WWW.EAWATER.COM

REG. NO: DELENG/200 1/3092
AUGUST 2023 | ₹800 | US $ 20

EAW
The Power of Knowledge

EVERYTHING ABOUT WATER

India's First Water eMagazine: www.eawater.com/eMagazine

Follow us on:

Instrumentation and Monitoring

The Past, Present, and Future of Water Quality Analysis

The Game Changer is Here!

900 Series

Conductivity, Resistivity, TDS,
pH, ORP, Salinity, ISE, Flow,
Pressure, +more with Touchscreen LCD

MYRON L® COMPANY
Water Quality Instrumentation
Since 1957

www.myronl.com
760-438-2021

DESIGNED, ENGINEERED AND ASSEMBLED IN THE USA

ONLINE WATER ANALYZER

SWAS SYSTEM

AXIS

Steam & Water Analysis Systems

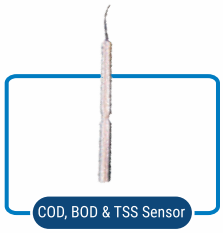
BRIX — ANALYZER & CONTROLLER

COD, BOD, pH & TSS Analyzer

Turbidity / Chlorine Analyzer

Smart Controller

SENSORS



COD, BOD & TSS Sensor

Ammonium Sensor

Turbidity Sensor

Chlorine Sensor

Multiparameter Controller

Knick

pH Sensors

Conductivity Sensors

Oxygen Sensors

Portable Analyzer

Transmitter

Thermo SCIENTIFIC

ANALYZERS

Silica Analyzer

Sodium Analyzer

Ammonia Analyzer

Hardness Analyzer

AXIS SOLUTIONS PVT. LTD.

Plot No. 324, Road No.5, G.I.D.C., Kathwada, Ahmedabad-382 430, Gujarat, India.
Tel. : +91792290 0860/61 | Fct. : 9925001633 / 9909906354
info@axisindia.in | www.axisindia.in

IN THIS EDITION

REGULARS

In Depth:

Case Study:

TECH 2.0:

Move your wastewater plant performance forward with Valmet's automation

Valmet's wastewater measurement and automation solutions perform even in the most challenging conditions.
You can get the most from our experience and know-how in technology and get well-timed results. Discover benefits throughout the sludge treatment process, from optimized polymer use, less circulating material, lower transportation costs, to optimized energy consumption – all resulting in significant savings and a speedy return on your investment.
Scan the QR code or visit **valmet.com/wastewater** to read more about our products and solutions.

Valmet Technologies Private Limited
1001 & 003, Everest Infotech Park II, C-30,
MIDC, Pawane,
Navi Mumbai
400 709 Mumbai
INDIA

For more information, please contact:
pravin.tripathi@valmet.com

Valmet FORWARD

Earth Water Foundation
A1/152, Neb Sarai,
IGNOU Road,
New Delhi 110 068, India

www.eawater.com

MANAGEMENT
Managing Director & Group Editor:
Sunil Ghorawat

BUSINESS HEAD
Assistant Vice President:
Nisha Aggarwal

Editorial Incharge:
Simran Arora

ART
Design Team @EAW

MARKETING & OPERATIONS
Manager: Rahul Mourya

PUBLISHER
Earth Water Foundation
A1/152, Neb Sarai, IGNOU Road
New Delhi 110 068, India
Tel: +91 11 4106 3970

For editorial contributions / press releases, write to:
editor@eawater.com
For advertising enquiries, write to:
enquiry@eawater.com
For magazine & e-newsletter subscription, write to: enquiry@eawater.com

OFFICE ADDRESS

A1/152, Neb Sarai, IGNOU Road
New Delhi 110 068, India
Tel: +91 97188 24607 / 85889 11033

A NOTE FROM THE EDITOR

Dear Readers,

The essence of our world, water, permeates every aspect of our lives in innumerable ways. It provides for our needs, protects our environment, and powers our economies. But just as the globe changes, so must our knowledge of water and our capacity to safeguard and manage this priceless resource. A voyage into the heart of "Instrumentation and Monitoring," a topic of utmost significance for our environment and future generations, is what this edition of EverythingAboutWater Magazine is all about.

Instrumentation provides real-time data that allows utilities to identify weak points and schedule maintenance proactively. By resolving issues early on, we not only conserve resources but also avoid wasteful water contamination. Take leak detection systems as an example. Millions of gallons of water are lost each year due to leaks, which is a major problem on a global scale. Even the smallest leaks may be located using sophisticated instrumentation, allowing for quick repairs and water resource conservation. Water utilities may lessen their environmental effect and ultimately save a lot of money by putting money into cutting-edge leak detection technologies.

Within the pages of this magazine, you will find a treasure trove of knowledge on the latest technologies, innovations, and strategies that have been harnessed to measure, analyse, and safeguard our water sources. Water quality characteristics can be continuously analysed by monitoring systems with sensors, ensuring that water complies with legal requirements. If there are any deviations, corrective action can be made right away. This is especially important in preventing epidemics and diseases involving water.

The effects of climate change are also being felt globally, increasing the frequency and severity of weather occurrences. In order to address these problems, instrumentation is essential. For instance, early warnings from flood monitoring systems can help communities evacuate and safeguard their water infrastructure. On the other side, monitoring droughts can assist in managing water supplies during times of scarcity, making sure that necessities are satisfied while minimising waste. The process of water treatment can be optimised with the use of instrumentation. Treatment plants can operate more effectively and economically if they can monitor and modify factors in real-time. This results in decreased water bills for customers as well as benefits for the company.

The difficulties we face are changing at an extraordinary rate with the rest of the world. Our water supplies are under tremendous pressure from factors such as population increase, urbanisation, industry, and climate change. It is our hope that the information presented in this issue will operate as a guiding light, encouraging people, groups, and governments to take initiative in promoting responsible water management.

In closing, I invite you to immerse yourself in the world of "Instrumentation and Monitoring" in the realm of water resources and environmental sustainability. Let the knowledge contained within these pages empower you to make a positive difference in your own corner of the world. Together, we can ensure that the life-giving waters of our planet continue to flow for generations to come.

thanks & regards,
Simran Arora
Editorial Incharge

Transchip 3.0

Advanced MBBR Technology
In Association with Mutag Germany

~ 5,500 m²/m³

MBBR MEDIA doesn't work in ETP!

TRANSCHIP 3.0 has proven it's a MYTH

DRDO
Alkem Labs Ltd
Auro Dyeing
Gujarat Narmada Fertilizers Company
CPWD
TATA BSL Ltd.
Alkem Labs Ltd
Eros Hotels
NTPC Leachate treatment plant, Varanasi
Coca Cola
Eros Hotels
Grasim Ltd
Sun Pharma Ltd.
Sharmanji Yarns
Omex builders
NTPC Leachate treatment plant, Varanasi
12 MLD Kukatpally STP
Par Formulations
Bhushan power ltd.
QUA Water Technologies Pvt. Ltd.
O. P. Jindal Global University

BEYOND CONVENTIONAL

Transcend Cleantec Pvt. Ltd.

S No 37/2, Shed no 463/1,Near Joshi Transformer,
Narhe, Taluka Haveli, Pune-411041

+91- (0)- 8669190129
info@transcendcleantec.com
www.transcendcleantec.com

NATIONAL W

Droplets

DyeCoo and CleanDye CO2 Dyeing Technology Slashes Greenhouse Gas Emissions by 58 Percent Compared to Conventional Dyeing

DyeCoo's waterless dyeing technology, operated by CleanDye's factory in Vietnam, generated 58 percent lower greenhouse gas emissions than conventional textile deing vendors, an independent lifecycle assessment (LCA) commissioned by Adidas shows.

The LCA was commissioned as part of a program with Adidas to identify and certify low carbon textile coloration technologies.

As brands like Adidas reshape the apparel industry to address climate concerns, technologies such as DyeCoo's supercritical CO2 dyeing that reduce both carbon emissions and water pollution are essential for sustainable fashion. Based on these results, Adidas will be incorporating CO2 dyeing into its supply chain.

The LCA was conducted by Sphera, a third-party consultant with a proven track record of producing reliable sustainability reports across several industries. Sphera compared CleanDye and DyeCoo's waterless dyeing process to three of Adidas' conventional fabric vendors and found that CleanDye and DyeCoo generated a 58 percent smaller carbon footprint versus conventional fabric dyeing technology.

This report coincides with increasing interest in DyeCoo's technology from firms all over the world, including manufacturers in Turkey, Vietnam, India, Bangladesh, and Central America and large international brands and retailers that seek to reduce their carbon footprint over the coming years. DyeCoo received enthusiastic feedback at ITMA — the world's largest international textile and garment technology exhibition, which was held in Italy in June. During the exhibition, DyeCoo introduced a range of new CO dyeing solutions, including a smaller fully electric CO dyeing machine suitable for sampling and small-scale production, as well as an advanced lab system for R&D purposes.

"We are thrilled about this report — and that CO dyeing is gaining momentum in textile manufacturing," said Kasper Nossent, commercial director at DyeCoo. "We look forward to expanding our technology beyond our current customers to other factories around the world in collaboration with our brand partners."

Besides the significant sustainable impact, DyeCoo's CO dyeing technology also provides a full color gamut and a very high batch-to-batch consistency in bulk production, without compromising on quality and cost.

Simon Weston, CleanDye's chief executive officer, said, "The LCA is also a testament to our Vietnam facility, where we use DyeCoo technology to deliver high-quality, sustainably manufactured fabric at competitive prices."

Srinagar's Dal, Nigeen Lakes to Have Floating Sewage Treatment Plants Soon

The Dal and Nigeen lakes will soon have floating sewage systems that connect the houseboats to treatment plants, protecting the lakes from pollution in the process.

The Lake Conservation and Management Authority (LCMA), which manages and conserves the water bodies and waterways of Jammu and Kashmir, said the project will collect sewage from the houseboats and keep the lakes clean. Both lakes have over the years, suffered a great deal of pollution. It also said the project will totally arrest the sewerage from the houseboats and render the lakes clean. LCMA vice chairman Bashir Ahmad Bhat said that the refuse from houseboats currently goes directly into the two lakes. Since the problem of sewage seeping into the lake has persisted, the government has decided to connect the houseboats through a proper sewage system.

Last year, the LCMA started a programme under which they planned to connect all the houseboats in the Dal and Nigeen lakes to the sewerage line, Bhat said.

"The western shore houseboats of Nigeen Lake were connected last year. Then the Dal Lake project got started and currently, we have completed 60- 70% of the work. We are hopeful that by the end of October, all the houseboats of both lakes will be connected to the sewerage line," he said. The houseboats in the lakes are being connected with a sewage treatment plant through a floating sewage system. "Basically, it is to arrest all the refuse that gets into the lake so as to improve the water quality. The goal (of LCMA) is to restore Dal Lake to its pristine glory," Bhat said, adding that it was a challenging project as many experiments on collecting sewage have failed in the past. He added that there are 950 houseboats in both the lakes. According to Tanveer Ahmad, Assistant Executive Engineer, LCMA, the project was designed to scientifically dispose of sewage from houseboats. For the Dal Lake part of the project, the water body has been divided into 11 clusters. Each cluster has about 70 houseboats. The work on the project is taken cluster after cluster, he said.

"These clusters will have an individual sump in which the sewage is collected. After the collection, it will be pumped out and will be carried to the shores where it will get treated in a nearby sewage treatment plant," Ahmad said.

He also added while the project deadline is November 15, the LCMA is trying to complete it before time. He said houseboat owners would benefit from the project as the lakes would be cleaner which would lead to an increase in tourism. "We have the support of houseboat owners and houseboat associations. They want this network to develop so that the lake remains clean," he added. Houseboat owners have welcomed the move and have thanked the authorities for it. "We want the sewerage system to be constructed as we live around water, and for many years now, it has been polluted," said Zahoor Ahmad, a houseboat owner.

He added that if the project is implemented properly "after three to four years, the water of the lakes will be fit for drinking." "Due to this sewerage system, our own health and the environment will get better which will be beneficial to everyone," he said.

ATER NEWS

World Bank Team Reviews Water Canal Project in Ludhiana

The World Bank (WB) team visited the ludhiana on 7th September where the water treatment plant is being set up under the project in Bilga village near Sahnewal. A four-member team of the World Bank held a meeting with the Municipal Corporation Commissioner Sandeep Rishi to review the 24X7 water canal project.

The WB team, led by senior water specialist Srinivas Podipireddy reviewed the project details during the meeting held at MC Zone D office in Sarabha Nagar. The team also reviewed progress under different components of the project, including digitisation, e-office implementation among others.

The officials said that the project was being taken up to provide 24X7 water supply to the residents. This will also help in saving the ground water as under this project, surface water of the canal would be treated and supplied to the households. Officials said that the project would be implemented in two phases. Tender process is going on and the civil work under the first phase of the project is expected to start at the ground level soon. Demo zones are also being established to conduct trials under the project.

MC commissioner Rishi said that the team visited to review the progress and positive discussions were held during the meeting. MC officials, including joint commissioner Ankur Mahindroo, superintending engineer Ravinder Garg, executive engineers Ranbir Singh, Ekjot Singh among others were also present in the meeting.

Indian Reservoir Storage Level Continues to be Below Last 10 Years Average

Despite the cumulative deficiency in the south-west monsoon remaining at 11 per cent, the water storage level in India's 150 major reservoirs continues to be lower than the last 10 years average, data from the Central Water Commission (CWC) show.According to CWC's weekly bulletin on live storage as of September 6, the storage in the reservoirs was 111.737 billion cubic metres (BCM), which is 62 per cent of the live storage capacity. During the same period a year ago, the level was 150.851 BCM, while the last 10 years average was 129.591 BCM. The storage in 150 reservoirs is 74 per cent of last year's level and 86 per cent of last ten years level.

Bihar fares worst

Among the 150, the storage in 27 reservoirs is less than 50 per cent of the normal level. The storage in Pennar and East flowing Rivers between Mahanadi and Pennar is highly deficient, while it is deficient in Subarnarekha, Brahmani and Baitarni, Cauvery, Mahi, Krishna and West Flowing Rivers from Tadri to Kanyakumari, the bulletin said.

State-wise, the level in Bihar is 82 per cent lower than normal, while it is 62 per cent lower in Andhra Pradesh and Telangana. Other States where the storage is lower than normal are Kerala (48%), Tamil Nadu (55%), West Bengal (46%), Uttar Pradesh (42%) , Odisha (32%) and Jharkhand (26%).

Overall, there are only five reservoirs – three of them in Telangana and two in western India – that are filled to capacity. Of the 42 reservoirs in the South, the storage in 17 of them is below 40 per cent. In the east, nine of the 23 reservoirs have a level lower than 40 per cent. A similar situation prevails in seven of the 49 reservoirs in the West and 7 of 26 reservoirs in central India.

Droplets

Grundfos India Launches a Truck Show 'Jal Se Jeevan Yatra'

Grundfos India, a leading pump and water solutions company, has embarked on a ground-breaking initiative, 'Jal Se Jeevan Yatra', a mobile van equipped with state-of-the-art water supply & solar pump solutions. This mobile van will traverse key regions across India to spotlight innovative solar pumping solutions for both community water supply and irrigation. The initiative was inaugurated on the 22nd of September by His Excellency Royal Danish Ambassador to India, Mr. Freddy Svane, in New Delhi.Grundfos's solar water solutions liberate farmers as well as rural communities from power cuts and disruption caused by poor grid supplied electricity. The frequent occurrence of pump failure due to inadequate power quality often results in disrupted water supply for irrigation. Solar pumping solutions play a vital role to help communities in remote villages have access to water. Thus, villages gain the autonomy to ensure a consistent, reliable water supply, laying the foundation for enhanced quality of life and economic prosperity.Grundfos has been a trailblazer in revolutionizing water supply solutions worldwide. With a rich legacy of innovative technologies and sustainable practices, Grundfos is committed to ensuring clean and reliable water access for communities around the globe. In India, Grundfos has played a pivotal role in providing cutting-edge water supply solutions that have positively impacted millions of lives. The state-of-the-art pumps and controls have been instrumental in elevating water infrastructure, from urban canters to remote rural areas. Grundfos's relentless pursuit of excellence in water supply solutions aligns seamlessly with the nation's goal of ensuring access to safe and dependable water sources for all. Through this "Jal Se Jeevan Yatra" initiative, Grundfos reaffirms its commitment to pushing boundaries and setting new benchmarks in the realm of water supply solutions.Speaking on the launch, Rangarajan Ramaswamy, Area Sales Director - Water Utility, Grundfos, said, "At Grundfos, sustainability is at the heart of everything we do, and we are committed to pioneering solutions to the world's water and climate challenges and improving the quality of life for people. India is growing fast, and the energy supply can hardly keep up with the demand, hence the need for solar power. With this campaign, our solar water pumping system provides a sustainable solution. By focusing on water supply, we aim to significantly elevate the quality of life in rural areas. We believe in offering solutions that directly impact the well-being of millions."The "Jal Se Jeevan Yatra" initiative is a testament to Grundfos India's unwavering dedication to revolutionizing water supply solutions. The mobile van will serve as a dynamic platform, showcasing an extensive range of efficient, reliable, and technologically advanced Grundfos solar-powered pumps and controls specifically designed for water supply applications. This journey will span six months, covering 24 states in two phases.

North situation better

In the north, no such reservoir faces such a situation, though one of the 10 has a level lower than 50 per cent.

The bulletin said the storage is better than normal in Indus, West Flowing Rivers of Kutch and Saurashtra – including Luni-, Narmada, Tapi, Sabarmati, Godavari and East Flowing rivers between Pennar and Kanyakumari.

The level is closer to normal in Ganga, Brahmaputra, Barak and others, Mahanadi and West flowing rivers from Tapi to Tadri.

Namami Gange Signs Agreement for Development of Sewage Treatment Infrastructure in Meerut

The tripartite Concession Agreement between National Mission for Clean Ganga (NMCG), Uttar Pradesh Jal Nigam and M/s. Meerut STP Pvt. Ltd. for development of Sewage Treatment Plant (STP) and other infrastructure in Meerut was signed in the presence of Director General, NMCG in New Delhi on the 8th of September, 2023. The project, under Hybrid Annuity PPP mode, was awarded at the total cost of Rs. 369.74 crores and is scheduled to be completed by December, 2025.

NMCG has approved the project for the construction of a Sewage Treatment Plant (STP) of total capacity of 220 MLD, among other works such as developing Interception & Diversion (I&D) structures, I&D network laying, Sewage Pumping Stations including Operation and Maintenance for 15 years. This project also aims to take care of the existing sewerage problems in the Meerut city and the resultant sewage pollution in River Kali. After the completion of this project, there will be no discharge of untreated sewage from Meerut city into River Kali (East) thereby reducing the pollution load. Kali (East) meets Ganga near Kannauj and the completion of this project will ultimately help reduce pollution in River Ganga.

The agreement was signed between S.K. Barman, Superintending Engineer, UP Jal Nigam (Rural), Mayank Agarwal, authorised Signatory,

M/s. Meerut STP Pvt. Ltd. (SPV formed by M/s G.A. Infra Private Limited –in JV with M/s SSG Infratech Pvt. Ltd.) and Binod Kumar, Director (Projects), NMCG in the presence of G. Asok Kumar, Director General, NMCG. Nalin Kumar Srivastava, Deputy Director General, NMCG was also present along with other representatives of state agencies and concessionaire during the signing ceremony.

Frequent Rain Improves Groundwater Level in Chennai

The frequent rain since June has improved the groundwater level in the Chennai. Barring Ambattur, the groundwater table has improved across the city in August when compared to the previous month. As per Metrowater's groundwater table data, there is a positive overall increase of 0.62 metres. The Met Department data shows that the city has received 544.7 mm since June, a 66% excess, according to a Metrowater official.

Thiru-Vi-Ka Nagar recorded the highest increase of ground water table, which is at 1.74m. This is followed by Kodambakkam, which recorded 1.41 metres. Ambattur area saw a dip in water table by 0.70m. In July, water was available at 6.31m. This has gone down to 7.01m in August. It is a shallow area and a little drawing of water can also prevent recharging. Sustained supply of piped water could be another reason for the better groundwater table level. Metrowater had scaled up its daily supply, to 1,038 mld this year.

With the completion of trial runs in a few added areas, Metrowater had started the regular supply in the suburbs located between Alandur and Tambaram. Many residential localities in the added areas were dependent on groundwater. Now, with Metrowater providing piped supply every day, those dependent on groundwater are not drawing it. According to hydrogeologist J Saravanan, who is a consultant for digging bore wells, companies are not getting many calls since June. "Groundwater table will be good in Chennai for the next two years," he said.

Customized Webinar With B2B Meetings

LET'S CONNECT DIGITALLY VIA WEBINAR

REGISTER NOW

More Information
+91 85889 11033

For case study submission, write to
deepak.chaudhary@eawater.com

Visit Now:
www.eawater.com

Desaline Seawater LLP

EPC / Turn-Key firms
Know - How Available for
ZERO LIQUID DISCHARGE (ZLD)

- For Polluted industrial waters of Chemical, Petro, Pharma, Power Plants, Mining, Textile,
- Food Industries, RO, Nano, Borated and High TDS waste waters.
- No pre-treatment, Less chemicals, No membrane clogging
- No Evaporation, Less corrosion.
- High yields, Pollutants removed by IS Repellents at - 4° C to -10° C.
- Patented in India, US and PCT.
- Developed by IIT B Chem Engineer.
- Testing facility at cost available.

30, Kalaimagal Nagar II Main Road; Ekkaduthangal, Chennai-600032, India.
Mob: +91 9677 030870 | Email: gopirs@seawater.in | Web: seawater.in

'1 Tap Per Second': India Hits 'High-Water Mark' With Har Ghar Jal in 2023

5 September - India has achieved a breakneck speed of installing "a tap per second" this year under Prime Minister Narendra Modi's signature Har Ghar Jal scheme to cover every household with potable tap water by 2024. In the first eight months of 2023, the country has already crossed all of last year's records.

The country saw a whopping 2.16 crore new tap connections being installed this year till August, compared to 2.08 crore in 2022. The performance this year under the scheme has translated to an average of 89,097 taps installed per day, which is more than "a tap per second". In 2022, about 57,000 taps were installed daily on average.

India is also at the cusp of crossing the mark of a total of 13 crore tap connections in the next few days, marking a 68 % coverage. India started the scheme under the Jal Jeevan Mission in 2019 with just 17 % tap water coverage and the Prime Minister had fixed a target of five years to cover every house.

Leading the way in performance this year has been Uttar Pradesh, which alone has installed 90.12 lakh new tap connections out of the 2.16 crore in India. The state has also crossed the landmark figure of installing 1.5 crore new connections since the start of the mission in 2019.

Last year, UP had installed only 30.8 lakh new connections, raising concerns about whether India's most populous state would be able to complete the mission in the time given as it had the largest unfinished job of providing 2.57 crore connections in 2019. But Uttar Pradesh has till now recorded 60 % coverage after chief minister Yogi Adityanath's push and intervention, said officials.

Assam, Chhattisgarh, and Madhya Pradesh have also made remarkable strides by surpassing the 55 % coverage mark by the end of August, according to a senior government official. However, the states of Rajasthan, Jharkhand, and West Bengal are struggling, with their coverage under the scheme standing at 43 %, 41 % and 38 % respectively so far.

