of biological life. Measured values indicate the temple pond water is within safe limit for the pre-monsoon and monsoon period, in the post monsoon period, the water has a greater pH value due to the discharge of all surrounding water into the pond.

- Electrical conductivity values vary depending on the various ions present in the water body, their comparative concentrations, and the ionic strength. EC is a helpful tool to assess the purity of water. Class A, B, and C no limit given for electrical conductivity Given that the pond water is safe in three seasons, the class D, E limit is met.

- The dissolved oxygen plays a most significant role in the survival of aquatic life. The existence of DO is essential to preserving the higher forms of natural life and keeping an appropriate balance of the various pollutions, thus keeping the water bodies healthy. The measured values were greater than the standard limit in three seasons. The DO is acceptable for 6 to 8.5 mg/l for pond water. Hence, the pond water is safe in all three seasons.
- The total dissolved solids are the suspended and dissolved matter present in water. In three seasons, the measured TDS values were within given standard limit according to classes A, C, and E.
- Chloride is a natural element; hydrogen chloride is in its dissolved form. It is present in nature as a salt. In three seasons, the measured chloride values were within given standard limit according to classes A, C, and E.
- Sulphate ions are naturally present in water. Sulphate is mixed into pond water by infiltrating waters and surface runoff. In three seasons, the measured sulphate values within the given standard limit according to classes A, C, and E.
- The hardness of water is a measure of its capability to form precipitates with soap and scales with certain anions present in the water. The limit given for class A only includes measured values less than 600 mg/l in three seasons. The pond water is safe in all classes according to hardness.
- Calcium serves as one of the important micro nutrients in organisms. The limit given for class A only includes measured values less than 200 mg/l in three seasons. The pond water is safe in all classes according to calcium.
- Magnesium is commonly found to be associated with calcium in all variety of waters, but its deliberation remains generally lesser than that of calcium. For chlorophyll growth, magnesium is needed. The limit given for class A only includes measured values less than 100 mg/l in three seasons. The pond water is safe in all classes, according to magnesium.
- Ammonical Nitrogen is extremely soluble in water, reacting with water to produce ammonium hydroxide, it is part of the nitrogen cycle, which is influenced by biological activity.
- Total Nitrogen is an essential nutrient for plants and animals. An excess amount of nitrogen in a waterway may lead to low levels of dissolved oxygen and negatively alter various plant life and organisms.
- Phosphorus is an essential nutrient for plants and animals. Excessive phosphorus in surface water can cause explosive growth of aquatic plants and algae. This can lead to a variety of water-quality problems, including low dissolved oxygen concentrations, which can cause fish kills and harm other aquatic life.
- Ammonical nitrogen, total nitrogen and, phosphate and silica limits are not given, hence the pond water safe in three seasons according to all classes.
- Iron is the nutrient element for humans. It is an important mineral for the production of haemoglobin. The heavy metal iron limit for class A is 0.3 mg/l, in pre-monsoon the measured value greater than the limit, other

classes with in the limit. In the monsoon and post monsoon period; the pond water is safe from content according to class B, C, D, E.

- The remaining heavy metals arsenic, lead, copper and, zinc is within the standard limit. Hence, the pond water is safe from these heavy metals.
- A microbiological test is used to detect the level of pollutions caused by living things. This produces pathogenic diseases on fish. The class C standard maximum value is 5000 MPN. The measured values indicate, according to class A, that the pond water has greater (50 MPN) value of coliform count in pre-monsoon and post monsoon. In post monsoon, the value was greater (500 MPN) than class B standards. The result indicates the pond water not directly useful for drinking purpose.

About the Author

Dr. P. Meenakshi is working as an assistant professor in department of Civil and Structural Engineering at Sri Chandrasekharendra Sraraswathi Viswa Mahavidyalaya (SCSVMV) University in Enathur. Kanchipuram district. Tamil Nadu, India. She completed a B.E in Civil Engineering, an M.E in Construction Engineering and Management, and a Ph.D. in water pollution. She has 19 years. of teaching experience

Dr. P. Meenakshi
Assistant Professor, SCSVMV University

CONCLUSION

The Kailasanathur temple pond water quality was studied in the three seasons. The result showed that in the pre - monsoon period, the iron value was 0.72 mg/l and the coliform count was 500 MPN greater than class A surface water standards, it was not directly used for drinking purposes. It is safe in class B, C, D, and E. The pond water is safe for bathing, fish culture, irrigation, gardening, and drinking after purification with conventional treatment followed by disinfection. According to the monsoon period, all the measured values were within limits according to all classes, hence, it is directly useful for drinking and other purpose. The result compared to post monsoon period is that the pH value is greater (9.31) than the standard limit according to all the classes. The coliform count value was greater 1600 MPN in compared to classes A and B. The pond water, with proper treatment, can be useful for all purposes. Hence, the study indicates that rain water will purify all impurities in the pond. Protection of pond and avoiding mixing of surrounding water into the pond will provide safe water in the temple pond.

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UNLOCKING THE TRUTH: DISCOVERING NEW INSIGHTS ON FLUORIDE AND FLUOROSIS-AFFECTED LIVES IN NALGONDA DISTRICT

Yashi Gautam, Assistant Program Lead, S M Sehgal Foundation

It is difficult to gauge how strong people are from the outside. It is commonly believed that physical strength equates to overall strength. However, this realization dawns upon us when we meet someone extraordinary. It's hard to imagine a disease that prevents you from doing physical activities that most people can easily do and gradually ages you faster than your natural pace of aging. Unfortunately, many suffering people are unaware of the reasons behind their weak or crippled legs and their inability to walk or even to stand straight. Often, they mistake these pains for normal body aches and seek medical attention, which can inadvertently worsen their condition. This unknown threat, known as fluorosis, has had serious health consequences for affected individuals.

Fluorosis is a condition that occurs when an excessive amount of fluoride is ingested into the body. It primarily affects teeth in the form of Dental Fluorosis and bones in the form of Skeletal Fluorosis and other non-skeletal manifestations. Therefore, fluoride is often described as a "double-edged sword" because it has both positive and negative effects, depending on its concentration and how much a person is consuming. The primary source of excessive fluoride intake is through drinking water with high fluoride levels. Other sources include certain foods, beverages, and respiratory exposure.

Many states in India, including Andhra Pradesh, have experienced a significant number of fluorosis cases, and numerous communities have been affected to varying extents. One such worst affected region is the Nalgonda district in Andhra Pradesh, where the groundwater contains a high concentration of fluoride. The impact of fluorosis in this area has reached even the fourth generation, with dental, skeletal, and neurological symptoms observed among children and individuals of various age groups.

This highlights the long-lasting and multi-generational effects of fluoride contamination in the region. Mission Bhagiratha has already succeeded in preventing new cases of fluorosis in the district by supplying fluoride-safe water to every house and eliminating risk from one of the major sources of fluoride. The state Government schemes have brought down the concentration of fluoride to less than the permissible limit which is 1.5mg/L (BIS). A remarkable individual named Mr. Kanchukatla Subhash is a fluorosis victim turned activist who has been awarded the esteemed Seva Ratna Puraskar for his extraordinary contributions.

Mr. Subhash has been a vocal advocate for addressing the issues surrounding fluorosis since 1992. Despite facing numerous challenges, he successfully conveyed his thoughts, aspirations, and opinions to the legislative assembly. As a result of his relentless efforts, approximately 10,000 liters of pure drinking water have been provided to approximately 1,177 villages in and around Nalgonda district. His dream of bringing Krishna water for domestic and irrigation use to the Nalgonda district is now a reality with the government's support. This accomplishment is seen as the most effective means of eradicating fluorosis from the region once and for all.

S M Sehgal Foundation with the support of Dr. Reddy's Foundation and Inrem Foundation, conducted a field visit to Nalgonda district, where they had the privilege

of meeting the esteemed Mr. K Subhash. Mr. Subhash, who himself has been affected by fluorosis, provided valuable insights and firsthand experiences on the subject of fluoride and fluorosis. He emphasized the critical importance of consuming fluoride-free water, which is being provided to the people of the district.

During the meeting, Mr. Subhash expressed his appreciation for the Government's efforts in preventing fluorosis in the district. However, he also highlighted a concerning issue: the lack of sensitization and awareness among community members. Additionally, he introduced the team to individuals in the district who were mildly affected by skeletal fluorosis but were still hesitant to use water from the Kaveri River due to the difference in taste, as they were accustomed to using RO water.

During further interactions, it became evident that the community members were unaware of the side effects of using RO water. They had been experiencing complaints related to the shortage of minerals in RO water but continued to rely on it. Unfortunately, the use of RO water may actually worsen the pain associated with skeletal fluorosis. Additionally, the community members are uninformed about the crucial role of nutrition in combating fluorosis.

S M Sehgal Foundation took the opportunity to engage with the community and educate them about the significance of proper nutrition comprising balanced diet in addressing fluorosis. They emphasized on the benefits of consuming nutritious food and its positive impact on mitigating and managing the effects of fluorosis. By increasing the intake of calcium, magnesium, vitamin C, and antioxidants, positive outcomes can be achieved to address fluorosis. One natural remedy that offers numerous benefits in the treatment of fluorosis is the consumption of Moringa leaves or its powder. These leaves are a valuable gift of nature as they contain high levels of vitamin C (seven times that of oranges and four times that of carrots), calcium, and magnesium (four times that of milk), potassium (three times that of bananas), and protein (twice that of curd). Including Moringa leaves (having good amount of antioxidants too) in the diet can be highly beneficial in combating the effects of fluorosis.

By imparting this knowledge, the foundation aimed to empower the community with valuable information that could contribute to their overall well-being and the management of fluorosis. This interaction with Mr. Subhash provided valuable insights into the challenges faced by the community and the need for continued awareness-building efforts to address fluorosis effectively in the district.

In the Nalgonda district, the majority of people are compelled to rely on groundwater having high fluoride contamination for their survival. Among the affected individuals is Tirupatamma, who has been battling fluorosis since the age of 12. Tirupatamma not only fights her personal battle but also serves as the convener of the Fluorosis Vimukthi Porata Samithi, a committee dedicated to eradicating fluorosis.

During the meeting, Tirupatamma expressed her gratitude towards Mr. Subhash for his assistance in her fight against fluorosis. She also shared that she had received support from a charitable trust, enabling her to establish a telephone booth and a general store. However, due to advancements in telecommunication sector, she was eventually compelled to close down Tirupatamma experienced joint pain while attending school, but it took time for her to realize that her leg pain and subsequent difficulties in walking were actually symptoms of fluorosis. Over the years, the pain in her legs gradually worsened, eventually leading to a crippling effect. As a result, she became dependent on a walking stick to move around. Despite facing numerous challenges in her life, Tirupatamma never lost hope and instead channeled her energy into becoming a proactive advocate for raising awareness about fluorosis within her community.

TIRUPATAMMA (ON LEFT) WITH A STAFF OF S M SEHGAL FOUNDATION

Her primary goal is to ensure that the future generation is saved from the devastating effects of this silent killer.

Tirupatamma's story exemplifies the challenges faced by individuals affected by fluorosis in the region and the efforts undertaken by both individuals like Mr. Subhash and supportive organizations to alleviate the situation. Witnessing the synergistic endeavors of both Mr. Subhash and Tirupatamma, the S M Sehgal Foundation has extended its support to enhance the community's capacity in the areas affected by fluoride. The foundation is actively involved in sensitizing the communities about the avoidance of RO water and emphasizing the crucial role of nutrition in combating fluorosis. Through these efforts, the foundation aims to empower the community with knowledge and resources to effectively address and prevent the disease.

SM SEHGAL FOUNDATION, DR. REDDY'S FOUNDATION AND INREM FOUNDATION WITH MR. SUBHASH (SECOND FROM THE LEFT)

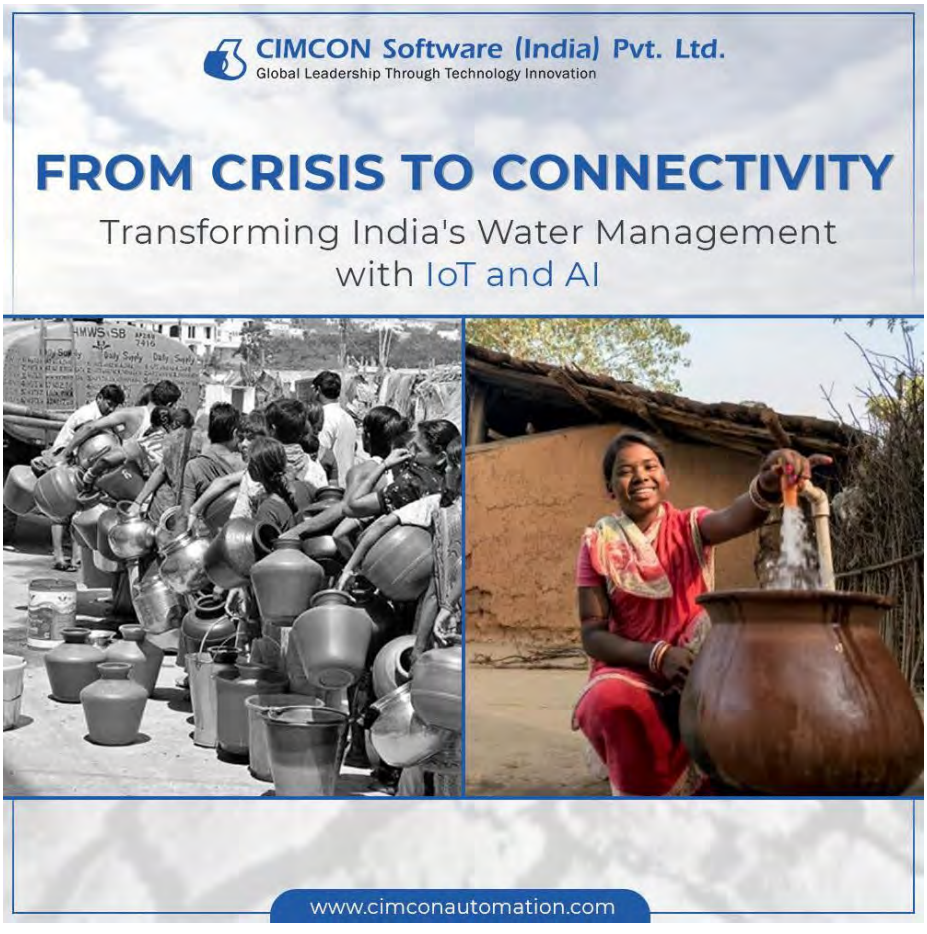
About the Author

As a Biotechnology graduate with a Master's degree in Water Science and Governance, I am currently serving as the Assistant Program Lead at S M Sehgal Foundation, where I am deeply engaged as a trainer and researcher. Recognized for my contributions, I am honored to be featured in the Top 30 Under 30 in 2021 by the Alberta Council for Global Cooperation in Canada. My primary focus lies towards safe drinking water and WASH behavior change among marginalized rural communities. With my research skills, knowledge, and interests related to drinking water, I work with communities and for communities, and support research work to develop sustainable and affordable technological solutions.

Yashi Gautam
Assistant program Lead, S M Sehgal Foundation

FROM CRISIS TO CONNECTIVITY: TRANSFORMING INDIA'S WATER MANAGEMENT WITH IOT AND AI

Vishal Kotadiya | Vice President | CIMCON Digital



India faces a multitude of challenges regarding water security and management, which have become increasingly critical in recent years. The primary issues include over-extraction of groundwater, water pollution, and inadequate distribution of water resources. These challenges are exacerbated by a lack of efficient water management systems, climate change impacts, and conflicts over water resources.

Over-Extraction of Groundwater: India heavily relies on groundwater for various purposes, including irrigation, industrial, and domestic use. This has led to a rapid depletion of groundwater levels, posing a significant threat to water availability in the future.

Water Pollution: The country is grappling with widespread water pollution, which has contaminated both rivers and groundwater. Industrialization and urbanization contribute to this issue, making water unsafe for consumption and other uses.

Inadequate Water Distribution: There is an unequal distribution of water resources across India, with some regions experiencing severe water scarcity while others have a surplus. This discrepancy is a significant challenge for ensuring equitable access to water.

Inefficient Water Management Systems: India's water management systems are often inefficient, characterized by leaky water supply networks and insufficient wastewater treatment facilities. This inefficiency contributes to the loss and contamination of water resources.

Impact of Climate Change: Climate change has led to irregular monsoon patterns and increased the frequency of natural disasters like floods and droughts, further straining water resources.

Conflicts Over Water: As water scarcity increases, conflicts over water distribution and use have become more prevalent among different states, communities, and sectors.

Water Stress and Sanitation Issues: A significant portion of the population lacks access to safe water and sanitation facilities. This situation is aggravated by extreme water stress, contaminated surface water, and the lack of piped water supply. The effects of climate change, such as droughts and rising sea levels, also impact access to safe water and sanitation.

Addressing these challenges is critical for India's sustainable development and requires a combination of policy, technology, and behavioural solutions. Improving water governance, adopting efficient water management practices, investing in water infrastructure, and promoting water-saving technologies are essential steps towards enhancing water security in India. Additionally, there is a need for collaboration and engagement among various stakeholders, including government, civil society, the private sector, and communities, to effectively tackle these issues.

IoT (Internet of Things) and AI (Artificial Intelligence) can play a pivotal role in addressing India's water challenges. These technologies provide innovative solutions that can significantly improve water management, conservation, and quality monitoring.

WATER QUALITY MONITORING:

IoT-enabled sensors can continuously monitor water quality in rivers, reservoirs, and groundwater. These sensors detect pollutants and provide real-time data, enabling swift responses to contamination. AI can analyze historical and real-time data to identify pollution sources and trends, aiding in effective pollution control strategies.

EFFICIENT WATER DISTRIBUTION:

IoT devices can monitor and control the distribution networks, detecting leaks and inefficiencies in the system. AI can optimize water distribution by analyzing consumption patterns, predicting demand, and managing supply accordingly, thus addressing issues of inadequate distribution.

SMART IRRIGATION SYSTEMS:

In agriculture, IoT-based smart irrigation systems can optimize water use. Sensors can measure soil moisture and weather conditions, and AI can process this data to determine the precise amount of water needed for crops, significantly reducing water wastage.

