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SUSTAINABLE WATER INFRASTRUCTURE AND CELEBRATING 19 WONDERFUL YEARS OF EVERYTHINGABOUTWATER EXPO AND CONCLAVE

Dear Readers,

Welcome to the August edition of EverythingAboutWater Magazine, where we continue to spotlight the critical issues and groundbreaking innovations shaping the future of water and wastewater management. This month, our focus intensifies as we gear up for the highly anticipated 19th Everything About Water Expo and Conference, set to take place from the 10th to the 12th of September in Dwarka.

As environmental challenges mount and global dynamics shift, the importance of advanced and sustainable water management strategies has never been more pronounced. In this issue, we delve into the transformative technologies and forward-thinking approaches that are not only addressing today's pressing concerns but are also paving the way for a more resilient and efficient future in water management.

Before we dive into the wealth of knowledge this issue has to offer, I want to extend my deepest gratitude to our readers, contributors, advertisers, and everyone who has supported us on this journey. Your unwavering support has been the bedrock of our growth, and it's heartening to see the water and wastewater industry gain the recognition it truly deserves, both in India and globally.

The upcoming Expo and Conference serve as a significant milestone in our shared journey. This event will bring together industry leaders, government officials, and experts from around the world to discuss, debate, and explore the most pressing issues and opportunities facing the water sector today. This Expo will not only highlight the latest advancements in water management technology but also provide a platform for networking, collaboration, and the exchange of ideas that will drive the industry forward.

In this special edition, we explore the roadmap for the water industry, examining the key trends, challenges, and opportunities that will shape its evolution in the world. As we look forward to the Expo, we invite you to join us in this journey of discovery, innovation, and progress.

Thank you once again for your continued support, and we look forward to seeing you at the Everything About Water Expo and Conference in September.

Thanks & Regards,

Simran Arora

Associate Editor

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NATIONAL W

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**Orbis Signs US Distribution Partnership
with Core & Main**

Orbis Intelligent Systems, a leader in water technology, is announcing a national distribution partnership with Core & Main, a trusted name in water infrastructure solutions. This collaboration combines Orbis' innovative SmartCap technology with Core & Main's extensive industry leadership and expertise, marking a significant milestone in the water industry.

Orbis and Core & Main are partnering to enhance water network performance and efficiency through the SmartCap technology. This acoustic fixed-base pipe monitoring system, housed in a fire hydrant cap, uses real-time data to detect leaks and reduce non-revenue water loss, providing a crucial role in modern water management.

Orbis, with its focus on cutting-edge infrastructure monitoring technologies, stands out as a key partner for water utilities and municipalities. Now, Orbis' SmartCap solution will be accessible nationwide through Core & Main's expansive distribution network.

To explore how Orbis' SmartCap technology can benefit your water operations, visit Orbis Intelligent Systems, or contact your local Core & Main CORE+ product specialist.



Need for New Tech to Tackle Water Crisis

India is facing an unprecedented water crisis, as by 2050, demand for water is expected to be twice the available water supply (NITI Aayog 2019). In India, out of 734 districts, 256 are water stressed. There are many regions where groundwater is depleting fast. Further, per capita freshwater availability has come down from 5,177 cubic metres (1951) to 1,465 cubic metres (2024) and is expected to go down further if no actions are taken. With an ever-increasing population and rising industrial demands, traditional water sources are becoming overburdened and insufficient. Recent water crises in Delhi and Bengaluru underscore the urgency of finding alternative solutions. Although pipelines are in place, their functionality remains unpredictable, and the duration of water supply is uncertain.

For example, in Delhi, the average water production is 995 million gallons per day (MGD). However, approximately 58% of this water is lost as 'non-revenue water' or 'unaccounted water' (leakages in water lines, unauthorised tapplings, theft, etc.), leaving only 421 MGD available for consumers. Despite an increase in Water Treatment Plant (WTP) capacity from 650 MGD to 906 MGD between 2006 and 2015, there has only been a 5% increase thereafter from 2015 to 2024. Several metropolitan cities, such as Bengaluru, have experienced severe water shortages, disrupting daily life and economic activities in the recent past. Despite the Bangalore Water Supply and Sewerage Board (BWSSB) charging the highest tariffs nationwide, it still incurs a Rs.390-crore loss annually. Transporting 70% of Bengaluru's water 100 km. from the Cauvery River is unsustainable, and water bodies have dwindled from 1,452 to 193 since the 1800s. This calls for alternative solutions for minimising reliance on traditional water resources.

As innovative solutions are sought to address the pressing water scarcity issue, Atmospheric Water Generators (AWGs) have emerged as a promising technology. This works on two basic parameters: humidity and temperature. High temperatures and high humidity serve as ideal conditions for the peak performance of water generators. AWGs extract water from humid ambient air by cooling the air to its dew point, causing water vapour to condense. This water is then collected, filtered, and purified to meet WHO drinking water standards. AWGs are particularly effective in regions with high humidity, such as coastal areas, where they perform with more than 100% efficiency.

ATER NEWS

AWGs offer numerous benefits: they harness a natural and ubiquitous resource—the air—providing a renewable source of water and reducing dependency on depleting groundwater resources and erratic rainfall patterns, promoting sustainability. Industries can achieve water neutrality by generating water on-site, reducing their water footprint, and contributing to local water conservation efforts, which enhances their brand image and promotes corporate social responsibility. AWGs can be installed in remote and arid areas where conventional water supply infrastructure is lacking or unreliable, ensuring that communities in those regions have access to safe drinking water. In crisis situations, authorities often rely on water tankers, but the quality of tanker water is often suspect. Atmospheric water can improve health outcomes for the population. Furthermore, in disaster-prone areas, AWGs can provide potable water when traditional supply lines are disrupted, offering critical emergency relief.

Select railway stations, including those in Mumbai and Secunderabad, have installed AWGs. Mumbai's high humidity allows AWGs at railway stations to harness atmospheric moisture to produce substantial amounts of water daily, dispensed through hygienic and user-friendly vending machines. The Secunderabad railway station similarly benefits from AWGs, providing a reliable source of clean water to commuters every day. In several urban parks, AWGs are integrated with existing infrastructure to provide hydration points for joggers and visitors.

The Ministry of Jal Shakti has approved AWGs as a recommended innovative technology for enhancing water resource availability. Adopting AWGs represents a significant stride towards addressing India's water scarcity challenges. By providing a sustainable and reliable source of drinking water, AWGs contribute to the nation's water security goals. For localities or industries requiring more water, multiple strategically located AWG systems may be used. This ensures at least some water availability in case of a breakdown, as the chances of all units failing simultaneously are low. To maximise the utility of AWGs across geographies, steps must be taken to reduce the costs of AWGs for wider adoption, create awareness about the benefits, and offer upgradation and customisation in systems for different climatic conditions.

A diverse array of stakeholders — including state and central government departments, industries, PSUs, research and academic institutions, NGOs/CSOs, businesses, places of worship, ship ports, airports, railway stations, bus stations, health care centres, remote defence training facilities and camps, lighthouses, telecommunication towers, electric substations, prisons, and individuals — may be encouraged to adopt this technology to address water demand effectively.

Rs. 700 Crore Funds Sought for Setting Up Effluent Treatment Plants in Faridabad

The Haryana State Industrial and Infrastructural Development Corporation (HSIIDC) has sought the approval of funds to the tune of about Rs. 700 crore for setting up new Common Effluent Treatment Plants (CETPs) in the district for the disposal of untreated industrial and chemical waste. It is alleged that over 70 percent of the untreated waste from the industries

DROPLETS

FluxGen collaborates with Microsoft to accelerate water replenishment in India

FluxGen Sustainable Technologies and Microsoft have developed a water replenishment project at two hospitals in Bangalore. By identifying and arresting leaks, wastage, and excessive usage through sensor fusion, AI, and IOT, the partners expect to reduce water use at each hospital by 50 percent. The technology can be scaled nationwide (and globally) and used to solve one of India's key developmental issues. By 2030, water demand will be twice the available supply, affecting major cities like Bengaluru, Chennai, and Delhi. Microsoft is committed to becoming water neutral by 2030 and is working closely with FluxGen to test and scale up ways to achieve this goal.



is being disposed of in drains and the Yamuna. The state government had approved the proposal for setting up three new CETPs with a total capacity of 90 MLD at Pratapgarh, Mirzapur and Badshahpur villages about a year ago. However, the work on ground is yet to take off, as the approval regarding the funding of these plants is awaited, claim sources in the district administration.

It is revealed that the estimates of required funds have already been submitted to the agencies of the Union Government under the schemes like the 'Namami Gange', a programme of the National Mission for Clean Ganga (NMCG). "The construction of the proposed CETPs is estimated to cost Rs. 400 crore. But the department may require an additional funding to the tune of Rs. 300 crore for outsourcing the work of maintenance and upkeep for a period of 10 to 15 years," said an official.

These plants, which will have an individual capacity between 15 and 50 MLD, will be set up at spots where a similar infrastructure of STPs has been functional for the treatment of domestic sewage. However, it is claimed that the existing infrastructure of the CETPs is poor and inadequate. Only one CETP with the capacity of 10.5 MLD is functional for over 800 industrial units in the Industrial Model Township (IMT) here. Besides, there is no waste treatment infrastructure for over 17,000 units operational in the non-conforming zones. A majority of the untreated waste goes into the Gonchi drain that falls into the Yamuna river. Only one-third of the total 28,000 industrial units, located in authorised industrial sectors, have access to the effluent treatment facilities," said a spokesperson of an industrial association.

HSIIDC Manager Hari Kishan said the tender for setting up a second CETP of 10.5 MLD capacity in the IMT sector has been released. The budget estimate of the new CETPs at Pratapgarh, Mirzapur and Badshahpur villages has also been submitted for approval.

Major steps taken by Government for Water Conservation and Rainwater Harvesting to reduce Water Stress in the country



Water conservation through rainwater harvesting is one of the foremost priorities of the Government, stated Union Minister of State for Jal Shakti, Shri Rajbhushan Choudhary, while giving a written reply to a question in Rajya Sabha today. Major steps taken by the Government for water conservation and rainwater harvesting to reduce water stress in the country are as follows:

Government of India has been implementing a scheme namely Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) which inter-alia includes water conservation and water harvesting structures. Financial assistance is given to various States under 15th Finance Commission tied grants which can be inter-alia utilized for rainwater harvesting.