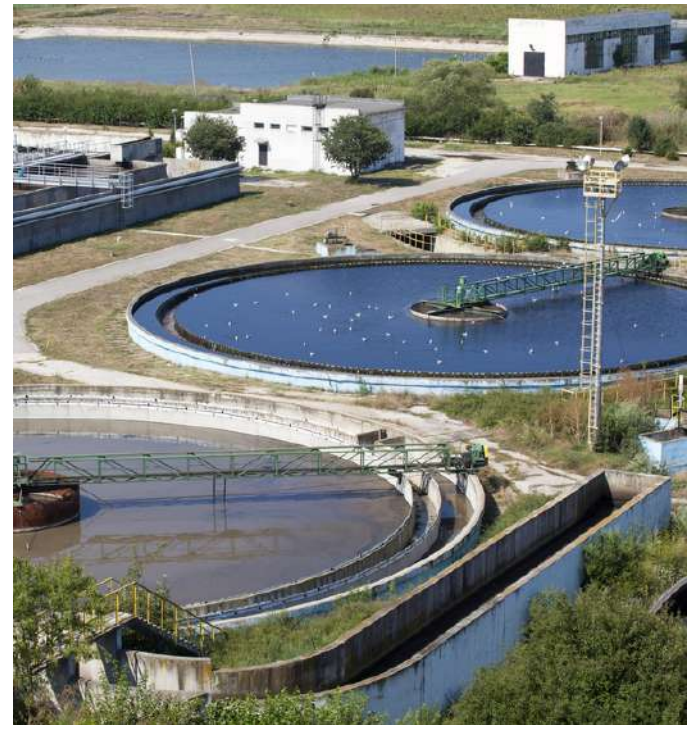
West Bengal still has 1.71 crore households without potable tap water connections and the state has only given 11 lakh connections this year. Five districts in West Bengal viz Purulia, Paschim Medinipur, Uttar Dinajpur, Darjeeling, and South 24 Parganas are below 26 % coverage.

Delhi Jal Board to Build Another Water Treatment Plant at Delhi Gate

Delhi Jal Board vice-chairman Shri Somnath Bharti announced that DJB was planning to build another wastewater treatment plant at Delhi Gate to treat the remaining sewage of Old Delhi areas. "The capacity of the new plant will be 10 MGD and the construction work will start soon. The work of this plant is expected to be completed in a year," said the vice-chairman.

After the construction of new plant, 100% treatment of sewage coming from old Delhi areas will be possible, according to Bharti. He was on a visit to the Delhi Gate waste water treatment plant to take stock of its operation. Bharti said that the quality of the treated wastewater generated at the plant was better than the prescribed standards.

"The plant is playing a key role in treating wastewater generated from parts of old Delhi. Here, there is an energy gas plant too that produces electricity. The electricity produced amounts to one-third of the total power consumption of the plant," said Bharti. The treated wastewater is also being filled in tankers and supplied to DTC for washing buses and PWD for cleaning roads.



CM Siddaramaiah urges MPs from Karnataka to put aside politics and stand together in Cauvery water dispute

One of the most controversial issues of the country related to water is regarding the release of Cauvery River Water. Stating that Karnataka will not release Cauvery water, Chief Minister Siddaramaiah urged members of Parliament from the State to put aside politics and speak together as one voice, even as Deputy CM D. K. Shivakumar said that the State will approach the Supreme Court.

"There is no question of releasing water. We have no water to spare. Put aside party politics and stand together as one with regard to protecting our State, language, water, land and culture," the Chief Minister told Union Ministers and MPs from the State at a meeting in Delhi on September 20. "The situation has turned critical, and there is no distress formula in place," he added.

What Karnataka needs

He reiterated that the State requires 106 TMC of water of which 33 TMC is for drinking, 70 TMC for crop protection, 3 TMC for industrial purposes. "At present, we are left with only 53 TMC of water. We have no water to spare for Tamil Nadu." He pointed out that Karnataka will not get rain after August while Tamil Nadu receives rains after August. "Ground water table is also high there. So, we are in more trouble.

"Mr. Siddaramaiah said while Karnataka had to release 108.4 TMC water as per the Supreme Court order, only 39.8 TMC of water has been released so far. "When faced with such a situation, it is necessary for us to protect the welfare of the people efficiently. So, we need the Mekedatu scheme to use our water, store it, generate electricity in our land. Mekedatu is the solution for such a situation in future. "We have written twice to the Union Jalshakti Minister, explaining the situation comprehensively. We have sought an appointment with the Union Jalshakti Minister and Prime Minister for a meeting with our delegation."

'Interest of State at stake'

Mr. Shivakumar, who holds Water Resources portfolio, told the MPs, "Politics should take a back seat when the interest of the State is at stake. Our officials, experts and legal team have efficiently presented the situation in Cauvery Water Management Authority (CWMA). Demand and pressure should be exerted in order to get positive help from the Centre. It is important for us to solve the problem and maintain the interest of the State.

"Speaking after the meeting, Mr. Shivakumar said, "We have discussed the issues with our MPs. All of them have pledged their support in our fight. We are facing a distress situation, of which we will apprise the Supreme Court. I hope justice will be given."

KBL receives Patent for Hydro Power Generation System

Kirloskar Brothers Limited (KBL), an industry leader in fluid management solutions for over 90 years, has recently been granted a patent for its PICO pump turbine, a groundbreaking hydropower generation system. This accomplishment underscores KBL's unwavering commitment to energy solutions and technological progress.

The patent has been bestowed in accordance with the Patents Act of 1970. The PICO pump turbine is poised to revolutionize energy generation across various sectors and industries.

Expressing elation, Rama Kirloskar, Joint Managing Director, KBL remarked, "The grant of a patent for our PICO pump turbine fills all of us at KBL with immense pride. It unequivocally reaffirms our dedication to forging superior energy solutions. The PICO Pump turbine system stands as a distinctive solution that generates electricity. Beyond its attractive investment aspect, it also significantly contributes to environmental preservation, a cause close to our hearts at KBL. PICO boasts cost-efficiency, portability, and low maintenance, rendering it an ideal choice for rural areas, hilly regions with water streams, high-rise structures, and even power plants. We take pride in crafting eco-friendly energy alternatives and being a driving force toward a greener future."

Engineers at KBL have ingeniously developed the PICO pump turbine system as a versatile solution capable of generating electricity. This revolutionary technology presents new avenues for meeting energy demands efficiently and economically within industrial contexts. Notably, PICO delivers a substantial return on investment (ROI) while actively contributing to a more sustainable tomorrow.

EA WATER CLUB

EVERYTHING ABOUT WATER

Life's now more
REWARDING at **EA Water Club!**
Simply subscribe to EverythingAboutWater magazine and enjoy exciting benefits.

As our valued Club member, you are entitled to benefit from exciting offers and rewards!

Subscribe

EA Water comes up with the most popular monthly magazine on water and wastewater management in India. Our Magazine is read by thousands of leading industries, government bodies, consultants, and contractors across the conuntry

SUBSCRIPTION FORM

NOTE: * 5% GST WILL BE APPLICABLE ON THE FINAL PRICE.

1. Choose your magazine subscription(s)

Subscribers	Term	No. of Issues	Issue Price	% Savings	You Pay
Domestic	5 Years	60	Rs.24000	40%	Rs. 14400
International	5 Years	60	USD 3000	40%	USD 1800
Domestic	3 Years	36	Rs.14400	25%	Rs. 10800
International	3 Years	36	USD 1800	30%	USD 1260
Domestic	2 Years	24	Rs. 9600	15%	Rs. 8160
International	2 Years	24	USD 1200	20%	USD 960
Domestic	1 Year	12	Rs.4800	10%	Rs. 4320
International	1 Year	12	USD 600	Nil	USD 600

2. Contact and postal details

Name_____

Designation_____

Company Name _____

Address _____

City_____ Pin/Zip Code (essential) _____ State_____

Country_____

Tel_____ Mobile_____ Fax_____

E-mail _____

Website _____

3. Payment details

National Subscribers

Cheque No. /DD No. (In favor of **"EARTH WATER FOUNDATION"**)_____

Drawn on (bank name) _____

dated_____ for Rs._____ (payable at Delhi/par).

Note:

- All payments to be made by DD/Cheque/NEFT/RTGS only, in favour of "**EARTH WATER FOUNDATION**"
- Account details: Bank Name: IDFC First Bank, Golf Course Extension Road Branch
- Account Number: 10056535743, Swift Code: IDFBINBBMUM, IFSC/RTGS/NEFT Code: IDFB0040101, PAN No.: AAACE7028F, Account Type: Current

International Subscribers

Note:

- All payments to be made by T/T (Wire transfer) only, in favour of "**EARTH WATER FOUNDATION**"
- For T/T transfer, bank and account details:
- Bank Name: IDFC First Bank, Golf Course Extension Road Branch
- Account Number: 10056535743, Swift Code: IDFBINBBMUM, IFSC/RTGS/NEFT Code: IDFB0040101, PAN No.: AAACE7028F, Account Type: Current

Date_____ Signature_____

Mail to: Earth Water Foundation 7, Khullar Farms, Mandi Road Mehrauli,
New Delhi 110 030, India Tel: +91 8448963579 / 85889 11033

PICO encompasses a range of features and advantages that position it as an exceptional energy solution. Its zero operating costs, enhanced mobility due to portability, minimal maintenance prerequisites, and user-friendly compact design that simplifies installation set it apart.

Moreover, standardised replacement parts bolster the ease of maintenance and ensure their ready availability. Furthermore, the PICO system serves as an energy supply option, making it a prime candidate for off-grid or remote locations where dependable energy access holds utmost importance.

The innovative design of the PICO system renders it suitable for diverse applications, including household lighting in rural areas, electricity generation in farms, powering tall buildings, battery charging, and integration into power plants connected to smaller grids.

With its extensive range of capabilities encompassing various flow rates and pressures, affordability, versatility, straightforward installation procedures, and swift delivery times, KBL's PICO system is poised to exert a significant influence on the renewable energy sector. With the patent grant for PICO, KBL has unequivocally solidified its status as a pioneering force in the realm of sustainable energy solutions.

Mumbai University Uses Earthworm-Based System to Treat Sewage Water

In its effort to create a carbon-neutral campus, University of Mumbai has revived its sewage water treatment plant with a unique concept of using earthworms. The sewage water is now being treated using the technique and is reused for purposes such as watering gardens, filling of the artificial pond on campus, etc at the university's Vidyanagari campus in Kalina. This plant treats 1,200 litres of water every hour with the help of earthworms.Explaining the process, Professor Aparna Phadke, of MU's Department of Geography, said, "Through simultaneous microbial and vermi-process with the help from earthworms, this wastewater treatment is turning the wastewater into properly suitable for reuse. Earthworms work as biofilters, enhancing microbial metabolism. They grind, aerate, crush and degrade chemicals, acting as biological stimulators.

"The earthworm-based treatment system shows waste removal efficacy of approximately 80-90 % for Biological Oxygen Demand (BOD) and 70 to 80 % for Chemical Oxygen Demand (COD). It effectively stabilises organic matter and converts it into a stable product.

Under this wastewater project, a daily volume of 10,000 to 12,000 litres of treated wastewater is recycled for the university's irrigation purposes.

Malaysia International Water Convention 2023

5- 6 December 2023
Conference & Exhibition

7 December 2023
Workshops & Technical Tours

World Trade Centre Kuala Lumpur

Sustainability: Transforming Vision Into Action

- Conference
- Exhibition
- Workshops
- Dialogues
- Lab Crawl
- Networking Reception
- CEO Meetings
- Technical Tours

Register Now!

- Engaging panel discussions with renowned water experts
- 2-day conference with 70 luminary keynotes and parallel session speakers
- In-depth learning workshops
- Network with C-suite executives, decision makers, specifiers and users
- Exhibition on cutting-edge technologies and innovations

HRDCORP CLAIMABLE

For enquiries, please contact

PROTEMP EXHIBITIONS AND CONFERENCES SDN BHD
(SSM No. 199901017179)

+603 6140 6666
+6012 3217345 or +6012 2315583
www.miwc.tech
info@protempgroup.com
miwc.tech
miwc2023

Organised by

Co-organised by

Supported by

Media Partners

GLOBAL W

Droplets

Memsift Innovations Unveils Plan to Establish First Global Engineering Hub in India

Memsift Innovations, a frontrunner in membrane-based separation and purification solutions headquartered in Singapore, has set its sights on a groundbreaking endeavor: the establishment of its inaugural global engineering hub in India. This strategic decision is accompanied by a pivotal partnership with esteemed entities Grasim Industries, a prominent member of the ABG Group, and Parry Enterprises, a distinguished entity under the Murugappa Group. The comprehensive project is poised to entail an estimated investment of 500M (US$6M) over the span of the next three to five years.

Reinforcing Industry Growth and Sustainability -

The novel initiative is forecasted to generate a substantial influx of high-quality job opportunities, in the hundreds, thus bolstering local economies and nurturing a skilled workforce. This strategic move comes as a result of Memsift Innovations' commitment to fostering industry growth, sustainability, and environmental responsibility.

Engineering Hub:

A Beacon of Innovation - The proposed engineering hub is primed to be a nucleus of innovation, equipped with state-of-the-art facilities and resources to develop small to large-scale industrial membrane systems. The central focus of these systems is the treatment of industrial effluents, championing the transformative principles of converting waste into value and decarbonizing high-value manufacturing industries on a global scale.

Insights from Dr J Antony Prince, Founder and CEO -

Dr J Antony Prince, the visionary Founder and CEO of Memsift Innovations, emphasizes the significant role of this initiative against the backdrop of the ongoing global transformation. He underscores the burgeoning potential of India as a hub for innovation, and the necessity of localized supply chains in the wake of supply chain disruptions prompted by the pandemic. With sectors such as pharmaceuticals, semiconductors, and microelectronics gaining momentum, the emphasis on sustainability and Environmental, Social, and Governance (ESG) commitments from corporations is becoming paramount. This aligns perfectly with Memsift Innovations' mission to provide cutting-edge technologies that cater to sustainability and decarbonization, thereby addressing the pressing needs of the industries.

US Allocates $20.5m to help Jordan's Water Infrastructure

Jordan's Ministry of Water and Irrigation and the US Agency for International Development signed an agreement paving the way for a $20.5 million grant to the Aqaba Water Company (AWC). The AWC is owned by the Water Authority of Jordan and the Aqaba Development Corporation. This grant will assist the AWC in improving Jordan's water infrastructure, including improving the accuracy and efficiency of its billing system metre readings, and replacing old metres. The AWC will also contribute an additional $2 million during the course of the five-year agreement. The $22.5 million will help to fund the company's projects to reduce water loss in southern Jordan, while delivering 1.2 million cubic metres of water per year, as part of the country's National Water Strategy 2023-2040.

AWC will also establish administrative offices in the southern governorates, build a new reservoir in Aqaba with a storage capacity of 30,000 cubic metres, construct a water station to increase supply to villages near Wadi Rum, and complete repairs on pipelines. The deal also includes offering the AWC consulting services in management and planning, as well as technical support for its employees.

Jordan is one of the driest countries in the world, according to the UN, with an annual average precipitation of less than 100 mm. Roughly 50 % of Jordan's extracted water is lost to leakage, theft, or inaccurate metering, USAID reported. Jordan's Minister of Water and Irrigation Mohammad Najjar said reducing water loss and improving the quality of services were priorities under the 2023-2040 strategy. He expressed the Jordanian government's gratitude for the continued support of the US government through USAID, which has had a substantial impact in addressing the country's water challenges.

ATER NEWS

City of Bradenton water treatment plant back online after Hurricane Idalia issues

The service resumed back to normal after the city of Bradenton urged residents to reduce their water usage Wednesday due to problems caused by Hurricane Idalia. The city posted on X, the social media website formerly known as Twitter, around 11 a.m. to alert residents that the water treatment plant was temporarily offline. By 5 p.m., the issue was resolved, city officials said.

Droplets

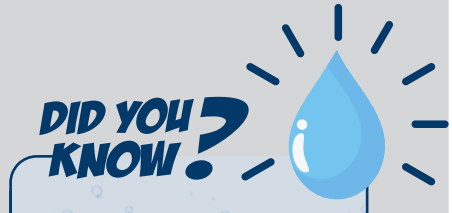
Hanna Instruments India Donates Water Testing Instruments to Estuarine and Coastal Studies Foundation, West Bengal.

Hanna Equipments India announced the donation of a HI991003 pH/mV portable metre and a HI98319 Salinity Tester to the Estuarine and Coastal Studies Foundation (ECSF) for the workshops on water quality testing in Indian Sundarbans, West Bengal on 13th September.

The donation was made in support of ECSF's workshop on the topic of "Ecosystem services and vulnerabilities: perspectives of fisheries, water quality and embankments" in Indian Sundarbans. The workshop was attended by faculties and research scholars and students (both UG and PG) from various colleges and universities of West Bengal including IIT, KGP.

During the workshop, Hanna Equipment's assistant regional sales manager, Mr. Debabrata Samanta, demonstrated the use of HI991003 pH/ORP meter to analyse water quality of Sundarbans. He also explained the importance of salt content in water and how to measure salinity using HI98319 Salinity Tester.

"We are proud to be associated with ECSF in their efforts to create awareness about the importance of water quality. We believe that this donation will help to improve the understanding of water quality in Sundarbans and help to protect this important ecosystem." said Mr. Debabrata Samanta. ECSF is a non-profit organization focused on research and higher education related to estuaries and coasts of India. It works towards the sustainability of the Indian Sundarbans ecosystem. The foundation has been conducting research on water quality in Indian Sundarbans for years. "We are grateful to Hanna Equipments India for their generous donation of water quality testing instruments. These instruments will be valuable tools for our research and will help us to better understand the water quality in Indian Sundarbans." said Dr. Sourav Paul, Co-founder and Director of the ECSF.



The water we have on Earth is older than our solar system. It formed from interstellar clouds that existed before the Sun and the planets were born, carrying with it traces of ancient cosmic history.

For about six hours, municipal water customers were asked to conserve water until the tides, which were high and caused flooding and road closures throughout Manatee County subsided and water levels returned to normal.

In an interview with the Bradenton Herald, Jeannie Roberts, the city's public information officer, confirmed that Bradenton's drinking water supply remained safe during that time period. Residents could continue to drink and cook with the water without concern, she said.

Morocco's Safi Water Desalination Plant Begins Operation

A Memorandum of Understanding (MoU) between Morocco's government and OCP group signed on July 5, aiming to provide the cities of Safi, El Jadida, and neighbouring regions with drinkable water using seawater desalination, has started taking shape.

According to the Ministry of Logistics and Water, operations in the Safi seawater desalination plant have commenced. The plan has an ambitious aim of producing approximately 10 million cubic metres of drinking water in 2023. The agreement grants the right to desalinate seawater to OCP Green Water, with the goal of providing competitively priced drinking water relying on "cutting-edge technologies" and "embracing renewable energy sources, alongside ongoing research and development efforts.

"Concerning the production of water to cater to industrial use, the agreement is designed to secure an annual supply of 35 million cubic metres for industrial use destined for OCP Group. As Morocco grapples to maintain its water security, the country bolstered investments dedicated to desalination projects in recent years.

Under a comprehensive 2020-2050 plan, the country has committed MAD 383 billion ($37.6 billion) over a 30-year period to bolster national water infrastructures for domestic and agricultural purposes. The plan also incorporates measures to safeguard water supplies against the looming threat of climate change.

Rivers are rapidly warming, losing oxygen; aquatic life at risk

Rivers are warming and losing oxygen faster than oceans, according to a Penn State-led study published today (Sept. 14) in the journal Nature Climate Change. The study shows that of nearly 800 rivers, warming occurred in 87% and oxygen loss occurred in 70%. The study also projects that within the next 70 years, river systems, especially in the American South, are likely to experience periods with such low levels of oxygen that the rivers could "induce acute death" for certain species of fish and threaten aquatic diversity at large.

"This is a wake-up call," said Li Li, Penn State's Isett Professor of Civil and Environmental Engineering and corresponding author on the paper. "We know that a warming climate has led to warming and oxygen loss in oceans, but did not expect this to happen in flowing, shallow rivers. This is the first study to take a comprehensive look at temperature change and deoxygenation rates in rivers -- and what we found has significant implications for water quality and the health of aquatic ecosystems worldwide."

Kishida said at the meeting that the release of the water is essential for the progress of the plant decommissioning and Fukushima prefecture's recovery from the March 11, 2011, disaster. He said the government has done everything for now to ensure the safety, combat the reputational damage for the fisheries and to provide transparent and scientific explanation to gain understanding in and outside the country.He pledged that the government will continue the effort until the end of the release and decommissioning, which will take decades.

A massive earthquake and tsunami destroyed the Fukushima Daiichi plant's cooling systems, causing three of its reactors to melt and contaminating their cooling water. The water is collected, filtered and stored in about 1,000 tanks, which fill much of the plant's grounds and will reach their capacity in early 2024. The release of the treated wastewater has faced strong opposition from Japanese fishing organisations, which worry about further damage to the reputation of their seafood as they struggle to recover from the nuclear disaster. Groups in South Korea and China have also raised concerns, turning it into a political and diplomatic issue.

The government and the plant operator, Tokyo Electric Power Company Holdings, say the water must be removed to make room for the plant's decommissioning and to prevent accidental leaks from the tanks. Junichi Matsumoto, TEPCO executive in charge of the water release, said in an interview with the Associated Press last month that the water release marks "a milestone", but is still only an initial step in a daunting decommissioning process that is expected to take decades.

The easing of opposition from the fishing industry was key to the release because the government promised in 2015 not to start without "understanding" from fishing groups, after past accidental and unapproved discharges. Masanobu Sakamoto, head of the National Federation of Fisheries Cooperatives, who met with Kishida on Monday, reiterated his organisation's opposition to the release, but acknowledged that members of the fishing community have gained some confidence about the safety of the move. They still fear damage to their industry, he said, and welcomed the government pledge for support.

The government has offered funding totalling 80 billion yen (USD 550 million) for sales promotion and other steps, and for sustainable fishing operations. The government and TEPCO say the water will be treated and then diluted with massive seawater to levels way safer than international standards, its environmental and health impact negligibly small. The International Atomic Energy Agency in a final report in July concluded that the release, if conducted as designed, will cause negligible impact on the environment and human health.

Scientists generally support the IAEA view, but some say long-term impact of the low-dose radioactivity that remains in the water needs attention. Kishida's government has stepped up outreach efforts to explain the plan to neighbouring countries, especially South Korea, to keep the issue from interfering with their relationship. Kishida said the effort has made progress and the international society is largely responding calmly to the plan. Still, Hong Kong said it would suspend exports from Fukushima and nine other prefectures if Japan went ahead with the plan, while China has stepped up radiation testing on Japanese fisheries products, delaying customs clearance.

CSIRO deploys world-first sensors in Southern Great Barrier Reef

Australia's national science agency, CSIRO, has installed specialised sensors on Darumbal Sea Country in the Southern Great Barrier Reef to help monitor and forecast sediment run-off, which impacts the UNESCO World Heritage site's marine ecosystem.

The reef is one of seven test sites for CSIRO's AquaWatch Australia Mission, which is creating a world-first 'weather service' for water quality using a combination of specialised sensors and satellite data.

Dr Alex Held, CSIRO's AquaWatch Mission Lead, said the project has the potential to support planning decisions in protecting areas of the reef, which brings in $5.2 billion annually and generates more than 64,000 full-time jobs.

"We are testing our systems for monitoring the flow of sediment and dissolved organic carbon – an indicator of the carbon exchange between land and ocean – from the Fitzroy River out into Keppel Bay towards the southern region of the reef," Dr Held said.

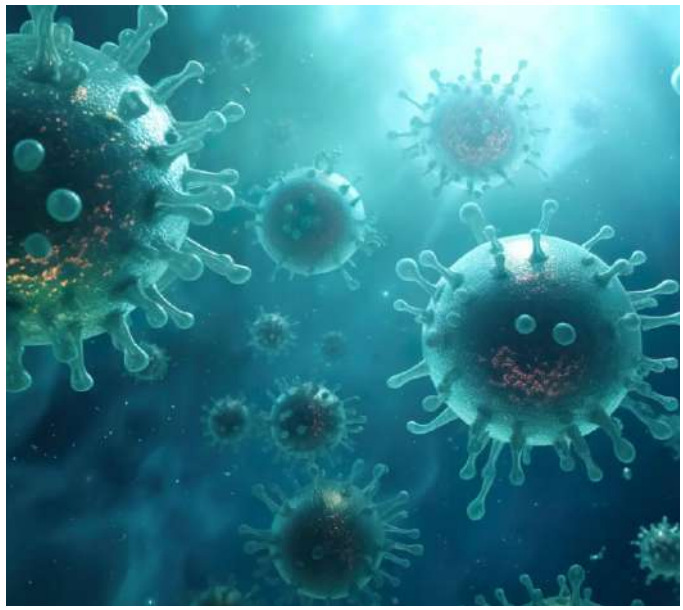
Dr Nagur Cherukuru, a senior CSIRO researcher, said modelling and artificial intelligence (AI) would be applied to the combined sensor and satellite data set to predict the sediment flows – ultimately identifying certain areas of the river where interventions can be made. “The modelling and AI will integrate not only the AquaWatch sensor data, but other factors like ocean currents, wind speed, wind direction and tidal conditions to improve the accuracy of forecasts from AquaWatch,” Dr Cherukuru said and added that much like having a weather report for guidance, the information can be used by water managers to inform marine and land planning decisions both during normal environmental patterns and in flood situations, when large volumes of sediment can be washed out to sea.