FLOOD AND DROUGHT PREDICTION:

AI algorithms can analyze weather patterns and environmental data to predict floods and droughts with greater accuracy. This allows for better preparedness and response strategies, mitigating the impacts of these natural disasters.

WASTEWATER TREATMENT AND RECYCLING:

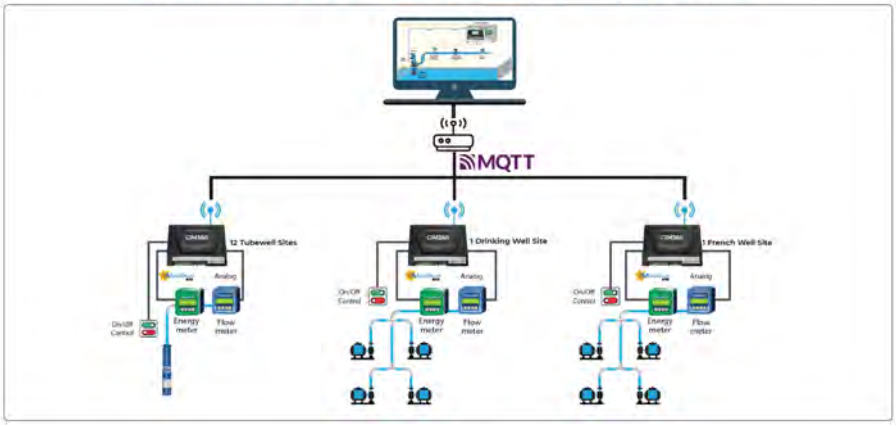
IoT sensors can monitor wastewater treatment processes, ensuring efficient operation and compliance with environmental standards. AI can optimize these processes, identify potential issues before they occur, and improve the recycling and reuse of water.

PUBLIC AWARENESS AND BEHAVIORAL CHANGE:

AI-driven platforms can analyze water usage patterns and provide personalized recommendations to consumers for water conservation. IoT devices can also help in engaging the public by providing real-time data on water usage and conservation tips.

By integrating IoT and AI into water management systems, India can significantly improve the efficiency, sustainability, and resilience of its water infrastructure. These technologies offer a way forward in tackling the complex and multifaceted water challenges the country faces.

System Architecture Overview: Enabling Scalability, Reliability, and Integration



A prime example of this transformation is the implementation of CIM360, an IoT Edge Gateway developed by CIMCON. CIM360 modernizes legacy water SCADA systems, integrating various Operational Technology (OT) protocols like OPC UA and Modbus TCP/IP. The benefits are substantial: improved reliability, real-time data reporting, and enhanced data security. Key features of CIM360 include its reliability, real-time data reporting capabilities, ease of configuration, the ability to incorporate custom logic, over-the-air upgrades, enhanced data security, and capabilities for remote programming. These features collectively contribute to its effectiveness in improving water industry operations. These advancements are not just technical improvements; they represent a paradigm shift in water treatment operations, marking a significant leap towards more efficient, secure, and sustainable water management.

THE BENEFITS OF USING CIM360 IN WATER TREATMENT FACILITIES INCLUDE:

- Improved reliability: Ensures consistent and stable operations.
- Real-time reporting: Offers up-to-date data for better decision-making.
- Ease of configuration: Simplifies the setup process.
- Custom logic integration: Allows for tailored solutions to specific needs.
- Over-the-air upgrades: Facilitates updates without physical intervention.
- Enhanced data security: Protects sensitive information.
- Remote programming: Enables management and troubleshooting from distant locations.

These features collectively enhance the efficiency and effectiveness of water industry operations.

In conclusion, the integration of IoT and AI in India's water management systems presents a viable path towards addressing its water challenges, enhancing the efficiency, sustainability, and resilience of water infrastructure, and ultimately contributing to the nation's sustainable development.

DID YOU KNOW?

Water has an unusual density anomaly, making it densest at around 4 degrees Celsius (39.2 degrees Fahrenheit).

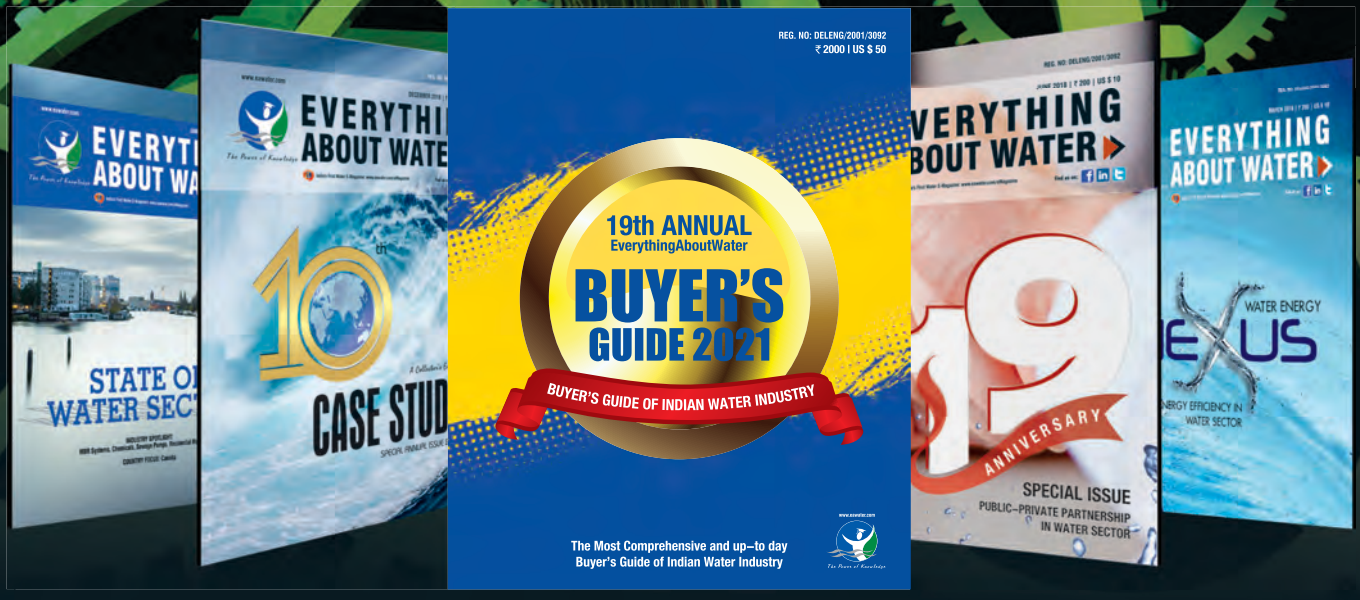
This property is vital for supporting aquatic life, as ice forms on the surface rather than sinking to the bottom.

About the Author

Vishal Kotadiya
V.P. Program Management,
CIMCON Digital

Vishal is at the forefront of technological innovation, providing strategic leadership and vision that propels CIMCON Digital into the era of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT). His expertise extends to the design and implementation of IoT solutions for remote monitoring and control, leveraging his mastery of microcontrollers and sensor technologies. From AI/ML solution development to IoT product design and development, and from firmware development to Python programming, he navigates the complex landscape of emerging technologies with ease. He thrives in dynamic environments, where his expertise transforms challenges into opportunities. Vishal excels in predictive maintenance, video analytics, and transit surveillance, redefining industry standards. As we journey into the future of technology, Vishal stands as a trailblazer, charting the course for a smarter, connected world.

Knowledge That Keeps The Gears Going...



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HAR GHAR JAL: CIMCON'S CONTRIBUTION TO INDIA'S WATER REVOLUTION UNDER JAL JEEVAN MISSION

Dhruv Krishna, Assistant Vice President | CIMCON Software India PVT LTD

CASE STUDY JAL JEEVAN MISSION:

INTRODUCTION

CIMCON Software (India) Pvt. Ltd. (CIMCON) is a global leader and the world's leading independent supplier of Industrial Automation Systems. With over 3 decades of experience, CIMCON has a history of continuous innovation and proven technology with an enviable track record of installing turnkey automation systems that are operating continually and successfully for over decades in mission-critical industries such as Water, Power and Oil & Gas.

Pioneering ease-of-use HMI, SCADA and IoT Products, CIMCON continues to deliver the best information available for making intelligent decisions. CIMCON Group's installed client base spans the globe and includes over 30 countries in North America, Latin America, Europe, Middle East and Asia Pacific. In the same spirit recently our company has started work on close to 2000 TWs, spread across 1700 plus villages in 8 districts of Uttar Pradesh under our Honorable P.M's flagship scheme , i.e. Jal Jeevan Mission.

BRIEF HISTORY OF THE COMPANY

Established in 1988, CIMCON is a pioneer and a global leader in the field of SCADA and Industrial Automation Systems. The word CIMCON stands for Computer Integrated Manufacturing and CONtrol that reflects the company's core focus.

CIMCON's Corporate Offices in the USA plays a crucial role in providing vital inputs for design, development and manufacturing of hardware and software for SCADA and IoT systems for mission critical applications on a global scale. Headquartered in Boston, MA the Technology Hub of USA that leads the world in the development of IIoT based Industrial

Automation Products, CIMCON is ideally placed and has global access to locate and identify the most suitable integrated solutions and hardware platforms in the world for the desired applications.

Since inception some 30 years back, CIMCON has always strived to make technology simple, easy and affordable for every sector across the globe. In line with that objective, CIMCON pioneered the use of easy to understand "FLOWCHART BASED LOGIC PROGRAMMING" that allowed our customers to easily program the most complex control logic instead of requiring dedicated programmers with the knowledge of ladder logic that had limited functionality.

CIMCON products are open, modular, scalable and use the latest advances in object oriented and internet technologies to ensure that our customers can- and-will use CIMCON products for substantial productivity gains. Customers who have used CIMCON products have reported productivity gains of better than 4 to 1 over previous method.

At CIMCON we understand the importance of local presence and have a solid presence in India with over 200+ highly experienced engineers spread across India that have the knowledge, customer focus and dedication to support our customers in mission critical application such as water.

CIMCON is a Total Solutions Company and believes in being its client's partner rather than just a supplier. CIMCON can deliver complete solutions including Hardware, Software and Turnkey Project Implementation and operating services in all key areas of automation.

BUSINESS MISSION

Develop, Market and Support state of the art, open, scalable automation products using software-enabler tools and applications that provide the lowest "Lifecycle Cost of Ownership".

GLOCAL OPERATIONS

CIMCON offers GLObal expertise with loCAL presence with world class, state of the art control systems for India and Asia Pacific through M/s. CIMCON Software (India) Pvt.

SEVERAL FIRST'S TO OUR CREDIT IN INDIA

- First Edge IIoT Platform
- First Vibration based Preventive and Predictive Maintenance System for the Water Utilities
- First Water Distribution SCADA System.
- First SMS based SCADA System for the Water Industry.
- First company to provide FLOW CHART based programming software.
- First Radio Based Electrical SCADA System.
- First Satellite based SCADA System.
- First Telephone based CP SCADA System. First Plant Wide Fibre Optic Network based CP SCADA System.
- First major city-wide NB IoT networked smart street light system.
- First Smart Pole System for Smart City Projects.

EFFICIENT WATER DISTRIBUTION:

CIMCON pioneered the automation of water sector in India nearly 30 years back. The very first project involved automating 100's of water tube wells in Uttarakhand using RTUs (Remote Terminal Units) and SMS based cellular communication network since GPRS based data networks were not supported at that time. The system installed 25+ years back continues to operate even today with the only difference that today the water network is much larger. Several cities in India depend on CIMCON's automation products for their water generation, distribution, treatment, and disposal. These projects have involved the use of state-of-the-art Hardware, MMI software, Advanced Control Algorithms, User Interface Design, Graphics, Database Management Systems, Communication Protocols and use of Artificial Intelligence and Machine Learning.

CIMCON has a proven track record of successfully completing projects on time and on budget, and exceeding client expectations for a high rate of repeat assignments. Technology has always been our strength, but what we believe is even more important is the commitment of our team to keep this mission critical infrastructure running 24x7. Our teams have worked tirelessly over these years even through the most difficult times that we recently witnessed during COVID to keep water supply going without any interruption.

FLOOD AND SAMPLE CLIENT BASE IN WATER SECTOR IN INDIA PREDICTION:

CIMCON has helped several water departments across India for the last 30+ years to automate all aspects of their water that includes the following:

- Water Generation – This includes water generation from tubewells or pumping water from existing sources via multi-stage pumping stations.

- Water Distribution- This involves tank level-based actuator operations, water flow measurement, water quality measurements (pH, chlorine turbidity), monitoring and control of parameters that help improve energy and operational efficiency of the water equipment,

- Water Treatment - Sensors are used to administer water quality parameters like turbidity, pH, total dissolved solids, and salinity. This not only allows water utilities to provide their customers with clean water, but also prevents equipment and pipeline corrosion due to water contaminants. "Digital Twins" help monitor and optimize the water treatment plant's function, optimize energy and chemical usage, and provide data-driven insights for efficiency improvements. It makes it easy to be proactive about finding and solving the problem rather than having to scramble when problems crop up.

- Water Sewage – Data from flow meters, energy meters, and water quality sensors provide valuable insights into the operational efficiency of the plant. Artificial intelligence and machine learning models provide decision support systems to increase efficiency, fix problems quickly, and effortlessly increase regulatory compliance.

- Smart Water – Through real-time data collection powered by IoT technology, the CIMCON iEdge 360 IoT platform facilitates consistent water and wastewater management. Utilizing sensors in the plant, it alerts you to potential failures, reducing the workload of those responsible for physically inspecting the plant.

- Once installed CIMCON has also been involved in the maintenance of these system for 7-20 years. Some of our early systems that were installed 20+ years back are still being maintained by us.

SUMMARY OF JAL JEEVAN MISSION AND OUR ENDEAVORS:

Har Ghar Jal " initiative was started by our Honorable P.M Shri Narendra Modi , wherein lakhs of villages spread across the length and bredth of India , who did not have access to clean drinking tapped water were covered and extensive plans ,Detailed Project Reports were prepared and by utmost collaboration between central and state governments this " Jal Jeevan Mission " having very high funding , close to 10 Billion Dollars was launched.

Now in its 4th Year , the scheme has come a long way and thousands of villages have been covered with setting up of green field infrastructure of both surface and ground water schemes , already covering lakhs of villagers. Uttar Pradesh being a large state and most populous had a very high quantity of such villages which needed to be covered , under the able leadership of C.M Yogi Ji , U.P has been the best performing state both in setting up of infrastructure and providing piped connections to the villagers.

Cimcon has been privileged enough to have a small contribution in this noble work.

Our teams are spread across 8 districts of rural Uttar Pradesh ,and have setup guest house/storage facilities and employed a large team of locals to execute E&I , Electrical and Instrumentations works across close to 1700 plus villages covering a population of around 4 Million peoples spread over 2000 villages.

In this one of our largest project which we have undertaken, and we can proudly say that due to our extensive experience as highlighted in the above brief introduction , we have been fairly successful in implementing and covering such a vast area and we hope to repeat our suc

cess in many more villages and other states.

The TW's and surface water schemes in this JJM project will have the standard SCADA hardware i.e RTU with Flow ,Level Monitoring instruments along with water quality instruments, thereby insuring water quality, supply audit, minimize wastage , enable automatic man less operation through smart logic , all along taking in power from green Solar Energy through solar Grid at each location ,subsequently all linked to central servers at state and central level though SCADA software and GPRS communication.

We can in conclusion say that JJM project is a perfect handshake of use of Digital technology, on a massive scale similar to UPI , in water sector, which in turn is extensively improving the lives of the people at the lowest denominator of our society and at the same time insuring green energy usage and reducing carbon footprint.

About the Author

Dhruv Krishna
Assistant Vice President
CIMCON Software India PVT LTD

Working with CIMCON Software India PVT LTD. as an Assistant Vice President, he is responsible for project execution, client interaction, pre to post-sales activities, various marketing activities, etc. He is based out of Lucknow and manages the region of Uttar Pradesh.Work Experience Details: He has over 15 years of experience in the fields of Sales, Marketing, and Project Execution. He began his career at Reliance Communication as a Retail Manager in Uttarakhand, where he managed retail outlets across the Garhwal Region. Later, he transitioned into the logistics industry and established a startup based in New Delhi. Subsequently, he joined CIMCON, where he has been working for over 10 years. During his time at CIMCON, he played a pivotal role in successfully completing various Water and SCADA projects across Uttar Pradesh under the AMRUT scheme.Currently, he is actively involved in working on projects related to the Jal Jeevan Mission in different districts of Uttar Pradesh.

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TRANSFORMING HEALTH: BIHAR'S COMMUNITY RESPONSE TO WATERBORNE DISEASES THROUGH AFFORDABLE HOUSEHOLD WATER TREATMENT SOLUTIONS

Lalit Mohan Sharma, Aparajeeta, Yashi Gautam, Sumit Kumar,

Ensuring access to safe drinking water is crucial for enhancing living standards and extending life expectancy by minimizing the prevalence of waterborne diseases. Approximately 2 billion people worldwide currently consume microbiologically contaminated water. Annually, approximately 37.7 million individuals in India suffer from waterborne diseases, with an alarming estimate of 1.5 million children succumbing to diarrhea alone, and a consequential loss of 73 million working days due to waterborne illnesses (UNICEF. Clean drinking water ensuring survival and improved outcomes across all outcomes for every child. 2019).

While microbiological contamination is the largest public health threat, chemical contamination can be a major health concern in some cases. Water can be chemically contaminated through natural causes (arsenic, fluoride) or human activity (nitrate, heavy metals, pesticides). According to the Indian Council of Medical Research's "India: Health of the Nation's States" report, the Empowered Action Group States of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, Uttarakhand, Uttar Pradesh, Odisha, and Assam bear a notably high burden of water-related diseases. In this context, the narrative from the rural households of Vaishali district, Bihar, offers a spectrum of the broader water quality challenges faced by the communities. Chandrakala Devi's family, consisting of 15 members in Gangajal, Raja Pakar block, mirrors the struggles encountered due to untreated water consumption. Her son, Nitish Kumar, faced recurring stomach pain before the adoption of water filter. The subsequent implementation of the Jalkalp Bio-Sand Filter has initiated positive changes, presenting a promising solution to the enduring issue of poor water quality. Through detailed case studies mentioned below, we delve into the transformative impact of accessible water quality solutions, offering cleaner and safer water consumption experiences for rural Bihar.