The Ministry of Jal Shakti has been implementing Jal Shakti Abhiyan (JSA) since 2019 on an annual basis. In the current year, Ministry of Jal Shakti is implementing Jal Shakti Abhiyan: Catch the Rain (JSA: CTR) 2024, 5th in the series of JSAs, in all the districts (rural as well as urban) of the country. JSA: CTR is a convergence of various Central Government schemes and funds like MGNREGS, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Per Drop More Crop, Repair, Renovation and Restoration Components under the Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Compensatory Afforestation Fund Management and Planning Authority (CAMPA), Finance Commission grants, State Government schemes, Corporate Social Responsibility (CSR) funds etc. One of the major interventions undertaken under the campaign includes constructions and repair or rainwater harvesting structures including rooftop and water harvesting structures.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 has provisions for harvesting the rainwater through storm water drains into water body (which is not receiving sewage/effluent). Through preparation of 'Aquifer Management Plan' cities targets to strategize groundwater recharge augmentation by developing a roadmap for improving rain water harvesting within city limits. Through IEC campaign, awareness is created about practices for water conservation like rainwater harvesting. Ministry of Housing & Urban Affairs has formulated guidelines for the States to adopt measures suitable to local conditions, such as Unified Building Bye Laws (UBBL) of Delhi, 2016, Model Building Bye Laws (MBBL), 2016 and Urban and Regional Development Plan Formulation and Implementation (URDPFI) Guidelines, 2014 with adequate focus on requirement of rainwater harvesting and water conservation measures.



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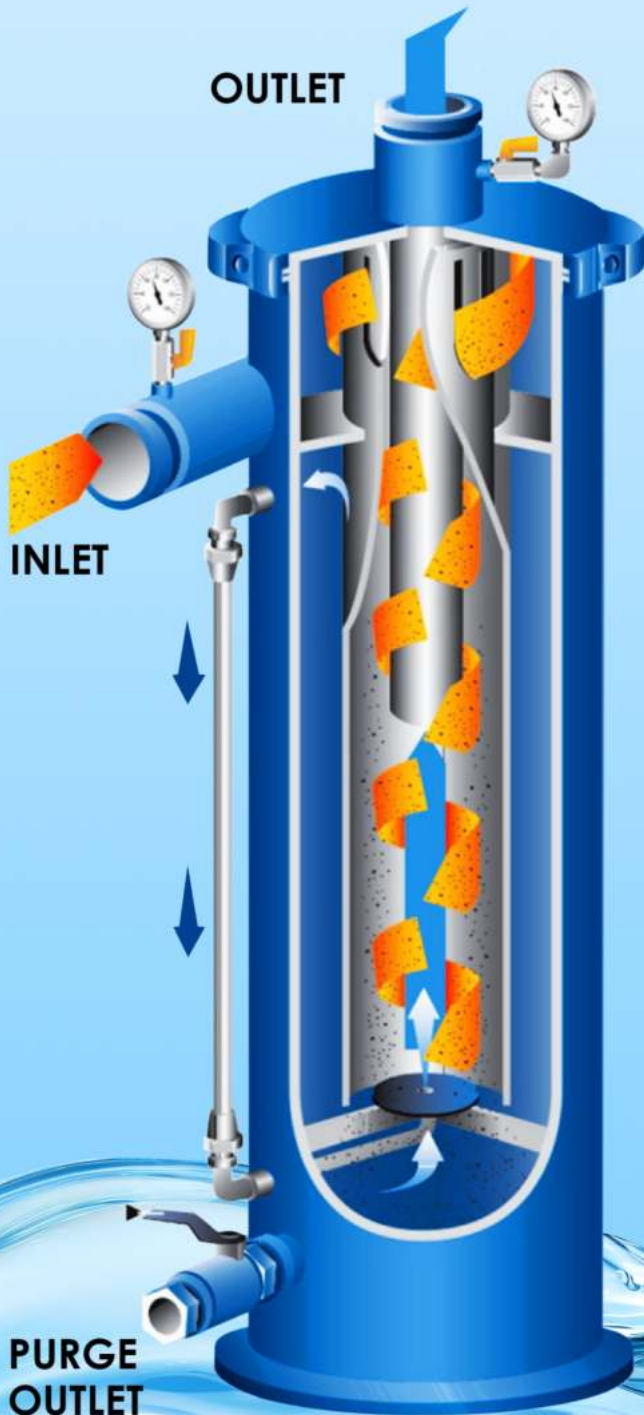
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Government of India is implementing Atal Bhujal Yojana, in 8,213 water stressed Gram Panchayats (GPs) in 80 districts of 7 States, viz., Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. The scheme marks a paradigm shift from groundwater development to groundwater management.

Government of India has been implementing “Pradhan Mantri Krishi Sinchai Yojana (PMKSY)” with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on farm water use efficiency, introduce sustainable water conservation practices etc. PMKSY has three components/ schemes namely Har Khet Ko Pani (HKKP), Repair, Renovation & Restoration (RRR) Scheme of Water Bodies and Surface Minor irrigation (SMI) Scheme. The Ministry of Jal Shakti has set up the Bureau of Water Use Efficiency (BWUE) under the National Water Mission on 20.10.2022, to act as a facilitator for promotion of improving water use efficiency across various sectors namely irrigation, drinking water supply, power generation, industries, etc. in the country.

Mission Amrit Sarovar was implemented in the recent times with provisions for creation/rejuvenation of at least 75 Amrit Sarovars in every district of the country with the purpose to harvest and conserve water. Central Ground Water Board (CGWB) has completed the National Aquifer Mapping (NAQUIM) Project in the entire mappable area of about 25 lakh sq. km. which has been shared with the respective State agencies for implementation. The management plans include various water conservation measures through recharge structures.

CGWB has also prepared a Master Plan for Artificial Recharge to Groundwater- 2020 in consultation with States/UTs which is a macro level plan indicating various structures for the different terrain conditions of the country including estimated cost. The Master Plan has provisions for construction of about 1.42 crore Rain water harvesting and artificial recharge structures in the country to harness 185 Billion Cubic Metre (BCM) of monsoon rainfall.

CGWB, under Ground Water Management and Regulation Scheme, has also implemented several successful artificial recharge projects in the country for demonstrative purpose which enable the State Governments to replicate the same in suitable hydro-geological conditions. National Water Policy (2012) has been formulated by Department of Water Resources, RD & GR, which inter-alia advocates rainwater harvesting and conservation of water and also highlights the need for augmenting the availability of water through direct use of rainfall. Department of Land Resources (DoLR) implements Watershed Development Component of Pradhan Mantri Krishi Sinchai Yojana

(WDC-PMKSY) for the development of rainfed and degraded lands in the country. The activities undertaken, inter-alia, include ridge area treatment, drainage line treatment, soil and moisture conservation, rainwater harvesting, nursery raising, pasture development, livelihoods for asset-less persons etc. WDC-PMKSY, through these interventions, seeks to ensure sustainable development through improved natural resource management and better resilience of farmers to climate change.

Water is a State subject and the Central Government supplements the efforts of the States through technical and financial support, the Minister added.

Mumbai Lakes Supplying Drinking Water to City at 72 Percent Capacity, says BMC



After heavy rainfall in the last few days, it was a dry day for the catchment area of seven Mumbai lakes which supply water to the city. In Mumbai, the collective lake levels in the seven reservoirs that supply drinking water to the city is now at 72 per cent, as per the BMC data.

According to the Brihanmumbai Municipal Corporation (BMC) data, on Wednesday, the collective lake levels or water stock in Mumbai lakes is now at 10,56,157 million litres of water or 72.97 percent. Mumbai draws water from Tulsi, Tansa, Vihar, Bhatasa, Modak Sagar, Upper Vaitarna, and Middle Vaitarna. As per the data shared by the civic body, the water level in Tansa is at 99.10 percent. At Modak Sagar, 100 percent of water stock is available.

In Middle Vaitarna 73.97 percent, Upper Vaitarna 43.10 percent, Bhatasa 70.67 percent, Vehar 100 percent and Tulsi 100 percent of useful water level is available. Lakes Vihar and Modak Sagar started to flood on Thursday as a result of persistently high rains. Around 4 pm on Wednesday, Tansa lake began to overflow, increasing the amount of water stored in all seven reservoirs by 17 days in a single day. Approximately 400 million gallons of water are supplied to Mumbai by



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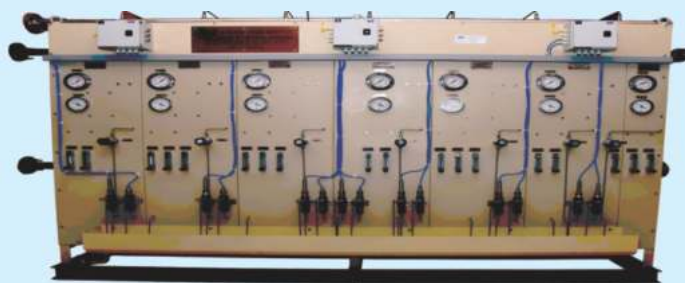
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Tansa Lake, which is situated in the Shahpur region of Thane. On July 26, 2024, it overflowed. One of the two lakes that directly feed water to the BMC, Tulsi Lake, started to overflow on July 20 at around 8:30 am, mimicking the event that occurred on the same day last year at 1:28 pm, according to a statement from the civic organisation. Meanwhile, the India Meteorological Department (IMD), in its latest Mumbai weather update, has predicted moderate to heavy rainfall in Mumbai on Sunday.

The weather department, in its latest Mumbai weather update, has predicted “moderate rain in the city and its suburbs with possibility of heavy rainfall at isolated places. Occasional gusty winds reaching 40-50 kmph very likely” in the next 24 hours. The Regional Meteorological Centre (RMC) in Mumbai has issued a yellow alert for heavy rainfall in the city. The maximum temperature in the city is likely to settle at 30 degrees Celsius and the minimum temperature will be recorded at 25 degrees Celsius. A high tide of about 3.85 metres is expected to hit Mumbai at 4.56 pm today, stated Brihanmumbai Municipal Corporation (BMC). The civic body also said that a low tide of about 1.14 metres is expected at 11.30 pm today.

The island city recorded 11 mm of rainfall, eastern Mumbai 8 mm and western Mumbai 5 mm of rainfall in the 24-hour period ending at 8 am.

Kothi, Avikkal STP Projects Dropped; New Plant to Come Up at West Hill

In a landmark move, a special council of the Kozhikode Corporation on July 29 (Monday) decided to relocate the site of two proposed sewage treatment plants (STPs) at Kothi and Avikkal Thodu, to a plot owned by the civic body in West Hill industrial estate. The decision was taken following a meeting chaired by District Collector Snehil Kumar Singh on July 19, where the idea was mooted and later passed at the AMRUT Core Committee meeting on July 23.

The Corporation struggled to resolve the dispute over the two STPs, as construction had stalled owing to public outrage and High Court interventions. Deputy Mayor C.P. Musafar Ahmed proposed relocating the sites to the industrial estate, which addressed previous concerns such as high population density and environmental pollution.