While this test data will only be available to research partners and Traditional Custodians initially, the long-term goal for AquaWatch is to provide national water quality monitoring and forecasts to all Australians via an app or integration into current weather reporting.

A newly identified virus emerges from the deep

September 20, 2023 - This week in Microbiology Spectrum, Wang and an international group of researchers report the discovery of a new virus isolated from sediment brought up from a depth of 8,900 metres. The virus is a bacteriophage or a virus that infects and replicates inside bacteria, and bacteriophages are believed to be the most abundant life forms on the planet. "To our best knowledge, this is the deepest known isolated phage in the global ocean," said Wang.

The newly found phage infects bacteria in the phylum Halomonas, which are often found in sediments from the deep seas and from hydrothermal vents, geyser-like openings on the seafloor that release streams of heated water. Wang said the group's analysis of the viral genetic material points to the existence of a previously unknown viral family in the deep ocean, as well as new insights into the diversity, evolution, and genomic features of deep-sea phages and phage-host interactions.



In previous work, the researchers have used metagenomic analysis to study viruses that infect bacteria in the order Oceanospirallales, which includes Halomonas. For the new study, Wang's team looked for viruses in bacterial strains collected and isolated by a team led by marine virologist Yu-Zhong Zhang, Ph.D, also at the Ocean University of China, in Qingdao. Zhang's research explores microbial life in extreme environments, including polar regions and the Mariana Trench.

The genomic analysis of the new virus, identified as vB_HmeY_H4907, suggests that it is distributed widely in the ocean and has a similar structure to its host. Wang said the study points to new questions and research areas focused on the survival strategies of viruses in harsh, secluded environments -- and how they co-evolve with their hosts. The new virus is lysogenic, which means it invades and replicates inside its host, but usually without killing the bacterial cell. As the cell divides, the viral genetic material is also copied and passed on.

In future studies, Wang said, the group plans to investigate the molecular machinery that drives interactions between deep-sea viruses and their hosts. They're also searching for other new viruses in extreme places, "which would contribute to broadening our comprehension of the virosphere," Wang said. "Extreme environments offer optimal prospects for unearthing novel viruses.”

New mixed-bed resin from LANXESS for ultra-pure water in semiconductor production

Cologne – Specialty chemicals company LANXESS has developed a new mixed-bed resin for ultra-pure water in semiconductor production. In comparison with the established Lewatit UltraPure 1296 MD mixed bed, the new UltraPure 1296 MD PLUS boasts a much lower content of metals such as iron, zinc and sodium. Early installations of the product as a final polishing filter in semiconductor manufacturing have yielded results close to the current analytical limits of detection.

LANXESS will be unveiling its new type of ion exchange resin to trade visitors at the UltraPure Micro conference being held in Austin in the US state of Texas from October 10 to 12, 2023.

"The Lewatit UltraPure 1296 MD PLUS produced in Germany is a vital component for cost-effective, sustainable and fault-free manufacturing in the fast-growing international semiconductor industry," says Hans-Juergen Wedemeyer, Technical Marketing Manager at the Liquid Purification Technologies business unit at LANXESS.

Lewatit UltraPure 1296 MD PLUS for the toughest assignments

The manufacturing of semiconductors and displays calls for complex water treatment to ensure that the water used is of the required purity. The latest generation of wafers and microchips demands a correspondingly high level of quality from the ion exchange resin systems employed. Furthermore, new analytical systems are capable

of analysing ions in the low ppt (parts per trillion) range. For some types of ion, they can go as low as the ppq (parts per quadrillion) range. Achieving the performance of semiconductors required by modern industry can necessitate as many as 200 treatment steps. The ultra-pure water needed for this is provided by means of a complex multistage process. The most important steps in the operation include conventional primary demineralization with standard ion exchange resins, reverse osmosis, degasification, ultrafiltration and hydrogen peroxide removal, while the last stage is final polishing with an ultra-pure mixed bed. The new Lewatit UltraPure 1296 MD PLUS ion exchange resin type was developed specifically for this final step, which is absolutely critical to the success of the process as a whole.

The ultra-pure water treated in this way can then be used in etching and cleaning processes in microchip production. "The high total capacity and degree of regeneration of the anion and cation exchange resins also result in excellent operating capacity for the removal of boron and silica, as well as metal ions," says Wedemeyer.

"The bead sizes of the monodisperse components are designed to avoid an inadvertent separation of cation and anion exchange resins. Due to the special production process for Lewatit UltraPure 1296 MD PLUS, the release of particles and TOC is within an extremely low range," adds Wedemeyer.

IOT-BASED MONITOR & CONTROL IN WATER SUPPLY: A GAME CHANGER!

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

Instrumentation and monitoring play a crucial role in ensuring the efficient and safe distribution of water in modern society. With the increasing demand for clean and reliable water supply, the management of water distribution systems has become more complex, necessitating advanced technologies for real-time monitoring, data analysis, and decision-making. This article explores the significance of instrumentation and monitoring in water supply systems, highlighting their role in maintaining water quality, minimizing leaks, and enhancing overall system performance.

The Internet of Things (IoT) has revolutionized various industries, and the water supply sector is no exception. By leveraging IoT technology, water supply systems can monitor, manage, and optimize in real time, leading to improved efficiency, reduced wastage, and enhanced sustainability. This article explores the applications of IoT-based monitoring and control in water supply systems, highlighting its benefits and potential challenges.

IoT involves the interconnection of everyday objects and devices through the internet enabling them to collect and exchange data (Fig.1).

Components of IoT Control

IoT Control System incorporated with hardware (sensors) and software components for communication of various data from source to end users within a fraction of time very preciously and honestly. The entire data of the project is stored in cloud-based storage and retrieved at any time.

- Mobile (Android)
- Laptop/PC.
- Digital Water meter.
- RTU (Radio Terminal Unit)
- Controller – microprocessor-based.
- Pressure Sensors.
- Flow Sensors.
- Water level sensors
- EC (Electrical conductivity) & pH Sensors & Monitor.
- Chlorine / Ozone Injector
- Hydraulic valves + pressure pilot + Solenoid
- Weather Station

Jain Irrigation Systems Ltd has played a significant role in developing/ implementing IoT-based Control in water supply and Irrigation schemes. In this system, communication among the various equipment/devices is established via electronic media – email or internet, to view the status at a glance and accordingly ease making the decision to optimize utilization of facilities in the right directions - control of timing, uniform distribution of water, water quality control, billing & revenue collections.

Fig.1 IoT-based components

IoT-based system can execute/control:

- Water Supply by Pre-paid /Post-paid meter to end-users.
- Leak detections in the system.
- Pressure check and regulation.
- Water quality check and control entrances –exist for a cluster network.
- Chemical treatment such as Chlorine / Ozone to cluster network/zone
- Operation of hydraulic valves based on sensors/flow meter/water meter.
- Alarming / warning in case of fault and manual overriding.
- Quantification of water used / demand.
- Troubleshooting in the operation of the system.
- Assessment of risk factors and remedies.
- Record of water volume and accurate billing.
- Optimizing water price to end-user.
- Water conservation.
- Power conservation.
- Assessment of risk factors and mitigation.
- Storage of all data in hard disc and
- Monitoring / Accounting: cost – economics.
- Optimization of the entire process and future planning.

Importance of instrumentation and monitoring

- **Water Quality Management**

Ensuring the delivery of safe and potable water is of paramount importance. Advanced sensors and monitoring devices can detect parameters such as pH, turbidity, chlorine, levels, and microbial contaminants in real-time. By constantly monitoring these parameters facilities and distribution networks can swiftly identify any deviations from quality standards and take immediate corrective actions.

- **Leak Detection and reduction**

One of the major challenges faced by water distribution systems is leakages. Instrumentation, such as pressure sensors and acoustic leak detectors, can pinpoint leak locations and enable swift repairs. This not only reduces water loss but also prevents infrastructure damage and minimizes disruptions in service.

- **Pressure Management**

Maintaining optimal pressure in the distribution network is crucial to prevent pipe bursts, leaks, and excessive strain on the system. Pressure sensors strategically placed throughout the network can provide real-time data that helps operators adjust pressure levels and respond promptly to pressure anomalies.

- **Data-driven decision making**

Instrumentation generates vast amounts of data that can be used for informed decision-making. By utilizing data analytics and machine learning, water supply operators can identify patterns, forecast demand, optimize distribution routes, and predict maintenance needs, leading to more efficient and cost-effective operations.

- **Early Warning Systems**

In the event of contaminations, natural disasters, or other emergencies, early warning systems are essential. Real-time monitoring can quickly detect changes in water quality or flow patterns, allowing authorities to issue timely alerts and take preventive measures to protect public health.

- **Remote monitoring and control**

Modern instrumentation allows for remote monitoring and control of water supply systems. Operators can access real-time data and control system parameters remotely enhancing operational flexibility and responsiveness.

Advantages of IoT

- **Real-Time Monitoring**

IoT sensors can be deployed throughout the water supply infrastructure to monitor parameters such as water flow, pressure, quality, temperature, BOD, COD, pathogen, Chlorine injections, Ozone treatment, UV treatment, revenue model, and overall management of the system. Real-time data collection provides immediate insights into system performance.

- **Remote Accessibility**

IoT-enabled systems can be accessed and controlled remotely allowing operators to monitor and manage water supply infrastructure from any location and it helps for quick response to emergency irregularities.

- **Data Analytics and insights**

The data collected by IoT sensors can be analyzed using advanced analytics and machine learning algorithms. These insights help identify trends, patterns, and anomalies, enabling predictive maintenance and informed decision-making.

- **Efficient resource management**

IoT technology helps optimize water distribution by providing accurate data on water demand and consumption patterns. This information aids in allocating resources effectively, minimizing wastage, and addressing water scarcity challenges.

- **Leak Detection & prevention**

IoT Sensors can detect leaks in the distribution network through pressure monitoring and acoustic sensing. Early detection of leaks allows for timely repairs, reducing water loss and infrastructure damage.

- **Energy Efficiency**

IoT-based systems can optimize the operation of motor pump sets, valves allied equipment reducing energy consumption and operational costs.

- **Customer services**

With IoT, water utilities can provide customers with real-time information about their water consumption and help them identify opportunities for conservation.

- **Challenges and future directions**

Despite its benefits, implementing comprehensive instrumentation and monitoring systems in water supply networks presents challenges.

- **Data Security and Privacy**

IoT systems involve the transmission of sensitive data. Ensuring robust cyber security measures and data encryption is crucial to prevent unauthorized access and protect user privacy. As water supply systems become more interconnected and digitized, the risk of cyber attacks increases. Ensuring the security of data transmission and system control is crucial to prevent unauthorized access and potential disruptions.

- **Interoperability**

Different IoT devices and platforms might not be compatible, leading to interoperability issues. Standardization efforts are necessary to create a unified ecosystem that promotes seamless communication between devices.

- **Reliability and Maintenance**

IoT Sensors require regular maintenance and calibration to ensure accurate data collection. Additionally, network connectivity issues can disrupt data transmission and remote control.

- **Initial investment**

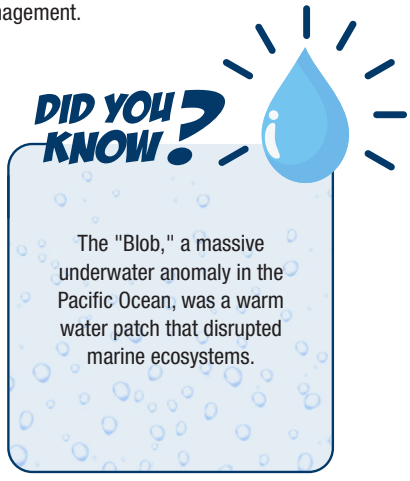
Implementing an IoT-based system requires an upfront investment in sensors, communication infrastructure, and data analytics tools. However, the long-term benefits often outweigh the initial costs.
The initial cost investment required for deploying advanced sensors and monitoring devices can be substantial. However, the long-term benefits in terms of reduced water loss, improved system efficiency, and enhanced public health outweigh these costs.

- **Data overload**

IoT systems can generate a vast amount of data. Effective data management and analysis strategies are essential to extract meaningful insights and prevent information overload. Handling and analyzing the massive volumes of data generated by instrumentation can be overwhelming. Robust data management strategies and advanced analytics tools are needed to extract meaningful insights.

- **Conclusion**

IoT-based monitoring and control systems have the potential to transform water supply management by providing real-time insights, optimizing resource usage, and enhancing overall efficiency. While challenges such as security, interoperability, and maintenance need to be addressed, the benefits of improved sustainability, reduced wastage, and enhanced customer experience make IoT technology a promising avenue for the future of water supply systems. As technology continues to evolve, collaboration between water utilities, technology providers, and regulatory bodies will be vital to realizing the full potential of IoT in water supply management.



ABOUT THE AUTHOR

Dilip Yewalekar
Senior Vice President

Email: yewalekar.dilip@jains.com, dhy2006@gmail.com, Mobile:+919403080162,
M.Tech- Civil- Structural Engg, PG Diploma in Piping Engg, AMIE,UK, ASAE, USA,
Google Scholar, Research Gate Scholar
Member of ICID.
Fellowship World Bank and Mashav, Israel
Faculty: Govt College of Engg, Jalgaon.
Faculty: Micro Irrigation Course of ICID & CWC, Govt of India.
Reviewer –ICID Conference, Beijing, China 2023
Awards: 1. The EEF Global Water Leadership Award – Global Water foundations. 2. Strategic Leader in Micro Irrigation – ABSA Award. 3. Professional Excellence Individual Award – Aqua foundations. 4. Great Manager 250 Award, Economics Times, honored by Hon Kumar Mangalam, Birla Group.

Best Innovative Article in Sabujeema International Magazine
Overall all experience of 36+ years in Water Management – Irrigation, Agriculture, Civil Engineering, Planning, Designing, Execution, Management & marketing in India and Abroad.
100+ papers/publications at national /international conferences/magazines/books.

Manisha Kinge
(M.Tech-Agri Engg)

Email: kinge.manisha@jains.com, Mobile:+ 91 9359457168.
Manager –Design & Projects (Dom/Export)
Faculty: Micro Irrigation Course of ICID & CWC, Govt of India.
Awards: 1. Recipient of ABSA 2023 Award : Women Creating Impact in Agriculture - Micro Irrigation. 2. Best Innovative Article in Sabujeema International Magazine
Overall experience of 18+ years in Water Management – Irrigation, Agriculture -Planning, Designing, Execution, Management & marketing in India and Abroad.
35+ papers/publications at national/international conferences/magazines/books.

INDIA WATER SHOW

WATER & WASTE WATER EXPO

WATER AND WASTEWATER RECYCLING AND DRINK TECHNOLOGY EVENT

10-12 JAN 2024

AUTO CLUSTER EXHIBITION CENTER, PUNE, INDIA

www.indiawatershow.com

Supported by

Knowledge Partner

Organized by

Call: 93632 35370 Email: info@indiawatershow.com

DIGITAL TWIN AS A VIRTUAL REPLICA OF RIVER AND WETLAND WATER QUALITY

By Sunil Nanda, JS Water Energy Life Co, India

A Digital Twin (DT) is a virtual model that mirrors the behavior of real assets. It replicates the process, state and parameters of the physical world. It digitizes input water quality signals through sensors on a continuous basis. The digitized signals can be fed into virtual process models that replicate the real world digitally. The virtual models can simulate the processes and transformations of the input signals into intermediate and output signals. Critical water quality parameters are continuously made available in output screens which are a very accurate representation of the real-world outputs. The simulation within the Digital Twin enables the historical, current, and predictive states of the outputs. As an example, predictive models, driven by machine learning, predict water quality parameters such as oxygen levels, E Coli levels, dissolved and suspended solids in the water.

In Water Quality Improvement projects like River Raw Water BioRemediation, Wetland Restoration, Wastewater Treatment Plants, Digital Twins can also simulate scenarios due to remediation. Results can be presented as outputs of the remediation efforts on a continuous basis. The scenarios can be blended, and a most likely scenario can be presented to the end users. Optimal remediation actions can then be taken to maximize the results.

Digital Twin makes it easier to treat large and complex water bodies like rivers, large drains, wetlands and wastewater treatment plants. It enables the authorities to assess the water quality of a specific area without collecting water samples or physically visiting the location. It must first have the baseline data/information and river water quality characteristics. Based on that, it assesses the risk, determines what has to be improved and where, and forecasts the risk.

Digital Twins are being increasingly used in Water related industries across the globe for Water utilities, Wastewater Plants, Wetlands and River Restoration projects. They can help in setting control parameters, understanding process bottlenecks, forecasting critical parameters and taking actions to minimize risk. The biggest benefit may be in allowing a continuous monitoring of all health parameters of the Water/River system so as to dramatically increase availability of fresh water to the population.

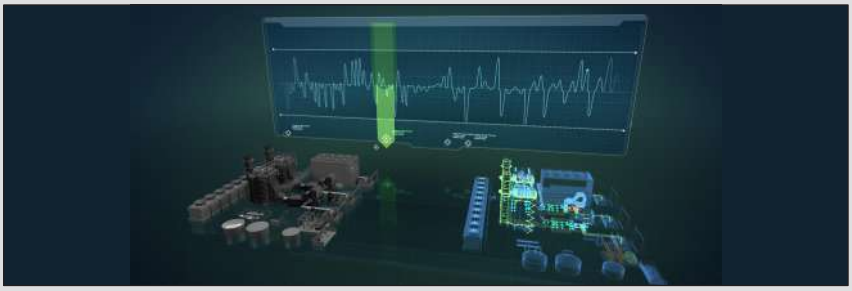
Digital Twins can also simulate scenarios due to remediation. Results can be presented asoutputs of the remediation efforts on a continuous basis. The scenarios can be blended, anda most likely scenario can be presented to the end users. Optimal remediation actions canthen be taken to maximize the results.

JS Water Energy Life's Quad Digital Twin is based on microsegments and brings an improved understanding of results within various portions of the river. Different segments of the river can have different constituents of contaminants and remediation efforts.

Annexure-1 IOT/Digital Twin technology images

End to end view of Digital Twin for Water / River purification

Real Plant (Left) and Digital Twin (Right). Digital Output shown on Screen.



As an example, wecan consider that one local area of the river may have an excess of heavy metals, whileanother segment may be dominated by organic pollution. Another variation in segmentscould be that the same combination of contaminants may occur at differing levels ofcontamination in different segments. Yet another variation could be based on the levels ofpre-treatment being carried out in various segments. These are just four examples of microsegments within the same river.

Simulation of these microsegments is the key to effectiveunderstanding and recommendations of remediation. An aggregated view may not be asinsightful as the microsegment view in understanding cause and effect of remediation.

A Microsegment based Digital Twin also helps in developing "What If" scenarios forremediation leading to optimization of efforts, and sharing of results in as manydepartments as needed. The entire status and predictive recommendations can be seen in acentral control room or even on a phone, if configured.

Implementation of Quad Digital Twin provides the Govt bodies like the Ministries, the Pollution Control Authority to analyst level insights of various critical metrics – cost, quality, actions needed, risks, benefits, distribution plan. It offers a consistent and continuous view of the state of water purity along the entire course of the river.

Other than decision insights, it also delivers an operational Control System with dials for parameter fine-tuning based onconditions. It provides control room UI for monitoring physical river system infrastructure inReal-Time.

With the Quad Digital Twin, Municipal authorities can monitor some of the importantparameters and share them within the departments:

1. The nature and extent of remediation interventions carried out in the designated waterbodies

2. Water quality before and after intervention.

3. Measurements of Critical physico chemical parameters.

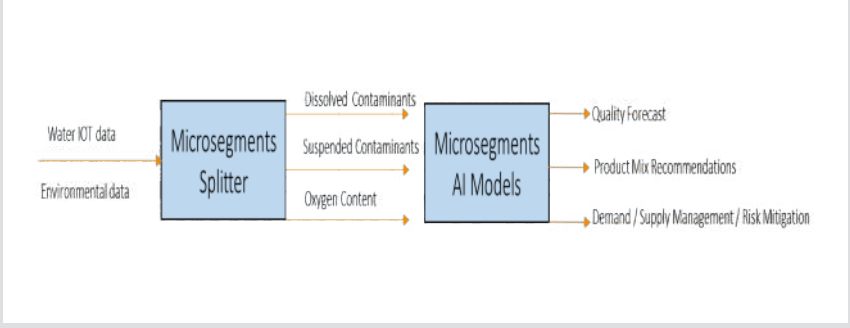
4. Dissolved oxygen content in river at various points along the river and at various depths.

5. Dissolved and undissolved contaminants.

6. Risks associated with extant water quality for human and animal consumption.

7. Risk of mass fish kill and loss of aquatic bio diversity.

Microsegment DNA Analyzer Powers the Digital Twin



Asset Build Out and Maintenance

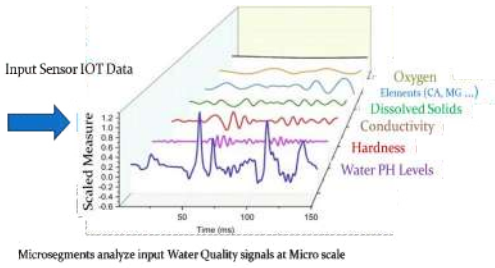
- Sensor, SCADA, online Meters are installed at critical points in the river/waterbody.
- Streaming of parameters to DT Engine.
- Display of Current data in various control rooms and on mobile phones (app based).
- Continuous real time data gathering post product introduction for Phyco Remediation.
- Model training Phase.
- Model Deployment Phase.
- Optimization and Scenario Planning Phase.
- Active Maintenance Phase.
- Annual Maintenance Phase.

During Annual Maintenance, the software and the Digital Twin Infrastructure (sensors andcloud data system) are transferred to the authorized party.

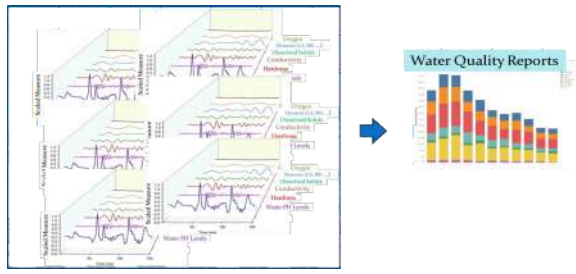
Special Features of Digital Twin in River's Psycho-remediation.

1. Automate data collection with sensors and IOT devices
2. Understand and quantify the impact of Remediation efforts on a continuous basis round the clock and around the months and years.
3. Capture and Predict the various parameters of Water quality such as oxygen levels, increase in algae and bacteria friendly for oxygenation, reduction in contamination etc.
4. Forecast contamination from industrial waste water and sewage.
5. Develop What if scenarios to try different combinations of remediation, infrastructure adjustments, pinpoint target locations for remediations, leading to optimization of efforts.

Microsegment + Bayesian Regression + Numerical Optimization (Monte Carlo)



Micro segments Splitter collects input water quality signals into 1000s of units called microsegments.



AI models Process Local Signals within 1000s of Microsegmentsand aggregate for Insights.

Summary

Digital Twin (DT) Monitoring System is emerging as a preferred choice of monitoring andintervention of Rivers, Wetlands, Wastewater Treatment Plants and even Basin MonitoringProjects.

It goes much beyond normal display of Water Quality parameters. Since the water qualitydata is being streamed continuously through online sensors, it can specifically pinpoint thereasons for drop in Water Quality and assign accountability to a Wastewater Treatmentplant which may be operating below the designed parameters or to an industry that maysurreptitiously discharge the effluents into the river/wetland, etc. Digital Twin can predictthe WQ variations based on deep analytics. It can optimise the cost of interventions for BioRemediation and Wastewater treatment. It can even help in optimising the design, capacityand location of STPs based on real data.