Meet Ajay Paswan, a hardworking daily-waged laborer from the village of Lakhnapur Lal in Vaishali district, Bihar. Ajay and his family of 10 have experienced a remarkable improvement in their health and well-being by making a simple yet impactful change – switching to affordable Matikalp ceramic pot water filters.

Ajay used to face health issues of indigestion like gastric and constipation, and his family's overall well-being was affected. Anili Devi, his wife, says that the family now prefers using filtered water. The children also developed a preference for Matikalp-filtered water. Ajay shares that earlier they used to consume water directly from the hand pump. Indigestion and skin issues like itching were a usual feature and required medication. Despite purchasing water at Rs. 20/day, their health issues persisted until they discovered the presence of iron and biological contamination in their water source in a community

mobilized meeting by staff from the S M Sehgal Foundation. He also got to know about the MatiKalp water filters as a solution in the same meeting. He further shares that initially he was not very convinced but the switch to Matikalp filters not only resolved their health concerns but also eliminated the need to purchase water daily.

After adopting Matikalp filters, Ajay and his family experienced a significant positive shift in their health. Gas and constipation issues were reduced, and the family's overall well-being improved. Anili Devi mentions that with improved health conditions all the family members are able to do much better whatever they are doing, when guests visit, she always offers Matikalp-filtered water, and the guests express delight and inquire more about the filter. The Paswan family's journey highlights the transformative impact of Matikalp water filters on their health and lifestyle. From overcoming health issues to winning the approval of guests, the Matikalp filter has become an integral part of their lives, symbolizing a positive change in their lives. Ajay and Anili's testimonies stand as a testament to the power of a simple yet effective solution in improving the quality of life in rural communities.

Meet Sunaina Devi, a resident of Lakhnapur Lal village in Vaishali district, Bihar, living with her family of eight. For the past two years, Sunaina and her family have been enjoying the benefits of the Matikalp ceramic pot water filter, both for drinking and cooking purposes.

Sunaina highlights the positive influence of water filtered by Matikalp on her family's well-being, recalling the days when consuming untreated water resulted in stomach issues and discomfort even nausea for everyone. With the adoption of Matikalp filters in the area, the incidence of gastric and stomach ailments has significantly reduced. This is resulting in better health, saving in terms of expenditure of medicines and no wage losses due to frequent diseases. Jay Kumar Paswan, Sunaina's husband, states the financial advantages of Matikalp filters. He asserts that the family's overall health has improved, leading to a significant reduction in medical expenses almost Rs 1000 to 1200 per month. The proactive approach of consuming filtered water has proven to be a cost-effective solution, saving money that would have otherwise been spent on medications. According to Jay he has recovered the cost of filter within a through savings on medicines. Jay and Sunaina Devi's narrative serves as a testament to the influence of Matikalp water filters, not only enhancing health but also contributing to significant financial savings. The family's transition from unfiltered to Matikalp-filtered water has not only addressed health concerns but has also become a strategic investment in their well-being and financial stability. Their journey from turmoil to tranquility exemplifies the positive impact of a simple yet powerful solution in rural India.

Neelam Devi, a resident of Khoksha Kalyan village in Vaishali district, Bihar, shares her family's experience after adopting Matikalp. With a family of four, Neelam narrates their journey of overcoming health challenges and improving overall well-being. According to Neelam, after attending the community meeting conducted by the S M Sehgal Foundation made her aware about the iron and microbial contamination in water and MatiKalp water filter a potential solution. Thereafter, the adoption of the MatiKalp water filter has brought relief from issues like acidity, constipation, and stomach pain that affected them when consuming water direct from hand pumps, and kept them in a constant state of illness.

Neelam highlights the issue of iron contamination in their drinking water source affecting the taste of water and making it unfit to use. Even the color of rice cooked with this water was yellowish. With Matikalp filters, the water tastes better, encouraged the children to drink more. Before adopting Matikalp filters, Neelam's family faced serious health challenges, including frequent diarrhea, typhoid and jaundice. Which is gone since they started consuming filtered water. When visiting her relatives who still consume untreated water, she encourages them to adopt MatiKalp. She talks high for the habit of drinking only filtered water, stating that it has become an integral part of their lifestyle. She further adds that cooking with Matikalp- water has improved the food quality and accelerates the cooking process, especially for lentils and rice, which used to take longer before.

Neelam Devi's testimony showcases the remarkable transformation in her family's health and lifestyle since adopting Matikalp water filters. The switch from unfiltered to Matikalp-filtered water has not only addressed health concerns but has also become an essential aspect of their daily routine, bringing about positive changes. Their journey exemplifies the impact of a simple yet powerful solution in enhancing health and well-being in rural communities.

Dilip Shah, a permanent resident of Kalyanpur village, Bidupur Block, Vaishali district, shares the remarkable change his family has undergone in the past six years since adopting the Jalkalp Biosand Filter for their daily water needs. Dilip expresses how the use of filtered water has brought significant relief from gas and constipation issues. The light taste of the filtered water has also led to an increased desire to drink more, promoting better hydration and overall well-being.

Dilip's wife, Muni Devi, highlights the challenges they faced when using water from a hand pump for cooking, specifically mentioning the prolonged cooking time of rice and lentils. With the use of filtered water rice now appears cleaner, and the cooking process is more efficient. The improved taste in their meals is a bonus. The absence of unpleasant odors in filtered water has made it more appealing to children. In the past, the undesirable smell of unfiltered water made it challenging to encourage the children to drink an adequate amount.

Dilip Shah's experience showcases the comprehensive positive impact of Jalkalp Biosand Filter on various aspects of rural living. From health improvements to time and effort savings, the shift from unfiltered to filtered water has not only addressed challenges but has also enhanced the overall quality of life and family economy via saving on health related expenditures for the Shah family in rural India.

Poonam Devi, residing in Kalyanpur village, Vaishali district, shares a compelling story of health her family through the adoption of the Jalkalp Biosand Filter. With a family of four, she narrates the positive changes that have unfolded over the past six years.

Six years ago, Poonam and her husband, Kummu Baitha, faced continued stomach-related issues. They experienced reduced appetite and a constant feeling

The turning point in Poonam's life came when they started using Jalkalp Bio-Sand Filter. Since then, their indigestion and stomach issues have reduced, and they now enjoy improved appetite, easy digestion, and more active lifestyle. In addition to the health benefits, Poonam highlights the financial relief they have experienced. The reduction in doctor visits and medical expenses has contributed to significant savings, providing economic comfort for the family. Poonam Devi's journey exemplifies the impact of the JalKalp Bio-Sand Filter on health and well-being. The shift from untreated water to filtered water has not only resolved health issues but has also brought financial relief, underscoring the holistic benefits of adopting household water treatment solutions in rural households.

Chandrakala Devi, a resident of Gangajal in the Raja Pakar block of Vaishali district, Bihar, shares insights into the impact of improved water quality on her family's health. With a family of 15 members, Chandrakala reflects on the changes they observed after the adoption of JalKalp Biosand Filter. Chandrakala mentions that before having water filter at her home, her son Nitish used to complain about frequent stomach pain. Upon using filtered water through the JalKalp Biosand Filter, Nitish's stomach pain subsided within a few days.

Chandrakala noted the positive change. When asked about the benefits experienced from drinking filtered water, she shares that while they might not feel a significant change, the family generally prefers the taste of water filtered through JalKalp. The improved taste has made a more enjoyable experience.
Chandrakala Devi's experience provides valuable insights into the subtle yet impactful changes that can occur with the adoption of water filters. The change in Nitish's stomach pain highlights the potential health benefits, and the preference for the taste of filtered water emphasizes the subjective improvements in the overall drinking water experience for the family.

About the Author

Lalit Mohan
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Lalit Mohan Sharma is Principal Scientist - Water Research and Trainings at SM Sehgal Foundation, is a graduate civil engineer and holds a Masters of Technology (Management & Systems) from Indian Institute of Technology, Delhi. He developed many innovations in the field of management and WASH. He was invited to present his innovation 'Creating Fresh Water source within Saline Aquifer' at Solutions Summit – 2015 at UN Headquarters, New York. He is passionate about building the capacity of Grassroots WASH practitioners. Under his leadership SM Sehgal Foundation's water management program has been recognized widely. The organization has won UNESCO-Water Digest awards; 'Best Water NGO' awards by Ministry of water resources, FICCI Water Award 2013, The Institution of Engineers (India) Award, etc. He has written and presented several papers on issues related to water management and WASH.

Aparajeeta
Assistant Program Lead,
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A Mechanical Engineering graduate with a Master's in Water Science and Governance from TERI SAS. Currently serving as an Assistant Program Leader at S M Sehgal Foundation, India, holds a six-year experience as a water professional. Specializing in drinking water quality, and concentrating on addressing issues related to iron, arsenic, fluoride, and microbiological contamination in marginalized rural communities, work extends to WASH (Water, Sanitation, and Hygiene) concerns. Actively contributes to technology development and adaptation for improving drinking water quality. Engaged in the "WASH for Healthy Homes" initiative in Vaishali, Bihar. The focus was on sensitization and awareness-building, promoting the adoption of correct, consistent, and continued WASH behavior. Additionally, leading efforts in the "Fight against Fluorosis" project, involving awareness building, mapping fluoride and fluorosis, implementing mitigation strategies, and contributing to fluoride removal technology development.

Yashi Gautam
Assistant Program Lead,
S M Sehgal Foundation

As a Biotechnology graduate with a Master's degree in Water Science and Governance, I am currently serving as the Assistant Program Lead at S M Sehgal Foundation, where I am deeply engaged as a trainer and researcher. Recognized for my contributions, I am honored to be featured in the Top 30 Under 30 in 2021 by the Alberta Council for Global Cooperation in Canada. My primary focus lies towards safe drinking water and WASH behavior change among marginalized rural communities. With my research skills, knowledge, and interests related to drinking water, I work with communities and for communities and support research work to develop sustainable and affordable technological solutions. With a commitment to developing sustainable and affordable technological solutions, I strive to make a meaningful difference in the lives of those who face challenges in accessing clean and safe water.

Sumit Kumar
Field Assistant, S M Sehgal Foundation

Sumit, a native of Champaran, Bihar, is a dedicated professional contributing to rural development. Holding a B.Sc. in Physics from B.R. Ambedkar Bihar University, he has been a valuable member of the Sehgal Foundation since 2016. Specializing in household water technology, Sumit embodies a work philosophy centered on continuous improvement. His commitment to learning and skill development is evident in his approach to challenges, viewing mistakes as opportunities for growth. His life mantra revolves around the belief that honesty is the best policy. Notably, Sumit is also recognized as an author, contributing insightful articles to various magazines.

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A DEEP DIVE INTO INDIA'S HYDROPOWER REVOLUTION

Akshita Jain, Content Writer

The importance of hydropower in India's energy landscape, a pivotal player in the face of escalating energy needs and the global push towards sustainability. In our pursuit to decrease dependence on fossil fuels and tackle the obstacles posed by climate change, the multifaceted advantages of hydropower have emerged as a prominent solution, leading us towards a future of energy that is both sustainable and resilient.

A NEED FOR STABILITY WITH RENEWABLE ENERGY

In the realm of renewable energy, solar and wind power, while champions of cleanliness, pose a unique challenge with their intermittent nature, relying on the unpredictable availability of sunlight and wind.

This intermittency introduces stability concerns for the electric grid, prompting the need for dependable counterparts. Enter thermal power and hydropower – the unsung heroes offering the essential stability the grid craves.

The technical prowess of hydropower becomes the linchpin in stabilizing our dynamic grid. Its nimble start-stop abilities, black-start features, spinning reserve attributes, and adept voltage and frequency regulation make it the perfect candidate to navigate the intricacies of our modern energy infrastructure.

INDIA'S ENERGY LANDSCAPE - A CALL FOR RENEWABLES

As India steers towards accelerated economic growth, the thirst for energy is set to soar in the next decade. The pursuit of planned GDP growth and the urgent call to address climate change align seamlessly. Balancing the burden of significant financial outlays for coal, oil, and natural gas imports with escalating environmental concerns underscores the critical shift towards renewables.

India's bounty of rivers becomes a strategic asset in this pursuit. Tapping into hydroelectricity from these water bodies not only signifies a clean and sustainable energy source but aligns perfectly with the nation's commitment to cleaner energy generation.

COP 26 COMMITMENTS TOWARDS A BOLD VISION FOR INDIA

Recent commitments made by the Indian government at the COP 26 events in Glasgow solidify the nation's resolve to confront its carbon emissions. India has set a high emissions target for the future, even though it is already the fourth-largest emitter in the world.

Moreover, India has outlined a comprehensive set of five pivotal elements, akin to the essence of nectar (Panchamrit), as part of its climate action agenda:

1. Attain a Non-Fossil Energy Capacity of 500 GW by 2030.

2. Source 50% of its Energy Needs from Renewable Energy by 2030.

3. Curtail Total Projected Carbon Emissions by One Billion Tonnes from the Present to 2030.

4. By 2030, the economy's carbon intensity should be lowered by 45% from 2005 levels.

5. Strive to Achieve Net Zero Emissions by the

These commitments mark a paradigm shift in India's energy priorities, placing a premium on clean energy initiatives and supportive policies for renewables. Post the Paris Agreement ratification, the government's increased budgetary allocation to the renewable energy sector reinforces its steadfast dedication to fostering a more sustainable energy mix.

HOW IS HYDROPOWER BENEFICIAL FOR INDIA?

Hydropower emerges as a linchpin in this clean energy revolution, offering an array of benefits that extend beyond carbon emission reduction. Its ability to reach new remote locations with electricity not only improves living standards but also opens up new opportunities for communities. Let us understand the advantages of Hydropower are:

1. It's Eco-Friendly and Enduring

Hydropower stands out as a clean and sustainable energy source, ushering in electricity without releasing harmful greenhouse gases or pollutants. By reducing the use of fossil fuels, it will help us in reducing air pollution and combating climate change as well.

What makes it even more remarkable is its reliance on rivers and streams, part of the natural water cycle, ensuring a continuous and renewable energy supply. Importantly, hydropower plants do not deplete water resources from the environment; any water taken is fully returned over time, making its water footprint exceptionally low.

2. Flexibility at Its Core

Hydropower plants demonstrate remarkable flexibility, adapting to variations in water availability. These systems require minimal energy to come online, allowing even large plants to transition from idle to full power and vice versa within minutes. The adaptability relies on the turbine type used and effective water flow management.

3. Grid Stability and Intermittency Prevention

Pumped storage hydropower plants act as energy reservoirs, effectively addressing the intermittency challenge. Excess electricity generated during favourable weather conditions by wind or solar plants is utilized to pump water into upper reservoirs. This stored water is later employed to generate electricity through turbines during periods without sunlight or wind, thereby providing stability to the power grid.

4. Flood Risk Reduction

Hydropower plants not only generate electricity but also play a role in mitigating flood risks. By allowing precise control over the release of water, these plants significantly reduce the chances of flooding during heavy rainfall, benefiting both the environment and downstream irrigated areas.

5. Reviving Nature's Balance

Hydropower plants not only generate energy but also actively contribute to environmental restoration. They play a crucial role in reclaiming marshy areas by regulating water flow and preventing the build-up of stagnant water. Additionally, the infrastructure of these plants aids in improving river navigability by capturing solid objects like branches and trees.

6. Tourism Flourishes, Water Adventures Beckon

Hydropower installations create inviting pedestrian paths around reservoirs, initially designed for operational purposes but equally enjoyed by tourists. Enhancing these areas with bicycle paths adds to their aesthetic charm.

7. Preserving Biodiversity Havens

The reservoirs formed by hydropower plants become havens for biodiversity, fostering vegetation growth that attracts a diverse range of animals. These areas often transform into sanctuaries for various species, aided by features like channels and passage ramps that facilitate fish migration.

8. Unlocking Gravitational Energy

The colossal mass of water at higher altitudes holds an abundance of gravitational potential energy, establishing hydropower as a formidable energy source. Capturing even a fraction of this potential translates into a significant and dependable energy supply.

9. Economic Wisdom in Investment

Despite the substantial initial investment required for setting up a hydropower plant, its economic viability in the long run surpasses that of other energy sources. Once the infrastructure is in place, maintenance demands are minimal compared to the upfront investment. The integration of digital technologies further bolsters efficiency, reducing waste and optimizing overall operations.

10. Propelling Innovation Forward

The world of hydropower is a hub of ongoing innovation, with emerging technologies continually enhancing machinery efficiency. Technology plays a pivotal role in ensuring robust maintenance practices and maximizing safety standards, steering the industry toward a sustainable and innovative future.

CHALLENGES WITH NAVIGATING THE PROJECTS

Despite its vast potential, the hydropower sector in India faces formidable challenges. With an estimated hydropower potential of 1,45,320 MW (excluding small hydro projects), the realization of this potential has been hampered by contractual conflicts, environmental litigations, local disturbances, financial stress, and the reluctance of purchasers.

In a bold move in March 2019, the Indian government accorded renewable energy status to large hydroelectric projects (HEPs), paving the way for these projects to access concessions and green financing akin to other renewable energy ventures.

Yet, obstacles endure, spanning from the lengthy task of acquiring land to the complex matters of relocating and rehabilitating communities (R&R), obtaining clearances for forests, facing financial constraints, and ensuring the development of essential infrastructure like roads and bridges.

A CALL FOR A HYDROPOWER REVIVAL

To meet the ambitious target of generating 500 GW of electricity from renewable sources, hydropower must be granted greater focus and recognition.

The recent assurance from the power minister regarding enhanced attention to hydropower instils confidence that India is poised for a significant upswing in hydropower generation in the years to come.

The synergy of solar, wind, hydropower, and green hydrogen presents a formidable arsenal in India's quest to achieve its clean energy targets. By strategically integrating these diverse sources, India can pave the way for a sustainable and resilient energy future.

INDIA GREENLIGHTS AMBITIOUS DIBANG HYDROPOWER PROJECT AMID CHALLENGES

In a significant move to bolster its renewable energy portfolio, India has given the nod to its largest hydropower venture to date.