The council on Monday passed five separate resolutions related to the two STPs, which will now be combined to a single STP. Unable to complete the project within the term of AMRUT-1, which ended on March 31, 2023, the Corporation has included it in AMRUT 2.0. Since a sum of Rs. 133.16 crore has been allocated for the project, the

Corporation is eager to complete it within budget. Seemak Hitech Products, the company that was initially awarded the contract for constructing the plants, had backed out after the civic body refused to meet its demand for additional funds. As a result, the AMRUT Core Committee has decided to issue a fresh tender and prepare a new detailed project report (DPR). The Corporation had earlier planned to rope in the Kerala Water Authority to prepare the DPR. However, the agency declined owing to delays in completing the DPR for the STP at Sarovaram, and taking on additional work would further postpone the project.

On the other hand, the resource recovery facility initially planned for the STP site at West Hill will now be constructed at the site earlier identified for the STP at Avikkal Thodu.

Schneider Electric collaborates with Water Resources Department, Maharashtra for Efficient Water Management

Schneider Electric, the leader in the digital transformation of energy management and automation, recently announced its collaboration with Water Resources Department, Maharashtra to sensitize officials on modernizing water and wastewater (WWW) management using the latest digital technologies. This partnership is a continuation to Schneider Electric's support to the Ministry of Jal Shakti's efforts to accelerate the technology adoption for sustainable water management in India.

India, a country grappling with a staggering ~40% water loss due to leaks, is confronting significant strain on its water table, posing a threat to its economic advancement. In response to this pressing challenge, Schneider Electric has made its mission to confront the complexities of water management and address the urgent need for fostering sustainability, efficiency, and resilience in the water sector.

With this strategic partnership with the Government of Maharashtra, Schneider Electric has reaffirmed its commitment to championing responsible water management. As part of this collaboration, the company aims to drive awareness among stakeholders, encouraging the adoption of innovative digital technologies to elevate efficiency, productivity, and sustainability in water management processes.

Schneider Electric's end-to-end IoT platform, EcoStruxure, offers real-time data, analytics, and professional services to increase water consumption efficiency, decrease leaks, and optimize water distribution. EcoStruxure also offers advanced diagnostics and seamless IT/OT integration to future-proof operations.

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The event was attended by key dignitaries including Sanjay Khandare, IAS, Principal Secretary, Water Supply & Sanitation Department, Government of Maharashtra, Sanjay Belsare, Secretary, Project Coordination, Water Resources Department, Government of Maharashtra and Aman Mittal, IAS, Deputy Secretary, Water Supply & Sanitation Department, Government of Maharashtra. These dignitaries gathered to discuss the pressing need to embrace digital technologies in the facilitation of a more sustainable water network.

“Integrating digital solutions into water management practices can lead to more efficient, resilient, and sustainable use of water as well as energy resources, thereby addressing the growing challenges posed by factors such as population growth, urbanization, and climate change”, said Sanjay Belsare, IAS, Secretary- CAD, Water Resources Department, Government of Maharashtra.

Emphasizing the significance of digital solutions for effective water management during a keynote address Aman Mittal, IAS, Deputy Secretary, Water Supply & Sanitation Department, Government of Maharashtra suggests a creation of mass awareness about the true potential of digital technologies, that is critical to address issues related to water resources. Digital solutions encompass various technologies such as data analytics, IoT (Internet of Things) sensors, remote monitoring systems, and predictive modelling algorithms. AI and machine learning algorithms can analyse water-related data to improve water distribution, predict droughts or floods, and make better water management decisions. Drone images and remote sensing could help map traditional water bodies, assess their health, and identify replenishment or restoration needs. Also, Chatbots and solutions built around them could serve as virtual water conservation aides, offering personalised advice and raising awareness about the judicious use of water and resources.



Addressing the gathering on the occasion, Mr. Arvind Kakru, Vice President – Industrial Automation, Greater India at Schneider Electric, said, “At Schneider Electric, we strongly believe that India’s journey toward water conservation and innovation is crucial for realizing its developmental aspirations. The significance of water in our progress cannot be overstated, and the impact of leakage on our water

resources and energy usage cannot be ignored. Water conservation directly translates to energy conservation and secures our future. Through our collaboration with Water Resources Department, Maharashtra, Schneider Electric is committed to engaging stakeholders in breaking the cycle of waste and establishing a circular system for efficient energy and water management. Together, we are dedicated to maximizing the value of every drop, driving innovation to combat energy and water wastage, and paving the way for a more sustainable future.”

Schneider Electric has also collaborated with the Ministry of Jal Shakti to prepare a skill development program that empowers eco-warriors to become proficient in using next-gen technology. The curriculum focuses on technologies in water governance, efficient operations, management of water and wastewater treatment plants, sustainable water management, technology for water conservation, and efficient desalination processes using digital technologies.

Krishna Water Revives Major Irrigation Projects in YSR District

Recent heavy rains in upstream areas of Maharashtra and Karnataka have resulted in increased inflows into the Srisailem project, which subsequently supplies water to the Owk and Velugodu reservoirs. KADAPA: The Krishna river is reviving two major irrigation projects in Kadapa district, with water from upstream reservoirs now flowing into the Telugu Ganga and Gandikota canals. This development comes as a much-needed relief to the local farmers following a difficult year marked by drought.

According to officials, 2,500 cusecs of water are currently being channelled into the Telugu Ganga project, while 11,500 cusecs are flowing from the Owk reservoir to the Gandikota project. On Saturday, Kadapa district Collector Siva Sankar Lotheti and Mydukur MLA Putta Sudhakar Yadav officially released water from Subsidiary Reservoir-1 (SR-1) to SR-2 within the Telugu Ganga project. The water had travelled from Velugodu in Kurnool district to SR-1, and is expected to significantly improve irrigation across the catchment area. Meanwhile, at the Owk reservoir, Jammalamadugu MLA Adinarayana Reddy, YSR district Joint Collector Aditi Singh, former MLC B.Tech Ravi, and local leader Bhupesh Reddy oversaw the release of 11,500 cusecs of water towards the Gandikota project. This water is expected to reach the Gandikota reservoir by Sunday evening or night.

Recent heavy rains in upstream areas of Maharashtra and Karnataka have resulted in increased inflows into the Srisailem project, which subsequently supplies water to the Owk and Velugodu reservoirs. Officials are optimistic about filling the Brahma Sagar reservoir, a critical part of the Telugu Ganga project, to its full capacity of 17 TMC (thousand million cubic feet) within the next 60 days. This would potentially benefit 96,000 acres of land under the Telugu Ganga project in the district.



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The Gandikota reservoir, part of the Galeru-Nagari project, currently holds only 1.44 TMC, despite its capacity exceeding 27 TMC. Officials expect it to crucially fill up over the next five weeks.

WABAG secures repeat order of INR 415 Crores towards 7 years Operation & Maintenance Contract of 110 MLD SWRO Nemmeli Desalination Plant, Chennai

VA TECH WABAG ('WABAG'), a leading pure-play water technology Indian Multinational Group, has secured a repeat order worth about INR 415 Crores from the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) towards Operation & Maintenance of 110 MLD SWRO Desalination Plant at Nemmeli in Chennai for a period of 7 years.

Wabag's initial Operation & Maintenance contract was completed in 2021, after which the contract was extended by the customer and Wabag continued to Operate & Maintain the Plant. CMWSSB floated a public tender for the Operation & Maintenance of the Plant, and Wabag secured this repeat order for Operating & Maintaining the Plant for another seven years. The Nemmeli Desalination Plant was inaugurated by the Honourable Chief Minister of Tamilnadu in 2013. This Plant is the first Municipal Desalination Plant built in India on Design, Build, Operate (DBO) basis for drinking water purposes. The Nemmeli Desalination Plant is equipped with the most advanced Seawater Reverse Osmosis (SWRO) technology, ensuring the production of high-quality desalinated water for domestic consumption, coupled with a process that optimises power consumption. The water produced from this Plant is being supplied to South Chennai, benefitting millions of residents.

Commenting on this order, Mr. Shailesh Kumar, CEO – India Cluster said, "We are extremely proud to secure this repeat order for the Operation & Maintenance of the 110 MLD Nemmeli Desalination Plant. In line with our Growth Strategy, this new order further strengthens our O&M order book, providing annuity income, improving cash flows, and revenue predictability. This award underscores the continued trust and confidence our client CMWSSB has in our expertise and consistent performance, for which we are extremely thankful. We look forward to continuing our partnership and ensuring the plant operates at peak efficiency, serving the community by providing safe and reliable water supply."

India-Israel Join Hands for New Water Technology Centre at IIT Madras

India and Israel have joined hands for the establishment of a new water technology centre at IIT Madras, which is expected to serve as a "key contributor" to India's efforts to achieve sustainable water supply for all.



The Embassy of Israel in India in its statement termed the deal a "significant milestone" in the ongoing collaboration between the two countries in the field of integrated water resource management. A Joint Statement of Intent was signed to establish a Centre of Water Technology at the prestigious Indian Institute of Technology, Madras. "This tripartite agreement, signed by the Embassy of Israel, IIT Madras, and the AMRUT mission of the Ministry of Housing and Urban Affairs, reflects a shared commitment to address the critical challenges of water management in India," it said.

The Centre of Water Technology aims to become a hub for innovation, research, and capacity-building in water technologies, particularly focusing on sustainable solutions for urban water supply. To kickstart this initiative, a capacity-building course on '24/7 Water Supply in Urban Areas' was organised at IIT-Madras from August 5 to August 8, it added. "This collaboration reflects the shared commitment of India and Israel to address the pressing challenges of water scarcity and management. "The establishment of the Centre of Water Technology at IIT-Madras is a testament to our strong partnership, and we look forward to working together to develop innovative solutions that will benefit millions in India," Ambassador of Israel to India, Naor Gilon, was quoted as saying in the statement. The Embassy of Israel in India remains committed to fostering cooperation in water technology and management, and this new centre is "expected to be a key contributor to India's efforts to achieve sustainable water supply for all," it said.

Rs. 14-crore Cauvery Riverfront Project Gets Govt. Nod

The maiden riverfront project for Trichy city proposed on the southern bank of Cauvery river passing along Odathurai Road has been approved by the municipal administration department. A detailed project report (DPR) completed by the city corporation has estimated the cost of the project at Rs. 14 crore. Apart from creating an open space for recreational amenities, the project will also indirectly prevent pollution in the river. The Cauvery river flows for a length of 16km.

SMC treats sewage water in tertiary water treatment plants, converting it into industrial-grade water. Currently, three sewage treatment plants with a capacity of 115 MLD are being used to treat the water. The SMC initiated this effort in 2014, and over the last 10 years, both income and water treatment have seen consistent growth. Municipal Commissioner Shalini Agarwal said, "After treating the sewage water, the SMC has reused and recycled around 350 MLD of water, using it for irrigation of plants in the BRTS corridor, plants on roads, and garden irrigation. Additionally, 150 MLD of water is sold to textile, power, and other industries, generating Rs. 140 crore in revenue. We aim to sell more water to industries over the next five years, which will likely double the income."