The process takes about 3- 6 months to install and operationalise. The cost of the Quadsystem is very affordable for Authorities.

ABOUT THE AUTHOR

Mr. Sunil Nanda
JS Water Energy Life Co. Pvt. Ltd.

Sunil Nanda, Founder of JS Water Energy Life Co. Pvt. Ltd. is an experienced professional in the environmental services domain covering Agriculture, Aquaculture, Wastewater and Poultry Industries. He has developed many promising products in this field and has been honoured with multiple awards for the same. He has uniquely employed Nanotechnology in the development of the products. His products under brand name Aquaritin are used globally to rejuvenate deeply polluted water bodies like polluted river, lakes, drains, wetlands, ponds etc. These remediate wastewater, algal blooms, neutralize growth of water hyacinths, restore pH of acidic drainage & accelerate digestion of sludge. Previously, he has worked as President and Executive President at Spice Energy and I Tec India, respectively. For the last decade, he has been a devoted Managing Director at JS Group. His aim is to continue breaking barriers with his advanced solutions. With that view and to promote more research in these a new R&D Centre has been established under his guidance.

India Water Intelligence

India's first monthly tracker on the municipal and industrial water markets,
in a easy-to-read e-magazine format, keeping you updated on the latest projects and trends

- Municipal water supply and sanitation projects
- Water and effluent treatment projects in large industries like power, steel, refinery, metals, cement, fertilizers...
- Advanced technology projects in wastewater recycling and desalination
- Information on funding under JNNURM, JICA, World Bank, ADB for water projects
- Projects under conceptualization, projects sanctioned, project planned, projects tendered, projects awarded...
- Regulatory changes and new guidelines being planned / notified contact details of relevant decision - makers and project incharges.

For more information and a complimentary copy,
please feel free to contact at Tel: +91 8448963579 / 85889 11033 | E-mail: editor@eawater.com

PIONEERING SUSTAINABLE WATER SOLUTIONS IN INDIA'S THRIVING WATER INDUSTRY

By Dhruv Krishna, Cimcon Digital

Today's water industry is in a state of high energy and is full of enthusiasm, wherein industry veterans and domain experts are providing solutions which are required at a scale never seen before. Key challenge is to maintain the quality, at the execution level, since water is a very critical utility and a 24x7 job and only experienced companies who understand the ground realities can provide seamless solutions. Major development has been the large-scale turnkey projects both green and brownfield, across India in water sector, wherein government is working on a twofold strategy, refurbishing old infrastructure and setting new WTP's, TWS. STP's in areas which previously did not have access to piped water, e.g. being (JJM), Jal Jeevan Mission. Keeping in tune with the changing face of India, and uptrend observed in various industries across the nation, we can confidently say that same pattern and exponential growth can be observed in water sector, covering both drinking and water for Irrigation needs.

India is adapting and adopting various solutions which have been implemented across the globe, such as IOT based monitoring, SCADA solutions to manage such assets and address water challenges, it is just that the scale and scope in India far exceeds any other similar works carried out globally. Lessons learned are that all solutions should be flexible, robust, and scalable to enable smooth roll out and long term sustenance.

Positive trend is the major adoption of technology, IOT, RMS, SCADA to manage these wide spread and remote utilities. Water industry in India on an exponential growth path, with lot of scope and areas still untouched to manage this depleting resource for such a large population like India, more and more advancement of 4G/5G networks across the length and Breadth of India will enable more implementation of IOT/SCADA solutions and ease of accessibility through network of upcoming roads etc. will allow more water infrastructure to be built, faster and manageable for years to come. Government policies are tuned in to meet the requirements of water for this huge population.

In water sector, opportunities are huge across various verticals, whether it is Civil work, Electrical and Mechanical Work, SCADA /IOT work, Solar grids etc., we are seeing huge investments across various projects related to Water. JJM scheme alone is worth more than 3.50 lakh crores, covering lakhs of villages, specifically projects are being designed and commissioned based on water availability and geographic conditions, both ground water and Surface water. Need of the hour is to buckle up and have capability, build capacity both in terms of supply and execution of these projects, it is important to note that in these projects' government has 10 years maintenance as part of contract, hence insuring long term play for all stake holders.

Key technologies which are transforming water industry and improving efficiency and sustainability are:

1. IOT/SCADA technology implementation for remote monitoring/control of assets.
2. Using AI and ML, to improve pump efficiency by preventing breakdowns, detecting anomalies, insuring continuous operation.

1. Preventing pump motors to run in abnormal electrical conditions through combinations of protection relays and smart logic, again preventing breakdowns.
2. Avoiding water wastage through overflow, using Flow-meters, level sensors and smart logic to shut down pumps based on level/flow of water.
3. Insuring water quality, through smart looping/logic with Depth Sensors, Turbidity/Chlorine sensors, and Chlorine dozing pumps, giving healthy and clean water to end consumers.

Various Instruments coupled with RTU/PLCs installed at the site, help in implementing the above-mentioned technologies.

Hardware i.e. various instruments along with software is designed to improve efficiency, preventing pumps to run in abnormal conditions, stopping overflow of water reservoirs, through smart logic and combinations of our level sensor and RTUS. Vibration sensor based , anomaly detection and fault management of pump motors through Machine learning and Artificial Intelligence, this gives the client a periodic update on the health and probable fault in time to come , thereby insuring preventive maintenance , reducing downtime and improving efficiency. Preventing wastage of water and allowing pumps to run at optimum levels with IOT/SCADA monitoring /control automatically prevents water scarcity and promote sustainable water management. Each Sector whether Agricultural, Industrial or any other has very specific demands and solutions which they require for the management of their water resources, for e.g. In Irrigation it is about monitoring of canals, reservoirs through network of Level sensors / Flowmeters and barrage management, wherein in industry it is about utilizing water as per requirements and minimizing wastage. Thus various demands can easily managed by Firms who have imbedded team to design and implement solutions as per requirements. For E.g. for NHP (National Hydrology Project), monitoring canal of hundreds of kilometers along an isolated stretch, wherein communication is through satellite, and based on data of sensors pumps are automatically operated. Public, private partnerships are most important, as they help is government bringing in experts, domain specialists to work on projects, government has a supervisory role , wherein private enterprise has the assurance that his payments etc. are secure as they have entered into a contract with government, successful examples are AMRUT Yojna projects, I.e. Atal Mission for improving water infrastructures in cities, plus now the ongoing Har Ghar Jal (Jal Jeevan Mission), wherein water supply is being provided to far flung villages who were previously unconnected.

Conclusion:

It is need of the hour, that digitalization and data-driven by using technologies are implemented like SCADA /IOT and are further improved and fine-tuned. Today government, clients need to know the site conditions/parameters, such as the amount of water

supplied in a day, water quality, reports on water conservation vs wastage, optimum running of pumps, minimum downtime, this data is the only way to justify the huge investments, correct data and its interpretation gives a clear message on the performance of an assest in turn insuring proper water supply to end consumer. Endeavor of government is to provide, sustainable, clean, on time water supply to the people of India, thereby improving live and health of its people, who after all are the biggest resource for a country.

Data gives access to current performance and future planning which in turn are drivers for investment.Innovation and Entrepreneurship is the key to drive this industry in India, to meet the huge demands new solutions which are reasonable, sustainable and manageable in a diverse land as India need to be developed and implemented , new startups need to utilize the communication, digitization boom which India is witnessing, resource management is the need of the hour and making material available as per requirements would be the driving force for any new start up in this sector.

Promises need to be followed by action only then this would be successful.

Har Ghar Jal
Jal Jeevan Mission

Atal Mission for Rejuvenation and Urban Transformation

ABOUT THE AUTHOR

Dhruv Krishna
Cimcon Digital

With over 15 years of experience in the fields of Sales, Marketing, and Project Execution, Dhruv Krishna 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.

EverythingAboutWater

Annual

BUYER'S GUIDE

Directory.

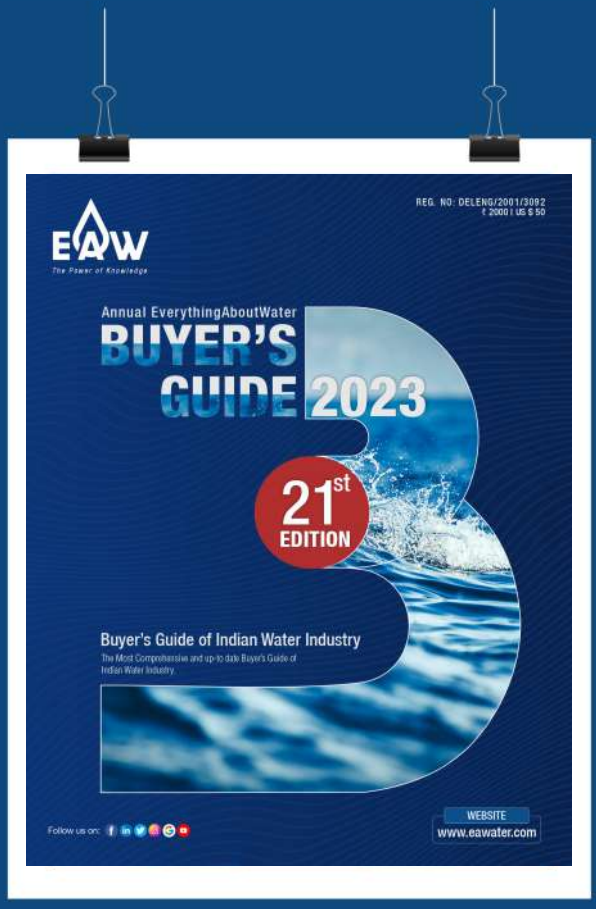
India's No. 1 destination for suppliers.

With a total circulation of more than 55,000 copies across India, the annual buyer's guide directory is one place where your products need to be seen.

List your products for FREE

OPT for paid listing

Choose to advertise



GET THE BEST

- India's No. 1 annual buyer's guide for the last 19 years
- Database of 5,000 water companies, 260 product categories in one buyer's guide
- Total circulation of more than 55,000 across India
- 10,000 complementary mailing on focused data
- Covers all major suppliers in the water and wastewater sector
- Most comprehensive list of products and services
- Year-long shelf life for buyers

REACH THE RIGHT AUDIENCE

- Purchase and Utility Managers of End-User Industries
- Consultants and Contractors for Water and Effluent Management
- Builders, Architects, and Construction Companies
- Water Treatment OEMs & System-Integrators
- Municipalities, Water Boards and Public Health Departments

WHY ADVERTISE HERE?

- Presence is one of the biggest and most premium issues of EverythingAboutWater magazine
- Reach premium target readers in one cost-effective package
- The buyer's guide has a presence in all major trade shows
- Dedicated marketing activities for increasing demand and interest level
- Ensure your premium ad location right now – book your spot before

EAW

Earth Water Foundation

OFFICE ADDRESS

7, Khullar Farms, Mandi Road
Mehrauli, New Delhi 110 030, India
Tel: +91 8448963579 / 8588911033

www.eawater.com

HARNESSING TECHNOLOGY FOR WATER SUSTAINABILITY

By Mandar Vijnapurkar, Head of Drives Sales, Marketing & Services, India

According to World Economic Forum 2017, a water crisis is evaluated as one of the highest risks to the world and with the largest impact. As populations grow, pressures mount and finding a more sustainable relationship between water and energy supplies become critical in less than two decades.

Today, close to one third of the world's population is estimated to live in water stressed and scarcity areas and by 2040, almost 20 % of all countries are anticipated to experience extremely high-water stress. Yet, water and energy loss in the water sector are extremely high. In fact, the average amount of water wasted by waterworks is 40 % worldwide and with 30% to 40% in India – due to errors, leakages, and water pressure.

Water and energy loss put pressure on the water industry

At the same time, 4 % of global electricity is consumed by the water industry – a figure that is expected to double by 2040 – and water accounts for up to half of a municipality's total energy bill.

Today's challenges Tomorrow's achievements

The industry challenges reflect a growing need for efficient water supply and treatment. The good news is that technologies to reduce energy consumption and leakages in all stages of the water cycle – from production and distribution to wastewater pumping and treatment – already exist.

Rethinking the water sector- Energy needs water, and water needs energy

The mutual dependence of energy and water and increasing global demand for each has an enormous impact on economic growth, environmental sustainability, and our future in general. Yet digitalization and existing technologies designed to create an energy-neutral water sector are already available. A more energy efficient water distribution system automatically helps reduce water leakage. Less energy is used. Less water is wasted.

Advanced Technologies in Safeguarding Water Sources

Danfoss provides game-changing concepts to extend our precious water and energy resources. From desalination via reverse osmosis, to traditional water production, water distribution and wastewater treatment, Danfoss gives you energy-efficient solutions. Today, it's even possible to generate energy during water processing, fulfilling the energy need of the entire water cycle.

Wastewater Treatment Illustration

1. Drives for mixers, dewatering and blowers

Koyambedu wastewater treatment plant in Chennai, 22% reduction in energy consumption with use of Danfoss VFD's for pumps, mixers, blowers, and dewatering applications.

The use of AC drives in the water industry is constantly increasing. Today, drives are widely used all over the industry from water production and distribution to wastewater pumping in sewage canalization systems and wastewater treatment plants both within municipalities and the industrial side of the business. AC drives control the speed of motors in a wide range of pump, blower, mixer, and dewatering applications to help enhance performance and value while saving energy and costs.

Typically, water and wastewater treatment processes account for 25–40% of a municipality's electricity bill and are the equivalent of 4% of global electricity consumption. Water and wastewater facilities are therefore normally the single-largest electricity consumer for a municipality. With extensive use of AC drives, energy-efficient components and real-life online process control combined with energy production based on the methane from a wastewater plant's digester, the first full-scale facilities are now in operation on a completely energy-neutral basis. This is obtained without adding external carbon. The energy neutrality covers the whole water cycle, from water production and distribution to wastewater pumping and treatment.

2. Drives for water pumping

Drinking water production

VLT® AQUA Drive used for controlling inlet and high-pressure pumps and booster pumps.

Whether surface water or groundwater is used for water production, Danfoss AC drives can help optimize the process and reduce energy and maintenance costs. A typical application is the control of deep well pumps, where the integrated advanced minimum speed monitor secures sufficient lubrication to protect the pump. Energy savings are achieved by selecting wells based on water level height. The VLT® AQUA Drive is also widely used in the desalination industry for controlling inlet and high-pressure pumps as well as booster pumps in relation to energy recovery.

Drinking water distribution

Danfoss High-pressure pumps delivering up to 120 bar

Within the water supply, drinking water distribution is typically the largest energy consumer. At the same time, 25–50% leakage is not unusual. By dividing the water distribution into pressure zones, the average pressure can often be reduced by 30–40%. The VLT® AQUA Drive is very widely used in boosting pumping stations to regulate pressure in each pressure zone. Integrated application software functions, such as Sleep mode, Dry run detection, Automatic Energy Optimization (AEO), Cascade control, Automatic flow compensation and Ramp functions help simplify the installation and make it more reliable, reduce the risk of water hammer, control pressure and reduce energy consumption.

Wastewater canalization system

Energy optimization and SCADA control of the wastewater canalization system is also a fast-moving trend. By using the VLT® AQUA Drive's integrated deragging function, it is possible to improve pump efficiency by 15–30% and drastically reduce maintenance costs. The deragging function prevents pump efficiency from dropping by increasing clocking and extends pump maintenance intervals. Using an AC drive together with a SCADA system also offers the possibility to secure maximum utilization of the volume capacity in the canalization system in relation to storm water overflow.

Reduced leakage and energy consumption go hand in hand

The energy used in the water distribution system typically represents 60–80% of the total energy consumption for the whole water supply system. By adapting the pressure to the real need using pressure zones and boosting pumping stations, you can achieve energy savings of 25–40%. At the same time, you can reduce water leakage by 30–40%.

3. Solenoid valves for leak detection

The increased focus on water leaks on the part of local water supply has led to digital solutions that detect water leaks immediately and shut off the water supply, thereby limiting the damage as much as possible.

The solution consists of sensors that are connected to a control system that sounds an alarm if a water leak occurs. The system then sends a signal to a shut-off valve, which automatically shuts off the water supply and ensures that no more water leaks out. The shut-off valve can be installed either on the building's main water supply or on the water supply pipeline or wherever there are other installations connected to the water supply.

The application of these technologies is not limited to just analysis and monitoring but extends to predictive maintenance as well. Innovative solutions now not only identify potential issues but can predict and prevent costly equipment failures before they occur, drastically reducing system downtime. As a leading organization in the industrial machinery sector, Danfoss India is steadfastly making a mark in environmental sustainability, particularly regarding water resources. From powerful tech innovations to on-ground strategies, Danfoss India is proactive in resolving water-related challenges.

Variable speed drives and pressure sensors are noteworthy examples of our technological deployments. As they become more integrated into water systems, there have been significant reductions in water and energy waste. For instance, Danfoss' DST P140 pressure transmitter, specifically designed for the water-pump sector, underlines their commitment to creating reliable and durable solutions for water and energy conservation.

CASE STUDY

In Chennai, the Koyambedu Tertiary Treatment Reverse Osmosis (TRRO) plant, with throughput of up to 45 million liters a day, meant that the plant faces high energy consumption. With Danfoss VF Drives, energy savings of 22% could be attained resulting in more than 700,000 USD — or 59 million INR (Indian Rupee) — savings in running costs over 15 years of operation. The project scope included aeration for removing dissolved organic matter and nutrients. Thus, aeration is the principal energy-guzzling process in wastewater treatment, representing half the cost of total wastewater treatment, followed by biosolids processing and pumping. Due to the high pumping requirement of the plant, the energy consumption is already high. Topping that, the extreme ambient temperature and humidity in Chennai also led to high heat dissipation from the motor panel room, contributing to high load on the control room cooling system. This required bigger HVAC system which consumed more energy hence energy bills were higher. It has become a model to be followed for wastewater treatment projects of other metro cities.

For technology to be genuinely effective in safeguarding our water resources, it must be wielded with a strategic approach. The goal of water security in an ever-changing world is complex, but with each technological innovation, we inch closer to attaining the goal, inspiring a sustainable water future for all.

Chennai - Koyambedu Tertiary Treatment Reverse Osmosis (TRRO) Plant.

ABOUT THE AUTHOR

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

Mr. 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.

Mr. 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.

DID YOU KNOW?

The blue colour of icebergs is a result of compressed ice, which absorbs colours at the red end of the spectrum.

IOT AND AI REVOLUTIONIZING THE WATER INDUSTRY: A COMPREHENSIVE EXPLORATION

By Priyanka Sinha, Global Lead : Digital Programs, Content & Marketing; DuPont Water Solutions

Over the past two decades, the world of IoT (Internet of Things) and sensor technology has undergone a remarkable transformation. What initially began with simple electrochemical sensors, like the glass electrode in the early nineties, has evolved into a complex ecosystem of integrated systems. This evolution has been so profound that the global sensors market is expected to surpass $400 billion by 2030, as reported by recent forecasts. Amidst this wave of innovation, the water industry has emerged as a significant adopter of sensor-based solutions. A recent report by research firm ID TechEx highlights that the water and wastewater treatment industries are witnessing significant growth, with an estimated market value of $2 billion by 2030. These industries are increasingly integrating IoT devices into their operations, and the excitement surrounding these innovations is palpable. While many of these sensors have been in use in other sectors, their adoption by water and wastewater companies is steadily gaining momentum.

The Proliferation of Sensor Types

The driving forces behind this paradigm shift are multifaceted. The current landscape of sensor technologies for measuring various water quality parameters reflects both the history of global water pollution and significant technological advancements in recent years. The availability of a diverse range of sophisticated sensors at decreasing costs has enhanced efficiency and effectiveness in water quality monitoring. What was once a technology relegated to basic applications is now finding its way into mainstream use. For instance, in addition to traditional sensors that measure parameters like pH and turbidity, advanced sensors can now detect a wide range of water quality parameters. Some examples include:

- **Spectral Sensors:** These sensors use optical technology to analyze the entire spectrum of light passing through water. This allows for highly accurate measurements of various substances dissolved in water, including organic compounds and contaminants.
- **Biological Sensors:** These sensors utilize biological indicators such as microorganisms to assess water quality. They are especially valuable for monitoring the presence of pathogens and harmful bacteria in real-time.
- **Nanotechnology-based Sensors:** Nanoscale sensors are capable of detecting even trace amounts of contaminants, making them invaluable for ensuring water safety. They can detect pollutants at extremely low concentrations, enhancing the precision of water quality monitoring.

Real-time Data for Informed Decision-Making

When combined with Wi-Fi connectivity, data analytics platforms, and dedicated mobile apps, these sensors offer multifaceted capabilities, from real-time leak detection to the day-to-day management of water treatment plants. The range of parameters that sensors can now measure includes pH, residual chlorine, turbidity, suspended solids, COD (Chemical Oxygen Demand), BOD (Biological Oxygen Demand), conductivity, and dissolved oxygen. This data can be accessed in real-time through mobile apps. Drinking water utilities, for instance, may deploy more than 100 water quality sensors from source to tap, while wastewater utilities may install an average of 60 sensors per facility. These numbers are expected to grow in the coming years, marking a significant step forward in water industry instrumentation and monitoring.

Different industries have specific requirements for monitoring wastewater. For example, semiconductor manufacturers must ensure that their wastewater is free of trace metals, while chemical or pharmaceutical plants must eliminate trace chemicals. This also applies to industries such as food and beverage, textile manufacturing, and pharmaceuticals. Although the upfront costs may not be insignificant, the long-term benefits are compelling. Notably, the cost of IoT sensors has seen a considerable decline, from $1.3 USD to $0.3 USD between 2012 and 2020, with further reductions expected.

Furthermore, the proliferation of cloud-based computing power has enabled the collection and real-time analysis of data. Coupled with wireless communication protocols, sensors can now be deployed in a wider range of locations, including remote areas. This development facilitates two-way communication between operating staff and sensors, fostering more dynamic, analytics-driven, and real-time system monitoring.

Real-time Monitoring for Improved Efficiency

It is estimated that the amount of energy wasted as a result of traditional methods of water processing and delivery can be reduced by up to 25% through more dynamic, analytics and real-time system monitoring. In recent years, advanced data analysis tools have become available, allowing high-resolution multi-parameter monitoring data to be collected and processed in real time. The ubiquity of Wi-Fi and Bluetooth, along with the widespread availability of cell towers and public Wi-Fi access points, offers more opportunities for IoT sensors to connect to the cloud. Several methods, such as Sensor to Gateway to Cloud, Sensor to Cell Phone to Cloud, and Smart Device Directly to Cloud, cater to different connectivity needs based on location, power consumption, data quantity, and convenience.

Diverse Connectivity Solutions

The choice of IoT wireless communication technology depends on various factors, including the deployment location of sensors, power consumption, data volume, and convenience. Smartphone-based solutions are gaining popularity due to their versatility and cost-effectiveness. As smartphone technology advances, it becomes an increasingly viable gateway for IoT sensor data transmission to the cloud.

The Future of Water Quality Monitoring

The future of IoT and AI integration in the water industry holds immense promise. Recent developments enable the integration of sensors, cloud-based infrastructure, data collection, and analytical capabilities. With the proliferation of computing devices, cost-effective sensors, and advanced analytics tools, utilities can capture more data in real-time, enabling informed decision-making on operations, maintenance, supply chain disruptions, and process improvements.

Innovations in Sensor Technologies

Moreover, the ongoing development of drone and mini-bot technologies further expands the application possibilities of sensor technologies for water quality monitoring. Watchtower Robotics, based in the United States, has developed a soft-sided robot capable of detecting leaks inside pipes, pinpointing their locations with remarkable precision. This innovation reduces the need for extensive and disruptive excavation to locate leaks.