The Dibang project, nestled in the mountainous north-eastern region bordering China, has received government approval with an estimated investment of 319 billion rupees ($3.9 billion). The nation's electricity grid is set to receive a boost of 2,880 megawatts through a colossal nine-year undertaking led by NHPC Ltd., the state-run hydropower generator.

KEY POINTS:

1. Renewable Push

India's green energy agenda receives a boost with the approval of the Dibang project, marking a significant step in the nation's transition from coal to renewable sources. Hydropower is a significant source of renewable energy essential for preserving grid stability when dealing with the intermittent nature of solar and wind power.

2. Environmental Concerns

Despite the renewable benefits, large-scale hydropower projects often come under scrutiny for environmental damage and community displacement. The Dibang project, spanning over 5,000 hectares of forest land, raises concerns about potential environmental risks and community dislocation.

3. Project Timeline

NHPC Ltd. envisions a nine-year timeline for the Dibang project's completion. However, scepticism arises, with critics highlighting the challenges posed by local protests and geological complexities. Such hurdles have previously led to delays in Himalayan region projects, impacting construction schedules.

4. Cost-Benefit Analysis

Himanshu Thakkar, coordinator for the South Asia Network on Dams, Rivers, and People, questions the viability of the Dibang project, anticipating higher costs and lower benefits. Environmental concerns and potential delays due to protests could make the project economically less feasible.

5. Government Support

The approved investment includes a significant sum of 67.2 billion rupees earmarked for government support, focusing on flood moderation and essential infrastructure like roads and bridges. These backing aims to address some of the challenges associated with the project.

Despite the hurdles, India's ambitious move reflects its commitment to expanding renewable energy capacity. The Dibang hydropower project, while facing scrutiny, marks a significant stride in the nation's pursuit of a sustainable and diversified energy landscape.

EMBRACING THE PROMISE OF HYDROPOWER FOR FUTURE GENERATIONS

In wrapping up, hydropower emerges as a promising force in India's journey towards a greener and more sustainable energy blend. Striking a balance between environmental considerations and the crucial need for a stable grid, hydropower takes centre stage in India's shift towards becoming a renewable energy hub.

India has the capability to unlock the immense advantages of hydropower by focusing on diligent endeavours, progressive policies, and a collective resolve to overcome obstacles. This will pave the way for an era of plentiful energy that resonates with the aspirations and ambitions of future generations.

FAQs

Q1: What is the hydropower potential in India?

A: India boasts a hydropower potential of approximately 1,45,000 MW. At a 60% load factor, this potential can effectively meet a demand of around 85,000 MW. Additionally, there's an estimated potential of 20,000 MW for power generation from Small Hydropower Projects.

Q2: What percentage of electricity in India comes from hydropower?

A: Hydropower contributes to about 22% of the electricity generated in India. This diversification in the energy mix sees thermal power plants leading at 65%, nuclear power plants at 3%, and the remaining 10% from alternative sources like solar and biomass.

Q3: Which is the largest hydroelectric power plant in India?

A: The Tehri Hydropower Complex takes the lead as the largest hydroelectric power plant in India, boasting a capacity of 2,400 MW. Situated in Uttarakhand, it stands as the highest hydroelectric power project in the country. Commissioned in 2006, its construction commenced in 1978 with technical collaboration from the former USSR.

About the Author

Akshita Jain
Content Writer

Akshita Jain, a content writer, has collaborated with numerous global clients and successfully completed multiple projects across various industries. Despite facing challenges as an average student and struggling with coding during college, she ventured into diverse fields. After acquiring new skills and immersing herself in marketing, content writing, and SEO, Akshita made the decision to fully dedicate herself to these areas. She possesses numerous ambitions and dreams, which continue to drive her passion for the field.

Engaging in online projects and networking with individuals who supported her growth, she is now working diligently to realize her dreams. Akshita believes that taking the right actions at the right time can work wonders for one's aspirations.

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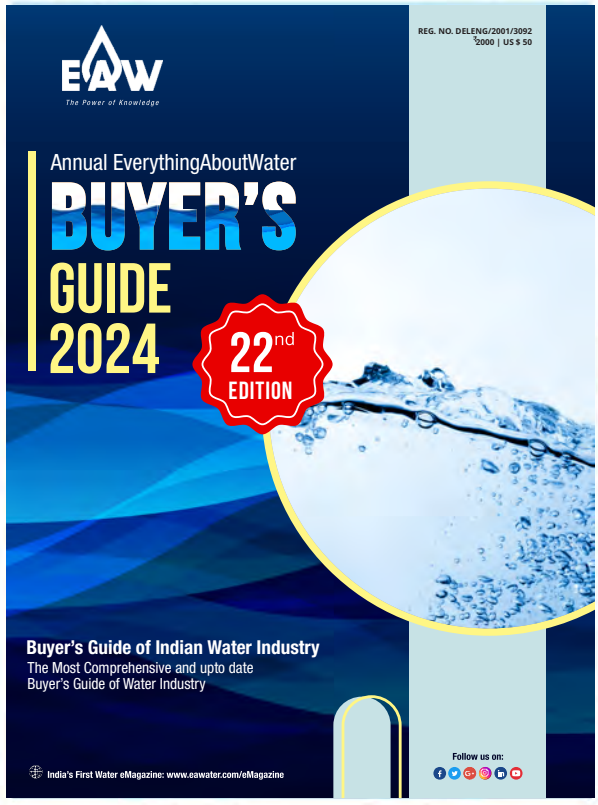

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CIRCULAR ECONOMY OF WATER

Dr. Mayur J. Kapadia, Trainer, Writer, Editor & Former AGM, Quality Control Dept, GNFC Ltd, Bharuch, Gujarat

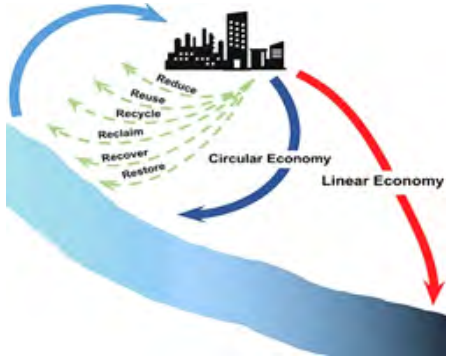
WATER : A STRESSED RESOURCE

Water is fundamental to our existence and a finite resource. Water underpins all drivers of growth - be it agricultural production, energy generation, industry or manufacturing. The soaring population growth, urbanization, agricultural farming and climate change have put much more pressure on water source. Agriculture accounts for roughly three-quarters of global freshwater withdrawals, and agriculture-related nutrients are polluting watersheds. Water leakages can contribute up to 60% of distributed water loss representing gross operational inefficiencies. The global thirst for water has been intensified by the compounding effects of all these factors.

Water utilities are, thus, challenged to provide clean and safe drinking water when faced with aging, costly infrastructure. When not well managed, competing interests for water has the potential to cause wars and leave sectors economically vulnerable. United Nations (UN), therefore, aptly drew much attention to water in its Sustainable Development Goals (SDG) with SDG 6 : CLEAN WATER AND SANITATION, which is concerned with improving water quality and water-use efficiency, as well as integrating water resources management.

LINEAR VS CIRCULAR WATER ECONOMY

The common Linear Economy concept leaves the emission and waste by-products largely unconsidered, despite the fact that some generation of economic 'bads' is taking place instead of useful 'goods'. Furthermore, some 'goods' are wasted rather than consumed. In simple words, linear economy of water follows the approach of 'take – make - use – discharge'. Here, the wastewater is treated only to be returned to water bodies as per prescribed norms of pollution control authorities. Fresh water is, then, extracted again for treatment before being used for productive purposes. This can no longer sustain our water resources as it is costly, energy-intensive and environmentally unsound.

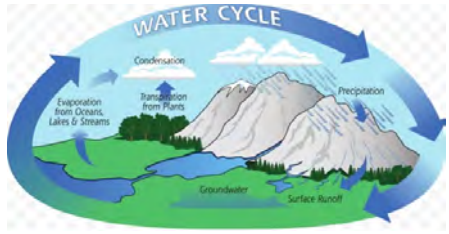


The relatively uncommon Circular Economy concept seeks to minimize the useless emissions and wastes by reappropriating them as potential resources. For this purpose, Circular Economy tries to optimize the production, distribution, and consumption of goods and services to avoid emission and waste by-products in the first place. This approach embraces the idea of circularity by design of the economic activity rather than as an afterthought. It acknowledges the negative implications of a linear economic model. In other words, the circular water economy works on the principle of 'take – make - use – reuse / recycle / restore'.

NATURE'S WATER CYCLE

The water cycle or the hydrological cycle existing in nature is a biogeochemical cycle wherein the water continuously moves above and below the surface of the Earth. The mass of water on Earth remains fairly constant over time but the partitioning of the water into the major reservoirs of ice, fresh water, saline water and atmospheric water is variable depending on a wide range of climatic variables. Nature purifies the water through various physical processes like evaporation, transpiration, condensation, precipitation, infiltration. This cycle is an evidence that water is circular. However, anthropogenic activities over the last hundred years have disrupted the circulation of the earth's water stock.

The greenhouse gas effect of climate change has disrupted the hydrological cycle through elevated moisture, evaporation and temperature, leading to melting of snow, rising of sea levels and an uneven distribution of rainfall patterns.



CIRCULAR ECONOMY OF WATER

Introduced by Pearce and Turner in "Economics of Natural Resources and the Environment" in 1990, circular economy is further developed by the Ellen MacArthur Foundation since 2010 in multiple sectors such as waste management, sustainable design and construction, food production, indicator development, etc. The principles of Circular Water Economy are founded on designing out waste and pollution. This concept endeavours to convert today's wastes into tomorrow's resources that yield economic, social and environmental benefits. Circular economy tries to keep the water in circulation for longer duration to reduce the burden on natural systems, while encouraging regeneration. Its goal is to decouple the economic growth from negative externalities on environmental systems and resource use.

STRATEGIES TO AIM CIRCULARITY OF WATER

Circular economy offers a path in reshaping how water systems operate. The strategy followed to achieve circularity in water sector is the 6R's strategy : Reduce, Reuse, Recycle, Reclaim, Recover and Restore. Circularity applies to any ONE or SOME or ALL of these 6R's.

Nevertheless, full circularity is a holistic philosophy which applies to all 6R's in order to close the water,

energy and nutrient outflows by integrating the relevant sectors that create mutual benefit along the extended value chain.

Reduce: Decrease the consumption of freshwater. This can be accomplished by increasing awareness in the consumer and reducing leakages. Reduction in sewage can be accomplished by consumer awareness and developing responsible behaviour in industries and organizations. Reduction in water consumption is possible by installing efficient plumbing fixtures / appliances e.g. dual flush system in place of conventional flushing. Demand management using smart meters can also help in reducing water consumption. All these attempts ultimately will reduce the generation of waste water.

Reuse: The use of wastewater in its crude form. It involves cascading use of used water in its crude form for multiple purposes so as to reduce the freshwater demand. Water may be used inside the same loop of use or outside the loop.

Recycle: Use of treated wastewater within the same loop or in the same process where it is generated. The waste water here may be partially treated for its recycling in either the same loop of the same process.

Reclaim: Use of treated wastewater and its use outside the loop or process. To make the water reusable in other processes, the water is given deeper treatment than that given for Recycle. With the rapid development and improvement in treatment technologies, wastewater can be treated to a quality equivalent to potable water quality. The extent of reclamation depends on the pollution status of the wastewater and the purpose for which reclaimed water is used.

Recover: Extraction of valuable resources from wastewater. Precious material, though in minute quantity, getting diverted into waste stream can be recovered by comprehensive treatment. On other hand, good quality water is generated for recycling. Energy may also be recovered from the waste water.

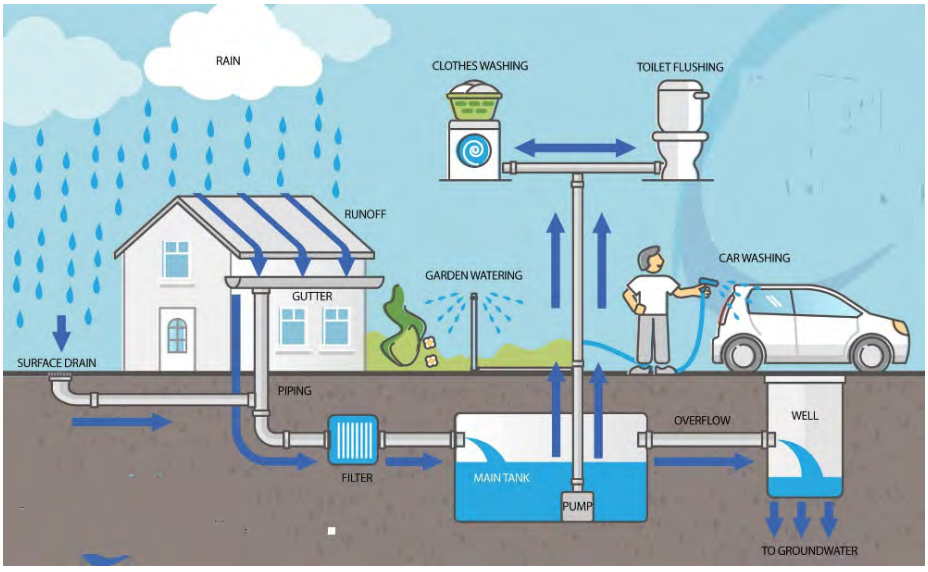
Restore: Replenish water resources like ground water, rivers, lakes through artificial interventions. Some of the examples of this strategy are recharge of the aquifer, harvesting of rain water or rejuvenation of water bodies. It enhances the availability of water in the dry season and also maintains the water balance in the region.

WAYS TO ACHIEVE CIRCULAR WATER ECONOMY

Circular economy is a Challenge on one side and an Opportunity on the other. Depending upon the water collection and distribution system, different approaches need to be followed to increase the potential for water conservation and reuse, increase the resiliency of the water infrastructure network, and reduce the cost of infrastructure replacement.

GREEN INFRASTRUCTURE (NATURE-BASED SOLUTIONS)

This is a kind of decentralized alternative to circularity of water for accomplishing 'Restore' of the 6 R's. Its role in providing water services is well understood, but undervalued. Rainwater harvesting has reduced the cost of damages caused by floods, demand for water and water production costs. Maintaining watersheds through forest management and wetland restoration have also been successful circular solutions. Green infrastructure can unlock the potential of the natural environment. It can provide natural means of water treatment through filtration, enhance storage through aquifers, reduce stormwater run-off and help recreation of green spaces.



CASCADING

Cascading is a sequence of consecutive uses of water for different purposes. Water (whether untreated or treated) can be used again and again in multiple stages of industrial and domestic processes. For instance, steam used for energy production can be used as condensate, then for cooling, again for cleaning, and subsequently for flushing toilets. Once treated, the same water can be used for irrigation as well. Cascading combines multiple strategies of circularity such as 'Recycle', 'Reuse' and 'Recover'. It ideally represents water in a circular model because it perfectly reflects the multiple states of water and is based on multiple interrelated uses.

To achieve Cascading, multiple solutions involving different strategies are integrated and combined. Cascading works best under proximity, when consecutive uses are located close to one another and with technologies working in synergy. In an ideal Circular Economy world, water is cascaded infinitely, as in the natural water cycle of the Earth.

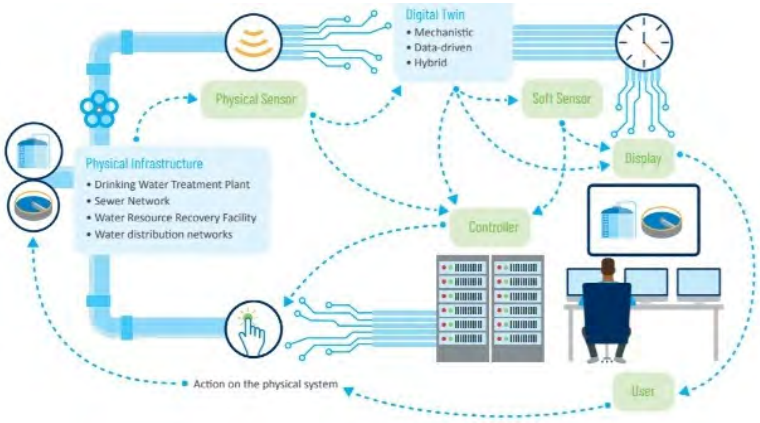
DESALINATION & REVERSE OSMOSIS

Desalination is a process to remove salt in general and other constituents from waste water by either Thermal process (Evaporation), Membrane Desalination, or Hybrid technologies. Among 6 R's of circularity of water, these processes could well be used for 'Reclaim' and 'Recovery' aspects. These processes have made their own niche in circular water practices. Desalination & Reverse Osmosis are best suited approach for coastal communities or islands. It can not only augment the water supply but also provide greater water security. RO and Desalination plants deliver autonomous, resilient, modular, and electrified systems that reduce costs, improve performance, and enhance the resilience of nontraditional water reuse systems.

DIGITALIZATION

The term digital water or smart water refers to water that is sensorized for information regarding flow, quality, contents and temperature. Digitalization generates large volumes of data in a high variety of formats from different sources. Starting with smart sensors for monitoring water pressure, flow and quality; digitalization expands its network through smart meters, smart pipes and systems that measure real time data and initiate automated actions. Further to this, IoT aids in the connectivity of these hardwares to create a networked and intelligent system - a smart water grid. It is this connectivity and water distribution

network that provides a wealth of benefits like reduction in energy consumption, aversion of unnecessary water losses, minimization of resource consumption, better monitoring and reporting on quality, quantity, reuse of water, extreme events like floods and water-scarcity, and aids informed decision-making. Digitalization has great potential to fulfil 'Reduce' strategy of the 6 R's.



By virtue of the numerous benefits digitalization has been offering, it has attained a position of a springboard for optimizing the gains towards circularity in water sector.