Thirty-nine Untapped Drains a Big Challenge Ahead of 2025 Maha Kumbh in Prayagraj, NMCG Steps in to Fix the Gap



As Prayagraj gears up for Maha Kumbh next year, 39 untapped drains out of a total 81 that flow into the Ganga and Yamuna rivers in the city have remained a big challenge to maintain cleanliness during the mega event scheduled for January 14 to February 26. Sensing the urgency, the National Mission for Clean Ganga (NMCG) — a central agency that implements the Ganga rejuvenation plan — has sanctioned three new sewage treatment plant (STP) projects at an estimated cost of Rs. 987 crore to significantly increase the sewage treatment capacity of the city and been working with local authorities to intercept and divert the untapped drains.

Multiple other activities, including a detailed sanitation plan and use of remote sensing and GIS technologies to map the impact of the temporary population on sewerage infrastructure and river water quality during Maha Kumbh, have also been taken up to make it a memorable event for crores of visitors at Sangam during Jan-Feb 2025. Currently, the city has a combined sewage treatment capacity of 340 million litres per day (MLD) against generation of around 500 MLD. This means 160 MLD of untreated sewage is being discharged into the Ganga and Yamuna rivers. "This is exactly why the three new STPs have been sanctioned as these projects will increase the city's total sewage treatment capacity to 523 MLD," said an NMCG official.

Within Trichy corporation limits, including both northern and southern banks. On some banks including Odathurai, the local body has identified littering activity prevalent among residents and the floating population. As the Cauvery river holds both cultural and economic importance, a master plan prepared for Trichy with projections for 2041 had suggested riverfront development for the city to tackle pollution and other non-conforming activities.

Taking the cue from the report, Trichy corporation identified a 250-metre-long stretch on the southern bank of the river between Thillainayagam bathing ghat on Odathurai road and the railway bridge across the river. About 60,000 square feet of unutilised area on the river bank will be put to use for the project. The DPR has adopted the 'city of elements' plan by American urban planner Kevin Lynch for the project. Accordingly, seven components included are amphitheatre, kids' play area, bathing ghat, riverside terrace, planters with seatings, watch tower and sundial. Fences will be installed throughout the banks abutting the riverfront area. "Width of the Cauvery river shall remain undisturbed. Rainwater accumulating in the open space will be discharged into the river," a senior official of Trichy corporation said. A 30-foot-tall watch tower with safety barriers is planned in the riverfront area for visitors to view the rajagopuram of Srirangam temple, Thiruvanaikoil temple and Rockfort hillock temple complex. A riverside walking track, public toilet and a meditation zone are among other proposals planned in the riverfront space.

The corporation said that the proposed facility will benefit the densely populated Melachinthamani and Devathanam areas like the Uyyakondan canal front development in Cantonment. With the study completed, the municipal administration department will choose a relevant scheme to fund the riverfront proposal after technical scrutiny. Schemes under Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) are also considered for obtaining funds. Making the project more environment-friendly, Trichy corporation has also drafted a plan to install a sewage treatment plant (STP) near the riverfront to re-treat wastewater discharged from residential and commercial areas in ward 15 into the river.

SMC Earns Rs. 140 Crore by Selling Treated Sewage Water to Industries

The city civic body has earned crores of rupees by treating wastewater at its Sewage Treatment Plant. The Surat Municipal Corporation (SMC) earned Rs. 557 crore against an expenditure of Rs. 379 crore. The city houses hundreds of textile mills in Pandesara, Sachin, and Palsana, which require crores of liters of water. To fulfill this requirement, the

The new STPs will come up at Salori (capacity of 43 MLD with a cost of Rs. 325 crore), at Rasoolabad (capacity of 90 MLD with a cost of Rs. 476 crore) and at Naini (capacity of 50 MLD with a cost of Rs. 186 crore). Since tapping the drains would be important to keep the rivers clean for the holy dip, the executive committee of the NMCG, headed by its director general Rajeev Kumar Mital, had last month sanctioned remediation of 22 untapped drains during the Maha Kumbh period at an estimated cost of over Rs. 55 crore. The remaining 17 untapped drains will be managed by the local authorities, using the Maha Kumbh 2025 budget.

Under the detailed sanitation plan, the NMCG, through its 'Namami Gange' programme has decided on the deployment of 1.45 lakh community toilets, 20,000 urinals and a number of prefabricated steel toilets and solid waste bins across the city. In addition, five ghats and two crematoria have been constructed to ensure cleanliness and sanitation during the mega event.

Rethinking desalination: Turning wave power into freshwater using advanced offshore desalination technology

Water conservation through rainwater harvesting is one of the foremost priorities of the Government, stated Union Minister of State for Jal Shakti, Shri Rajbhushan Choudhary, while giving a written reply to a question in Rajya Sabha today. Major steps taken by the Government for water conservation and rainwater harvesting to reduce water stress in the country are as follows:

Government of India has been implementing a scheme namely Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) which inter-alia includes water conservation and water harvesting structures. Financial assistance is given to various States under 15th Finance Commission tied grants which can be inter-alia utilized for rainwater harvesting. The Ministry of Jal Shakti has been implementing Jal Shakti Abhiyan (JSA) since 2019 on an annual basis. In the current year, Ministry of Jal Shakti is implementing Jal Shakti Abhiyan: Catch the Rain (JSA: CTR) 2024, 5th in the series of JSAs, in all the districts (rural as well as urban) of the country. JSA: CTR is a convergence of various Central Government schemes and funds like MGNREGS, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Per Drop More Crop, Repair, Renovation and Restoration Components under the Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Compensatory Afforestation Fund Management and Planning Authority (CAMPA), Finance Commission grants, State Government schemes, Corporate Social Responsibility (CSR) funds etc. One of the major interventions undertaken under the campaign includes

constructions and repair or rainwater harvesting structures including rooftop and water harvesting structures. Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 has provisions for harvesting the rainwater through storm water drains into water body (which is not receiving sewage/effluent). Through preparation of 'Aquifer Management Plan' cities targets to strategize groundwater recharge augmentation by developing a roadmap for improving rain water harvesting within city limits. Through IEC campaign, awareness is created about practices for water conservation like rainwater harvesting. Ministry of Housing & Urban Affairs has formulated guidelines for the States to adopt measures suitable to local conditions, such as Unified Building Bye Laws (UBBL) of Delhi, 2016, Model Building Bye Laws (MBBL), 2016 and Urban and Regional Development Plan Formulation and Implementation (URDPFI) Guidelines, 2014 with adequate focus on requirement of rainwater harvesting and water conservation measures. Government of India is implementing Atal Bhujal Yojana, in 8,213 water stressed Gram Panchayats (GPs) in 80 districts of 7 States, viz., Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. The scheme marks a paradigm shift from groundwater development to groundwater management.

Government of India has been implementing "Pradhan Mantri Krishi Sinchai Yojana (PMKSY)" with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on farm water use efficiency, introduce sustainable water conservation practices etc. PMKSY has three components/ schemes namely Har Khet Ko Pani (HKKP), Repair, Renovation & Restoration (RRR) Scheme of Water Bodies and Surface Minor irrigation (SMI) Scheme. The Ministry of Jal Shakti has set up the Bureau of Water Use Efficiency (BWUE) under the National Water Mission on 20.10.2022, to act as a facilitator for promotion of improving water use efficiency across various sectors namely irrigation, drinking water supply, power generation, industries, etc. in the country. Mission Amrit Sarovar was implemented in the recent times with provisions for creation/rejuvenation of at least 75 Amrit Sarovars in every district of the country with the purpose to harvest and conserve water. Central Ground Water Board (CGWB) has completed the National Aquifer Mapping (NAQUIM) Project in the entire mappable area of about 25 lakh sq. km. which has been shared with the respective State agencies for implementation. The management plans include various water conservation measures through recharge structures. CGWB has also prepared a Master Plan for Artificial Recharge to Groundwater- 2020 in consultation with States/UTs which is a macro level plan indicating various structures for the different terrain conditions of the country including estimated cost.



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The Master Plan has provisions for construction of about 1.42 crore Rain water harvesting and artificial recharge structures in the country to harness 185 Billion Cubic Metre (BCM) of monsoon rainfall. CGWB, under Ground Water Management and Regulation Scheme, has also implemented several successful artificial recharge projects in the country for demonstrative purpose which enable the State Governments to replicate the same in suitable hydro-geological conditions. National Water Policy (2012) has been formulated by Department of Water Resources, RD & GR, which inter-alia advocates rainwater harvesting and conservation of water and also highlights the need for augmenting the availability of water through direct use of rainfall. Department of Land Resources (DoLR) implements Watershed Development Component of Pradhan Mantri Krishi Sinchai Yojana (WDC-PMKSY) for the development of rainfed and degraded lands in the country.

The activities undertaken, inter-alia, include ridge area treatment, drainage line treatment, soil and moisture conservation, rainwater harvesting, nursery raising, pasture development, livelihoods for asset-less persons etc. WDC-PMKSY, through these interventions, seeks to ensure sustainable development through improved natural resource management and better resilience of farmers to climate change. Water is a State subject and the Central Government supplements the efforts of the States through technical and financial support, the Minister added.

Projects under Yamuna Action Plan near completion; full capacity to be reached soon

The quest for a clean Yamuna is gaining momentum as the three large wastewater treatment projects (WWTP) being developed by Delhi Jal Board under the Yamuna Action Plan-III are nearing completion. These three mega WWTPs in Okhla, Kondli and Rithala are already in advanced stages.

Okhla WWTP: State of the art infrastructure to make Yamuna clean Delhi Jal Board is upgrading and rehabilitating four phases of Okhla WWTP under the ongoing project. The massive project has a capacity of 564 MLD. The Okhla WWTP will treat wastewater in accordance with effluent standards of BOD – 10 mg/l, TSS – 10 mg/l, or better. Currently the project is 96% complete and will soon be fully operational. Okhla WWTP is Asia's largest and world's fourth largest WWTP which is being constructed to make the Yamuna River clean. The project will serve the large parts of Delhi including the South-Delhi area; treating the emanating wastewater. About 56.4 crore liters or 564-MLD wastewater channelized from sewer networks will be

treated or cleaned daily at this plant. It will benefit around 40 lakh residents of the national capital. The rehabilitation and upgradation work of Okhla WWTP began on June 19, 2019.

At Okhla, for the first time in Delhi, UV technology has been employed in a WWTP ever to clean wastewater. This technique is commonly used in RO plants with a purpose of making the water potable/drinkable. Also, Okhla WWTP has also been developed with a unique design. The tank of the primary sedimentation unit of the WWTP has been designed in a rectangular shape instead of a circular one. Also, Lamella Filter has been used in this section of the plant. Due to these changes, the time taken for the treatment of wastewater will be reduced to half and this unit has also been developed in a very small space.