Real-world Success Stories

Nothing is more powerful that the real world examples of innovation in this space and new stories are emerging often making headlines. An example worth mentioning here is Saneago, a major water and wastewater company in Brazil, which adopted ABB smart drives, motors, and sensors to improve energy efficiency while boosting reliability at four key pumping stations last year. Remote condition-based monitoring ensures a secure water supply for millions of people and industrial users. All these arguments establish that water industry is a natural fit for IIoT (Industrial Internet of Things) and AI integrated systems, and this could be the next wave of disruption we are waiting for. There is a lot of scope for climbing onto this new bandwagon as the industry strives to meet ever-changing pollution norms, managing new pollutants (such as Covid-19, for which IIT Mumbai developed a low-cost sensor), and the overall need for reducing contaminants from water.

Data-Driven Decision-Making

The future clearly belongs to integrated systems, and a lot of work is being done in that area. Both private and government entities are poised to benefit from

such systems, which can function as 'one-stop shops' for a multitude of challenges. Real-time data and predictive analysis, enabled by existing AI engines, empower informed decision-making about operations and maintenance needs, potential supply chain disruptions, and process improvements.

The Rise of Subscription-Based Models

Furthermore, the development of subscription-based business models is gaining momentum, with companies offering Platform as a Service (PAAS) and Software as a Service (SAAS) solutions to their customers. Subscription models are finding solid ground in the water industry, and the next few years are likely to witness substantial growth in such offerings by industry giants. However, data security remains a paramount concern, necessitating a global commitment to safeguarding sensitive information.In conclusion, the adoption of IoT and sensor technologies is revolutionizing the water industry in multifaceted ways. They empower water utilities and municipalities to make data-driven decisions, enhance operational efficiency, and ensure the safety and quality of water resources. Here are some key takeaways:

- **Enhanced Water Management -** IoT-powered sensor networks enable utilities to proactively manage water resources. They can monitor water quality parameters in real time, identify issues, and respond swiftly to incidents, such as leaks or contamination, ensuring a continuous supply of safe and clean water.

- **IImproved Environmental Impact -** These technologies support environmentally sustainable practices by helping utilities reduce energy consumption and minimize waste. For instance, real-time monitoring can optimize the use of chemicals in water treatment processes, reducing environmental impact and operational costs.

- **Improved Environmental Impact -** These technologies support environmentally sustainable practices by helping utilities reduce energy consumption and minimize waste. For instance, real-time monitoring can optimize the use of chemicals in water treatment processes, reducing environmental impact and operational costs.

- **Transparency and Accountability -** IoT sensors provide transparency to consumers about their water consumption, promoting responsible usage. Utilities can also track wholesale and retail consumption accurately, helping to manage resources efficiently and equitably.

- **Predictive Maintenance -** Predictive maintenance, facilitated by IoT, ensures that water infrastructure operates smoothly. By monitoring equipment conditions in real time, utilities can schedule maintenance pro-actively, reducing downtime and extending the lifespan of critical assets.

- **Innovation and Growth -** The water industry is experiencing a wave of innovation, driven by the integration of IoT and AI. As new sensor technologies and data analysis tools emerge, there are limitless possibilities for improving water management, quality, and sustainability.As we look ahead, it is not an exaggeration to claim that the next decade belongs to IoT and AI in water management. The ongoing innovation and adoption of these technologies hold the key to addressing the evolving challenges and ensuring the sustainable and efficient management of this vital resource. Embracing these advancements will not only benefit the water industry but also contribute to a cleaner, more sustainable future for our planet.

ABOUT THE AUTHOR

Priyanka Sinha
Global Lead : Digital Programs
Content & Marketing
DuPont Water Solutions

Digital transformation is the need of hour in every industry, Priyanka Sinha in her role as Global Digital Lead for DuPont Water Solutions, is responsible for developing and executing digital solutions for complex business challenges mainly to drive revenues or to achieve operational efficiencies, along with working on the long-term strategy for digital transformation and digitalization of water business globally. She is currently managing multiple projects related to Generative AI and AI based projects, digital infringement solutions, digital sales enablement, e commerce, social media marketing and customer engagement platforms. Priyanka has over 18 years of rich multi-functional experience in enterprise & retail sales, marketing, Supply chain, global business development and digital strategy. She is also a trained six sigma black belt. She started her career with Dow Chemicals and later worked in The Climate Corporation, a Silicon Valley agriculture tech startup, prior to joining Dupont water solutions. Priyanka has graduated in Agriculture Sciences in the year 2003 and has pursued MBA in marketing from National Institute of Agriculture in the year 2005. She was the youngest woman to earn Black Belt in Six Sigma & first woman sales leader in agricultural industry during her tenure in Dow AgroSciences. She loves to read & paint during her free time.

India's first & the most read

WATER & WASTEWATER MAGAZINE

ADVERTISE WITH US **SUBSCRIBE FOR FREE**

More Information:
+91 98113 39374

Write to us at:
enquiry@eawater.com

Visit Now:
www.eawater.com

INDUSTRIAL CHALLENGES IN WATER QUALITY MONITORING AND SOLUTIONS

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

Water is crucial to life on our planet. Life simply cannot exist without water. However, the quality of our water is under threat. Water quality deterioration is not concerned only with drinking water, but the quality of water that flows through our rivers, oceans and other water bodies is also a major issue, since they support marine life, the fishing and aquaculture industry. Poor practices of waste disposal, increased chemical pollutants have posed threat towards water quality. Monitoring water quality is, therefore, clearly important for industries, NGOs, communities and the public. It not only imparts knowledge about how the quality is changing over time, but also assists to analyse trends and to devise plans and strategies to improve water quality for meeting with its designated use.

The purpose of water quality monitoring for industries could be one of the following or combinations of several points :

- **Environmental planning:** Collection of data and their interpretation helps in prevention of water pollution and effective environmental management.
- **Compliance with norms:** Monitoring has become rather mandatory for industries so as to ensure that the effluent discharges are meeting with local, national and / or international norms.
- **Identify specific pollutants and their source:** To list a few here are, sewage seeping into the water supply, passing of pesticides and fertilizer to water receiving body, oil pollution, dumping in rivers and oceans due to port, shipping and industrial activity. Water quality assessment provides a source of data to identify immediate issues and their sources.
- **Identify short and long-term trends:** Data collected over a period of time show trends.

- **Tackle emergencies:** Emergencies like major oil leaks from shipping tankers or flooding due to excessive stormwater runoff can be better handled if access to real-time data is available to assess the impact of pollution level on water quality.

CHALLENGES COMING ACROSS WATER QUALITY MONITORING

When developing and implementing a water quality monitoring and testing strategy, industries often face challenges including large distributed water networks not suited for conventional water monitoring processes that rely on manual sampling and testing. This includes long turnaround times for test results. Other challenges include decentralized water quality data, device reliability, the inability to autonomously test for heavy metals, overspending on chemical

CUSTOMIZED

WEBINAR

WITH B2B MEETINGS

LET'S CONNECT DIGITALLY VIA WEBINAR

EverythingAboutWater offers customized

WEBINAR & B2B MEETINGS

THROUGH OUR DIGITAL PLATFORM.

BENEFITS

- Connect with your target audience at one platform
- Direct interaction with decision–makers
- Get contact details of all attendees for future follow ups
- Showcase your presentation and talk about your product in detail without worrying about travel, meetings & other concerns
- Resolve on spot queries related to your Products & solutions
- Undivided attention from audience
- Free product promotion through digital marketing tools

EARTH WATER FOUNDATION

E–mail us on:
enquiry@eawater.com

treatment and cost-prohibitive business models that don't encourage the adoption of new technology.

- **Large Distributed Water Networks:** Large industries have enormous water distribution networks which call for a considerable amount of time and expense to monitor and test water quality across the plant or facility.

- **Longer time period for getting analysis:** Traditionally, samples are collected either by operators or chemists and brought into the Laboratory. Traditional analysis has longer procedural timings as well as calculation and computation time. These results are conveyed over telephone or email or LIMS or ERP programs, which also require manual, time-intensive data input. At times, delayed analysis results lead to inefficient operation of plants.

- **Probes and online analysers:** Monitoring water with older probes generally helps identify physical parameters like pH, electrical conductivity (EC) or turbidity only, which make only a small subset of parameters being measured in the lab sample. It does not eliminate the need for lab analysis.

- **Reliability of older Probes and Analysers:** Probes and online analysers sometimes introduce potential error. External calibration of these instruments is required to be frequently carried out. Calibration process of probes cause downtime in availability of real-time data.

- **Lack of instrumentation:** Several aspects of water like biologicals, pathogens and viruses are not possible to be detected by any online instrumentation accurately. Unfortunately, laboratory testing is static, expensive and time-consuming. Industries need to spend a lot of money towards establishment and operation of equipped laboratory.

- **High cost of instruments:** Instruments such as probes and new technology online analysers are not easily affordable. Cheaper versions of new age analysers are not durable or precise compared to labs. Older devices are dedicated to single parameter; hence every parameter almost needs its own dedicated online instrument, forcing companies to acquire several online analysers. In several cases, they provide only calculated estimates without any direct measurements.

- **Fouling and depositions affecting accuracy:** Each device requires frequent cleaning and calibration using consumables purchased from instrument suppliers. When cleaning or calibration does not occur regularly, the reliability and accuracy of the devices are significantly impacted.

- **Decentralized Water Quality Data:** Water data and analytics have become increasingly available, but the insights themselves are not actionable. Integrating water quality data and analytics into an actionable water quality monitoring strategy that is pervasive across the complete organization is critical.

- **Autonomous Heavy Metal Detection:** Precisely measuring heavy metals is critical in a wide range of industrial water applications including metals, mining, and manufacturing. However, online instrumentation to accurately estimate heavy metals autonomously is non-existent.

- **Ongoing Repair & Maintenance:** Data acquisition through instruments needs frequent, rather continual, repair and maintenance, which could overrun the budget. Some of the common maintenance problems are stainless corrosion, bent or broken pins, wiper failure, faulty cables and connectors, etc. Maintaining and repairing equipment costs can rack up quickly over time. Aging instruments face a number of issues.

- **Uncertainty of monitoring requirements:** There are a lot of outside forces that can affect monitoring programs, and one main force is legislation. New regulations can instantaneously change monitoring requirements that increase workload and potentially need the purchase of new equipment. Expansion of industry in terms of new projects can, similarly, raise the monitoring requirements.

- **Training:** Water quality instrumentation can be incredibly tricky to learn to use all of the features. Older technology oftentimes takes years of hands-on experience to fully understand and that knowledge frequently resides with one or two employees. Additionally, as more experienced employees change jobs or retire, the subtle tips and tricks they have learned with equipment over the years are lost leaving a gap in critical knowledge.

SOLUTIONS TO OVERCOME SOME CHALLENGES

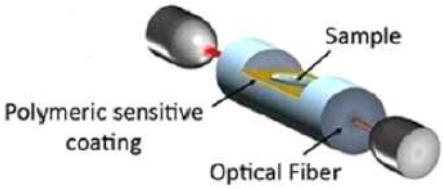
There is no shortage of obstacles that can pop up. But there are ways and tips to overcome those challenges and collect the best data. Challenges and problems are universal to all industries. However, some of the tips could help to deal with the issues and avoid typical frustrations.

- **Widely distributed network:** Rather than depending upon manual analysis, the monitoring should be done using probes and online analysers . More sophisticated analysers having self-calibrating and sanitation facilities between measurements can substantially assist in the monitoring of wide water networks remotely and quickly. The timely availability of analytical findings improves the efficiency of industrial operations.

- **Decentralized data:** Integration of monitoring data from various sources, their analytics, and development of actionable strategy can be done by developing a metrics-driven Business Intelligence (BI) tool. Though an expensive affair, it can collect, aggregate, and assess data and forecast an implementable strategy. BI tool is interoperable with different systems and can provide a meaningful outcome relevant to a water operation system.

- **Hardware failures:** For combating with issues related to connectors and cables, wet-mate hardware should be used. The traditional design of connectors deploy water-tight seal at the junction point, which could render the cable vulnerable to water ingress. Though use of wet-mate connectors were earlier confined only to harsher oceanographic applications, they have now found applications in many standard water quality instruments. These connectors are impervious to moisture. Use of strain relief cables and Kevlar materials have made the instruments more consistent in their functioning, as they are stronger to hold more weight and can take additional pressure.

- **Sensors with increased life:** Overcoming corrosion and other issues of sensors are tackled by the advancements in material sciences. Use of PVC and stainless-steel sensors pose challenges in the operating environment like salt water. New materials like polymers or titanium are being introduced as a new sensor technology because they really increase the durability of the overall sensor as well as address some of the flooding issues that can occur with sensors.

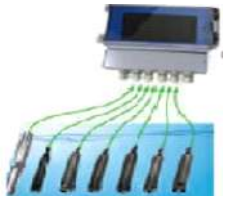


- **Reliability of analysers:** Sensor maintenance could be delayed as long as they are kept clean. Out of several ways to keep the sensors clean, many manufacturers have been deploying ways like stepped bulk-heads or central wiper to minimize biofouling. New technologies such as copper-based materials, use of pumps, flow-thru systems, chemical injunctions, shutter systems, and wipers have fairly been successful in improving cleanliness, reduced fouling and thereby increased reliability.

- **Uninterrupted working:** Preventative service program with manufacturer can bring about uninterrupted working of instrumentation. At the same time, it also fetches overall reduction in repair costs. It is prudent to include 5 years of preventative service upfront while procuring new equipment. It is a good option to include annual replacement of common consumables like pH membrane, dissolved oxygen cap etc in maintenance contract.

- **Uncertainty about scope of monitoring:** There is a need to become flexible as regards to ever changing monitoring requirements on account of new projects, legislation etc. For tackling uncertainty, old and rigid instrumentation should be replaced by versatile and flexible continuous water quality monitoring equipment. Such equipments provide users the ability to create customizable sensor configurations. Many application-specific instruments are now being consolidated into one or two systems that are a jack-of-all-trades style instrument.

- **Interruptions in data availability:** Data loss, instrument configuration time, fault in sensor



etc lead to unavailability of monitoring data for some period of time. There are improvements driven by smart sensor technology to provide data without interruptions. Data is stored both on the instrument and passed through email or data logger to a web server to give a backup data file externally. Smart sensors store their own calibration data and automatically configure themselves when plugged into any port on the instrument, this allows the sensor to automatically start working right away when installed. New instruments can also send up a flag when a fault condition has occurred.

- **Biomonitoring of water:** For getting an estimate about bacteriological counts, dip slides is a cheaper and fairly reliable alternative that can avoid manual bacteriological monitoring in Lab. Estimation is possible for a variety of bacteria like total viable count, coliforms, E. coli, Pseudomonas, sulphate reducers, nitrifiers, etc. Instruments for online BOD estimation, urine contamination, E. coli count have also been recently developed. Bioactive paper sensors are also developed to monitor heavy metals and some bacteria.

- **Cost towards Calibration of sensors:** The new sensors are capable of being calibrated in the lab and then installed in the field. These sensors eliminate cost towards laptop at the field site. Also, keeping only spare set of sensors is sufficient to continue monitoring without need to swap entire systems. The facility of concurrent calibration makes it possible to calibrate multiple sensors parallelly through a single instrument in a common pour of standard. This feature eliminates draining of calibration standards from each sensor, thereby saving good amount of money.

- **Sensors with modular consumables:** The old sensors need to be replaced in entirety in case of failure, whereas smart sensors' modular consumables make it possible to replace only a consumable portion of sensor rather than entire sensor. This endeavour proves less expensive over a period of years, though the initial capital cost of smart sensors seem high.

- **Training:** For dealing with knowledge gap due to retirement and attrition, monitoring tools having simple, intuitive software and easy calibration should be procured. Devices of "plug and play" type can prevent any issues with configuration and set up. The software with built-in quality checks avoids errors in monitoring. Web tutorials are also proving great to help new employees get a head start on learning to use instruments. Free factory training should be negotiated while purchasing new instrument in which employees could be given hands-on training as well as opportunity to interact with application engineers and technical support staff.

CONCLUSION

Safe water for designated use is rapidly becoming a scarce resource due to the combined impact of increased population, pollution, and global warming. It is necessary to monitor industrial water quality in real-time because monitoring serves a range of purposes, from control of chemical and ecological status compliance to safeguarding specific water uses. Due to large water network within industry, manpower attrition, financial limitations and uncertainty about monitoring requirements collectively put-up various types of challenges towards reliable and effective water quality monitoring. Diligent thinking about benefits of monitoring, allocation of adequate funds and proper selection of monitoring technology mixed with manual lab testing for accurate and reliable testing followed by disciplined implementation strategy could tremendously benefit industry.

ABOUT THE AUTHOR

Dr Mayur J. Kapadia
MSc, PhD, Trainer, Editor, Technical Writer and former Add Gen Mgr & Lab Head of GNFC Ltd, Bharuch, Gujarat, India.

He possesses professional industrial experience of 40 years in the fields of Quality Control of Chemicals / Fertilizers / FMCG products, and many other areas. He has been conducting full day training programs on Quality Control, NABL, Instrumental Analysis, etc for industry professionals.He is an active member in technical committee of Bureau of Indian Standards (BIS), which has conferred upon him a 'Certification of Appreciation' for his immense contribution towards establishing and improvising various Indian Standards. He also has been rendering technical services to various organizations for quality improvement, process trouble-shooting and analytical aspects.

STUDY OF RIVER MEANDERING IN VELLAR BASIN, TAMIL NADU FOR ITS ASSESSMENT AND ITS ASSOCIATED ECOLOGICAL RISK MONITORING – A SHORT CASE STUDY

By- Abhijeet Das Research Scholar, Department of Civil Engineering,
C.V. Raman Global University (CGU), Bhubaneswar, Odisha, India

The Vellar river basin is situated in the Northern part of Tamil Nadu State in South India,. The total area of the basin is 7520.87 km2. The total length of the river is about 150 km. The river originates on the southern slope hills in Salem District and drains into Bay of Bengal. The river is a seasonal one and receives most of the flow during north east monsoon. The annual rainfall of river in lower reach is about 1300mm. Maximum rainfall is during north east monsoon period over a span of about 10 days. In the lower reaches the river is experiencing heavy meandering resulting loss of agricultural lands and roads located adjacent to the banks. Kammapuram is one such village located along the river. Hence protection works was proposed. Initial field surveys were conducted for existing field

information. Using the data, HECRAS-1D, Mike 21 numerical modeling studies were performed. Based on the studies vulnerable locations were identified and initial river training works were designed and experimentally verified through physical modeling techniques and finalized. The post effects of the training works are observed which resulted in good accretion. The details of studies are detailed in the paper.

Keywords: Basin, Model, Vulnerable, Rainfall, Numerical

- **Introduction**

The River Vellar as the name itself depicts a river which carries seasonal floods. The river originates in Salem district of Tamilnadu, joined by another tributary Manimutha and finally confluences with bay of Bengal (Fig 1). It flows for a maximum period of 30 days per year. During the flood times the river quite often finds its path in a meandering way at many locations. The satellite image shown below (Fig 2) denote the severity of meandering of the Vellar River. On November 2005 unprecedented heavy rain occurred causing heavy floods in Vellar and Manimuktha river, which realized a maximum flood discharge of 2492m3/s.The meandering resulted in the concentration of flow in the right and left bank. The River Manimuktha has a river width of 120m (Fig 3). Occurance of flash flood in the river is a recurring in every monsoon, the affected people requested the Government to safeguard their villages from the damages to the dwellings units, agricultural land, live stocks and their properties by forming flood banks, construction of spurs and retaining walls. Hence project proposal funds were released under Flood Management Program.

Fig. 1. Index map

- **Materials and Methods**

1. Reconnaissance
2. Desk studies
3. One dimensional Modelling
4. Two-dimensional Modelling
5. Physical modelling

- **Reconnaissance**

The site Kammapuram ((11°28'29.51"N, 79°25'22.89"E) was visited for collecting basic information .The important findings are Three villages namely Tholur, Kammapuram and Ka Puthur are located (Fig 3) in the flow direction. Flow pattern changes from concave at Tholur to convex at Kammapuram and again becomes concave at Ka Puthur The river undergoes heavy meandering in the downstream reach of 40km from confluence point Most of the time river is dry and when flood water flows, it takes its own lowest path available causing meandering The maximum number of rainy days is around 30 The river flow is very high in north east monsoon from October to December Flash floods are regular occurrences Agriculture area to the tune of 3251 km 2 (325100Hec) Heavy discharge of 2492 m3/s was realised in 2005.

- **Desk studies**

The area is highly productive in agriculture and lands are located adjacent to the river. Due to meandering the river course gets changed resulting in the erosion of agricultural lands (Fig 4). The present village C Keeranur is facing such a problem. It was assessed from various imageries that adjacent to this village about 13 Acres of land was lost due to change in course. The driving slope is assessed as 1 in 3000.

Fig3. Details of study area

Fig. 2. Details of Vellar River meanderingp

Fig.4. Eroded stretch

- **One dimensional modelling**

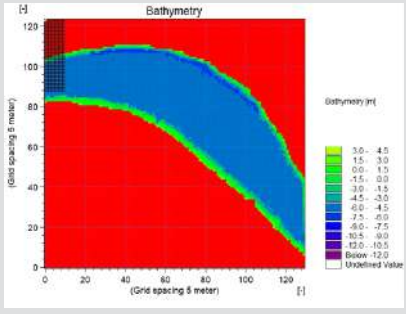
In order to assess the existing hydraulic conditions of the field like bank elevation, discharging capacity, numerical model studies were made. For the present study the U.S. Army Corps of Engineers' River Analysis System (HEC-RAS) software is used. This software is developed by the Hydrologic Engineering Center (HEC-2008), which is a division of the Institute for Water Resources (IWR), U.S. Army Corps of Engineers. HEC-RAS allows users to perform one-dimensional steady and unsteady flow calculations (HEC, 2002). In a HEC-RAS steady state simulation, water surface profiles are computed from one crosssection to the next by solving the standard step iterative procedure to solve the energy equation. The energy equation is intended to calculate water surface profiles for steady gradually varied flow.The input are geometric, flow and boundary data. The geometric data consisting of cross section and chainages were keyed in after making a base map of the study area. The flow data adopted was the maximum value as suggested by the field engineers. The upstream and downstream slopes were given as boundary conditions. Cross section at 25m interval covering total reach of 2km including the affected location was given as the main input . With the above flow data and the boundary conditions, results are obtained by running the HEC-RAS model for different scenarios. The results of the same are obtained for the steady state flow conditions. The maximum value of discharges for Manimuthar is 2492 m3/s.

- **Two dimensional model studies**

MIKE 21 HD is the basic computational hydrodynamic module of the entire MIKE 21 system (DHI 2001) providing the hydrodynamic basis for other MIKE 21 modules such as advection-dispersion (AD), water quality (ECOLab), sand transport (ST) and mud transport (MT). The modeling system is based on the numerical solution of the two/three-dimensional incompressible Reynolds averaged Navier-Stokes equations. The model consists of continuity, momentum, temperature, salinity and density equations and it is closed by a turbulent closure scheme. MIKE 21 HD can be applied to a wide range of hydraulic and related phenomena. This includes modelling of tidal hydraulics, wind and wave generated currents, storm surges and flood waves.

It is a general hydraulic model that easily can be set up to describe specific hydraulic phenomena. The studies are performed to identify locations where river training structures are necessary. The input to the model is hydrographic details of river, discharges at the open boundaries. The output includes velocity contours and water levels. It was proposed to strengthen the river banks by retaining walls and spurs. Spurs are the structures constructed transverse to the river flow and extend from the bank into the river. These structures are known by several names, the most popular being, spurs, spur dikes and transverse dikes and constitute, probably, the wide used training works. The lengths are adopted as discussed in technical report of CBIP (1971, 1987). Repelling spurs are effective in results, if correctly positioned with respect to the meander length. It is desirable to test them in hydraulic models before finally adopting them. The optimum angle of deflection upstream varies from 60° to 80° with the bank. Regarding the spacing of the spurs, a wider spacing (say 4 to 6 times the length) can be planned for a 'convex bank' and a closer spacing (2 to 2.5 times their length) for 'concave banks'. Spurs were designed as per CBIP (1971 &1987).In the present case it was used to analyse the flow pattern pre and post effect of spurs and formation of eddies. Initially the studies were performed with the existing condition and the flow pattern with spurs placed at locations suggested by field engineers with an angle of 200 deg from normal to the bank. All the spurs adopted were repelling one. The river bed contours adopted are furnished in Fig 5.