PHYSICAL / CHEMICAL / BIOLOGICAL TREATMENT

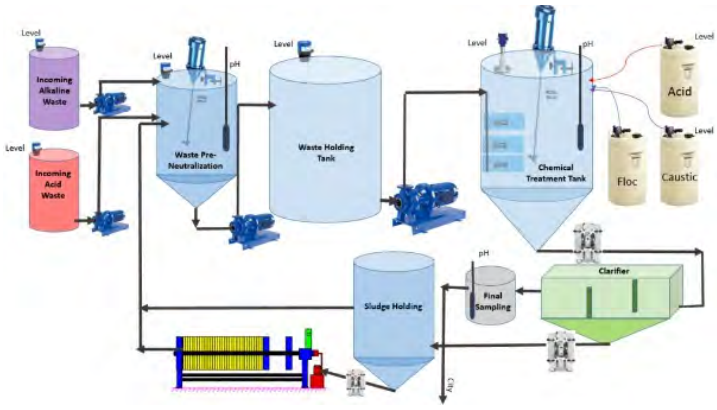
Particles or chemical / biological contaminants are removed, or concentrations are lowered to acceptable levels by appropriate treatments for recycling the used water. 'Recycle' can encompass a single treatment (e.g. debris removal) or several simultaneous or sequential chemical, physical and biological treatments from among coagulation, flocculation, sedimentation, etc. Post treatment, the quality of water is enhanced and thereby value of the water is raised, which contributes to the upcycling of water.

WAY FORWARD

Water is a unique element because it is a resource, a product and a service with no equivalent in the economic system. 'We cannot produce more water and therefore we must not use up the quantity available to us from nature' – should be adopted as a motto for industrial and domestic water consumers. Circular water economy has to be assigned substantial attention in the water industry.

Circularity should not be confined only to the 6 R's, but additional strategies like 'Rethink', 'Avoid', 'Replace', 'Cascade', 'Store', and so on should be considered and many more should be researched. Circular Water Economy can serve as a basis for sustainable water management through water saving and efficient use, thereby contributing to fulfilment of many UNSDGs.

However, issues of investment and a missing legal framework are slowing the rate of uptake of circular economy. The water sector has been sluggish when it comes to technology adoption for numerous underlying reasons – industry conservatism, intolerance for infrastructure downtime, half-hearted field trial tests on water networks and so on. Furthermore, increased cost of Information & Computer Technology, scarce higher skilled personnel and lack of standardization have been compounding the slower uptake of technology. On this basis, Circular Economy of Water represents both a challenge and an opportunity for the water industry.



Combating these problems is an opportunity for water sector. The industries, NGOs and government organizations should put efforts towards development of national / international standards for hardware and software platforms. The data generated from sensors of a number of different suppliers should allow interoperability and a seamless integration. This will allow a high degree of connectivity between networks and necessary knowledge exchange. It will also enhance business opportunities as the fragmented way of doing business in silos would be done away with. The industries should come forward to adopt the new principles of conserving water and invest optimistically into infrastructure because the pay-back period would be less than 3 years in view of the saving achieved in terms of water and energy. Financial institutions are also supporting environmentally and socially sustainable economic activities by providing sustainability-linked loans. The never-ending developments in IT field is likely to curtail expenditure towards ICT based technologies.

Water scarcity has reached to a threshold level with excessive pressure on human wellbeing. All the stakeholders - consumers, government authorities, local water bodies, industries, small and medium enterprises, water and wastewater treatment plant authorities – need to play a crucial role to achieve water sustainability through circularity. A holistic approach by all concerned bodies will achieve successful implementation of Circular Economy of Water.

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He is a Trainer, Technical Writer, Editor, former AGM & Laboratory Head of GNFC Ltd, Bharuch, Gujarat, India. He possesses industrial experience of 40 years in the fields of Quality Control, Lab Set up, Cooling Water Management, ISI certification, and many other areas. He has to his credit technical suggestion awards, >25 publications and >20 presentations. He has been conducting training programs on Quality Control, NABL, ISI certification, Cooling Water Management, etc. He is an active member in committee of Bureau of Indian Standards, which has also conferred upon him an Appreciation award for his immense contributions.

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USE TREATED WASTE WATER (TWW) COUPLED WITH SOLAR POWERED RAINPORT SPRINKLER SYSTEM FOR SMALL SCALE AGRICULTURE

Dilip Yewalekar, Senior Vice President, Jain Irrigation and Manisha Kinge (M.Tech-Agri Engg), Jain Irrigation

Glasgow, 10th Nov 2021, The UNEP, and Bharat signed an agreement on climate change and committed to achieving the target of SDG 6.3, and water conservation, energy conservation, environmental protection, and green energy are the task to achieve. Agriculture is the world's largest consumer of water and power. To minimize the consumption of water and power in agriculture, use of TWW coupled with a solar-powered Rain-port plays an important role. TWW management and solar power(green energy) are the prime target of the UN's Sustainable Development Goals (SDG 6.3) & environment protection (COP26), is explicit focuses on reducing water pollution, renewal energy, treatment of wastewater, and re-reuse for agriculture landscape, forestry, and gardens.

Use treated wastewater (TWW) for irrigation in small-scale agriculture, coupled with solar powered Rainport sprinkler system, is innovative and sustainable solution. This approach not only addresses water scarcity issues but also harness renewable energy for efficient irrigation. Here's an outline of the key components and benefits along with case study and economics.

WWT

(WWT) Wastewater treatment means the removal of impurities from wastewater, before reaching aquifers or natural bodies of water such as rivers, lakes, and Oceans. Water pollution, therefore, is caused primarily by the drainage of contaminated wastewater into surface water or groundwater & agriculture-irrigation activity is one of the major causes of water pollution. 'UNWWDR2017' report said more than 80 percent of the world's wastewater flows back into the environment without being treated and unfortunately proper data on wastewater treatment and reuse is not available at this stage. Some European Countries has made a significant contribution to wastewater treatment and reuse for agriculture, construction, and cleaning purpose.

Because of a lack of political will, technical know-how, R & D database, and mindset, this subject is least highlighted at national –international forums. Haryana & Punjab State Governments have started implementing the use of TWW for agriculture at a small scale and growers are also coming forward to use TWW for agriculture.

KEY COMPONENTS

1. TWW system

- Establish a wastewater treatment system to purify water from various sources like sewage treatment plants or industrial effluents.
- Ensure that the treated water meets quality standard for agricultural irrigation.

2. Storage Tank

Provision of storage tank to hold treated waste water (TWW), ensuring a consistent and reliable supply for irrigation.

3. Solar Powered System

- Utilize solar panels to generate electricity for powering the irrigation system.
- Install a battery storage system to store excess energy for use during non-sunny periods.

4. Rainport Sprinkler System

- Implement a Rainport Sprinkler System, which is low pressure, energy efficient irrigation technology.
- This system is designed for small landholders and uses pipes with small perforations to distribute water evenly over crops.

RAIN-PORT SPRINKLER IRRIGATION (RPSI)

Rainport Sprinkler irrigation is an artificial stimulation of rainfall and water is sprayed through the air over a large surface area under pressure. The pressure is usually obtained by a solar powered motor pumpset or electrical motor pump set or Diesel Engine Pump set. Sprinklers are grouped as Micro/Mini Sprinkler, Overhead Sprinkler, Rain Gun Sprinkler called as Sprinkler family. The utility of each sprinkler varies with respective features, performance & cost-effectiveness.

A Rain-port Sprinkler Irrigation system is intermittent sprinkler irrigation, where the option to choose the droplet size of water particles with respect to nozzles is available as per the demand of crops.

RPSI system comprising of Solar Photovoltaic Module, Control Head Unit, Piping network, Driplines, Control Panel, and Motor Pump-set. Architect of Solar Powered Rainport Sprinkler System is displayed in Fig 1.

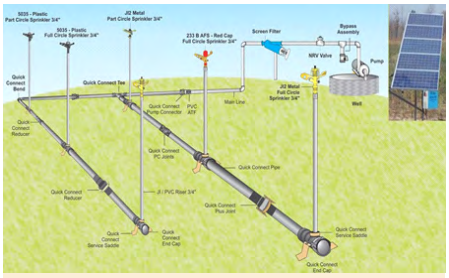

Fig.1 Architect of Solar Powered Rain-port Sprinkler Irrigation System.

ADVANTAGES

1. Water Conservation

- TWW reduces dependence on freshwater sources, promoting sustainable water use.
- The Rainport Sprinkler System minimizes water wastage by delivering water directly to root zones of plants.

2. Energy Efficiency

- Solar Power provides a clean and renewable energy source, reducing the environmental impact.
- The rainport sprinkler system operates at lower pressure requiring less energy compared to traditional high-pressure irrigation methods.

3. Improved Crop Yield and Quality

- Consistent and Controlled irrigation leads to better crop growth and yield.
- The Rainport Sprinkler System ensures uniform water distribution, preventing overwatering or under watering of crops.

4. Environmental Protection

- Using treated wastewater helps mitigate pollution by repurposing water that would otherwise be discarded.
- Solar power reduces reliance on fossil fuels, contributing to a lower carbon footprint.

5. Cost Savings

- While the initial setup cost may be higher, the long term operational costs are reduced due to free solar energy and the efficient use of treated wastewater.

6. Community Health

- Properly treated wastewater reduces the risk of water borne diseases, contributing to community health improvement.

7. Regulatory Compliance

- Adhering to water quality standards for treated wastewater ensures compliance with environmental regulations.

CONSIDERATIONS

1. Water Quality Monitoring

- Regularly monitor the quality of treated wastewater to ensure it meets the required standards for irrigation.

2. Maintenance

- Regular maintenance of solar panels, rainport sprinkler system and other components is essential for optimal performance.

3. Community Engagement

- Educate and involve local communities in the implementation and benefits of the system to ensure long term sustainability.

4. Adaptability

- Design the system to be adaptable to different crops types and changing agricultural needs.

5. Criteria for selection of Nozzle of Rain-port Sprinkler

- Nozzle should have a low discharge rate.
- Nozzle should have a larger diameter than the throw.
- Nozzle should have low operating pressure.
- Nozzle should have a higher CDU (more than 80%).
- Nozzle should be easy to replace.
- Nozzle should be cost-effective.

6. Placement and overlapping of Rain-port Sprinkler

Based on the sprinkler precipitation profile, crop root spread, canopy, soil & slope of the ground, Rain-port Sprinklers preferred to be placed in a square fashion and from radius to radius as shown in figure 2. LLDPE Polytube of sizes 16 mm, 20 mm, 25 mm 32 mm, 40 mm, 50 mm & 63 mm is used as sprinkler laterals.

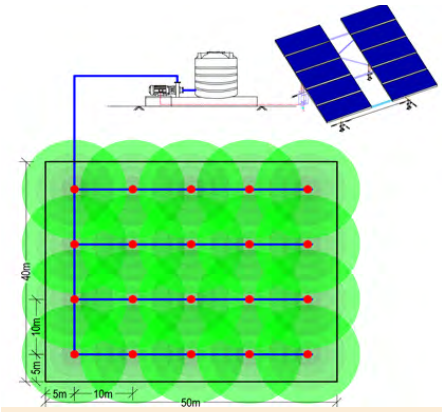

Fig. 2 Layout of Rain-Port Sprinklers

CONSIDERATIONS FOR SOLAR POWER

Since solar radiation is available in a daytime for the generation of power, the entire irrigation to crops has to be concluded in a daytime most preferably. Obviously, all the design calculation is based on the fluctuation of solar radiation from morning to evening and season to season to meet the crop water demand. However, the following factors have to be considered and integrated while designing a Rain-port Sprinkler irrigation system.

- Average solar radiation- morning to evening on a monthly and seasonal basis.
- Optimization of ETcrop (Net Crop water demand) on a daily or alternate basis.
- Soil-based water retention capacity.
- Master plan of crops.
- Water availability and assessment to meet crop water demand.
- Operation/management of the system.
- Optimization of the requirement of motor-pump-set (solar-powered).
- Photovoltaic Solar Module.

- Average solar energy can be harvested to 200-300 watts/m2 in various countries based on latitude and longitude. It varies from season to season and mainly affects the clouds and haziness. Maximum solar power can be harvested in the summer season and minimum in rainy seasons due to cloudiness. Hence, the frequency of irrigation in the rainy season is low and maximum in summer.

Similarly, in a daytime, solar energy is minimum in the morning, maximum at the noon, and again minimum during the evening. In figure 3, clearly show the solar power harvesting in a day, it is very clear that the design of Rain-port Sprinkler irrigation should be done to meet the water demand of crops in day time corresponding to available solar radiation only.

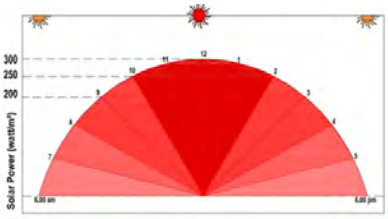

Fig. 3 Solar Power Harvesting Monochrome.

TWW QUALITY NORMS FOR AGRICULTURE

The success of (TWW) Treated Waste Water use for crop production largely depends on adopting appropriate strategies aimed at optimizing crop yields and quality, maintaining soil productivity, and safeguarding the environment. Several alternatives are available to use TWW for agriculture via various irrigation methods. The user should have prior information on TWW supply and its quality as per Table 1 for reference to ensure the formulation and adoption of an appropriate on-farm management strategy.

Table 1. TWW Quality Norms (Ref-PPCB)

Sr.	Parameter	TWW Standard Norms
1	Temperature	Not more than 50C.
2	pH	5 - 9
3	BoD	<= 10 ppm
4	COD	<= 50 ppm
5	TSS	<= 20 ppm
6	Sulfates	<= 200 ppm
7	TKN	<= 50 ppm
8	Faecal coliform	<= 100 MPN/100 ml
9	Total Phosphorus	<= 2 ppm
10	Ammonical Nitrogen	<= 20 ppm
11	SAR	<=3.5 ppm
12	EC	<=2000 micro siemens/cm
13	RSC	<= 2.5 meq/l

GOVERNMENT POLICY

Government policy on TWW available to farmers for unrestricted irrigation or to irrigate public parks and urban green areas is a deciding factor to promote the use of TWW at a large scale and to minimize the water stress and pollution of the environment. Instead of using TWW 100%, the option of blending TWW with other water supplies –canal water, groundwater etc. It is possible that a farmer may have saline groundwater and, if he has non-saline treated wastewater, could blend the two sources to obtain a blended water of acceptable salinity level.

Adopting a blending strategies of TWW is normally advantageous in respect of allowing greater flexibility, increased financial security and more efficient use of the wastewater throughout the year coupled with solar powered motor pumpset, whereas a single-use strategy will give rise to seasonal surpluses of effluent for unproductive disposal. A case study is highlighted in Table 2 along with photos graphs.

Table 2. Solar Powered Rainport Irrigation System for vegetable.

Sr.	Parameter	Value
1	Grower	CADA, Jhajjar, Sutanpur, Harayana.
2	Project (*)	Solar Powered Integrated Irrigation Project with STP water.
3	Capacity of STP	8-13 MLD
4	Command Area	1400 ac.
5	Design Discharge	2.4-3.6 cusec per 1000 ac.
6	Crop	Green Chilly and others
7	Irrigation time	4 to 7 hours depending on solar radiation available, crop water demand and agro-climatic conditions.
8	Irrigation type	Rainport Sprinkler Irrigation System.
9	Area	1 acre representative area out of 1400 ac.
10	Yield	12 Quintal
11	Market rate	Rs. 3,000 per Quintal. (year 2020-21) (Average assumed).
12	Total Income	Rs. 36,000.00
13	Farm Expenses	Rs 22,000.00 (estimated).
14	Net Income	Rs. 23,000.00
15	BC Ratio	1.63
Note: Details of of quality parameters of chilly, Taste, Smell not received.		

Solar Panel, TWW tank, Control Head

Rainport Sprinkler Irrigation

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Reviewer –ICID Conference, Beijing, China 2023
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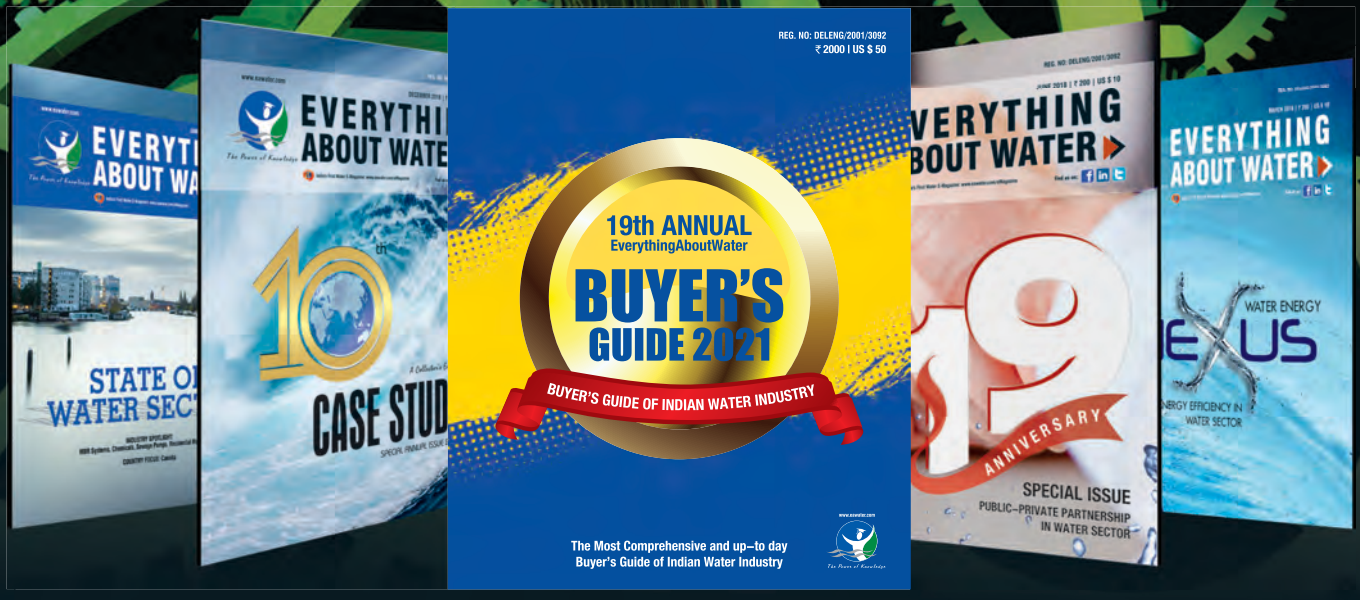

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ANAEROBIC TREATMENT OF WASTE AND WASTEWATER OF POTATO STARCH MANUFACTURING INDUSTRY

Dr. Vanita Prasad, Founder, Director & CTO – Revy Environmental Solutions Pvt. Ltd.