Kondli – Catering East Delhi

Kondli: The WWTP project being developed in Kondli is of a capacity of approximately 214 MLD. The project is about 98% complete. It is being developed with effluent standards of BOD -10 mg/l, TSS – 10 mg/l or better under YAP-III with the objective of removing pollutants entering the waters of Yamuna in Delhi through wastewater. The project will cater the large area of East Delhi including Shahdara area and disallow any outfall of wastewater into Yamuna without treatment.

Rithala – No untreated wastewater to go in drains

The Rithala Rehabilitation and Up-gradation project involves the development of 182-MLD capacity Wastewater Treatment Plant with effluent standards of BOD-10 mg/l, TSS – 10 mg/l or better. This project will cater to the large parts of North & North-West Delhi disallowing any sewage to enter the Najafgarh Drain or Yamuna untreated. This project is complete and already under the phase of trial run and commissioning. Although the WWTP projects faced challenges like delays in clearances, EPCA bans and Covid led restrictions, the concerted efforts has brought these mega WWTP projects to near completion. Many of the sewage treatment plants (STPs) in these projects are already functional and treating the wastewaters of Delhi.

The objective of the three big sized WWTPs is to ensure that the wastewater emanating from the households & industries of Delhi do not out-fall into the Yamuna River untreated. With the proper cleaning of wastewater, its re-use and release into the Yamuna River will not just axe pollution from the holy river but also help maintain the healthy ecological flow necessary to support aquatic life. The health of Yamuna is important to ensure the overall health of Delhi's environment. All three projects are nearing completion and will be fully commissioned & operational very soon.



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MAJOR PROJECT AQUAFIN: 5 HUBER BELT DRYERS BT FOR THE THERMAL TREATMENT OF MORE THAN 120,000 TONNES OF SEWAGE SLUDGE PER YEAR

HUBER SE will supply a total of five HUBER Belt Dryer BT units to the Belgian company Aquafin for the two sites in Roeselare and Beringen. The plants for drying and thermal utilisation of sewage sludge will treat a minimum capacity of 32,500 tonnes of dry substance or 120,446 tonnes of original substance with a dry residue (DR) content of 27% per year. In addition to the HUBER belt dryers, the scope of supply includes the entire wet sludge logistics, cooling water supply, exhaust air treatment for the dryer and bunker exhaust air as well as the treatment and storage of the dry sludge. The total order for HUBER SE for approx. 40 million euros was placed in mid-2023. company Aquafin for the two sites in Roeselare and Beringen. The plants for drying and thermal utilisation of sewage sludge will treat a minimum capacity of 32,500 tonnes of dry substance or 120,446 tonnes of original substance with a dry residue (DR) content of 27% per year. In addition to the HUBER belt dryers, the scope of supply includes the entire wet sludge logistics, cooling water supply, exhaust air treatment for the dryer and bunker exhaust air as well as the treatment and storage of the dry sludge. The total order for HUBER SE for approx. 40 million euros was placed in mid-2023.

Project constellation

The project is carried out by a team of three companies: Stadsbader Group (contractor), HUBER SE (Technology partner for sludge drying), Sweco (engineering and study). For the end customer Aquafin, this combines the strengths of a healthy construction company, a specialised technology partner in drying technology and an experienced engineering company with specific experience in the fields of hydraulic engineering, civil engineering, hydrology and (geo)stability. The collaboration between the Stadsbader Group, HUBER and Sweco guarantees high-quality project execution thanks to local roots on the one hand and process and technical expertise on the other.

After submitting the approval documents at the end of 2023, the environmental permit for the Beringen site was granted after just over six months. The permit for the plant in Roeselare is also expected this year. This means that the engineering phase for this major project is as good as complete and the first work can start on site this year.

20 years, 82 plants and 1.8 million tonnes of sludge per year

In the last 20 years, HUBER Belt Dryers have processed 1.8 million tonnes of sludge per year in 82 plants worldwide.

With the appointment of HUBER as technology partner, the project partners can draw on decades of practical experience in the supply, installation and commissioning of sludge drying plants.

HUBER has already gained regional experience with its drying technology in the Benelux region: one of the largest belt drying plants, probably the largest in the world, is currently being built at the customer HVC in Alkmaar.

Aquafin – current sludge chain

Aquafin is a Belgian company that was founded in 1990 by the Flemish government and is responsible for the inter-municipal infrastructure and treatment of domestic wastewater. Every year, it produces around 350,000 tonnes of dewatered sludge with an average dry residue of 27%. The disposal of this sludge is currently organised via three disposal routes: One third of the sludge is dried using residual heat and fossil fuels and then utilised externally in the cement industry (coincineration). One third is dewatered and processed under autothermal conditions in the sewage sludge recycling plant in Bruges. The remaining third is also dewatered and thermally recycled together with industrial waste by an external company.

Aquafin – new sludge chain

From 2026, Aquafin will initially dry up to a third of the dewatered sludge using HUBER Belt Dryer technology as part of its climate and energy targets. This will be done using residual heat that would otherwise be lost. For this purpose, two largely analogue drying plants will be built in Roeselare and Beringen. The sewage sludge delivered by lorry from around 40 different sewage treatment plants is fed directly into the HUBER Belt Dryers by a crane system from the bunker via a downstream moving floor and thick sludge pumps.

In the Beringen plant, a total of 84,446 tonnes of dewatered sewage sludge per year are dried from 27 % to 90 % DR at an inlet temperature of 110 °C. Three HUBER Belt Dryers BT 28 are used for this purpose. In the Roeselare plant, two HUBER Belt Dryers BT 22 are used to dry 36,000 t/a of dewatered sewage sludge from 27 % to 90 % DR at an inlet temperature of 90 °C. The bunker and dryer exhaust air are treated separately, with the dryer exhaust air undergoing a 4 stage cleaning process – with scrubbers, biofilters and downstream activated carbon filters. After drying, the sewage sludge is fed into a pellet press by screw conveyors and a bucket conveyor. The cooled pellets are then stored in dry material silos before being transported to Ghent.

Construction of a mono-incineration plant in Ghent

Aquafin will build a mono-incineration plant on the site of the steel company ArcelorMittal in the port of Ghent by 2026, in which the sewage sludge dried in Beringen and Roeselare will be utilised.

ArcelorMittal will purchase 100% of the steam generated by the sludge treatment plant.

For the steel company, this is an additional source of energy for its internal steam network, further reducing the use of fossil fuels. The direct purchasing of the entire steam production in combination with the focus on raw material recovery (phosphorus) gives the overall project considerable ecological added value. This new plant will be designed, built, financed and maintained until 2046 by the BESIX Indaver consortium.

A prime example of sustainable resource management

With its belt drying technology, HUBER is making a significant contribution to Aquafin's goal of no longer using fossil fuels by 2030 and becoming a climate-neutral company in the long term. In addition, waste heat is utilised directly at the point of origin and the dried sewage sludge is transported to the utilisation site as an energy source. The large-scale Aquafin project is therefore a transferable example of sustainable resource management.



2 nos. HUBER Belt Dryer BT 22 in Roeselare. (© HUBER SE)



3 nos. HUBER Belt Dryer BT 28 in Beringen. (© HUBER SE)

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MAXION WHEELS CELEBRATES INAUGURATION CEREMONY OF FORMARE IN INDIA

India selected as the third country of operation for academic scholarship program, with the goal to support the Indian government's Economic Weaker Section and skill development initiative

Maxion Wheels, a leading global wheel manufacturer for passenger cars, light trucks, buses, commercial trucks and trailers, in partnership with lochpe Foundation from Brazil, and Savitribai Phule Pune University (SPPU), today celebrated the inauguration of the company's first Formare program in Asia, with a ribbon-cutting ceremony of the new Formare Learning Center located in Pune, India.

Formare is a well-established academic scholarship program for underprivileged youth in Brazil and Mexico, and with this inauguration, begins its first Formare class in India. 26 Economic Weaker Section (EWS) students were selected for the two-year academic and industry program which began with SPPU university classes in July, and now professional training at Kalyani Maxion Wheels' manufacturing operation in Pune.

"The launch of Formare in India is a special moment for our company – a true testament to lochpe-Maxion's dedication to transforming lives through education and opportunity," stated Marcos Oliveira, President and CEO of lochpe-Maxion, and Chairman of the Board, lochpe Foundation. "For more than 35 years, we have successfully connected classroom learning with real-world workplace experiences for thousands of students in Brazil and Mexico and excited now to bring this successful program and social benefits to India."

"People and culture are at the center of everything we do, from the wellbeing and inclusion of our employees to the social and environmental needs of those who live in our communities," said Pieter Klinkers, CEO of Maxion Wheels. "The primary objective of Formare is to enhance the employability of underprivileged youth, and in this case, for the Pune region. I'm proud of the company and many Formare volunteers who work tirelessly to create a better shared future for us all."

"Unlike other educational scholarship programs in the region, Formare is not focused on molding students into future employees; instead, we want to give participants an opportunity to succeed in the overall job market," offered Suthdeep Ratnabhas, President of Maxion Wheels' Asia business unit. "Formare provides job readiness and industry acumen, therefore opening doors to a wide range of employment opportunities upon graduation."

Claudio Anjos, President of lochpe Foundation, highlights the leadership and pioneering spirit of Maxion Wheels in launching another Formare unit, now in India: "Our foundation has worked closely with Maxion Wheels for almost 25 years in Brazil and Mexico. By offering opportunities for education and professional training to young people who really need it, Formare has the power to transform lives."

"We are honored to partner with Maxion Wheels in realizing this program and to provide the academic education for the Formare students here at Savitribai Phule Pune University", said Prof. Dr. Suresh Gosavi, Vice Chancellor SPPU. "The program is unique as the comprehensive benefits alleviate any financial concerns and therefore allow the students to focus wholeheartedly on their education and professional development."

India was selected as the third country of operation for Formare, with the goal to support the Indian government's Economic Weaker Section (EWS) and skill development initiative. Students will receive a comprehensive academic scholarship sponsored by Maxion Wheels. In addition to 100% tuition being reimbursed, they will receive a uniform, transportation, meals, and a monthly stipend. After successfully completing the two-year program, students will receive a Manufacturing Technology academic diploma.

ABOUT MAXION WHEELS

Maxion Wheels, a division of lochpe-Maxion S.A., is the world's leading steel and aluminum wheel supplier. With our low-carbon expertise and energy-efficient designs, we deliver cost-effective solutions for real-world matters across cars, buses, trucks, and trailers.