Fig 5. Details of river contours



- **Findings of numerical model studies**

The numerical experiments with HECRAS indicates that insufficient water way to carry the quantum of flood values suggested and needs a redesign of the section with a top level (Fig 5).In the existing cross section the left bank is found to be lower than right bank and it can carry a bank to bank discharge of 600m3/s and found to overflow for maximum adopted value of 2492 m3/s. Initial Mike 21 model trials indicate more flow concentration along left bank After a free board of 1.8m. The 2D studies with Mike 21 suggest that 1.2km of length of river bank is vulnerable to erosion due to high eddy formation (Fig 6 & 7). Hence based on the discussion with field engineers repelling spurs with inclination with normal to river bank were adopted and results indicate reduction in velocity.

Fig.6 HEC-RAS output

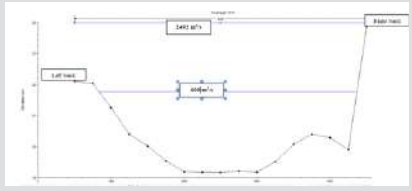
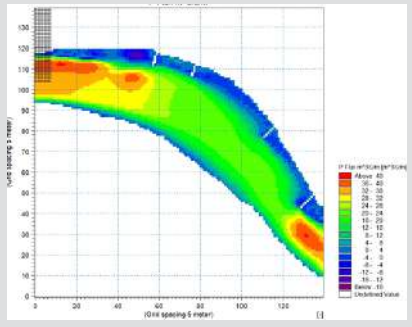


Fig 7. Mike 21 output



- **Physical model studies**

Physical model studies were carried out to study the performance of river training spurs proposed from Mike21 numerical model studies and the top level of the banks was revised based on HECRAS model studies with a free board of 1.80m. A comprehensive mobile bed, geometrically distorted physical river model, with a horizontal scale of 1:500 and vertical scale of 1:100, and the representing affected reaches with the proposed spurs was constructed. Model discharge of the river was allowed through 'V' notch. Necessary gauge wells have been constructed for measuring the water levels as done for other reaches of Vellar (IHH Poondi-1995).

- **MOBILE BED SETUP**

In the model, bed of the river has been properly simulated. Sand samples (disturbed) were collected by the field officers and sediment mean diameter (D.50) value is calculated as 0.64 mm. From this, utilizing the roughness index, the model sediment size was calculated based on Shield stress criteria and found to be 0.6 mm. Accordingly, the corresponding mesh was utilized to get the 0.6 mm diameter sand materials. The mobile bed was formed utilizing the above-sieved sand particles. The model was constructed is shown in Fig8.

Fig 8. Physical model of study reach

- **Model study**

The model run was performed for the scaled values of maximum discharges for Manimuthar which was 2492 m3/s respectively. The model discharge was computed and allowed through "V" notch. The initial model was operated for maximum flood discharge, with the angle of inclination and location of spurs as obtained from 2D Mike 21 model studies. During the model run (Fig 8) observations are made on eddy formation near spurs and accretion. After number of trials and suggestions the alignment of the spur were arrived (Fig 9). Three spurs of length Then the performance of the model was observed for various discharges varying from 50% to 100% of maximum discharge. The proposal with repelling spurs for bank protection based on observations for the maximum discharge is shown vide Table 1. Angle of spur is given with respect to normal to the bank and orienting opposite to flow direction (Fig 9). Project was completed in 2015.Inorder to study the effect of post project field visits were made in 2022. Imageries for the year 2015 and 2022 were collected and analysed. Comparision studies indicate good green formation and bank stabilization (Fig 10).

Table 1 Alignment of spur

Sl No	Village	Length of Spur(m) & name	Bank	Inclination with shore normal (deg)	Spacing (m)
1	Tholur	20, S1	Right	24	S1 commencing
2	Tholur	20m, S2	Right	25	S1-S2 100m
3	Kammapuram	40,S3	Left	25	S3commencing
4	Kammapuram	30, S4	Left	24	S3-S4 100m
5	Kammapuram	30, S5	Left	25	S4-S5 100m
6	KaPuthur	25,S6	Left	25	S6 commencing
7	KaPuthur	25,S7	Left	24	S6-S7 100m
8	KaPuthur	25,S8	Left	25	S7-S8 100m

Fig 9. Physical model

Fig 10. Physical model

Conclusions

Detailed studies with numerical and physical model techniques were done and river training spurs were proposed. The spurs provided on bank deflect the flow current concentrate to the central portion of the river and a marginal erosion of shoals on the left bank of the river is noticed. Eddy formations near the toe of the spurs was observed , for which suitable toe protection is to be provided to avoid local scour. Slight modifications of orientation angles were made with the initial value obtained from 2D Mike 21 model studies in consultation with field engineers. Accretion of sand is noticed between the spurs in physical model .The model run was made with sufficient number of trials to assess the effective functioning of the measures. The performance of spur system in the model was satisfactory. In the model run, it is noticed that the further cave-in action at the concave bund region provided with spurs has decreased . Sufficient free board of 1.8m above maximum flood level should be provided so as to prevent flooding in to adjacent agriculture lands. Eddies are noted at the nose of spur and it should be sufficiently taken below scour depth. The post project observations indicate that the proposals formulated were fairly successful.

References

1. Central Board of Irrigation and Power (CBIP) Manual on river behavior, control and training Technical Publication no 60, 1971.
2. Central Board of Irrigation and Power Report on design of Spurs Publication no 39, 1987.
3. Institute of Hydraulics and Hydrology, Poondi Hydraulic model studies for providing protective arrangements at the right bank of river Vellar IHH Report no 17/1995.
4. Danish Hydraulic Institute DHI. (2001) User Manual and Reference Guide for LITPACK and MIKE21,
5. US Army corps of engineers Hydrologic Engineering Center HEC-RAS River Analysis System Application guide March 2008.

ABOUT THE AUTHOR

Abhijeet Das
Research Scholar, Department of Civil Engineering, C.V. Raman Global University (CGU), Bhubaneswar, Odisha, India

Mr. Abhijeet Das works as a Research Scholar in the Department of Civil Engineering at C.V. Raman Global University (CGU), Bhubaneswar, Odisha, India. He has teaching experience of about 8 years and Research experience too, and his area of specialization is Water Resource Engineering. He has published more than 10 papers in reputed journals and presented papers in various national and international level conferences and published four book chapters recently.

DID YOU KNOW?

The concept of "virtual water" refers to the hidden water used in the production of various goods, like clothing and food.

EFFICIENT PIPELINE INSPECTION VIA A BIOMETRIC ROBOT: A STUDY INCORPORATING SNAKE LOCOMOTION PATTERNS AND LINEAR ACTUATOR FUNCTIONALITY FOR ENHANCED PERFORMANCE.

By- Riddhish Soni, Karthik Swaminathan, Mahesh Tupe, Chinmay Mundane, Vaidic Gupta, Dr. Faruk Kazi, Aman Chhaparia, Divyang Soni, Nirmal Chittora, Anurag Wasnik

Abstract:

This study introduces a groundbreaking approach to pipeline inspection using an advanced biomimetic robotic system (Seth et al., 2021). The technology proficiently integrates the principles of snake locomotion (Hirose, 1993) and the precise functionality of linear actuators, optimizing the system's motion capabilities. Through successful incorporation of biomimicry and linear actuator (Brown et al., 2018) technology, our system guarantees sophisticated navigation within complex pipeline networks, significantly enhancing the inspection process's overall efficiency.

Keywords:

Pipeline Inspection, Biomimicry, Snake Locomotion, Linear Actuator, Robot, Efficiency.

Introduction

Pipeline assessment is an essential process across multiple sectors, prominently including the oil, gas, and water distribution industries (Johnson et al., 2019). This process is instrumental in safeguarding the structural integrity of pipelines, allowing for early identification of leakage points, and facilitating anticipatory approaches towards maintenance needs (Zhang et al., 2020). Despite its significance, the inherent intricacies and broad expanse of pipeline

networks pose formidable challenges. These encompass the increased complexity of the assessment process, potential hazards, and notable financial implications. Such factors highlight the urgent requirement for the development and integration of autonomous robotic systems in the domain of pipeline inspection, a field that has witnessed considerable interest and rapid advancements in recent times.

Image 1: Mechanized locomotion within pipeline environments

Among numerous innovative approaches, biomimicry, a design paradigm that borrows ideas from nature's models, systems, and strategies, has surfaced as a powerful and promising solution for the creation of robotic systems. Nature, with its diverse and efficient mechanisms that have stood the test of time, provides an abundant source of inspiration that can be leveraged to enhance and guide the functionality of robotic systems. Snake locomotion serves as a fitting model due to its inherent adaptability, flexibility, and efficiency, offering invaluable insights for the design of robotic systems intended for navigation in complex structures and terrains. By integrating these characteristics, biomimicry paves the way for remarkable progress in robotic designs, significantly bolstering their operational performance in challenging scenarios such as pipeline inspection.

Linear Actuator Mechanism:

The utilization of linear actuator technology is instrumental in simulating the snake's locomotion (Chirikjian, 1994) within the context of a robotic system. Linear actuators effectively transform energy into linear motion (Smith, 2017), thereby permitting meticulous regulation of the robot's speed and location. Such precision is essential in intricate environments, particularly when maneuvering through the complexities of pipeline structures.

Initially, the body of the snake robot was divided into multiple segments, each designed to bend relative to its neighbours. Within each of these segments, a linear actuator was incorporated, programmed to control the bending of each segment, thereby generating a wave-like pattern that started from the head of the snake

Actuator

Image 2 (a): Rarefaction Actuator

Image 2 (b): Compression

and moved towards its tail. This mechanism simulated the common form of snake movement known as lateral undulation. This kind of flexibility in robotic systems would help in accessing the unimaginable inaccessible areas and a wider field of view for inspection particularly inside closed and hollow structures like pipes. Additionally, sensors like touch or proximity sensors were integrated into the robot, enhancing its ability to interact effectively with its environment. Given that linear actuators typically require more power than other forms of actuators, compressed air was chosen as the power source due to its high energy density and the capability to supply the required power for the actuators.

Image 3: Robot Assembly

Study Area

This study, spearheaded by students from the Society of Robotics and Automation at VJTI college in collaboration with Aumsat Technologies LLP, and supported by PHED Udaipur, Nagar Nigam Udaipur, and the Wash Innovation Hub ASCI Hyderabad, addressed the pressing concerns plaguing a 600mm diameter pipeline that extended 52.8 kilometers from Jaisamand to the Titardi water treatment facility in the Udaipur District of Rajasthan, established in 1995 (Government of Rajasthan, 1995). Despite its initial capacity to transport 900 cubic meters of water hourly, the pipeline has faced persistent leakages and issues such as illegal encroachments, structural cracks, and algae contamination since its inception, which significantly impacted the water quality. These continuous complications not only disrupted efficient water transportation but also presented substantial threats to nearby ecosystems and communities. As the problem escalated over time, it necessitated urgent interventions to rectify the existing issues and prevent further damage.

Image 4: Leakages in Jaisamand Pipeline

This situation underscored the vital need for detailed research and robust strategies to safeguard this crucial infrastructure. Furthermore, it pointed out the urgent necessity to incorporate modern technology and preventive measures to maintain the pipeline's long-term functionality and reliability, thus ensuring a steady water supply while preserving the environmental and community well-being in the adjacent areas.

Illegal Encroachment

The deployment of a snake locomotion-based linear actuator robot marked a significant stride in addressing the unauthorized connections plaguing the Jaisamand pipeline (Gupta et al., 2022). This robot, demonstrating snake-like agility and flexibility, efficiently navigated the complex pipeline network, offering an intricate view vital in identifying illegal connections. Armed with advanced thermal and optical sensors, it quickly pinpointed structural irregularities and breaches, often relaying real-time insights that enabled immediate action.

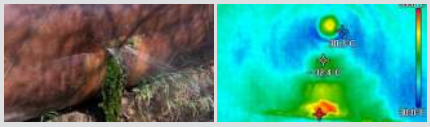
Image 5: Illegal Connections from the main line

Additionally, it housed data analytics tools that meticulously analysed gathered data, helping trace the origins of the illegal connections and facilitating legal actions against violators.

Algae Detection

The infiltration of algae had been a significant concern, impacting the quality of water being transmitted through the Jaisamand pipeline system (Singh et al., 2018). Algae presence in the pipelines often led to the degradation of water quality, potentially posing health risks to consumers and leading to blockages and disruptions in water flow.

Image 6: Algae Detection



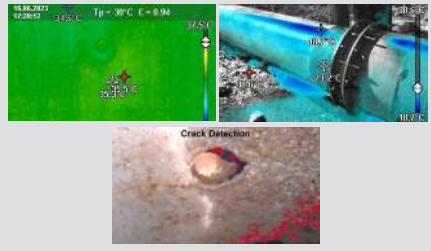
The advanced AI sensors onboard the robot were instrumental at identifying variations in temperature and optical signatures that indicated algae presence, thus enabling swift interventions. Through the careful analysis of the data collected, the origins of the algae infestations were traced, facilitating targeted clean-up operations and preventative measures.

Crack Detection

Since its establishment, the continuous issue of detecting and rectifying cracks had been a significant impediment to the optimal functioning of the Jaisamand pipeline (Davies et al., 2020). These fractures had seriously undermined the structural integrity of the pipeline, allowing detrimental substances to contaminate the water supply, thereby jeopardizing its safety and usability. Our robot had been adept at functioning in diverse environments: fully submerged, partially submerged, or empty pipe, facilitating a detailed and extensive inspection of the pipeline.

It not only expedited the resolution of identified issues but also assisted in strategizing to prevent analogous issues in the forthcoming period. Consequently, the robot had become a crucial entity in prolonging the operational life and enhancing the efficacy of the Jaisamand pipeline, thereby contributing to a more robust and sustainable water distribution network.

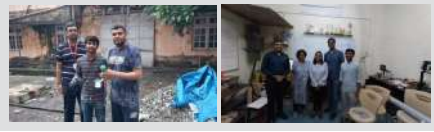
Image7: Crack Detection



Outcomes

The collaboration between the Society of Robotics and Automation at VJTI college and Aumsat Technologies LLP produced remarkable results. Their robotic system, fortified with advanced AI and sensors, tackled the pipeline's challenges head-on. Of the 14 detected leaks, 11 were immediately addressed, showcasing a 78% success rate. Furthermore, the system's interventions led to a significant reduction in daily water loss, bringing it down from 300,000 litres. This strategic intervention also resulted in a dramatic decrease in non-revenue water losses from 33% to 17%. Beyond addressing leaks, the robot adeptly identified structural concerns, unauthorized encroachments, and quickly acted on algae contamination.. The model was constructed is shown in Fig8.

Image7: Robotics team showcasing their groundbreaking creation

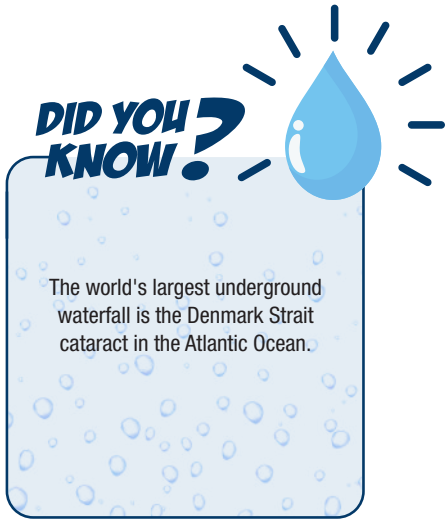


Such pivotal achievements not only reinforced the pipeline's reliability but also elevated community trust. Ultimately, this endeavor illuminated the game-changing potential of combining academic innovation with industry expertise to craft tangible, real-world solutions.

Conclusion

The advent of the biomimetic robotic system, harnessing snake locomotion and linear actuator technology, is revolutionizing pipeline inspection (Liu et al., 2021). This innovative technology strengthens existing frameworks, demonstrating significant advancements in inspection efficiency and accuracy. Inspired by snake movements in nature, this development has spawned a robot capable of intricately navigating pipeline networks with unprecedented agility, enhancing inspection comprehensiveness and minimizing overlooked issues that might escalate into severe complications later. Positioned as a frontrunner in fostering a resilient and sustainable water distribution infrastructure, this innovation proactively addresses leaks, unauthorized connections, and contamination issues, thereby curtailing water wastage and protecting water quality, aligning with global sustainability and prudent resource management initiatives.

Furthermore, the robot is instrumental in protecting environmental health by identifying and mitigating potential leak points and contamination early on, thus preventing substantial environmental harm like soil contamination and water pollution, which could adversely impact surrounding ecosystems. Besides environmental benefits, this technology markedly enhances community well-being by ensuring water supply network safety and significantly contributing to public health and safety. It also promises potential long-term cost savings, reducing financial strains on communities and encouraging economic prosperity. As we enter a period defined by technological innovation, integrating biomimetic robotic systems in pipeline inspection marks a key milestone in evolving infrastructure management. It exemplifies a seamless meld of technology and nature, facilitating a future where technology harmonizes with natural principles, nurturing a symbiotic relationship for a more balanced and sustainable future. Looking ahead, it is vital to continually hone this technology, supporting ongoing research and development to maximize its potential, solidifying it as a cornerstone in the global initiative towards a safer, more sustainable, and prosperous future for everyone.



References:

1. Brown, J. Smith, and M. Johnson, "Linear actuator functionality and applications," Journal of Robotics, vol. 12, no. 3, pp. 231-243, 2018.
2. G. Chirikjian, "A study on the efficacy of snake-inspired locomotion for robotic systems," Applied Mechanics, vol. 24, no. 2, pp. 45-58, 1994.
3. R. Davies, A. Johnson, and R. Murphy, "Crack detection and management in large-scale pipelines," Journal of Infrastructure Systems, vol. 29, no. 4, pp. 459-471, 2020.
4. Government of Rajasthan, Udaipur Water Project: A Retrospective, Jaipur, Rajasthan: State Government Publication, 1995.
5. S. Gupta, A. Kumar, and D. Patel, "Modern techniques for pipeline surveillance against unauthorized encroachments," Journal of Security & Sustainability, vol. 5, no. 1, pp. 17-30, 2022.
6. S. Hirose, Biologically Inspired Robots: Snake-like Locomotors and Manipulators, Tokyo: Oxford University Press, 1993.
7. M. Johnson, A. Davis, and N. Patel, "Importance of pipeline assessment in the oil and gas industry," Journal of Petroleum Technology, vol. 71, no. 3, pp. 18-26, 2019.
8. Z. Liu, H. Lee, and S. Kim, "Biomimetic robotic systems: An overview of recent developments and future directions," Robotics and Autonomous Systems, vol. 142, Article 103689, 2021.

ABOUT THE AUTHOR

Riddhish Soni:
Ex-ISRO Scientist and part of Chandrayaan 2 Mission. He comes with 9 years' experience in the Space Application Industry.

Karthik Swaminathan:
Senior Board Member at Society of Robotics and Automation and Project Lead. Has more than 3 years of experience in Robot hardware and software development.

Mahesh Tupe: Embedded and controls lead, has one year of experience in applying control theory and embedded systems in robotics.

Chinmay Mundane: Design Lead, has one year of expertise in designing robotic systems and their autonomous navigation control.

Vedic Gupta: Structures and PCB lead, has one year of experience in designing mechanical systems as well was PCBs.

Dr. Faruk Kazi: Professor & Dean of Research at VJTI Mumbai. He has around 25 years of academic & research experience.

Aman Chhaparia: Senior Board Member at Society of Robotics and Automation. Has more than 3 years of experience in Computer Vision, AI related software development.

Divyang Soni: GIS Analyst at Aumsat Technologies LLP. He has 2 years' experience in Radar signal processing and Geodatabase creation.

Nirmal Chittora: National Water, Sanitation & Hygiene (WASH) Expert, Ministry of Jal Shakti GoI, having experience of 38 years in WASH Sector.

Anurag Wasnik: Innovation Lead, NITI Aayog 8+ years of Consulting, Government Affairs, Social Sector and Social Policy experience.final.

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

By- Aude Camus, Bentley System

ContextCapture 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 Context Capture 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.

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

Image 2: 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
Bentley System

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.

OPTIMIZING WATER PURIFICATION PROCESSES WITH CIM10 IOT EDGE GATEWAY: A PATH TO ENERGY CONSERVATION AND SUSTAINABILITY

By Mr. Prashant Kapadia, Cimcon Digital

Introduction

Water purification is a critical process for ensuring access to safe and clean drinking water, as well as for various industrial applications. In recent years, there has been a growing focus on optimizing water purification processes to achieve energy conservation, reduce waste, enhance equipment life, and meet Environmental, Social, and Governance (ESG) goals. CIM10 IoT Edge Gateway emerges as a powerful tool in this quest, enabling precise monitoring and control of the purification process. In this article, we explore how the CIM10 IoT Edge Gateway plays a pivotal role in water purification process optimization, with a special focus on energy efficiency, cost savings, and sustainability.

- **Instrumentation and Real-Time Monitoring**

Water purification involves a series of intricate chemical and physical processes. Critical parameters such as pH levels, flow rates, and turbidity must be continuously monitored to ensure the quality of the purified water. Traditional monitoring methods often involve manual checks and periodic measurements, leaving room for human error and inefficiency .

CIM10 IoT Edge Gateway can address this challenge by enabling real-time instrumentation and monitoring. It connects to various sensors placed at

key points in the purification process, providing a constant stream of data. This data can be analyzed locally at the edge, allowing for immediate detection of anomalies and deviations from the desired parameters.

- **.Energy Conservation**

One of the primary objectives in water purification optimization is energy conservation. The energy-intensive processes involved in water treatment, such as filtration and chemical treatment, can contribute significantly to operational costs and carbon emissions.CIM10 IoT Edge Gateway can facilitates energy conservation through precise control mechanisms. CIM10 IoT Edge Gateway comes with Python SDK so process owners and Subject Matter Experts can develop custom proprietary algorithm which enables precise control mechanisms. By continuously monitoring and analyzing data from sensors, it can dynamically adjust equipment settings in real-time to optimize energy consumption. For example, it can regulate pump speeds based on flow rates or adjust chemical dosages based on water quality, leading to substantial energy savings.

- **Cost Savings and Waste Reduction**

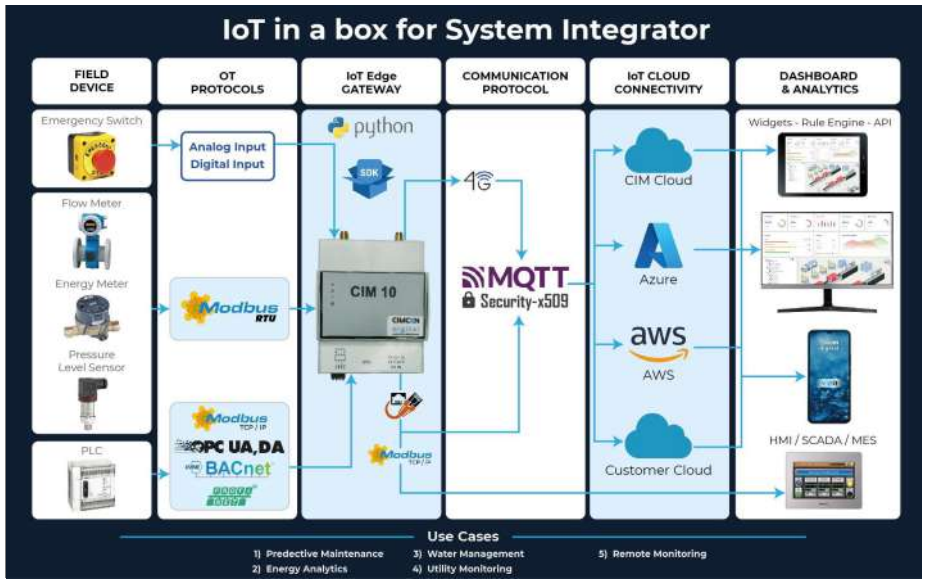
Efficiency gains achieved through CIM10 IoT Edge Gateway translate into cost savings. By optimizing energy use, reducing chemical consumption like dosing material, enhancing RO Membrane life and minimizing downtime through predictive maintenance, water treatment facilities can substantially lower operational costs.