A potato Starch manufacturing industry at Gujarat generates large quantities of waste water containing considerably high COD (25000 -35000 mg/L) mainly in form of starch, glucose and protein from Potato Crush and a TSS of about 10,000 mg/L. The TSS is in form of fine particles of left over potato skin. Waste water should have a high BOD due to high biodegradable content, hence can be treated using biological methods in order to enable an environmentally safe utilization or disposal. The growing quantities of wastewater generated in the industry require innovative treatment processes that are capable of achieving significant cuts in cost of treatment. Technologies that combine efficient COD & BOD reduction along with TSS removal capability, the production of reusable waste water at competitive costs represent the most desirable solutions.

Anaerobic treatment of this effluent having high content of biodegradable material is broken down by microorganisms in absence of air and Biogas is produced. This process is popular because it is energy positive, requires less foot print and produces very little biomass. But the major problems associated with potato waste include easy degradability resulting in acidification which rapidly lowers the pH noticeably. This problem is associated with low pH of the substrate itself, poor buffering capacity and the possibility of potentially high volatile fatty acid (VFA) accumulation during digestion.

Anaerobic digestion is the standard technique to treat wastewater to reduce the amount of organic matter. To establish that use of REVY's anaerobic biomass consortia and Biomass Growth Enhancement Formulations (BGEFs) which can help reduce organic content and stabilize UASB reactor performance. a treatability Study was conducted to establish most optimum treatment scheme for effluent so that treated water to meets statutory disposal / reuse norms.

Clear water and Settled Sludge were collected from industry and analysed to identify the properties of the same. Anaerobic treatment was done in lab scale UASB reactors. Results of experiment with low and high loading rate are tabulated. 77% COD reduction was achieved at high loading rate yielding 5.7 Litre gas per day. On basis of this, it is implemented on full scale treatment plant treating 400 m3/d effluents daily which will produce 4500 m3 gas per day containing 64-68 % methane gas.

Sr.	Parameter	Clear Water	Settled Sludge	Units
1	pH	6.44	4.64	–
2	Conductivity	18	ND	mg
3	Total Dissolved Solid	12300	ND	mg/L
4	Total Suspended Solids	155	ND	mg/L
5	Total Solids	2.1	4.34	%
6	Total Volatile solids	3.1	3.52	%
7	Volatile Suspended Solids	103	ND	mg/L
8	BOD	17500	62500	mg/L
9	COD	25661	94180	mg/L
10	VFA	5735	14605	mg/L
11	Alkalinity	4050	3000	mg/L
12	Ammonia	1204	420	mg/L
ND- Not Done				

Sr.	Parameter	Higher Loading Rate	Lower loading rate	Units
1	VFA	59	56	%
2	TSS	73	76	%
3	VSS	77	79	%
4	COD	77	68	%
5	BOD	69	60	%
6	Gas Volume	5.7	3.2	L/d

Liquid wastewater anaerobic treatment

Sr.	Parameter	Value	Units
1	Wastewater volume	400	m^3/d
2	COD of wastewater	30000	mg/L
3	COD load	12000	kg/d
4	Methane generation	3000	m^3/d

Solids from wastewater primary treatment

Sr.	Parameter	Value	Units
1	Wastewater volume	400	m^3/d
2	Solids	1	%
3	Total Solids	4000	kg/d
4	Proposed treatment	Anaerobic CSTR	–
5	Estimated Methane	1850	m^3/d

The results obtained during this study will account for saving 55.4 tons of GHG emissions per day and annually 20220 tons from effluent treatment whereas from solid waste treatment, 34.6 tons of GHG emissions per day and annually 12640 tons will be saved.

To summarize we can say anaerobic treatment of effluent and solid waste using REVY-S will offer an alternative solution which is eco-friendly and economical as it can produces 9 MWh electricity per day (renewable energy) while treating the waste and resulting in climate protection through an improvement in the CO2 balance of the treatment plant.

CLIENT TESTIMONIAL

The Green Environment Services Co-op. Society Ltd
(Common Effluent Treatment Plant & Secured Landfill Facility

30.05.2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Anaerobic Granulated sludge (REVY-D) developed and provided by REVY Environmental Solution Pvt. Ltd., Vadodara was able to stabilize secondary sludge produced at Green Cooperative CETP,Vatva to produce Biogas and Manure. This study was carried out for 3 months in pilot scale reactor with continuous Biogas production.

We recommend this product to be used for stabilization of biological sludge instead of just dumping in the landfills which is hazardous and may contaminate the soil and ground water. The technology developed by REVY will help and sustainable management of waste as well as waste water and will help combat climate change and its impacts.

For The Green Environmnt Services Co-op. Soc. Ltd.

Deepak H Davda
CEO

About the Author

Dr. Vanita Prasad
Founder, Director & Cto –
Revy Environmental Solutions Pvt. Ltd.

Dr.Vanita Prasad - a scientist turned into an Entrepreneur, is a New Age Environmental Instrumentalist providing Biotech solutions. Having done her Ph.D. in Environmental Biotechnology and with her extensive experience of 28 years in waste bioremediation with various academic and Industrial institutions, she floated her own company REVY Environmental Solutions Pvt. Ltd. with a vision to solve the global crisis of food, water, and energy and to make our mother earth cleaner and greener. Her mission is to strive for innovation and provide economically feasible, eco-friendly & sustainable solution to the world.

She is leading this company as a Founder, Director and CTO. Her core expertise is in anaerobic digestion technology and innovation of customized Bio-cultures. At REVY, they have developed an indigenous product Granulated Sludge, a micro flora of carefully chosen and embedded Anaerobic Bacteria, an innovation that act as a very cost effective solution for High rate Anaerobic Digesters for its commissioning as well as work as a medicine for many sick units of STPs & ETPs. She is now focusing on developing a biological process of Biohythane production: Next generation Clean and Renewable Energy to be used as Future Fuel.

She is a DBT - BIRAC – BIG & SPARSH Grantee and holds various patents for specific innovation in the field of Waste management and Renewable energy (Bio hydrogen and Bio methane).She herself and her company has won many awards and accolades at National and International forums for the work being recognised as Low energy, cost effective and sustainable solutions for waste / wastewater treatment.

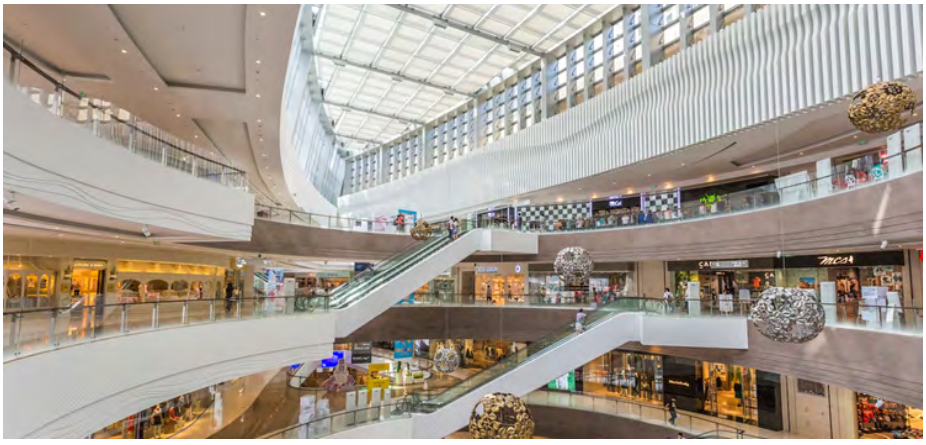
To name some of these awards are –

- BRICS Mulan Award, by BRICS China under BRICS Women's Business Alliance Initiative;
- Winner of India-Israel Innovation Challenge 2017 organized by Invest India;
- Winner of "ICONIC WOMEN LEADER AWARD" by ASIA – GCC Conclave;
- BIRAC-TiE WInER Award 2019 by DST, GOI.
- Finalist for 'Women in Biogas' Award By World Biogas Association in 2022

REVIVING A TROUBLED SEWAGE TREATMENT PLANT AT A RENOWNED SHOPPING MALL

Sanjay Bahl, CEO at Superweld Ecosolutions

Shopping malls, often witnessed as hubs of commerce and entertainment, generate a variety of wastewater that, if overlooked, can lead to unforeseen problems. In this exploration, we shed light on how Superweld Ecosolutions came to the rescue in solving the wastewater issues within a shopping mall and also learning the potential consequences of neglecting proper wastewater management.



The population within a shopping mall is diverse, comprising various consumers as well as staffers with distinct purposes. Before we move ahead in understanding the challenge we must first learn the different segments of the mall population and the type of wastewater being generated from the shopping malls. Shopping malls are dynamic ecosystems where various activities take place, creating a complex space of wastewater sources. These include:

- **Foot Traffic:**

The constant rush of visitors contributes to restroom usage, leading to the generation of sanitary wastewater. If not treated well can result in unhygienic conditions and a negative impact on the overall mall environment.

- **Food Courts:**

Food courts, with their diverse culinary operations, wastewater. From pot washing and food handling to continuous dishwashing, this area generates both solid waste and waterborne pollutants. Neglecting the treatment of this wastewater can lead to foul odours, hygiene issues, and potential legal implications.

- **Commercial Spaces:**

Individual stores, boutiques, and service providers within the mall also contribute to wastewater. From cleaning activities to restroom usage, these smaller sources collectively add to the overall wastewater load. Ignoring their impact can result in localised problems that may escalate if left unattended.

- **Cleaning Operations:**

Even seemingly clean operations, such as maintenance activities and general cleaning, produce wastewater. Overlooking the treatment of this water may lead to contamination of nearby water bodies, soil, and infrastructure.

Supweweld encountered a shopping mall owner seeking assistance in revitalising their Sewage Treatment Plant (STP) and addressing issues with their wastewater treatment processes. The current operational methods of the shopping mall were deemed insufficient, requiring urgent attention and improvement.

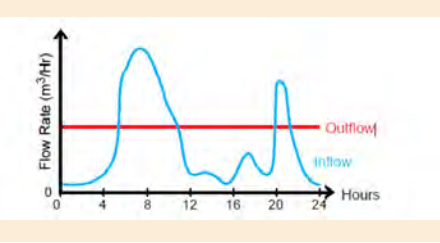
So, how exactly was this shopping mall facing unexpected problems? It had some unnoticed issues in how it was running, leading to a big challenge that nobody saw coming!

ADDRESSING THE REAL CHALLENGE!

Our subject, a thriving shopping mall, encountered significant problems in managing its wastewater due to its diverse operations. With varying pollutant loads arising from daily foot traffic, food court activities, and inconsistent usage patterns, the existing Sewage Treatment Plant (STP) struggled to maintain efficiency. These were the major problems:

1. Inadequately Designed STP:
The shopping mall encountered a significant challenge in wastewater management because it has varying pollutant loads. The Sewage Treatment Plant (STP) in place was insufficient to handle these fluctuations, lacking the necessary size and buffer capacity.

The fundamental principle of an STP is maintaining consistent treatment by equalising the pollutant load in wastewater. It is crucial to provide a uniform flow to microbes, avoiding variations like high BOD one day and low BOD the next. To achieve this, the collection tank should have ample buffer capacity. A minimum buffer of 2-3 days is essential to accommodate the diverse wastewater generated by the shopping mall, ensuring a steady and reliable treatment process.



The size of the plant was unable to handle the fluctuations and thus, no buffer.

2. Bad odour coming out of STP:
Oil and grease from kitchen activities was coming out with the wastewater which in turn introduced heavy pollutants into the STP. This led to potential odours originating from the Sewage Treatment Plant, and the repercussions of unpleasant smells within the shopping mall presented a substantial and urgent challenge. The owner had to urgently find a solution to avoid potential legal consequences.

3. No expert operator to monitor the STP:
To run a wastewater treatment plant effectively, it's important to have a well-thought-out plan and skilled workers who know how to treat wastewater, manage odours, and handle unexpected issues. These experienced individuals, needed due to the demanding nature of the job, often charge higher fees compared to those who operate residential sewage treatment plants.

When managing a wastewater treatment plant, it's crucial to consider your budget. This underscores the importance of using technology that focuses on recycling water, such as UF or RO membranes.

Installing UF membranes requires meticulous attention, ensuring Total Suspended Solids (TSS) below 20 PPM, and Biological Oxygen Demand (BOD) substantially lower than 40 milligrams per litre. Neglecting this would block the UF membrane, which is leading to compromising the most expensive and crucial part of the STP infrastructure.

"Having a dedicated expert for continuous monitoring of the wastewater plant is essential. This professional ensures timely troubleshooting, maintains comprehensive data records, and consistently updates officials on the plant's operations to prevent potential issues from escalating." - Sanjay Bahl, CEO at Superweld Ecosolutions.

The shopping mall owner and operators faced a tough time finding someone to fix the wastewater issue. They consulted many wastewater treatment companies, tried various products to solve the problem, but things kept getting worse. It taught them that it's not just about the products; having years of expertise and the right knowledge is crucial for finding the correct solution.

This wasn't just any Sewage Treatment Plant; it was an STP designed for a shopping mall, demanding the highest level of care. Overlooking any aspect could trigger a chain reaction of interconnected issues, ultimately affecting the footfall of the shopping mall.

When the need was dire, they reached out to the right solution at the right moment. Indeed, Superweld Ecosolutions' expertise has consistently been a saviour in such situations. Explore their LinkedIn to discover numerous instances where Superweld has successfully revived Sewage Treatment Plants of different companies and hotels, rescuing them from their most challenging conditions.

So, what exactly did the team of Superweld do that no other companies couldn't?

LOOKING OUT FOR A SOLUTION:

Enter Superweld, a leader in wastewater management solutions. Recognizing the unique needs of the shopping mall, Superweld implemented an all-in-one approach to revolutionise wastewater management.

1. Tailored Microbial Treatment:
Superweld introduced advanced technologies, including Super24 and Oxysuper, specifically designed to address the mall's complex wastewater composition. Let's understand how they performed magic on the treatment.

Oxysuper: A powdered bio product containing a blend of microbes, enzymes, and herbs designed to foster the development of a well-settling Mixed Liquor Suspended Solids (MLSS). Specifically employed for the Commissioning, Recovery, and Maintenance of tanks in activated sludge systems.

Super24: A formulation based on minerals that enhances Dissolved Oxygen, removes odours, and decreases BOD, COD, and TSS. It effectively eliminates unpleasant odours, extends sludge settling time in clarifiers, and addresses Ammonia, H2S, and Septic conditions. Ideally used in treating wastewater in Sewage Treatment Plants (STPs), composting, and the digestion of oil and grease.

Super Settler: A unique 100% organic coagulant and flocculant designed to diminish Total Suspended Solids (TSS), Color, Biological Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). Suitable for use in activated sludge systems, serving as an excellent alternative to PAC and inorganic coagulants.

These products not only ensured efficient treatment but also played a crucial role in controlling odours and mitigating the impact on the mall's overall atmosphere.

"The use of Bioculture like SUPER 24 products in wastewater plants is becoming more and more relevant not only to meet current demands but also adapt seamlessly to future challenges, ensuring sustainable and resilient wastewater management."- Sanjay Bahl mentioned.

2. Expertise and Personnel:
Superweld emphasised the importance of technically qualified personnel to operate the STP. A trained workforce capable of troubleshooting, handling emergencies, and ensuring a consistent flow became an integral part of the solution. Superweld's team demonstrated the expertise needed to manage the complexities of the mall's wastewater.

THE FINAL RESULTS:

The implementation of Superweld's solutions resulted in a significant turnaround for the shopping mall. The tank size even though was small, the flow rates were optimised, and the persistent issues of clogging and inefficient treatment were resolved.

Remarkably, within just 10 days of implementing Superweld's recommendations and products, the STP began to perform efficiently. The overall water quality significantly improved, leading to clearer effluent.

As part of the agreement, the mall owner insisted that only Superweld products be used in the STP and that they receive ongoing guidance from Superweld to maintain the plant's optimal performance.

Before **After**

The mall owner's testimonial further solidified the success of Superweld's interventions, stating, ***"Only Super24 and Oxysuper must be used to treat the wastewater; no other microbial treatment should be entertained."***

BENEFITS OF CONSIDERING SUPERWELD ECOSOLUTIONS?

If your company is going through similar wastewater challenges, Superweld Ecosolutions presents a compelling case study. Their tailored technologies, emphasis on expert advice, and years of commitment towards successes of various other companies make them a standout choice for transforming wastewater management in complex environments.

In conclusion, this paints a comprehensive picture of the shopping mall's wastewater management journey, underscoring the critical role the experts of Superweld Ecosolutions played in overcoming challenges. By integrating advanced technologies, expert personnel, and tailor-made solutions, the team not only addressed the immediate issues but also opened the gates for a sustainable and efficient wastewater management in the long run.

If you encounter similar wastewater treatment challenges, don't hesitate to reach out to Superweld Ecosolutions– your trusted partner in turning wastewater problems into success stories.

DID YOU KNOW?

The Great Salt Lake in Utah is saltier than the ocean, with salinity levels reaching up to 27%. It is one of the saltiest bodies of water in the world.

About the Author

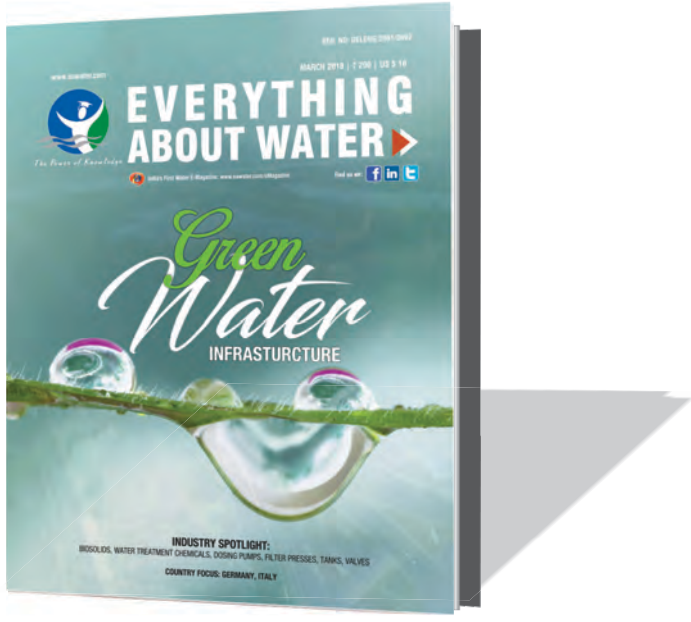
Sanjay Bahl
CEO at Superweld Ecosolutions

Sanjay helps businesses and their leaders by providing Eco-logical solutions for pollution control and waste management problems. At Superweld Eco-Solutions, they create innovative products to treat Wastewater, Malodors, Solid waste, Algae Treatment, Lake and Pond remediation.