Maxion Wheels works with global vehicle manufacturers on wheels for personal mobility, transportation, agriculture, defense, and off-highway applications. Our 10,000 employees operate out of 31 locations in 14 countries on five continents, including state-of-the-art technical centers in the Americas, Europe, and Asia. Together we produce 50 million wheels a year, making us the world's largest producer and supplier of wheels. The company has operated in India since 1996 and employs close to 1,200 people at its three facilities (two in Kurali Village, Chakan, Pune, and one in Khed City, Pune). To learn more, please visit Maxion Wheels' website at www.maxionwheels.com.

ABOUT IOCHPE FOUNDATION'S FORMARE PROGRAM

The lochpe Foundation is a nonprofit organization based in São Paulo, Brazil, with the mission to drive social transformation by promoting equity and creating opportunities for social growth through professional qualification and art education. The Formare program recently celebrated its 35th anniversary, which is a benchmark in Brazil for providing professional training to economically and socially vulnerable young people. In partnership with medium- and large-size companies, Formare offers initial professional training courses to young people from low-income families enrolled in public high schools. Through the work of volunteer educators, the program has trained over 26,000 young people, and according to a survey by Plano CDE, 89% of those graduates secure formal jobs in their first employment. The courses are certified by the Federal University of Technology – Paraná (UTFPR) in Brazil, the Technological University of San Luis Potosí (UTSLP) and the Technological University of Chihuahua (UTCH) in Mexico, and the Savitribai Phule Pune University (SPPU) in India. To learn more, visit www.fiochpe.org.br.

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GLOBAL W

DROPLETS

Over 300 years' service at Lakeside Equipment Corporation from just 12 employees

As Lakeside Equipment Corporation (established 1928) approaches its centenary, a total of just 12 of its employees have completed a combined service record of more than 300 years. Renowned manufacturers of long-lasting water treatment equipment, including screens, screw pumps and grit collectors, Lakeside continues to engineer, develop and provide top quality water purification systems to municipalities and businesses throughout North America.

The company's President, Karen Wolk has been with the Illinois-based firm for 39 years, but top of the tree for long service at Lakeside is Draftsman Supervisor, James Snyder, who has worked for the business for 42 years. Pete Kasch (Shipping and Receiving) has served with Lakeside for 31 years, while Linda Zimmerman (Engineering Assistant) has recorded a full three decades. The long-serving team also includes National Sales Manager, Jim McKee (25 years), Regional Sales Manager, Jim Aitkenhead (11 years), Inside Sales Manager, Keith Humphrey (17 years) and Tim Lim, Project Engineer, 20 years.

Vice President of employee-owned Lakeside Equipment Corporation, Dan Widdel, has 24 years of service, as does Mary Ann Bell (Receptionist) and Severo Sosa (Senior Draftsman); closely followed by George Fridrich (Draftsman/Parts Associate) with 23 years. Completing the mammoth 310-year milestone presents an average of 22.8 years for each of the 12 long-serving members of the team.

Lakeside's Contract Administrator, Marian Widdel, commented: "Time flies by here, which is always a good sign. It was only just recently when we noticed that a combined figure for such a small number might be in the region of 200 or 250 years' service, but to see that is actually a total of 310 years clocked up by just twelve people is a truly great achievement. We very much back any move to attract new people to our industry, but you have to say that for our customers, there are many times when you simply can't beat calling upon all that experience from such very knowledgeable, hard-working and enthusiastic professionals."



Phosphorus removal options explored in collaborative trials

Alternative approaches to phosphorus removal at rural wastewater treatment works are being explored in an innovation project led by United Utilities. The ALT-P project, for which Spring Innovation is the knowledge-sharing partner, received funding through Ofwat's inaugural Water Breakthrough Challenge in 2021. Working alongside United Utilities are project partners Southern Water, Wessex Water, University of Portsmouth, Power & Water, Kolina, Hydro Industries and Evergreen.

The water industry is heavily dependent on the use of metal-based coagulants for the removal of phosphorus, particularly at rural wastewater treatment plants. By exploring the key benefits, such as cost, reliability and sustainability, ALT-P aims to reduce the carbon footprint of wastewater treatment and increase resilience by reducing reliance on chemicals.

The alternatives being examined are:

- Electrocoagulation and natural coagulation – onsite investigations led by United Utilities at Woolton Wastewater Treatment Works are complete and technical reporting is underway.
- Reactive media – investigations led by Southern Water and the University of Portsmouth are due to complete in October 2024. The ALT-P team will be discussing the project at the ALT-P conference hosted by United Utilities at Haweswater Conference Centre, Lingley Mere, Warrington, on 17 September 2024.

Spring will also host a project knowledge showcase event and three surgery sessions, as part of its best practice knowledge-sharing initiative. More details will be released soon.

Lisa Mansell, chief engineer (innovation and carbon) at United Utilities, said: "Through the ALT-P project, we aim to determine what can be achieved using alternative approaches and the climate benefits these could deliver for the water sector. The project is really opening up new opportunities and we are now understanding, in more detail, what is required from us as water companies to incorporate these processes and move away from our fossil fuel-based standard solutions."

ATER NEWS

Phosphorus can enter watercourses from various sources, including wastewater treatment works, agricultural land and urban run-off. High levels are damaging to water environments, promoting excessive algal growth and depriving fish and other aquatic animals of oxygen. In England, excess phosphorous remains the top reason for water bodies failing to achieve 'good' ecological status, and water companies are working to achieve ever-tightening targets for its removal from wastewater. Chloe Tooth, knowledge and communications manager at Spring said: "Spring is delighted to be the knowledge-sharing partner on this collaborative project to find alternative approaches to phosphorus removal at rural wastewater treatment works. We are extremely proud of how our knowledge transfer service is helping to disseminate knowledge from these innovation projects and accelerate learning across the sector."

ABB launches innovative solar drive for sustainable water pumping globally

Solar photovoltaic (PV) powered water pumping systems are becoming increasingly important across the globe. They play a vital role in reducing CO2 emissions related to water pumping and can work in areas with weak power grid coverage, where reliable water supplies are essential for agricultural irrigation, livestock watering, and drinking purposes.

ABB's new generation ACQ80 solar pump VSD has been engineered to meet this demand by supporting the water pumping installations to operate efficiently with a low carbon footprint, using clean energy from the sun. A key feature of the ACQ80 is the built-in Maximum Power Point Tracking (MPPT) logic combined with a wide input voltage range from 225 to 800 VDC. This enables the drive to operate the pump motor even if the power output from the solar panels drops during periods of low sunlight. This operational window is much wider than in conventional drives, allowing the maximum amount of water to be pumped over a range of operating conditions.

While the ACQ80 will be deployed mainly in off-grid solutions, where it converts the direct current (DC) from the solar panels to the alternating current (AC) required by the pump, it also has the flexibility to accept an AC input. This enables the drive to be connected to a local grid or generator, ensuring continuity of pumping during the night or periods of low sunshine by blending both AC and DC input supplies.

"A solution with low CO₂ emissions is vital for irrigation, farming and water utility pumping, for a sustainable future. The ACQ80 is an ABB innovation set to play an important role across the world in enabling the solar pumping schemes to operate with maximum efficiency and reliability, even in varying levels of sunshine. We are also proud it received the Solar Impulse Efficient Solution label from the Solar Impulse Foundation," said Jugal Patnaik, Global Product Manager, Solar Pump Drives, ABB. The ACQ80 offers built-in pumping features such as flow calculation, dry-run protection, pump cleaning and multiple smart-operating modes to optimize water pumping process and minimize human intervention, as well as fieldbus connection for integrating the VSD into control systems. It is also compatible with induction motors, as well as with highly efficient permanent magnet assisted synchronous reluctance (SynRM) motors in both submersible and surface type pumps.

DROPLETS

Miraliving launches a range of contemporary home decor accessories

LANXESS India has won two prestigious Global Environment and Energy Foundation (GEEF) Global Awards - Safety award in the platinum category and the WaterTech award in the Sustainable Water Management category for the year 2024. These accolades are a testament to our commitment towards excellence in safety standards and sustainable water management practices.

Balaram Khot, Wholetime Director and Head of PTSE along with Bharat Meesala, Senior Manager, PTSE - Occupational Safety, Xact, Responsible Care and Trade Compliance received the awards on behalf of LANXESS India at a gala event held in New Delhi on 26th July 2024.

The GEEF Global Safety Award recognizes LANXESS India's outstanding achievements in maintaining the highest safety standards within the chemical industry. The platinum category win displays the organization's dedication to ensuring a safe working environment for all its employees and stakeholders. LANXESS has strict group-wide directives on health protection, occupational & process safety. These directives focus primarily on identifying risks in advance and implementing measures designed to prevent accidents and rapidly detect and respond to incidents. Key features of the safety systems include active involvement of the employees in building operating procedures, job safety analysis, more focus on the behaviour-based safety programs, robust work permit system, contractor management systems, programs to improve employee health, implementation of strong technical control measures, increased focus on reporting of unsafe conditions and unsafe acts, incident management system, trainings and effectiveness check.

The Global WaterTech Award in Sustainable Water Management category highlights LANXESS India's innovative approach towards sustainable water management. Water plays a central role in LANXESS's strategy. As a chemical company, the organization faces up to its responsibility to decouple its own water consumption from economic growth and pursues clear goals: reducing specific water consumption overall and local water consumption, especially at sites where water is scarce. To this end, a water risk analysis is regularly carried out at LANXESS' sites to accurately measure what is known as "water stress," i.e. the relationship between water withdrawal and renewable water supplies.

LANXESS
Energizing Chemistry

The ACQ80 has received the Solar Impulse Efficient Solution label from the Solar Impulse Foundation, which confirms it is a profitable product operating on clean power. The label is awarded to products, services, and/or processes that combine credible environmental and economic performance, while outperforming the mainstream options in their market. This allows political and economic decision-makers to adapt much more ambitious energy and environmental policies and set a roadmap to reach their environmental objectives.

Oxford flood alleviation scheme gets the go ahead

The much-anticipated Oxford Flood Alleviation Scheme is one step closer to becoming a reality after Oxfordshire County Council recently resolved to grant planning permission. This decision, subject to certain standard requirements, marks a significant milestone on the way to reducing flood risk from the River Thames and protecting the city's homes, businesses, roads and railways.

Led by the Environment Agency in partnership with 9 other organisations, the Oxford Flood Alleviation Scheme is one of the biggest flood schemes currently planned in England. The scheme will work with the natural floodplain to the west of Oxford. A new stream will be created, fed by the River Thames and meandering through its own gently sloping floodplain, consisting of grazing meadow with wildflowers and wetland. People will be able to walk and cycle alongside the new stream, enjoying the views and wildlife.

When the Thames is high, water flowing from the river into the stream will naturally start to fill the lowered floodplain, instead of overspilling from the River Thames into built-up areas of the city. Oxfordshire County Council considered the planning application following their public consultation on it last year. At the Planning and Regulation Committee meeting, councillors resolved to grant planning permission after hearing from the Environment Agency and their partners.