Furthermore, waste reduction is a natural by-product of process optimization. When processes are finely tuned, there is less need for excessive treatment or rework due to subpar water quality. This not only saves on treatment chemicals but also reduces the volume of waste generated, contributing to a more sustainable and cost-effective operation.

- **Enhanced Equipment Life**

Maintaining the longevity of purification equipment is vital for sustainable operations. Frequent breakdowns and premature equipment replacements not only incur high costs but also contribute to environmental waste.

CIM10 IoT Edge Gateway plays a crucial role in enhancing equipment life by implementing predictive maintenance strategies. Through continuous monitoring and the application of machine learning algorithms, it can predict when equipment is likely to fail and trigger maintenance activities before a breakdown occurs. This not only extends equipment life but also ensures uninterrupted water purification processes.



- **Anomaly Detection for Proactive Responses**

An integral aspect of CIM10 IoT Edge Gateway is its ability to detect anomalies in real-time. Machine Learning (ML) models can be trained on historical data. The training can be conducted using the healthy state of equipment and the process. Training will be done on a high end computation intensive infrastructure while the trained model can be run on CIM10 IoT Edge Gateway. Sudden but sustained fluctuations in pH levels, flow rates, or turbidity can signal potential issues in the purification process. The gateway's ML algorithms can identify these anomalies and trigger alerts to maintenance teams, allowing them to take proactive measures to prevent water quality issues or equipment failures.

- **ESG Goals and Sustainability**

In today's world, businesses are increasingly focused on their ESG goals, which encompass environmental, social, and governance responsibilities. Water treatment facilities play a pivotal role in achieving these goals, particularly in the context of water conservation and responsible resource management.By optimizing water purification processes with CIM10 IoT Edge Gateway, organizations can make substantial progress toward their ESG commitments. Energy conservation, waste reduction, and enhanced equipment life contribute to a more sustainable operation, aligning with broader sustainability initiatives.

- **Data Security and Scalability**

CIM10 IoT Edge Gateway comes with Firewall features which allows it to whitelist specific IP addresses. It also comes with VPN access so users can access CIM10 remotely for configuration and troubleshooting without worrying about security breaches. Moreover all the data sent by CIM10 is sent over a secured MQTT connection with two side authentication and end to end data encryption.

CIM10 also supports features like Field Device Management which help in Configuration, Real time Telemetry view, Import and Export for bulk configuration etc. As mentioned earlier, custom logic can be developed in CIM10 using SDK so it supports User App management. Over The Air upgrade (OTA) is another feature which makes it easy to deploy new features in the field remotely. CIM10 comes with two network options i.e. Ethernet or Cellular. Since cloud connectivity and data reliability is crucial for such applications, CIM10 stores the data in SD card when there is no connectivity so that it can send data later on when connectivity resumes.

- **Other Water Applications**

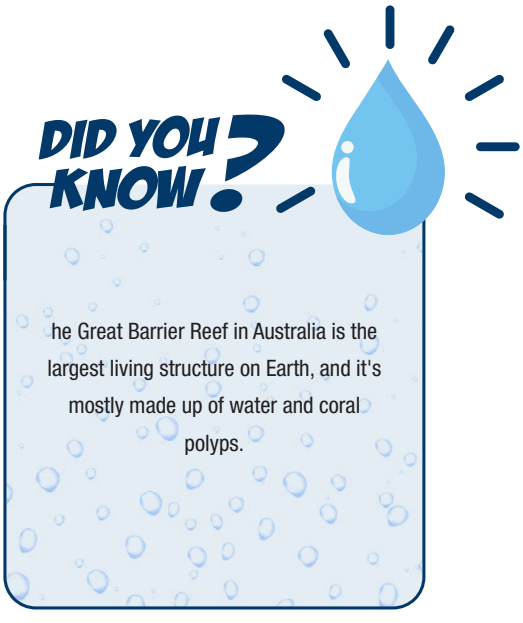
Similarly, CIM10 IoT Edge Gateway is capable of delivering applications in Wastewater Treatment, like Effluent Quality Monitoring: Measurement of pollutants, biochemical oxygen demand (BOD), chemical oxygen demand (COD), and suspended solids to ensure compliance with environmental regulations or Sludge Management: Monitoring sludge levels, temperature, and composition for efficient treatment and disposal.

One of the unique use cases CIM10 can deliver is Flood Monitoring and Prediction. Since CIM10 can run a ML model on edge so it can monitor rain and water level of the dam or reservoir and based on historical data it can be used to predict floods. CIM10 can also be used in Water Distribution and Utilities such as Leak Detection: Using flow meters, pressure sensors, and acoustic devices to detect leaks in water distribution networks.

CIM10 is also promising in applications like Industrial Water Management such as Cooling Water Treatment: Monitoring corrosion, scaling, and microbial growth in cooling water systems to optimize chemical dosing and prevent equipment damage or Process Water Quality: Ensuring the quality of water used in industrial processes to maintain product quality and reduce operational risks.

Conclusion

The CIM10 IoT Edge Gateway represents a transformative tool in the optimization of water purification processes. Its capabilities in real-time monitoring, energy conservation, cost savings, waste reduction, enhanced equipment life, and anomaly detection align perfectly with the goals of ESG and sustainability. By harnessing the power of edge computing and IoT, water treatment facilities can not only provide cleaner and safer water but also contribute significantly to a more sustainable and environmentally responsible future. The journey to energy-efficient, cost-effective, and sustainable water purification starts at the edge with CIM10.



ABOUT THE AUTHOR

Mr. Prashant Kapadia
Cimcon Digital

With 24 years of experience in industrial automation, embedded products, industrial software application design, development, manufacturing, and global business development with companies such as GE Digital, Hitachi, and currently CIMCON Digital, I have been a part of the Digital Transformation journey of many Fortune 500 organisations.CIMCON Digital's iEdge 360 IoT platform helps you connect your assets and, using AI/ML algorithms, provide actionable insights to reduce planned and unplanned maintenance and increase OEE, Asset availability, and reliability.

WATER QUIZ

Here is a short MCQ quiz we have brought for you with 10 questions related to water.
Solve it and check your knowledge related to this lifeline.
ENJOYYYY!!!!!

1. **Which famous waterfall is located at the border of the United States and Canada?**
   A) Angel Falls ◯ **B) Niagara Falls** ◯ **C) Victoria Falls** ◯

2. **What is the term for the area of land where all of the water that is under it or drains off of it goes into the same place?**
   A) Watershed ◯ **B) Reservoir** ◯ **C) Aquifer** ◯

3. **Which ocean is the saltiest?**
   A) Atlantic Ocean ◯ **B) Indian Ocean** ◯ **C) Red Sea** ◯

4. **What is the largest glacier in Antarctica and the world's largest freshwater reservoir?**
   A) Pine Island Glacie ◯ **B) Lambert Glacier** ◯ **C) Jakobshavn Glacier** ◯

5. **What is the deepest known point in the world's oceans?**
   A) Mariana Trench ◯ **B) Puerto Rico Trench** ◯ **C) Sunda Trench** ◯

6. **Which desalination method is known for its high energy efficiency and ability to produce freshwater and lithium from brine?**
   A) Multi-Effect Distillation (MED) ◯ **B) Reverse Osmosis (RO)** ◯ **C) Forward Osmosis (FO)** ◯

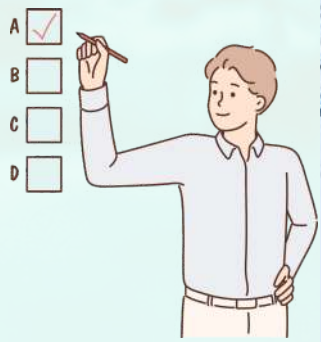
7. **What type of water infrastructure uses sensors, real-time data, and automation to optimise the distribution and consumption of water resources?**
   A) Smart Water Grid ◯ **B) Hydroinformatics Network** ◯ **C) Aquaponic System** ◯

8. **What is the approximate residence time of deep ocean water in the global circulation system?**
   A) 100 years ◯ **B) 1000 years** ◯ **C) 10,000 years** ◯

9. **In the context of water quality, what does the term "colloidal particles" refer to?**
   A) Particles with diameters greater than 1 micron ◯ **B) Particles with diameters between 1 nanometer and 1 micron** ◯
   C) Particles with diameters less than 1 nanometer ◯

10. **What is the primary cause of the "blue shift" phenomenon observed in water spectra?**
    A) Hydrogen bonding ◯ **B) Deuterium substitution** ◯ **C) Temperature variation** ◯

MCQ's answer are on 67 page number



WATER ACCESS: ENSURING UNIVERSAL AVAILABILITY

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

Access to safe drinking water is critical for everyone, no matter who they are, what they door where they live. In many cities around the globe, water is not available all day, every dayand safe water availability varies from one city to another and between countries. Thosewithout water have to queue at stand posts—with the additional burden of often notknowing when water may come.

With a water crisis looming over India, over 40 percent population already facing severescarcity and this figure is just growing. According to the 2030 Water Resources Group, if wecontinue to consume water at the current rate, India will only have half the water it requiresby 2030 - a flashpoint within seven years.

Only 4 percent of the limited freshwater resources exist in India and freshwater sources areunder heavy stress. Water demand continues to outstrip supply, and this is predicted toincrease by 40 percent by 2030. As per government estimates, overall water demand inIndia will increase from 710 BCM in 2010 to 1,180 BCM by 2050, an increase of 67 percent.

The main reasons for this escalation in water demand are cited to:

- **Population Growth:** India's population is projected to continue growing until at least 2050. The United Nations estimates suggest that India's population could reach around 1.7 to 1.9 billion by 2050, from the current 1.4 billion. Managing this huge population growth and ensuring drinking water facility for all the citizens are key challenges for India's policymakers and utilities in the coming decades.
- **Urbanization:** India has been witnessing rapid urbanization, with a significant increase in the urban population. It is projected that over 50 percent of the country's population will be living in urban areas by 2050 from the current level of 36 percent. As people move to cities, the demand for water, particularly for domestic and industrial purposes, tends to rise.
- **Infrastructure:** Insufficient water storage infrastructure and the inadequacy of water supply and sanitation in many areas are pressing challenges that contribute to water

scarcity and contamination. India's water infrastructure, in many cases, is aging, having been built several decades ago, and a significant portion of it has surpassed its effective lifespan. Building and maintaining such infrastructure require substantial investments.

Many of India's water storage facilities, dams, reservoirs, and treatment plants were constructed during a time when population and water demand were significantly lower than present level. These structures are not equipped to handle the current volume of water required to serve the ever growing population. Maintaining aging infrastructure is a challenging task for the government and water utilities. The cost of repairs and rehabilitation often exceeds the available resources. Neglected maintenance can lead to leaks, contamination, and inefficient water distribution, further worsening water scarcity issues and accessibility challenges.

- **Agriculture:** The agriculture sector in India is a significant consumer of water resources. Agriculture is accounting for the majority of the country's total water usage. It is estimated that more than 80% of India's available freshwater is used for irrigation. Achieving a balance between meeting the food needs of a growing population and conserving water resources is a complex and ongoing challenge for India's agricultural sector.

Efforts to improve water management and promote sustainable agricultural practices are essential to ensure the long-term viability of agriculture in India while safeguarding the country's water resources for future generations.

- **Economic Development:** Economic development in India has been a topic of significant interest globally and a topic of discussion over the years. The landmark economic reforms of 1991 were pivotal in unleashing India's economic potential. Economic growth leads to increased water demand, both for agriculture and industrial sectors. As India's economy expands, the demand for water-intensive industries such as manufacturing, energy production, and food processing will also increase.

- **Regional Disparities:** Water access disparities in different regions in India are a significant challenge due to the country's diverse geography, climate, and population distribution. Some regions receive abundant rainfall, while others are arid or semi-arid, leading to stark differences in water availability. Northern and north-eastern states

generally have more water resources due to the presence of major rivers like the Ganges, Yamuna, Brahmaputra, and their tributaries. In contrast, peninsular southern states often face water scarcity issues.

India relies heavily on monsoon rains for its water supply. Irregular or inadequate monsoon rains generally lead to droughts and water shortages in some regions, particularly in central and southern regions. Interstate disputes over the sharing of river waters are common. For example, the sharing of the Cauvery River's waters has been a contentious issue between the states of Karnataka and Tamil Nadu. Urban areas generally have better access to treated water supply and sanitation facilities, while rural areas typically face greater challenges due to limited infrastructure and resources. Even, sometimes the regions affected by conflict, climate change, or natural disasters experience further strains on water availability and access.

Addressing these disparities requires a combination of efficient water management practices, sustainable policies, and a focus on equitable distribution to ensure that all regions have access to an adequate and reliable water supply.

- **Financial Constraints:** To address the water accessibility challenges, substantial investments are required. These investments should encompass both the rehabilitation of existing infrastructure and the construction of new facilities that can meet the water demands of a growing and urbanizing population. Many water utilities in India lack the financial resources to invest in water infrastructure and improve water services.

Government Initiatives: The Government of India has recognized the importance of addressing these water related challenges. Initiatives like the Jal Jeevan Mission with huge budgetary allocation for making drinking water accessible to all households, Atal Bhujal Yojana, which focuses on sustainable groundwater management, and the AMRUT (Atal Mission for Rejuvenation and Urban Transformation) program, which targets urban water supply and sanitation, are steps in the right direction.

AQUALITY Contributing to Clean Water Access

AQUALITY is dedicated to providing safe drinking water to a diverse range of clients through tailor-made, high-quality water treatment solutions that incorporate cutting-edge technologies.

The service network includes civilian households, defense installations, pharmaceutical companies, textile manufacturers, commercial enterprises, educational institutions, technological firms, and industries requiring ultrapure water.

AQUALITY places a strong emphasis on delivering innovative solutions because it firmly believes that addressing contemporary water challenges requires unconventional approaches. As a committed and responsible entity, it firmly believes that innovation is a fundamental driver of an organization's growth and long-term sustainability.

A cutting-edge solar-powered water treatment system designed to harness the solar energy and deliver clean, safe drinking water has been the latest innovation. This revolutionary water treatment and purification solution prioritizes environmental sustainability, energy efficiency, and practicality, making it an excellent choice for off-grid or remote regions with limited access to electricity.

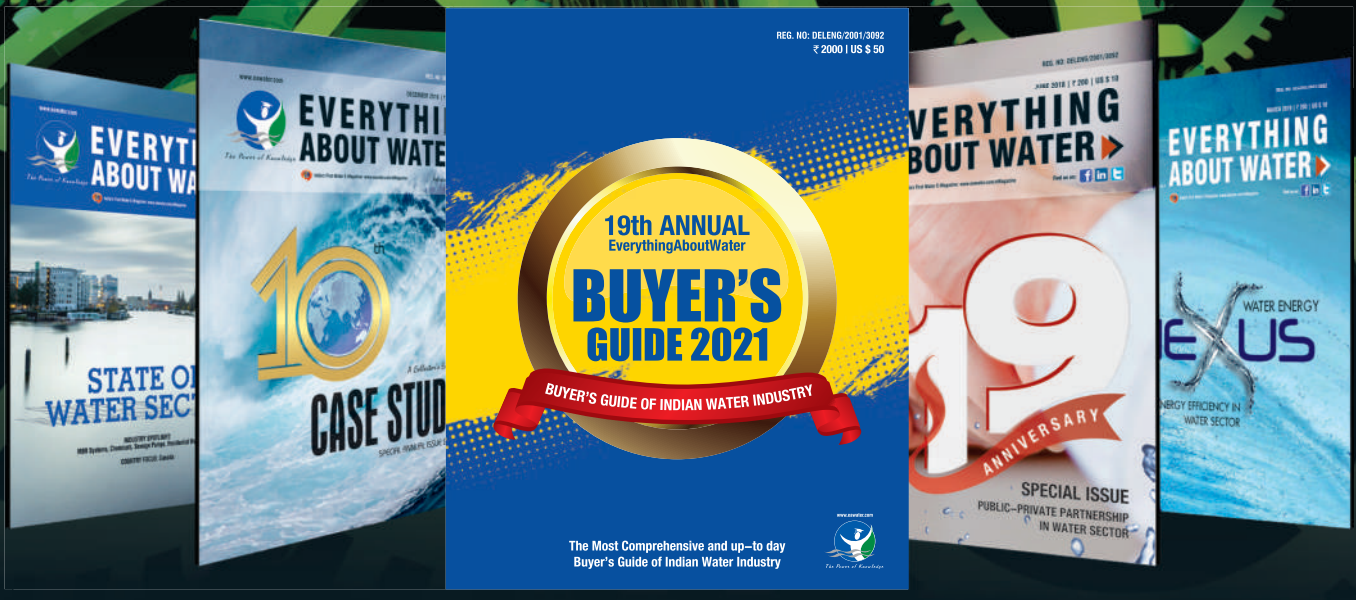
The solar-powered water treatment solution not only ensures access to safe drinking water but also contribute to sustainability efforts by reducing reliance on fossil fuels and decreasing greenhouse gas emissions. Moreover, these systems have the capability to recycle used water for non-potable purposes, facilitating the establishment of a circular water economy. AQUALITY firmly believes that these technologies are pivotal in addressing water-related challenges, especially in regions where conventional energy sources are scarce or inaccessible.

ABOUT THE AUTHOR

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

A first-generation entrepreneur, he possesses a passion for innovation and a willingness tomake changes in water treatment. He founded the renowned Aquality Water Solutions witha vision to offer technologically advanced solutions to domestic, institutional, and industrialclients. Driven by a strong desire to improve access to clean drinking water, he has madesignificant contributions in enhancing the lives of people through unwavering commitment, groundbreaking technological innovations, and a steadfast pursuit of quality excellence.

Knowledge That Keeps The Gears Going...



With a readership of over 77,000, EverythingAboutWater is India's first and only monthly magazine that addresses key issues facing the water industry. Through its reach to decision-makers on water and wastewater management, the magazine helps to shape the industry policy and practice.

As an ideal reference tool for water professionals, the magazine covers case studies, technical articles, news about technological advancements, updates on the upcoming water events and much more.

Subscribe Now

Indepth Researched Content | Practical Information | Impactful Presentation

Earth Water Foundation
Mail to: Earth Water Foundation 7, Khullar Farms, Mandi Road Mehrauli,
New Delhi 110 030, India Tel: +91 8448963579 / 85889 11033

Join us at:

RECENT TRANSITIONS IN ULTRAPURE WATER (UPW) TECHNOLOGY: RISING ROLE OF ADVANCED EDI SYSTEM

By- Byju Varghese, Sr. Manager- QUA Water Technologies Pvt Ltd

The power sector in nations like China, India, and Brazil is anticipated to be the driving force behind the consumption of UPW due to the rising energy needs of developing economies and the large-scale electrification initiatives that have resulted from those needs. The main use for ultrapure water is as washing fluid. Ultrapure water is used as a cleaning agent in a variety of end-use industries, including semiconductors, flat-panel displays, and pharmaceuticals. These industries use various washing and cleaning processes to get rid of particles and impurities from the small parts. This is done by using ultrapure water that has been highly purified. In addition to being used as a washing fluid, ultrapure water is also used as a process feed in coal-fired power plants and businesses that produce electricity

using gas turbines. Markets for ultra-pure water are divided into those used for cleaning, etching, ingredients, and other purposes. According to industry reports, the short-term market growth is likely to be fuelled by the semiconductor industry's rising demand for ultra-pure water and the pharmaceutical industry's rising use of it.

The global ultrapure water market was valued at USD 8.0 billion in 2022 and is projected to reach USD 12.1 billion by 2027, growing at 8.6% CAGR during the forecast period as per markets & markets research firm. Technological Innovation is a key trend gaining popularity in the ultrapure water market. Advanced ultrapure water systems are critical components in various industries, including manufacturing and semiconductor sectors.Ultrapure water (UPW) or High Purity water (HPW) can be considered a solvent for industrial use. It is purified to the highest possible standards for dissolved organic contaminants, inorganic ions, heavy metals and dissolved gases. The need for ultrapure water of the highest standard is continuing to increase as the density of integrated devices rises steadily. Modern integrated circuits have such intricate geometries that any microscopic contamination will have an effect on the finished item.An important step in obtaining high-purity water quality is deionization (DI). The primary method of treating DI has long been ion exchange (IX), which has existed in a variety of configurations since its invention in the 1940s. These configurations include separate anion and cation beds, mixed beds, polishing beds, and packed beds, among others. High-purity water systems have developed over time with supplementary treatment steps made to work with IX.

Electrodeionization (EDI), a different DI treatment method, first appeared in the 1980s. Early systems had modest capacities that were useful for purifying water for laboratories, but over time, manufacturers of EDI systems have created products that can produce the quantities of purified water required for power plant and other industrial end users. Additionally, in order to ensure optimal performance, water system designers have identified the required pretreatment steps, specifically the use of reverse osmosis before EDI.One advantage EDI brings to the table is that it does not require chemical regeneration (green technology), which is one of the sought out attractive feature. Therefore, EDI is the key technology to replace conventional mixed bed ion exchange, which requires onsite or offsite chemical regeneration.

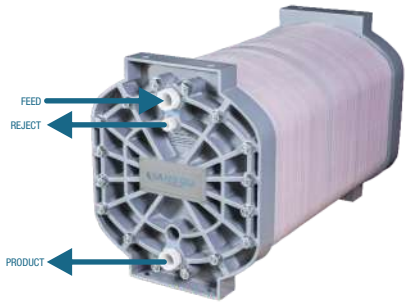
The semiconductor industry requires ultrapure water to manufacture printed circuit boards and other susceptible electronic components. Semiconductor device fabricators have achieved many significant advances over the last decades. Electronic products are steadily becoming smaller, thinner, lighter, faster, and less expensive. Meanwhile, the demand for higher quality UPW is growing as devices are becoming more sensitive to contaminants. In addition, as semiconductor manufacturers invest more in installing new manufacturing facilities and developments around the globe, the need for ultrapure water in producing semiconductors is anticipated to increase manifold in near future. There are strict regulations on the concentration of total organic carbon (TOC), metal ions, anions, and other substances in the UPW.

Conventional EDI is limited by feed water hardness, free CO2 and silica. The EDI recovery process is dependent upon the feed water hardness. To address those challenges, the advanced FEDI® line of stacks were developed by QUA, the experts in electro separation, which can be interconnected to provide high flow blocks. FEDI® modules produce high resistivity water with low silica levels consistently. It provides continuous electrodeionization solutions for ultrapure water (UPW) production. It typically operates after the pretreatment and the reverse osmosis process.

In continuation to the firm belief in continuous improvement and challenging our self, QUA group has recently launched new product in FEDI® line of stacks, i.e. FEDI® - GIGA. It is a next-generation fractional electrodeionization (FEDI) technology that is designed to produce ultrapure water with a high flow capacity while requiring a low footprint. It can minimize associated piping and instruments due to its unique port design feature with one inlet and two outlet ports. It is the first electrodeionization stack with three ports—Feed, Product & Reject. All these feature with the regular feature of providing consistent product water quality in terms product resistivity and product silica Each stack is factory tested to meet strict industry standards and is manufactured in an ISO 9001:2015 quality management system. Also these stacks are in line with FEDI® line of stacks which comply with2014/35/EU directive on electrical safety. FEDI-GIGA has two types of stacks – 30X and 45X.Fractional electrodeionization (FEDI®) technology by QUA helps companies in various industries access ultrapure water using green technology and commercially viable technology solution benefiting the environment. It has applications in power industry - boiler feed water, rinse water for electronics and semiconductor industry, industrial process water, food and beverage industry, pharmaceutical industry.