Sanjay has helped clients like Paper Mills, Pharma Companies, Hospitality Industry, Food and Beverage Industries to meet stringent wastewater discharge parameters. A Post Graduate from Symbiosis College, Sanjay and his team act as technical advisors and trouble shooters to 900+ clients. They help companies Like CETPS, Dairy, companies improve their biological wastewater treatment, he strongly believes Indian biotechnology is among the best in the world. Along with his passion for transforming the course of companies, he likes to read about the latest technologies and does social work in his free time.

The only bad thing about good luck is..
you never know when it will favor you.

That's why smart professionals make informed decisions.



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STUDY OF WOUND AND MELT BLOWN FILTER CARTRIDGES

Shashi Bhushan Jha, General Manager, MMP Filtration Pvt. Ltd.

SELECTION OF APPROPRIATE FILTER CARTRIDGES

Herewith is the solution of how mmp Hydro Wound Filter Cartridges have more dirt holding capacity and life compared to melt-blown filter cartridges. The selection of appropriate filter cartridges is very important.

EXECUTIVE SUMMARY:

mmp is sharing a related experience with AMUL. We received a call from Amul Diary Plant to visit their plant & the reason was that they had to replace the filter cartridges very frequently and management was not agreeing to bear such high costs, as well, as they were facing problems in plant maintenance also.

We visited the plant and noted that source water i.e. groundwater and turbidity was very high even though, they were using mmp supplied Melt Blown Filter Cartridges. In front of him, we broke the filter cartridges and showed him all three layers of filter cartridges were chocked, so melt blown filter cartridges performed very well but it has a certain limit to hold impurity. We then explained that if they want more life then they should use mmp Wound Filter Cartridges brand name is HydroWound, which would give double the life of melt blown. We requested to allow us to send samples to prove our point. Thankfully he agreed, and we sent a HydroWound sample. He was very much satisfied with our sample, and he got the same results that they were looking for. He has sent written mail for appreciation and a token of thanks.

SUBJECT INFORMATION:

This case study is all about application and how we must select the appropriate filter cartridge. There are various types of filter cartridges available in the market, selection of right filter cartridges at right place is very important because nature of water is different in every place.

CHALLENGES AND OBJECTIVES:

Most challenges faced by the customer is in selection of appropriate filter cartridges as per plant requirement from various type of filter cartridges available in market. Here are few points customer must check before selection of filter cartridges, like

- Turbidity in water,
- Micron size of particular they want to arrest,
- Flow of water
- Pressure
- Temperature
- Application i.e. in water or solvent.

RESULT:

There are various parameters out of which herewith I am sharing some basic parameters which help in selection of filter cartridges.

Type	Parameter
Melt Blown Filter Cartridges (MB)	• Good micron efficiency which is 84-85% • Cost wise cheaper among all different type of filter cartridges. • Low dirt holding capacity. • Temperature upto 80° Degree centigrade • Flow as per 10inch 1m3
PP Wound Filter Cartridges	• Good micron efficiency which is 80-85% • Cost wise costlier than MB. • High dirt holding capacity. • Temperature upto 80° Degree centigrade. • Flow as per 10inch 1m3
Fiber Glass Wound Filter Cartridges	• Good micron efficiency which is 80-85% • Cost wise costlier than MB, Wound. • High dirt holding capacity. • Temperature upto 210° Degree centigrade. • Flow as per 10inch 1m3 • Decide as per chemical composition in liquid.
Cotton Wound Filter Cartridges	• Good micron efficiency which is 80-85% • Cost wise costlier than MB, Wound. • High dirt holding capacity. • Temperature upto 120° Degree centigrade. • Decide as per chemical composition in liquid. • Flow as per 10inch $1m^3$
PP Pleated Filter Cartridges	• Very Good micron efficiency which is 85% for nominal rating and 98.9% for absolute rating • Cost wise costlier. • High dirt holding capacity. • Temperature upto80° Degree centigrade. • Flow as per 10inch $1m^3$

Above stated points can help in selection of appropriate filter cartridges as per application. Following are some brief key points on above discussion.

- How to select filter cartridges.
- What happens when we select the wrong filter cartridges.
- Types of filter cartridges available in the market.
- Challenges and solution.

Thus, Selecting appropriate filter cartridges is crucial for effective filtration in various applications. Factors like particle size, compatibility with the fluid, and filtration efficiency should be considered.

Choosing the wrong filter cartridges can lead to compromised filtration performance, causing contamination or system malfunctions. It's essential to match the filter type with the specific requirements of the application to ensure optimal results. There are various types of filter cartridges available in the market, including depth filters, membrane filters, and pleated filters, each designed for specific purposes. Understanding the characteristics and advantages of these types helps in making informed decisions.

Lastly, Challenges in filter cartridge selection may arise due to diverse application needs, but thorough research and collaboration with filtration experts provide effective solutions, ensuring the filtration system's reliability and efficiency.

About the Author

Shashi Bhushan Jha
General Manager
MMP Filtration Pvt. Ltd.
www.mmpfilter.com

A passionate professional with nearly two decades of experience in liquid filtration and Air filtration. He aims at offering innovative solutions to any key industry and resolve their filtration issues with timely action and offers a win win solution to the end customer.His expertise & dedication in the filtration field plays a key role in his success

Our innovative solutions and our best of breed partnerships are helping leading organisations meet their water sustainability goals.

INTERVIEW WITH

Alok Sharma

CEO, SCALENE LIVPROTEC PVT LTD

Q: What vision drives your company?

A: The core vision driving our company, LIVPROTEC is deeply rooted in environment, sustainability, safety and public health. We recognize the critical link between environment, health, climate change and the increasing contamination of our water resources. Our commitment to our cause is unwavering, and we ensure that our technologies do not cause any further harm to our planet. In an era threatened by pollution and contamination, we consider clean air and water as fundamental rights. We see a world where water is abundant and pure; energy is renewable; air is safe and all forms of life are healthy.

Through our initiatives, we aspire to create a future where the integrity of our natural water resources and environment is preserved, providing sustainable and pure water for generations to come.

Q: Water is crucial for the sustenance of our planet. What is the biggest challenge with water today according to you?

A: There are three major issues impacting water today.

First, the challenge confronting water is widespread and universal contamination of our aquifers and water resources. Furthermore, everything we eat is dependent on water to grow. The contaminants in the water are absorbed by our crops and animals and they finally land up in our bodies. No wonder health issues like cancer, autoimmune disease, infertility, etc. are proliferating by the day.

Second, water does not get the required attention from leaders today as much as carbon due to its commercial aspects. This needs to change as water is fundamental to life and survival.

Third, Over the last century wastewater has become a lot more toxic and complex, however, the basic technology relying on biological and chemical treatments have not fundamentally changed.

At Livprotec, we recognize the need to address this pressing concern with innovative technological solutions that go beyond conventional practices of wastewater management. Our technologies offer the distinct business advantage of reducing one's water footprint and thereby saving significant costs. At the same time, they put the principle of circular economy of water at work that safeguards our precious water resources for future generations.

Q: As a company, what are your main areas of work?

A: Our focus is to solve unsolved problems in various verticals through our Nature Restorative Technologies. We offer new technologies and solutions in water, wastewater, bioenergy, aerial biosafety, health and advanced materials. We are working with forward thinking customers and partners who have resolved to put an end to these problems through new, innovative means and are willing to be the role model for others to follow.

Q: So as we are talking about innovation, what do we need to do to ensure full reuse of water?

A: Addressing water reuse requires a paradigm shift. At a policy level, water deserves as much attention as carbon. If this happens, everything else will fall in place.

We will then see a growing awareness about the importance of water. Think about it - only 1% of the earth's water resources is available for consumption and 8.1 billion people in the world depend on it. Can we afford the unabated contamination of our water resources?

We have to ensure Zero Discharge of Hazardous Chemicals into the environment. And to make this happen, the industry needs to adopt new and innovative technologies that ensure circular economy of water. Our wastewater management technology, Aquatron, ensures that.

Q: Could you tell us about your product Aquatron? Also, How does Aquatron solve problems that conventional technology does not?

A: Aquatron™ is a patented water recovery technology that recovers water at ISO 10500 or reuse standards without any toxic discharge. This enables the organisations to implement circular economy of water, reduce their water footprint dramatically providing risk mitigation against non-adherence to environmental norms and provides water security. This remarkable achievement is realised using the principles of physics without reliance on chemical or biological processes, reverse osmosis (RO), and evaporator technology. An elemental analysis of the wastewater is done to determine the elements present as dissolved solids. The wastewater is then bombarded with Specific Frequencies of Dissociation (SFoD) for the different elements in a resonating reactor. The dissolved solids get broken into their elemental forms and get segregated as suspended solids. These impurities are recovered as elements in a non-toxic form. Clean water is recovered using an advanced filtration process. The recovered water may be fully reused back in the process. The best aspect of Aquatron is its unparalleled effectiveness at a very low cost of operation. Aquatron's operating cost to achieve ZLD for most effluents is between Rs. 75 to Rs. 150 per KL, which is very low compared to conventional technology using MEE technology. Aquatron is one technology for all needs - WTP, STP, ETP (across industry segments) and Desalination. Aquatron is industry and application agnostic and can treat any effluent with ease and efficacy. Aquatron removes hardness, arsenic, nitrates, heavy metals, PFAS and forever chemicals. Aquatron reduces TDS, COD, and BOD by 95%. Aquatron removes turbidity, colour, total organic carbon (TOC), and Disinfection Byproduct Precursors (DBP). Conventional treatment processes have issues related to RO brine handling, toxic sludge management, high carbon footprint for ZLD and scaling of evaporators, etc. These issues are not encountered in Aquatron-based solution.

Q: We understand that Aquatron is a disruptive new technology. How has the industry responded to it?

A: Livprotec has received an enthusiastic response to our revolutionary technology across the whole water ecosystem consisting of potential customers, system integrators who would like to integrate our technology in their solution offerings, and top sustainability consulting companies who want to help their customers reduce their water footprint. It's been overwhelming to say the least. In a short span of few months since launch in August, we have signed up system integrators in India, ASEAN counties and GCC countries and many top consultants have already evaluated our technology for their customers. Some of the notable names are Murugappa Water Technology Solutions, Cleanedge Resources (ASEAN), XH2O, Protreat (Thailand), Albe (Malaysia), JM Enviro, Wapp Systems, Lars Enviro, H2O and Sai Aquafresh amongst others.

Q: How do you envision Aquatron's role in advancing sustainability over the next 5 years?

A: In the beginning, nature gave us clear water and elements. Humans made chemicals and those are now mixed in water due to current manufacturing and water treatment processes. Only Aquatron gives back to nature clean water and elements as nature gave to us originally. We are committed to reversing the damage already done. We expect to have a global presence in the next two years across all continents. We are optimistic about critical industries across the world adopting Aquatron as a standard for their wastewater recovery and water reuse needs due to its unbeatable efficacy and low cost of operation. This shall pave the way for Aquatron to play a pivotal role in advancing sustainability in water in the coming years.

Q: How important is the cause of water to you personally? How and when did you enter the water industry?

A: I have always felt a deep connection with water and have been passionate about technology. Hence, being able to bring these innovations to the water industry is an honourable experience for me. My journey in the water industry began in 2015 when we were moved by the call of the Hon'ble Prime Minister on Namami Gange. We visited various ghats of river Ganga in Benaras and understood issues related to unabated pollution. Since then we have been involved with the development of this technology with its inventor Dr. Rajah Vijay Kumar. After successful customer installations with marquee customers, we have launched the solution in India and global markets in the middle of 2023. In this short yet impactful period, we've already formed partnerships with esteemed collaborators, reflecting our commitment to swift and effective engagement. As we navigate the dynamic water industry landscape, our focus remains unwavering on innovation, sustainability, and collaboration with industry leaders for a positive impact on the global water ecosystem.

> **Aquatron has been well-appreciated by visionary customers and partners. We value such associations as they work as agents of change that our planet immediately needs.**

Q: Could you share a personal experience or moment that inspired your deep commitment to sustainability and environmental responsibility?

A: During my engineering years at Banaras Hindu University, we often used to visit the ghats of Ganga. It moved us to see the level of devotion of the people of India towards Ganga and also the way it was plagued by pollution. This gave us a deep sense of pain. When we tested the water in later years, the paradox of seemingly dirty water maintaining alkalinity intrigued us, sparking a commitment to safeguard our revered river by addressing contamination. Witnessing worship, pollution, and the river's resilience formed the foundation of my journey into water-related literature, guiding a decade-long exploration in the water industry dedicated to environmental responsibility. This ignited not just a passion but a mission to contribute to environmental sustainability. My academic background and subsequent exploration equips me to navigate the complexities of the water industry. Through the dedicated work of our team, we aim to implement technology that not only addresses contamination but also contributes to broader water sustainability efforts.

Q: How do you engage with the industry?

A: Our approach to industry engagement revolves around universal accessibility to our technology. Rather than fostering competition, we prioritize collaboration, recognizing that our solutions partners are key to solving this global problems. We want to work with people who believe in what we believe. Our company is dedicated to helping the solution providers in the water industry to exceed their expectations in helping them meet their sustainable goals and reduce their water footprint. In a short span of time, we have established many noteworthy collaborations that include partnerships with esteemed entities. As newcomers providing innovative technology solutions, we've successfully garnered interest from a select group of reputable companies within the water industry. Our emphasis on choice ensures a diverse market, and thus far, we haven't encountered any substantial challenges. This commitment to collaboration and adaptability positions us at the forefront of meeting the evolving needs of the water sector.

Q: How do you engage with the One final question: what's the best advice you have ever received?

A: Cultivating a robust value system has profoundly shaped my personal and professional approach. This advice guides our company, fostering a culture of integrity, responsibility, and ethical conduct. A values-driven philosophy influences our organizational culture and strengthens relationships with stakeholders, creating a ripple effect for enduring success in a dynamic industry.

ORP – A BETTER WAY TO ACCESS SWIMMING POOL WATER QUALITY

PART-II

WHY DOES THE pH INCREASES IN POOL WATER

pH of the pool water will increase due to

1. Use of alkaline chlorine compounds like NaOCL (liquid bleach) and Solid Bleach.
2. Make up water addition.
3. Body oil , sweat , etc from swimmers

OXIDATION-REDUCTION POTENTIAL (ORP)

ORP or Redox refers to the oxidation reduction potential-a measure of the oxidizing properties of the sanitizer in water- which is determine by a sensor with a noble metal electrode, usually platinum, and a standard Ag/AgCl reference electrode. Like pH, ORP represents an intensity factor. It does not characterize the capacity of the system for oxidation or reduction, in the same way pH does not characterize the buffering capacity.

When an ORP sensor is placed in water containing a sanitizer-such as chlorine or ozone which is also an oxidizer, it acts like a small battery and creates a small but measureable electric potential. The value of this potential varies with the type of sanitizer and its concentration. Each Disinfectant has different ORP values . The Higher the ORP value the greater is the disinfectant property.

ORP and Cyanuric acid stabilizers :

Cyanuric acid stabilizers are often used as a substitute to liquid bleach . This is because the cyanuric acids will combine with cholrine to form compounds that are not destroyed readily by the UV rays of the sunlight .The amount of cyanuric acid in the pool water should not exceed 100 ppm and should ideally be between 25 -50ppm only . This is because at higher levels the bacteriological effects of Chlorine are drastically reduced. It is suggested that FRC in pools using cyanuric acid as stabilizers must be 3 times more than the normal FRC in pools

The presence of cyanuric acid reduces the ORP reading of the sensor. This is because it reduces the concentration of HOCl in the water. It is therefore every important not to exceed the maximum recommended concentration in the water (normally 100 ppm).

ORP AND OZONE

The ORP value as seen from the table is very high Ozone is another strong oxidizer

$$O1 = 2H + 2e - O2 + H2O$$
$$E0 = 2.07V$$

Ozone also can be monitored with ORP sensors. Because of its short lifetime and lack of residual value, we need to maintain a residual disinfectant level in the pool . In addition, it also may be required for safety reasons to reduce the ozone level in the water with activated charcoal before returning it to the filtered water into the pool

ORP AND RESIDUAL OZONE

In swimming pools ORP levels of 500 mV would be a reasonably good levels to achieve. Achieving higher levels of 600-650 mV will depend totally on the quality of water , bather load and control of pH.

Ozone generators with inbuilt ORP display and probes: Today ozone generators come with an in built ORP digital display and good reliable ORP sensors , The sensors are normally located after ozonation and connected to the digital display Care should be taken that while installing an orp probe on line we ensure that the location does not permit turbulence of water . This may cause false reading of the ORP levels. The probe must ideally be platinum tipped and screw type so that it is easily removable and cleaned . When the ORP is very low, the pool maintenance guy can check the pH , the residual chlorine levels as well as the check on the performance of the ozone system.

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Exploring the Mystique of Lake Natron:

Nature's Alkaline Wonderland

Nestled in the Great Rift Valley of Tanzania, Lake Natron stands as a testament to nature's remarkable artistry. This alkaline lake, often misunderstood for its harsh conditions, unveils a tapestry of unique features that captivate the imagination.

THE ALKALINE BALLET: UNRAVELING THE PH MYSTERY

One of Lake Natron's most intriguing attributes is its alkaline nature, with a pH as high as 10.5. This alkalinity is attributed to the high concentration of minerals flowing into the lake from the surrounding hills and hot springs. Surprisingly, this seemingly inhospitable environment becomes a haven for certain extremophile microorganisms and flamingos.