Approval is subject to the application first being referred to the Secretary of State for the Ministry of Housing, Communities and Local Government, due to the scheme's location in the green belt. She will decide if she wishes to make a determination. This is a normal requirement in these circumstances. The Environment Agency will also need to sign a legal agreement with the council relating to the management and monitoring of the new habitats that the scheme will create.

Robbie Williams, Project Director of the Oxford Flood Alleviation Scheme, said:

"Gaining the committee's approval marks significant progress in our ambition to better protect Oxford residents and businesses from the sort of flooding that we have seen in recent years and can expect in the future. We are delighted with the outcome of today's meeting. We have consulted widely to design what we believe to be the best scheme for Oxford, which will bring both greater protection from flooding and other amenity and environmental benefits to the community."

Councillor Pete Sudbury, Deputy Leader of Oxfordshire County Council with Responsibility for Climate Change, Environment & Future Generations, and Chair of the Oxford Flood Alleviation Scheme Sponsoring Group, said:

"I welcome the committee's support for the Oxford Flood Alleviation Scheme. The scheme will provide Oxford with vital protection from flooding and help the city to become more resilient to the effects of climate change. The Council will work closely with the Environment Agency to secure the swift delivery of the scheme and ensure local communities can benefit from reduced flood risk as soon as possible."

Councillor Nigel Chapman, Cabinet Member for Citizen Focused Services and Council Companies, Oxford City Council, said:

"This an important milestone in the scheme which brings us another stage closer to ensuring peace of mind for our city as we face wetter winters. Oxford has a long history of flooding, and many people have experienced the disruption it causes to homes, businesses, main roads, railway lines and vital services. Flooding also affects the mental health of communities who see their lives, homes and businesses devastated by floods."

Councillor Bethia Thomas, Leader of Vale of White Horse District Council, said: "We are pleased that the Oxford Flood Alleviation Scheme has reached this next stage in securing planning permission; this is an important step forward for the project and welcome news for the Vale communities of South Hinksey, Kennington and North Hinksey, who are at regular risk of flooding. As we face increasingly unpredictable and extreme weather, the Oxford Flood Alleviation Scheme is more urgently needed than ever."

Dr David Prout, Pro-Vice-Chancellor (Planning and Resources), University of Oxford, added:

"On behalf of the University of Oxford, I am delighted that the Oxford Flood Alleviation Scheme has received the backing of the planning committee. The University is a strong supporter of the scheme, and we believe addressing flood risk for the long term will help ensure a prosperous, sustainable future for the city."

The Oxford Flood Alliance (OFA), made up of local residents affected by flooding, has worked closely with the Environment Agency on the development of the Oxford Flood Alleviation Scheme. Simon Collings, from the OFA, said:

“We’re proud to have helped get the scheme to this point; it has been a huge effort across multiple partners bringing their expertise to the table. We believe the Oxford Flood Alleviation Scheme is the best option for Oxford, its communities, its economy and biodiversity. Risk of severe flooding is increasing all the time and we need to ensure we are in a position to manage this.”

Water scarcity risk rises in East of Scotland despite unsettled weather



The Scottish Environment Protection Agency (SEPA) is urging businesses to stay vigilant and ensure water supplies are managed sustainably as water scarcity Alerts are issued for areas around Firth of Tay and Firth of Forth. The risk of water scarcity for areas around the rivers Don (Aberdeenshire), Tay, Earn and Clyde has also been raised to Early Warning. SEPA advised in the latest weekly report published on Thursday 1st August. Parts of the East, along with Kintyre, Irvine and Ayr, and the Cree area of Galloway remain at Early Warning.

While much of Scotland has experienced a relatively wet summer so far, some regions have experienced drier than average conditions. Limited rainfall over the past week, particularly across more central parts of Scotland, has meant that ground conditions and river flows have deteriorated across much of the country.

Ground conditions remain Quite Dry across much of the East and parts of the South-West. Firth of Tay and Firth of Forth areas have Dry ground conditions. Claire Tunaley, Senior Hydrology Specialist at SEPA, said:

“Although the sun may not always shine during the Scottish summer,

we all know the weather can be unpredictable and we’re now seeing drier conditions across parts of the country. “This is a crucial time of year for water demand – it’s important water users and abstractors are aware of the risk of water scarcity so we can all help reduce pressure on the water environment. We know it can be challenging for businesses that rely on the water environment to plan ahead during periods of unsettled weather, but the reality is the situation can change very quickly should we have drier than average conditions.

“We’re encouraging abstractors to monitor water usage and review best practice to prepare for these dynamic conditions, rather than waiting until levels reach a critical state. Sustainable water management not only reduces environmental impacts during dry periods but can also lead to cost savings and improved efficiency for businesses.”

Investment project to reduce storm overflow spills is the first of its kind in the UK

Northumbrian Water has started a ground-breaking £20m project which is set to significantly reduce spills from storm overflows across Tyneside. The project, which is set to be the first of its kind in the UK, will see a combination of new technology, sensors and AI analytics used to lower the risk of overflows happening and is based upon research and proven techniques used in the United States.



In South Bend, Indiana, USA, the smart sewer technology – sensors, AI analytics, control measures – were installed in a section of wastewater network with the aim of reducing the number of spills from storm overflows. Over a 10 year period, they saw an 80% reduction in the amount of spills with a combination of smart controls and targeted investment. The ‘smart sewer’ project is revolutionary in that it will allow Northumbrian Water to make changes to the flow and direction of wastewater (which contains a dilute mix of sewage, rainwater, run-off from roads and fields, and water from sinks,

showers and appliances) moving it around the sewer network, and making spills less likely to happen. Using a mix of AI technology and hundreds of smart sensors placed along sewer pipes, it will predict when and where rain is about to hit in the region and when and where the sewer networks are more likely to reach capacity and spill.

It will then automatically balance the flows of the network, diverting this wastewater to the emptier parts of the network, managing capacity and reducing the likelihood of spills taking place. The technology will also identify areas where additional capacity is needed, allowing further targeted investments to be made to build alternative storage for rainwater where it is needed most.

This real-time decision support system will be powered by a digital twin – which is a digital version of the physical sewer network which runs ahead of time and gives Northumbrian Water more control over the system and the chance to make changes before spills happen. The “smart sewer” will be carried out in partnership with HydroDigital, and will help to reduce the impact of storm overflows on the region’s rivers and keep the high standards of the region’s bathing waters – with 32 of the region’s 34 bathing water currently meeting Defra’s top two standards of Excellent and Good.

Nigel Watson, Information Services Director at Northumbrian Water, said: “This is an exciting and really innovative project which is set to completely revolutionise the way that our network operates, and maybe even how our industry works as a whole. We are determined to be at the forefront when it comes to using clever new technology to protect our rivers and coasts as much as possible. This could be a massive step for us towards reducing how we use storm overflows. We know that we, like all water companies, need to do better when it comes to managing how storm overflows operate – and this, along with other innovations and projects we are working on, is set to be a huge step forward in protecting our environment, whilst continuing to protect homes and businesses from flooding.”

Luis Montestruque, Principal at HydroDigital, added: “With two decades of exclusive experience building smart sewer systems, we’re proud to partner with Northumbrian Water on this ground-breaking project. This initiative is pioneering in its use of AI for design, advanced hybrid digital twin technology, innovative stress avoidance routing control, and use of probabilistic weather forecasting. It stands out for its large number of sensors and globally coordinated control points and one of the most aggressive implementation timelines in the industry. This project will set a global standard in how water companies use smart sewer technology to reduce spills at a fraction of the cost and time needed by traditional engineering solutions.”

Three new wetlands created in Evenlode Valley

The Environment Agency has part funded the creation of three new wetlands in the Evenlode Valley, near Chipping Norton. The project, which was devised and delivered by the Evenlode Catchment Partnership, has created a total of four and a half hectares of wetland habitats adjacent to the Cornwell Brook. The brook has historically been straightened and dredged, most probably to improve land drainage, but the result is that it leaves the river separated from its floodplain.



Rivers connected to floodplains benefit from slowing moving water and therefore less flood risk to the valley and local communities downstream. They can also naturally filter sediments and nutrients, provide refuge for fish from high flows and create species rich wetland habitats.

Paul St Pierre, Environment Agency Geomorphologist said:

“Working with catchment partners, their network of experienced landowners and long-standing members of the community is a very effective way of delivering these massive projects. So many thousands of hectares of wetlands have been lost over the past hundred plus years that it’s incredibly rewarding and exciting to recreate them again.”

The reconnection to the floodplain has been achieved in innovative and environmentally friendly ways. Parts of the floodplain were lowered using large excavators and the old channel was filled in, encouraging the river to flow across the floodplain and create multithreaded flow pathways. As all material was sourced and reused on site, the carbon footprint was kept to an absolute minimum.

St Pierre continues:

“It will be interesting to monitor how these channels develop and how the rewetted floodplain soils start to provide a network of valuable wetland habitats. In some areas where we didn’t lower the floodplain,

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we cut away the banks, allowing the river to find its way across the old grassland meadow, before re-entering the existing channel. This has created a large area of slow flowing open water that already attracts large numbers of wading birds and wildfowl.”

Landowner Alex Ward says:

“I’ve been amazed by the birdlife which the new wetland has attracted. Heron and Egret arrived within days, and you could see Mallard feathers after a few weeks. Within six months this wetland has turned unquestionably the least attractive part of the farm into a paradise for ducklings, Ringed Plover, Sandpiper, Yellow Wagtail and Wheatear. I am looking forward to seeing what it will look like in two, let alone five years’ time.”

Ann Berkeley the Project Manager from the Evenlode Catchment Partnership says:

“We created three different wetland types. In the upstream wetland we removed a substantial amount of subsoil, creating riffles, pools and backwaters from the in situ gravel terrace materials. The middle wetland simply had the topsoil stripped and the beginning of channels formed to get the water out into the floodplain. The lower wetland had channels created at the start and return of the brook to direct the water into a permanent pasture, no soils were stripped.”

Habitat enhancement is taking root at Durleigh

An ambitious project to create a variety of habitats in which a wide range of trees, plants and animals can thrive is taking shape next to Durleigh Reservoir to the west of the town over the coming months.

Teams will move on to the land to start preparing the ground on two fields previously used for arable farming, the latest stage of Wessex Water’s investment in and around the reservoir, which supplies drinking water to more than 44,000 people in the area. The habitat work follows the company’s previous project at the same site which saw a new wetland created that has substantially reduced chemicals, sediment and silt within Durleigh Brook, improving the quality of water reaching the reservoir and nearby water treatment centre.