There are key benefits of QUA FEDI® ultrapure water (UPW) system as below:

- **High flow per stack - up to 15 m3/hr (66 gpm)**
- **Minimum ports – Feed, Product & Reject**
- **Minimum piping & instrumentation• Single voltage operation**
- **Ultrapure water quality**
- **Low footprint**
- **CE Certified**



ABOUT QUA GROUP

QUA is an innovator of advanced membrane products that address the most demanding water challenges. The company's diverse product portfolio includes electrodeionization, ceramic and polymeric ultrafiltration, and submerged membranes for wastewater applications. These products include patented FEDI® (fractional electrodeionization), Q-SEP® (hollow fiber ultrafiltration membranes), CeraQ™ (Ceramic Filters), and EnviQ® (flat sheet submerged ultrafiltration membranes). Committed to on-going innovation, QUA manages the entire lifecycle and manufacturing chain of its products. QUA's Q-SEP and EnviQ® membranes are also Title 22 complaint. QUA has received the Frost & Sullivan's New Product Innovation Award for Industrial Water & Wastewater Treatment Technology, North America, for Its Q-SEP® and FEDI® Products.

ABOUT THE AUTHOR

Byju Varghese
Sr. Manager- QUA Water Technologies Pvt Ltd

MSc Chemistry from Department of Chemistry, Pune University. 20 years of industrial experience with 7 years in research and development of Ultrafiltration membrane right from raw material development to making of final product fit for the use in water and waste water treatment and 13 years in the field of Quality control of manufacturing of membrane based products.

PACKAGED WATER OZONATION
OZONE REACTIONS ON PLASTICS

Ozone Applications are increasing in India. Numerous instances have been noticed that applications are decided without due considerations to the materials of construction of pipes , containers etc .We provide below some information on the use of different type of plastics and Ozone's effect on them.

Two group of plastics are discussed here ;Plastics termed as Thermoplastic materials and other group of plastics are the Thermosetting Plastics. They find numerous use in Industries and each type of plastics are used for different purposes dependant on the physical & chemical properties of each.

The effects of ozone on each of these materials will depend totally on the configuration of the polymers that make up the plastics. Crossed linked plastics such as poly propylene, poly- ethylene , poly- vinyl chloride and silicone or fluorine combined plastics are sufficiently impervious to ozone to enable their use in direct contact.

Most of the mineral water plants all over the world use plastics in some form or the other and the knowledge of each of these will help understand the likely effects with the use of ozone.

From a careful study of different kind of plastics , some forms of polymers are readily attacked by ozone and are not recommended , there are other forms that are quite resistant and take a longer time for effects of ozone. and others attacked immediately and not recommended.

Since most of the mineral water manufacturers prefer residual ozone, and they invariably use PET Bottles, Poly Carbonate Jars, PP Filters, that are all polymer materials , the question of whether they are safe with ozone is frequently asked. The effects of ozone in the long run could unzip some of these polymers to form by- products , but they are all dose, concentration and time related , that invariably the effects are noted after the useful life of these materials are surpassed.

For example poly-carbonate has been shown to be very resistant to UV and like water is classified as an universal solvent. Ozone can also be classified as an universal reactant- the only question is how much does it react. Through practical experience, it is very insignificant. For that matter , Ozone is also supposed to be Corrosive to Stainless Steel .But the corrosion is concentration and time related and therefore Stainless steel is regarded safe with the use of Ozone. In fact many ordinary plastics that give out smell (the popular PVC tank) can also be held suspicious, more than ozone which imparts no flavor to the water. The action of ozone on plastics also depends on whether Ozone is used as a gas or solution.. For example Nylon appears to break down faster when in contact with ozone-air mixture than ozone solution.

In fact the use of chlorine as a disinfectant, produces more harmful by-products in the water which are proven carcinogen, but we rarely question this fact as we believe that chlorine cannot be substituted . In spite of this knowingly Chlorine is still being used . There are reported incidences that Chlorine by products are still present in the water in spite of the use of the Best activated Carbon filters .The Use of Ozone therefore is much safer in as much as many of its by products have not been identified and proven toxic.

Some care that could be observed while using ozone would include:

1. Do not use ozone before cartridge filtration in packaged water process.
2. Do not store fresh ozonated water in PVC containers (use ploy carbonate instead).
3. Use CPVC /SS pipes preferably if water is being used for drinking.
4. Store freshly ozonated drinking water in SS containers instead
5. For prospective ozone users check for ozone reactions on MOC of containers/pipes before you use them.

Many of the reported ozone reactions on materials are time concentration related and many of the toxic effects have never been proven.

ISSUED IN PUBLIC INTEREST BY:
OZONE TECHNOLOGIES & SYSTEMS INDIA PVT LTD1-A,
12TH Cross Street, Shastri Nagar, Chennai 600 020

Tel: 44 4211 8266
e-mail: otsilozone@gmail.com
web: www.otsil.net

THE WONDEROUS WORLD OF THE BUBBLE GUM LAKE

Nestled in the heart of Gumdrop Valley, a lake that defies both gravity and convention is the enchanting Bubble Gum Lake. This natural wonder is not your average aquatic destination; it's a playground for the imagination, a spa for the soul, and a testament to the absurdity of Mother Nature. In this unconventional guide, we're going to dive into the gooey, giggly world of Bubble Gum Lake, where the water is sticky, the laughter is infectious, and gravity has clearly taken a vacation.

The Magnificent Gooeyness Around

Bubble Gum Lake is a water wonderland like no other, with one distinguishing feature that sets it apart – its water is not just wet; it's deliciously gooey. The lake's aqua-blue surface might look like any other body of water, but as soon as you dip your toes, you'll realise that you've stepped into something straight out of a cartoon.

The gooeyness of the water is a result of the unique combination of minerals and magical microbes that call this place home. Imagine floating on water so thick you could practically walk on it. Visitors can't help but giggle as they bob along on the surface, which is reminiscent of a giant bubblegum bubble. Even swimming becomes an entirely new experience. It's like navigating through a sea of melted cotton candy – pure, sticky, sugary bliss.

Meeting some Extraordinary Species of the Lake

What truly sets Bubblegum Lake apart are its endearing residents. Meet the Bubbleguffians, a species of miniature, bubblegum-flavored dolphins with mischievous grins and a penchant for acrobatics that would put the most talented circus performers to shame. These adorable creatures are the undisputed life of the party, leaping and somersaulting through the air, leaving trails of shimmering bubbles in their wake.

And let's not forget about the Bubble Gum Crabs, a species unique to this peculiar ecosystem. These charming crustaceans sport vibrant, pastel-colored shells and an uncanny knack for sculpting intricate bubblegum art. Witnessing a Bubble Gum Crab fashion a lifelike replica of the Loch Ness Monster out of chewed gum is an experience that one won't soon forget!

A Marvellous Spectacle to Behold

Evenings at Bubble Gum Lake are a visual spectacle like no other. As the sun sets, the entire lake comes alive with neon colours and shimmering reflections. The gum's translucent quality creates a kaleidoscope of candy-coloured hues, turning the lake into a giant, ever-changing piece of bubble gum art.

To add to the surreal experience, every evening, local artists create giant bubble sculptures that float gracefully on the lake's surface. It's a mesmerising display that will leave you in awe and fits perfectly with the overall whimsy of Bubble Gum Lake.

The Bubble Gum Lake is more than just a tourist attraction; it's a whimsical retreat where gravity takes a backseat, and laughter reigns supreme. Whether you're floating on its gooey surface, indulging in bubble-themed activities, or sharing a chuckle with its eccentric residents, this extraordinary water wonderland is guaranteed to leave you with a smile that's stickier than ever. So, try to take time from your busy schedule and pack your bubblegum-scented sunscreen, your marshmallow flip-flops, and your sense of humour, and get ready to laugh your way through the gummiest wonderland on Earth. Bubble Gum Lake – where laughter and chewiness are the only things you need!

TENDER

Providing And Fixing Barbed Wire Fencing Around The Land Taken Over For Construction Of Decentralized Sewage Treatment Plant (Dstps) And Sewage Pumping Station (Spss) At Village Tajpur, Sungerpur And Palla In Narela Ac-01. Nit 5			
Authority	Delhi Jal Board **Address:** Pitampura, Delhi-110034		
Location	Delhi: Delhi		
Bid Open Date	**13 Oct 2023**	**Tender Value**	**20.69 Lac**
Doc Collection Date	**13 Oct 2023**	**FTID**	231004413860
Construction Of Arsenic Free Water Treatment Plant (With Soak-Pit) At Mouza-Bagpole Under Dighra Malickberia Gram Panchayat, Habra-Ii Dev. Block, North 24 Parganas.			
Authority	Zilla Parishad **Address:** Dighra Malikberia Gp, Bira		
Location	West Bengal: Bira		
Bid Open Date	**16 Oct 2023**	**Tender Value**	**8.85 Lac**
Doc Collection Date	**13 Oct 2023**	**FTID**	231004415220
Installation Of Arsenic Removal Water Treatment Plant At Faridpur Kishor Sangha . App No 40/2022-23			
Authority	Zilla Parishad **Address:** Jalangi Block, Murshidabad, Pincode 742303		
Location	West Bengal: Murshidabad		
Bid Open Date	**11 Oct 2023**	**Tender Value**	**3.44 Lac**
Doc Collection Date	**09 Oct 2023**	**FTID**	2310044179660
Design Build Operation And Maintenance Of Faecal Sludge Treatment Plant Of 10 Kld Capacity At Attingal Municipality On Dbot Basis			
Authority	Municipal Corporation **Address:** Executive Engineers Office,Water Works Department, Municipal Corporation, Opp.Galaxy Cinema, Bhavnagar.Mo-8141550236, Pin Code 364001		
Location	Gujarat: Bhavnagar		
Bid Open Date	**31 Oct 2023**	**Tender Value**	**8.26 Crore**
Doc Collection Date	**29 Oct 2023**	**FTID**	2310034242510
Construction Of Water Treatment Plant For Safe Drinking Water Near Ajimsara Bohumukhi Madrassa Under ProsadpurGram Panchayat			
Authority	Zilla Parishad **Address:** Haribhanga, Murshidabad, Murshidabad, Pincode 742302		
Location	West Bengal: Murshidabad		
Bid Open Date	**13 Oct 2023**	**Tender Value**	**12.36 Lac**
Doc Collection Date	**16 Oct 2023**	**FTID**	23093042780
Work Of Operation And Maintenance For The Existing Sewage Treatment Plant In Govt. Medical College Thrissur			
Authority	Directorate Of Medical Education And Research **Address:** Principal Govt. Medical College Medical College P O Mulankunnathukavu Thrissur, Pincode 680596		
Location	Kerala: Thrissur		
Bid Open Date	**30 Oct 2023**	**Tender Value**	**8 Lac**
Doc Collection Date	**30 Oct 2023**	**FTID**	230930420550

T E N D E R

Construction Of Solar System Arsenic Free Water Treatment Plant At Noapara Tetultala At Noapara-X, Jl No-33, Under Chandigarh Gp			
Authority	Zilla Parishad **Address:** Chandigarh Gp, Pin Code 743166		
Location	Yaavatmal | Maharashtra		
Bid Open Date	**09 Oct 2023**	**Tender Value**	**7.38 Lac**
Doc Collection Date	**16 Oct 2023**	**FTID**	230930432150
Installation Of Water Treatment Plant Solar Water Treatment Plant Sub Marshal At Kapranga Chowk Safe Drinking Water Sansad No 13 With M.S. Steel Structure At Under Gobindapur Gram Panchayat			
Authority	Zilla Parishad **Address:** Administrator Gobindapur Gp, Pin Code 733202		
Location	West Bengal: Islampur		
Bid Open Date	**13 Oct 2023**	**Tender Value**	**12.43 Lac**
Doc Collection Date	**11 Oct 2023**	**FTID**	230930433120
Extension Of 550 Volt Overhead Line From Jet Hostel To Water Treatment Plant And Installation Of 550 volt Ocb At Sarpi Unit Sub Station Under Shyamsundarpur Colliery Under Bankola Area.			
Authority	Eastern Coalfields Limited **Address:** Office of The General Manager Bankola Area, Pin-713363, Pin Code 713363		
Location	West Bengal: Laudoha		
Bid Open Date	**10 Oct 2023**	**Tender Value**	**2.79 Lac**
Doc Collection Date	**09 Oct 2023**	**FTID**	2309304150790
Boundary Wall And Land Development Including Side Drain, Frontal Approach Road (Max-2.50 Mtr.) Of 390 Cum. O.H.R. At Near Of Kandi Municipality Under Water Treatment Plant Under Kandi Water Supply Project, Kandi, Murshidabad			
Authority	Municipal Corporation **Address:** The Chairman, Kandi Municipality, Kandi, Murshidabad, Pin code 742137		
Location	West Bengal: Murshidabad		
Bid Open Date	**12 Oct 2023**	**Tender Value**	**11.76 Lac**
Doc Collection Date	**16 Oct 2023**	**FTID**	230928434100

WATER QUIZ

MCQ's Answers

1. **B) Niagara Falls**
2. **A) Watershed**
3. **C) Red Sea**
4. **B) Lambert Glacier**
5. **A) Mariana Trench**
6. **C) Forward Osmosis (FO)**
7. **A) Smart Water Grid**
8. **C) 10,000 years**
9. **B) Particles with diameters between 1 nanometer and 1 micron**
10. **B) Deuterium substitution**

EVENT CALENDAR

August 2023

18th EverythingAboutWater Expo 2023
Thu, 03 – Sat, 05 Aug 2023
Pragati Maidan, New Delhi
www.eawaterexpo.com

Public Drinking Water Conference 2023
Tue, 8 – Wed 9 aug, 2023Austin, USA
Austin, USA
www.tceq.texas.gov/drinkingwa ter/conference .html

Water Tech 2023
10-11 aug 2023
New delhi, India
cam.mycii.in/OR/EventDetailOR.html?id=E000 061989

The Water Expo
Wed, 23 - Thu, 24 Aug 2023
Miami, USA
www.thewaterexpo.com

World Water Summit 2023
25- 26 Aug 202
New Delhi, India
worldwatersummit.in/who-can-exhibit.html

International Conference on Water Resource, Environmental Protection & Sustainable Development
25 - 26 Aug 2023
Zhengzhou, China
10times.com/e13z-gh3s-fs30

September 2023

Water Indonesia
Wed, 13 - Sat, 16 Sep 2023
Jakarta, Indonesia
www.waterindonesiaexpo.com

CamWater
14 - 16 Sep 2023
Phnom Penh, Cambodia
www.camwaterexpo.com

THAI WATER
Wed, 30 Aug - Fri, 01 Sep 2023
Bangkok, Thailand
www.thai-water.com

SR Onshore Wind Conference
Wed, 06 Sep 2023
Glasgow, UK
www.scottishrenewables.com

Gat Wat
Wed, 06 - Thu, 07 Sep 2023
Cologne, Germany
www.gat-wat.de

WasteEcoExpo
Tue, 12 Sep 2023
Krasnogorsk, Russia
en.waste-tech.ru

Contamination & Geotech Expo
13 - 14 Sep 2023
Birmingham, UK
www.ess-expo.co.uk/four-shows/clr

Taiwan International Water Week
Wed, 20 - Fri, 22 Sep 2023
Taipei, Taiwan
www.taiwanintlwaterweek.com

P3 Water + Energy Summit
21 - 22 Sep 2023
San Diego, USA
www.p3electrified.com/

Water Expo – Hyderabad
Thurs, 21 – sat, 23 sept 2023
Hyderabad, India
waterindia.net/

LANKAWATER
21 - 23 Sep 2023
Colombo, Sri Lanka
lankawater.org/

WCW Conference & Exhibition
Mon, 25 - Thu, 28 Sep 2023
Saskatoon, Canada
www.wcwwa.ca/page/AnnualConf

October 2023

Wetex
Mon, 02 - Wed, 04 Oct 2023
Dubai, UAE
www.watex.ae

AWT Convention and Exposition
Wed, 04 - Sat, 07 Oct 2023
Grand Rapids, USA
www.awt.org/events/annual-convention

Envitech
Tue, 10 - Fri, 13 Oct 2023
Brno, Czech Republic
http://envitech.co.in

VietWater
Wed, 11 - Fri, 13 Oct 2023
Ho Chi Minh, Vietna
mwww.vietwater.com/en

Minnesota Water Resources Conference
17 - 18 Oct 2023
Saint Paul, USA
wrc.umn.edu/events/conference-2023

IFAT India
Wed, 18 - Fri, 20 Oct 2023
Mumbai, India
www.ifat-india.com

Pak Water & Energy Expo
Wed, 25 - Fri, 27 Oct 2023
Lahore, Pakistan
pakwaterexpo.com

Aqua Ukraine
17 - 19 Oct 2023
Kiev, Ukraine
10times.com/aqua-ukraine

Water In Industry
Tue, 31 Oct 2023
Moscow, Russia
www.aquatechtrade.com/news/industrial-water

November 2023

Water Loss Forum
01 - 03 Nov 2023
Lutfi Kirdar International Convention & Exhibition Center, Istanbul, Turkey
www.waterlossforum.org

Bangladesh Water Expo 2023
02-04 Nov 2023
Dhaka,Bangladesh
www.bangladeshwaterexpo.biz

Aquatech Amsterdam
06 - 09 Nov 2023
RAI,Amsterdam, Netherlands
www.aquatechtrade.com/amsterdam

The International Water Conference
12 - 16 Nov 2023
San Antonio Marriott Rivercenter, San Antonio, USA
iwconf.org

Smart City Expo - Dubai
14 - 15 Nov 2023
The Ritz-Carlton, Dubai, Dubai, UAE
10times.com/smart-cities-nh

WETEX and Dubai Solar Show
15 - 17 Nov 2023
Dubai World Trade Centre, Dubai, UA
www.watex.ae

Myanwater
16 - 18 Nov 2023
Myanmar Expo, Yangon, Myanmar
myanwater.com

Sand Water Rv Expo
17 - 18 Nov 2023
Lake Havasu State Park, Lake Havasu, USA
sandandwaterexpo.com

EVENT CALENDAR

Cairo Water Week
29 Oct - 02 Nov 2023
Cairo, Egypt
www.cairowaterweek.eg

East Africa Water Summit
29 Nov - 01 Dec 2023
Nairobi, Ikoo, Kenya
www.eawaters.com/

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 2024

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

BAYWATCH

WORLD WATER-TECH NORTH AMERICA
Los Angeles, October 25-26, 2023

Now in its 11th year, the World Water-Tech North America Summit returns to Los Angeles in 2023 to accelerate innovation, investment, and collaboration in the North American water ecosystem. Held on October 25-26, the summit will provide water leaders with a platform for high-level discussion, networking, and deal making.

The world's water resources are under pressure due to decades of overuse, growing populations, and feast-or-famine precipitation patterns. North America's water industry is uniquely positioned to lead the world in facing these issues head-on, by building solutions around efficiency, resilience, and conservation.

Join us in October for plenary discussions, start-up showcases, fireside chats and 1-to-1 networking. Whether joining in person or virtually, networking is made easy via our online platform where all delegates will be able to meet and collaborate to forge partnerships and develop ideas critical to move the water industry forward.

Date: 25-26 October 2023
Venue: Los Angeles, North America
Website: worldwatertechnorthamerica.com

IWA the international water association

The IWA Digital Water Summit is designed to be the reference in digitalisation for the global water sector. Targeting all stakeholders involved in the water sector digitalisation, the Summit has a focus on business and industry. Water technology providers and water utilities are the main participants that will discuss and shape the agenda of this second edition.The Digital Water Summit will have some of the world's leading experts on digital water. It is co-organised by IWA with the water utility in the region (Consorcio de Aguas Bilbao Bizkaia) and the IWA Governing Member in Spain (AEAS)

Date: 14-16 November 2023
Venue: Bilbao, Spain
Website: digitalwatersummit.org

BAYWATCH

19th EVERYTHING ABOUT WATER EXPO
SOUTH ASIA'S LARGEST WATER EXHIBITION AND CONFERENCE 2024

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.

India is currently on a trajectory towards severe water stress, with projections indicating a critical situation by 2025.

Date: 10 -12 September 2024
Venue: IICC, New Delhi
Website: www.eawaterexpo.com

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.

ويتيكس 2023 WETEX معرض دبي للطاقة الشمسية DUBAI SOLAR SHOW

WETEX and Dubai Solar Show organised by Dubai Electricity and Water Authority (DEWA), are in line with Dubai's vision to build a sustainable future for the Emirate and is held annually under the directive of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE, Ruler of Dubai and under the patronage of HH Sheikh Ahmed bin Saeed Al Maktoum, Chairman of the Dubai Supreme Council of Energy.

The exhibition provides a leading platform for international organisations to present their latest solutions and products, and to learn about innovative technologies from all over the world in the sectors of energy, water, sustainability, green technologies, renewable and clean energy, green mobility solutions, sustainable development, green buildings, water desalination technologies, smart cities and others. Through specialised seminars and panel discussions held on its sidelines, it also provides opportunities to exchange ideas with several international experts and specialists.

Date: 15-17 November 2023
Venue: Dubai World Trade Centre (DWTC)
Website: www.wetex.ae/en

ADVERTISER'S INDEX

74

SR. NO.	COMPANY	PAGE NO.	Telephone	E-mail	Website
111	Axis Solutions Pvt. Ltd.	01	+91 79229 00860	info@axisindia.in	www.axisindia.in
112	Customized Webinar by EAW	68	+91 85889 11033	enquiry@eawater.com	www.eawater.com
113	Daftech Engineers Pvt. Ltd.	11	+91 98141 27804	mail@daftechindia.com	www.daftechindia.com
114	Desaline Seawater LLP	09	+91 96770 30870	gopirs@seawater.in	seawater.in
115	EAW Annual Buyer's Guide 2023	33	+91 85889 11033	enquiry@eawater.com	www.eawater.com
116	EverythingAboutWater eMagazine	41	+91 85889 11033	enquiry@eawater.com	www.eawater.com
117	EverythingAboutWater Expo 2024	Back Cover	+91 85889 11033	enquiry@eawaterexpo.com	www.eawaterexpo.com
118	EverythingAboutWater Magazine	37	+91 85889 11033	enquiry@eawater.com	www.eawater.com
119	EverythingAboutWater Magazine	63	+91 85889 11033	enquiry@eawater.com	www.eawater.com
120	India Water Intelligency	29	+91 85889 11033	enquiry@eawater.com	www.eawater.com
121	India Water Show	25	+91 93632 35370	info@indiawatershow.com	www.indiawatershow.com
122	Malaysia International Water Week	15	+603 6140 6666	info@protempgroup.com	www.miwc.tech
123	Myron L Company	Front Cover- Inside	+1 - 760 438 2021	kwilson@myronl.com	www.myronl.com
124	Rybon Chemical	02	+91 265 2985733	chemical@raybonchemical.com	www.raybonchemicals.com
125	Subcription Form	13	+91 85889 11033	enquiry@eawater.com	www.eawater.com
126	Transcend Cleantec Pvt. Ltd.	05	+91 86691 90129	info@transcendcleantec.com	www.transcendcleantec.com
127	UB Steel	Front Cover	+91 99991 05486	watertanks@ubsteels.com	www.ubsteels.com
128	Valmet Technologies Pvt Ltd	03	-	pravin.tripathi@valmet.com	valmet.com/wastewater

Thank You for Advertising with Us!

This Index is published as a service. Although every effort is taken to make it accurate, EverythingAboutWater assumes no responsibility for errors or omimissions

www.eawater.com

BANNER ADS ON WEBSITE

Be Seen Where It Really Matters!!
Create the buzz in water market.

Advertise with us on our website:

www.eawater.com

and reach out to 5,000 readers daily!

EARTH WATER FOUNDATION

Email us on: **enquiry@eawater.com,** for further details.

19th EVERYTHING ABOUT WATER EXPO 2024

SOUTH ASIA'S LARGEST WATER EXHIBITION AND CONFERENCE

10-12 Sep 2024 | IICC, New Delhi, IN

Join us at the Water Expo and be the part of the solution for a sustainable future.
Together, we can make waves of positive change.
See you there!

Organized By

EAW

Supported By

जल शक्ति मंत्रालय MINISTRY OF JAL SHAKTI

MAKE IN INDIA

स्वच्छ भारत

- NETWORKING
- B2B OPPERTUNITIES
- INFORMATION SHARING

CONTACT US

Earth Water Foundation
7, Khullar Farms, Mandi Road
Sultanpur, New Delhi, 110030, IN

M : +91 85889 11033
E : enquiry@eawaterexpo.com
W : www.eawaterexpo.com

Where the Water Community Comes Together