FLAMINGO HAVEN: A PINK MIRAGE ON THE ALKALINE CANVAS

Lake Natron is a vital breeding ground for Lesser Flamingos, drawing flocks that transform the lake into a sea of pink. The alkaline waters create a buffer against predators, providing a safe haven for flamingo chicks. Witnessing these elegant creatures wading through the vibrant hues of Lake Natron is a spectacle that leaves an indelible mark on any observer.

CHALLENGES OF SURVIVAL: LIFE IN EXTREME CONDITIONS

While the flamingos gracefully navigate the alkaline waters, other wildlife faces the challenges imposed by Lake Natron's extreme conditions. The high salinity and alkalinity create an environment unsuitable for most aquatic life. However, certain species of fish, adapted to withstand these conditions, thrive in this unique ecosystem.

THE PETRIFYING TOUCH: CALCIFIED ODDITIES ALONG THE SHORELINE

Lake Natron's alkaline waters possess a petrifying touch, turning unfortunate creatures that meet their end in its depths into calcified statues. The eerie sight of these calcified remains along the shoreline adds a

surreal element to the lake's allure. It serves as a stark reminder of nature's ability to shape landscapes in unexpected ways.

THE ENGAGING LANDSCAPE: OL DOINYO LENGAI AND SURROUNDING MARVELS

Beyond the shores of Lake Natron, the landscape unfolds with the majestic presence of Ol Doinyo Lengai, an active volcano. The ash from its eruptions further enriches the lake's alkalinity. Surrounding the area are surreal landscapes, including dramatic waterfalls and expansive salt flats, creating a visual symphony of contrasting elements.

CONSERVATION CHALLENGES: BALANCING TOURISM AND PRESERVATION

As Lake Natron gains attention for its unique features, the delicate balance between tourism and conservation becomes paramount. Efforts are underway to promote sustainable tourism practices that allow visitors to appreciate the lake's beauty without jeopardizing its fragile ecosystem.

Lake Natron thus, stands as a testament to the wonders of the natural world. Its alkaline waters, teeming with life adapted to extreme conditions, create a spectacle that beckons explorers and nature enthusiasts alike. As we unravel the mysteries of this enigmatic lake, the need for responsible conservation becomes clear, ensuring that Lake Natron's allure remains an everlasting marvel for generations to come.

TENDER

Interception And Diversion For Tapping Nallah And Setup Of Sewage Treatment Plant			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Madhya Pradesh, Bagli		
Bid Open Date	**14 Feb 2024**	**Tender Value**	**3.15 Crore**
Doc Collection Date	**12 Feb 2024**	**FTID**	240113448050
Operation Support In Water Treatment Plant, Dm Plant, Oil Transfer P/P House And Any Other Misc. Works As Per Direction Of Engineer In Charge.			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Jharkhand, Bokaro		
Bid Open Date	**20 Jan 2024**	**Tender Value**	**93.70 Lac**
Doc Collection Date	**19 Jan 2024**	**FTID**	240113412990
Horaizontal 2 Nos Filter Chamber Drain Water Treatment At Aushbati Village Mouza Aushbati Jl 09			
Category	Construction, Infrastructure, Civil Work tenders		
Location	West Bengal, Serampore		
Bid Open Date	**27 Jan 2024**	**Tender Value**	**85 Thousand**
Doc Collection Date	**25 Jan 2024**	**FTID**	2401134256250
Cleaning Of Weeds From Facultative Ponds No.1 I/C Cleaning Of Grass And Surface Dressing Work At Kotra Sewage Treatment Plant Campus, Bhopal			
Category	Manpower, Security Guard Supply tenders		
Location	Madhya Pradesh, Huzur		
Bid Open Date	**29 Jan 2024**	**Tender Value**	**14.20 Lac**
Doc Collection Date	**25 Jan 2024**	**FTID**	2401134239230
Supply And Erection Of 2000 Lph Reverse Osmosis Water Treatment Plant With Deep Borewell In Ward No.20			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Tamil Nadu, Sriperumbudur		
Bid Open Date	**19 Jan 2024**	**Tender Value**	**9.70 Lac**
Doc Collection Date	**19 Jan 2024**	**FTID**	2312094103850
Construction An Arsenic Free Water Treatment Plan At Infront Of Sujapur Bas Stand Traffic More Sansad Ii Under Sujapur Gp Kck I Panchayat Samiti Malda. (Scheme Id-71376457)			
Category	Construction, Infrastructure, Civil Work tenders		
Location	West Bengal, Kaliachak		
Bid Open Date	**01 Feb 2024**	**Tender Value**	**2.54 Lac**
Doc Collection Date	**30 Jan 2024**	**FTID**	2312094120550

TENDER

Horaizontal 6 Nos Filter Chamber Drain Water Treatment At Mashat Village Mouza Mashat Jl 16			
Category	Manpower, Security Guard Supply tenders		
Location	West Bengal, Serampore		
Bid Open Date	**27 Jan 2024**	**Tender Value**	**2.55 Lac**
Doc Collection Date	**25 Jan 2024**	**FTID**	2401134270530
Horaizontal 4 Nos Filter Chamber Drain Water Treatment At Banamalipur Village Mouza Banamalipur Jl 15			
Category	Construction, Infrastructure, Civil Work tendersa		
Location	West Bengal, Serampore		
Bid Open Date	**27 Jan 2024**	**Tender Value**	**1.70 Lac**
Doc Collection Date	**25 Jan 2024**	**FTID**	2312074116880
Bhattu Kalan Mahagram Stp 4.00 Mld Dnit For Design Construction Erection Testing And Commissioning Of 4.00 Mld Sewage Treatment Plant Based On Sequential Batch Reactor Sbr Technology Complete			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Haryana, Fatehabad		
Bid Open Date	**25 Jan 2024**	**Tender Value**	**32.26 Crore**
Doc Collection Date	**25 Jan 2024**	**FTID**	2401134289950
Supply Of Sewer Treated Water For Use Of Non Domestic Purpose Through Tankers From Sewerage Treatment Plant To Demanded Place On Premium Sharing Basis. (Package-3)			
Category	Transport Equipments tenders		
Location	Madhya Pradesh, Indore		
Bid Open Date	**06 Feb 2024**	**Tender Value**	**5.62 Crore**
Doc Collection Date	**05 Feb 2024**	**FTID**	240112449070

EVENT CALENDAR

December 2023

East Africa Water Summit 2023
29 Nov - 01 Dec 2023
Nairobi, Ikoo, Kenya
www.eawaters.com/

Water Bangladesh International Expo
07 - 09 Dec 2023
International Convention City Bashundhara (ICCB), Dhaka, Bangladesh
www.water-exhibition.com

SRW India Water Expo 2023
20 - 22 Dec 2023
Chennai Trade Centre, Chennai, India
www.waterexpo.in

World Conference on Sustainability, Energy and Environment 2023
08 - 09 Dec 2023
City Hotel Berlin Mitte, Berlin, Germany
www.steconf.org/conference/world-conference-on-sustainability-energy-and-environment/

Malaysian International Water Convention 2023
05 - 07 Dec 2023
Putra World Trade Centre, Kuala Lumpur, Malaysia
www.miwc.tech/home

GoGreen Summit 2023
29 - 30 Dec 2023
Bali, Indonesia
www.gogreen.bioleagues.com

January 2023

Water India Expo
17 - 19 Jan 2024
Pragati Maidan, New Delhi, India

Water & Wastewater Equipment,
Treatment & Transport
24 - 27 Jan 2024
Indiana Convention Center, Indianapolis, USA
www.wwettshow.com/en/home.html

WWT Wastewater Conference and Exhibition
25 - 26 Jan 2024
The National Conference Centre, Solihull, UK
www.10times.com/wwt-wastewater

Nevada Water Resources Association
Annual Conference Week
9 Jan - 01 Feb 2024
Tuscany Suites & Casino, Las Vegas, USA
www.nvwra.org/2024-symposium

Local Water Management Crossroads
31 Jan - 01 Feb 2024
Parc Expo Rennes, Rennes, France
www.10times.com/carrefour-des-gestions-locales-de-leau

InterAqua
31 Jan - 02 Feb 2024
Tokyo Big Sight, Koto, Japan
www.interaqua.jp/eng/

Smart Energy India Expo
17 - 19 Jan 2024
Pragati Maidan, New Delhi, India
www.smartenergyindiaexpo.com

Utah Greeen Conference & Trade Show
22 - 24 Jan 2024
Mountain America Expo Center, Sandy, USA
www.10times.com/utah-green-trade-show

February 2024

Annual Water Expo
06 - 08 Feb 2024
Delta Hotels by Marriott Fargo, Fargo, USA
www.10times.com/water-system-expo-fargo

Mountain States Ground Water Expo
08 - 09 Feb 2024
Aquarius Casino Resort, Laughlin, USA
www.mountainstatesgroundwater.com

AquaFarm
14 - 15 Feb 2024
Pordenone Fiere, Pordenone, Italy
www.aquafarm.show/en/aquafarm-program

World Water Tech Innovation Summit
20 - 21 Feb 2024
Hilton London Bankside, London, UK
www.worldwatertechinnovation.com

E-World Energy & Water Exhibition
20 - 22 Feb 2024
MESSE ESSEN GmbH, Essen, Germany
www.e-world-essen.com/en

Pacific Water Conference
20 - 22 Feb 2024
Hawaii Convention Center, Honolulu, USA
www.hiawwa.org/2024-pacific-water-conference

UF Water Institute Symposium
20 - 21 Feb 2024
J. Wayne Reitz Union, Gainesville, USA
www.conference.ifas.ufi.edu/waterinstitute

WATER TODAY'S WATER EXPO
28 Feb - 01 Mar 2024 Chennai Trade Centre, Chennai, India
www.waterexpo.biz

Water Garden Expo
28 Feb - 01 Mar 2024
Grand Casino Hotel & Resort, Shawnee, USA
www.wgexpo.com

WAPTAG Water Expo
29 Feb - 02 Mar 2024 Mahatma Mandir Exhibition Hall, Gandhinagar, India
www.waptag.org

March 2024

Roorkee Water Conclave
03 - 06 Mar 2024
Indian Institute of Technology Roorkee, Roorkee, India
www.iitr.ac.in/rwc

New England Water Well Expo
07 - 09 Mar 2024 Best Western Royal Plaza Hotel & Trade Center, Marlborough, USA
www.newwassociation.org

WateReuse Research Conference
10 - 13 Mar 2024
Hilton Denver City Center, Denver, USA
www.watereuse.org/event/2024-watereuse-symposium

Start by this : Water Policy Conference
18 - 20 Mar 2024
Washington Hilton, Washington DC, USA
www.10times.com/e1zk-rr53-h02x

Rural Water Conference
18 - 21 Mar 2024
Penn Stater Conference Center Hotel, State College, USA
www.prwa.com/annual-conference

Aqua Netherlands
19 - 21 Mar 2024
Evenementenhal Gorinchem, Gorinchem, Netherlands
www.aquanederland.nl/en/

KRWA Conference & Exhibition
26 - 28 Mar 2024 Century II Performing Arts & Convention Center, Wichita, USA
www.krwa.net/TRAINING/Conference

April 2024

Florida Water Resource Conference
02 - 05 Apr 2024
Gaylord Palms Resort & Convention Center, Kissimmee, USA
https://www.fwrc.org/

EVENT CALENDAR

Texas Water
09 - 12 Apr 2024
Fort Worth Convention Center, Fort Worth, USA
www.txwater.org

AZ Water Conference & Exhibition
10 - 12 Apr 2024 Phoenix Convention Center, Phoenix, USA
www.azwater.org/group/annualconference

Water Expo & Forum
16 - 18 Apr 2024 Abu Dhabi National Exhibition Centre - ADNEC, Abu Dhabi, UAE
www.worldfutureenergysummit.com/en-gb/water.html#/

IE Expo China
18 - 20 Apr 2024 Shanghai New International Expo Centre (SNIEC), Shanghai, China
www.ie-expo.com

Asia Water
23 - 25 Apr 2024
Kuala Lumpur Convention Centre, Kuala Lumpur, Malaysia
https://www.asiawater.org/

SDARWS Rural Water Expo
24 - 25 Apr 2024
Best Western Ramkota Hotel, Rapid City, USA
https://www.sdarws.com/

International Green Energy Expo
24 - 26 Apr 2024
EXCO, Daegu, South Korea
https://www.greenenergyexpo.co.kr/eng/

Water Expo Bangladesh
25 - 27 Apr 2024
International Convention City Bashundhara (ICCB), Dhaka, Bangladesh
https://www.limraexpo.com/water/index.php

Green Vision Summit & Expo
30 Apr - 02 May 2024
MFCC - Malta Fairs & Conventions Centre, Malta
https://10times.com/e15k-f3dd-4fx4

May 2024

Maryland Rural Water Association Conference
06 - 09 May 2024
Roland E. Powell Convention Center, Ocean, USA
https://10times.com/mrwa-ocean

Power of Water Canada Technical Conference & Trade Show
08 - 10 May 2024
Niagara-on-the-Lake, Canada
https://www.owa.ca/conference/

IFAT Munich
13 - 17 May 2024
Exhibition Munich, Munich, Germany
https://ifat.de/en/trade-fair/

Renewable Energy Show
16 - 18 May 2024
International Convention City Bashundhara (ICCB), Dhaka, Bangladesh
https://10times.com/renewable-energy-show

Water Management Show
16 - 18 May 2024
International Convention City Bashundhara (ICCB), Dhaka, Bangladesh
https://10times.com/water-management-show

West Africa Water Expo
21 - 23 May 2024
Landmark Centre, Lagos, Nigeria
https://elanexpo.net/waweexpo/

June 2024

SIEE Pollutec
02 - 05 Jun 2024
Add Safex - Foire d'Alger, Mohammadia, Algeria
https://siee-pollutec.com/?page_id=90&lang=en

International Exhibition on Environmental Technology & Green Energy
03 - 05 Jun 2024
COEX Convention Center, Seoul, South Korea
https://www.envex.or.kr/eng/main/index.asp

Watertech Africa
05 - 07 Jun 2024
Kenyatta International Convention Centre, Nairobi, Kenya
https://www.expogr.com/watertech/

GreenTech Amsterdam
11 - 13 Jun 2024
RAI Amsterdam, Amsterdam, Netherlands
https://www.greentech.nl/

China (Guangzhou) International High-end Drinking Water Industry Expo
14 - 16 Jun 2024
China Import and Export Fair(Canton Fair Complex), Guangzhou, China
http://www.ihe-china.com/cn/Invitation/40.IWE/

Singapore International Water Week
16 - 20 Jun 2024 Singapore
https://www.siww.com.sg/

Egypt Infrastructure & Water Expo
25 - 27 Jun 2024
Egypt International Exhibition Center, Cairo, Egypt
https://www.egyptinfrastructureexpo.com/

July 2024

Water and Aqueous Solutions Gordon Research Conference
20 - 21 Jul 2024
Holderness School, Holderness, USA
https://www.grc.org/water-and-aqueous-solutions-conference/2024/

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Aquatherm Moscow stands as a unique B2B powerhouse, fostering effective interactions among industry leaders. This exhibition is more than a gathering; it's a dynamic platform where negotiations thrive, fueled by the shared commitment to success. Drawing participants from manufacturing, trading, distribution, construction, design, and public authorities, the event facilitates seamless communication. The positive atmosphere enhances the experience, making Aquatherm Moscow not just an exhibition but a pivotal opportunity to connect, collaborate, and propel the industry forward.

Date: 06-09 February 2024
Venue: Crocus Expo, Pavilion 3, Moscow
Website: aquathermmoscow.ru

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WATER INDIA
WATER & WASTEWATER INDUSTRY EVENT

Delighted to announce Kushi Events' Water Expo Pune 2024 on February 8th-10th at Deccan College Ground, Pune, India. With a rich history of opening new avenues in the Indian Water Industry, this exclusive trade show is a beacon for marketers, vendors, and various water industry sectors. Beyond established companies, it's a key platform for startups, facilitating connections with target customers for accelerated business growth. Water Expo spotlights the flourishing residential water purification market, attracting manufacturers, integrators, and distributors nationwide. Amidst the celebration of the Indian water industry, we prioritize safety, strictly adhering to COVID-19 guidelines for this event. Join us in shaping the future of water solutions!

Date: 08-09 February 2024
Venue: Deccan College Ground, Yerawada, Pune, India.
Website: tradeshows.tradeindia.com/waterexpo-pune/

BAYWATCH

The 19th EverythingAboutWater Expo 2024 stands as a remarkable and all-encompassing annual event in India, spotlighting cutting-edge technologies and solutions within the water sector. This event serves as an exceptional gateway for stakeholders worldwide to immerse themselves in the expansive and dynamic realm of the Indian Water management Industry, facilitating the exchange of business opportunities, networking, and the exploration of innovative Water solutions.

Date: 10 - 12 September 2024
Venue: IICC, New Delhi
Website: //www.eawaterexpo.com

India is currently on a trajectory towards severe water stress, with projections indicating a critical situation by 2025. The rapid pace of Industrialization and the burgeoning population have significantly widened the gap between water supply and demand, a matter of deep concern for both the Central and State Governments. Within the framework of the 19th Everything About Water Expo 2024, unparalleled business prospects will emerge for both domestic and international players in the Water Industry. Attendees will have the opportunity to gain valuable insights, discover future trends, and navigate the evolving landscape of the Indian Water market.

InterAqua

Addressing urgent global water shortages and environmental challenges is crucial for creating a sustainable society. Japan, grappling with population decline and climate risks, requires concerted efforts and fundamental revisions. Corporate engagement is pivotal, demanding activities aligned with a decarbonized society and Sustainable Development Goals (SDGs).

InterAqua2024, themed "Exhibition of water business supporting sustainable corporate activities," transcends showcasing innovative technologies. In its 15th year, this exhibition serves as a global and domestic platform to address water environment issues, evolving with market needs. Seize InterAqua2024 as a gateway for new business opportunities and insights into ongoing corporate activities, fostering a sustainable future.

Date: 31 January – 2 February 2024
Venue: Tokyo Big Sight, Koto, Japan
Website: en.www.interaqua.jp

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19th EVERYTHING ABOUT

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