This latest phase will see more than 1.5 hectares of lowland meadow created on adjacent land, while more than 4.5 hectares of trees will also be planted to sit alongside the previous river realignment work. A further 15 ponds and scrapes, or seasonal shallow ponds, will also be dug.

Wessex Water’s Conservation, Access and Recreation (CAR) Manager Tom Reynolds said:



“By creating these habitats we can complement our previous river realignment project, providing further permanent and seasonal ponds on site, creating features that mimic those found in ancient woodlands, plus delivering a mosaic of habitats that include wetlands, meadows and species-rich grassland. We’ll be maintaining these habitats into the future and planting woodland and meadow species that are appropriate to the local area and reflect the different ground conditions, particularly soil moisture and nutrients, across the site. The key habitats created by this project will help to promote greater biodiversity across the area.”

Woodland species such as willow, oak, lime, wild cherry, dog rose, hawthorn and crab apple will be among those planted, while newts, frogs and grass snakes will benefit from the wet areas. The range of ponds will be dug as a more varied ground surface is prepared to allow the sowing of the meadows and tree planting to be completed from the autumn.

Conservation, Access and Recreation (CAR) Manager Tom Reynolds added: “Public footpaths will stay open during this work and where there may be minor diversions, we’ll be placing signs to inform path users and maintain safety, as well as working sensitively to minimise the impact on existing wildlife and local enjoyment of the area.”

The project is one of Wessex Water’s current WINEP (Water Industry Natural Environment Programme) projects being completed before 2025 that will see the industry meet environmental obligations as set out by the Environment Agency. Several schemes to restore and create priority habitats across at least 25 hectares of land are already under way, including restoring limestone grasslands at Charmy Down near Bath and a cattle-grazing project to help preserve and enhance Bleadon Levels, near Weston-super-Mare. Wessex Water’s £50 million reconstruction of the Durleigh water treatment centre at the eastern end of the nearby reservoir came into supply in late 2022, to provide an improved water supply to customers in the Bridgwater area.

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Costain to support design of new Oxfordshire reservoir securing water supply for 15 million people across the South East



Known as SESRO (South East Strategic Reservoir Option), the new 150Mm3 reservoir will provide a resilient water supply for Thames Water customers in London and the Thames Valley, as well as customers served by Affinity Water and Southern Water. The new reservoir will also create new habitats, increase biodiversity, and provide new leisure and recreation facilities.

The work will see Costain conduct clay compaction trials to understand the ground conditions at the proposed site. Within the proposed reservoir footprint, on land owned by Thames Water, three test embankments will be built, each approximately 50m long, 20m wide, and up to 3m high, using the same plant and methodology as the proposed reservoir embankments. Geologists will then determine the performance of the Kimmeridge clay under different compaction conditions. The data gathered will have a direct impact on the reservoir embankment design and construction methodology.

Costain has also provided constructability advice to inform Thames Water's design proposals for the new reservoir. Drawing on its experience and capabilities in the wider infrastructure ecosystem, Costain provided design, construction and sequencing recommendations for significant elements of the project, including the embankment, tunnelling and the rail siding from the Great Western Mainline, which runs to the south of the proposed site.

In addition, Costain will also provide safety, health, environment and quality (SHEQ) assurance and act as a logistical hub for all ground and environmental investigations, including archaeological assessments on the site. The clay compaction trials will begin in the summer and are expected to take between six and 12 months to complete, depending on weather conditions. At the end of the project, all land will be

restored to its original state. Graham Sugrue, framework director at Costain, commented: "The UK needs to upgrade its water infrastructure to meet increasing demand and remain resilient in the face of climate change. Working with Thames Water to help it develop a reservoir that will serve around 15 million people across the South East is a huge honour.

"This is a project that will see our customer benefit from the breadth and depth of Costain's capabilities. Our construction and infrastructure experts in water, road and rail, in addition to our environmental, geological and archaeological experts, will work together to provide Thames Water with the information they need to secure government approval and a Development Consent Order."

Leonie Dubois, head of engagement, land and consent, at Thames Water, added: "We have an excellent track record of working with Costain and we are looking forward to drawing on the team's expertise for this exciting project. We continue to listen carefully to residents, who naturally want assurances about the design and integrity of the reservoir. This is why we're starting the process to understand local ground conditions at a really early stage."

This news continues Costain's longstanding relationship with Thames Water, and follows its recent award to upgrade sewage treatment works as part of its Wastewater Asset Assurance Programme. Costain continues to grow in the water sector, having secured long-term framework agreements with both United Utilities and Northumbrian Water to deliver strategic infrastructure programmes for the AMP8 period.

Greece Fears Water Shortages After Warmest Winter Ever

After Greece's warmest winter and earliest heatwave on record, authorities are sounding the alarm over the risk of dire water shortages in the heat of the Mediterranean summer. "Would you like some water? Turn off the tap!" one public service announcement in Athens implores; another daily spot urges the capital's residents to not fill their bath all the way to the top. At the beginning of July, the Mornos reservoir around 200 kilometres (125 miles) west of Athens, the main water source for the Attica region surrounding the capital, levels were down 30 percent from the same period last year. Overall reserves for Attica were down by nearly a quarter over the same period, according to the water utility company EYDAP.

The influx of millions of tourists to the country's beaches each summer puts additional pressure on local resources, significantly increasing the population.

On some islands suffering from overtourism, the demand for water in summer “is sometimes 100 times greater than in winter”, said Nikitas Mylopoulos, a professor of water resource management at the University of Thessaly. Mylopoulos said the problem of mass tourism was being compounded by poor water management. At the end of June, a month-long state of emergency was declared for the Dodecanese island of Leros. The island’s council noted malfunctions at the desalination plant, alleging “poor maintenance in the past”. Other islands threatened by water scarcity include Sifnos in the Cyclades, Chios in the north Aegean and Lefkada and Corfu in the Ionian Sea. Sifnos’s mayor, Maria Nadali, has criticised “the overconsumption of water for swimming pools and watering large gardens”. On Lefkada, Michalis Makropoulos, a resident and author, denounced a “deplorable” situation where “the water was cut off at the end of June for four consecutive days”. In a local newspaper article, he blamed the problem on “years of mismanagement by the municipal authorities” and the “uncontrolled development of tourism without adequate infrastructure”. Prime Minister Kyriakos Mitsotakis travelled to Lefkada in July to announce “one of the largest water supply projects in Greece to cover the needs”.

Extreme weather:

The water shortfalls have been made worse by intense heat, which scientists say is at least in part a result of human-driven climate change. The mildest Greek winter on record has been followed by higher average temperatures this spring. Last month, the country’s earliest-ever heatwave resulted in the hottest June since 1960, with temperatures reaching 43 degrees Celsius in many parts of the country. The heat has also sparked an increase in wildfires, with more than a thousand recorded last month, over double the number in the same month last year, authorities say.

The head of the water utility EYDAP, Charalambos Sachinis, has said a “special plan” had been drawn up “to deal with extreme water shortages”, including investments of around 7,550 million Euros (\$819 million).

Elissavet Feloni, a hydrologist at the National Technical University of Athens, said the company was also planning to tap Lake Yliki, around 85 kilometres northwest of Athens, as an additional emergency source alongside the main Mornos reservoir. “However, this is an energy-intensive solution because the water has to be pumped up, whereas the Mornos stream has a natural gradient,” she said. “For better water management, a central body needs to be set up to develop a comprehensive approach to resources across the country,” she said.

Romanian Utility Tackles Water Losses with Advanced Data Analytics

A Romanian water utility is using advanced analytics to transform its infrastructure and tackle water losses in real time. ApaVital S.A., which serves more than half a million people in the region of Iasi, will apply intelligent data integration software to optimize its network, detect and prevent leaks, and ensure a more sustainable water supply for its communities.



In Romania, about 41% of water is lost before it reaches consumers due to leaks. To address the issue ahead of new leakage thresholds mandated by the revised European Drinking Water Directive, ApaVital is implementing Xylem Vue powered by GoAigua, a cutting-edge software and analytics platform from global water technology leader Xylem (NYSE:XYL).

The platform will combine data from across ApaVital’s existing infrastructure network of more than 4,000 kilometers of water pipes, 193 pumping stations, and 50,000 water meters. Operators will be able to monitor performance in real time and proactively identify and fix leaks. The utility aims to reduce water loss to below 20%, making households and businesses in the region more water-secure.

“As we grow our digital capabilities and increase our volume of data, we recognize the need to streamline our sources to increase operational efficiencies,” said Mihail Dorus, Managing Director at ApaVital. “This solution will give us the visibility to address critical challenges such as water losses and allow us to maximize our infrastructure investments and benefit our communities.”

“Most utilities already have plenty of data. The difficulty is turning the numbers into actionable insights and decisions,” said Kenny Khoo, Managing Director for Eastern Europe South at Xylem.

“Connecting data streams simplifies water management by giving operators a comprehensive understanding of how their network is performing. With greater system insight, utilities can optimize operations, unlock more value from existing infrastructure, and address challenges quickly and sustainably.”

UNICEF and Partners Advancing Sustainable Water Systems in Colombia

Estefany starts each day by brushing her teeth alongside her two children, 5-month-old Matías and 2-year-old Jeisson. Then she heads out to check the solar panels on her community's water system, preparing for her day's work — turning saltwater into fresh water.

A member of the Wayúu, the largest indigenous group in northern Colombia, Estefany lives in the Guarerao community in the country's La Guajira department. With an arid desert climate and an economy that relies on destabilising mineral resource extraction, fresh water is scarce in La Guajira. Natural disasters and weather emergencies compound the lack of safe drinking water.



Unsafe water, sanitation and hygiene (WASH) environments jeopardise children's health and human rights in Colombia and around the world. In 2023 alone, 136 children in La Guajira died due to preventable diseases related to poor WASH conditions, according to Colombia's National Institute of Health. Globally, over 1,000 children under 5 die every day from diseases linked to inadequate WASH services, which kill 1.4 million people every year.

UNICEF USA, UNICEF Colombia and the Baxter International Foundation recognise the urgent need for resilient and adaptive solutions, and have partnered since 2021 on programming to improve access to safe WASH services for thousands of children, adolescents, families and communities in Colombia.

The Baxter International Foundation recently extended its support through 2027 to reach thousands more children and families in the region. The additional funding will help UNICEF rehabilitate water systems, promote basic sanitation using community-based solutions, monitor water quality and distribute hygiene kits and other supplies to Colombia's most vulnerable children.

Solar-powered water plants improve the lives of women and girls. Estefany, 23, is the plumber for her local solar-powered water plant, which serves more than 2,500 people in her community, including over 600 students from the Isidro Ibarra Education Institution. The system converts contaminated, untreated groundwater into clean water that can be stored and used for multiple purposes. “Here, we all drink water from the plant because it comes out fresh. We use it for everything. We cook with it. We wash ourselves and our clothes,” Estefany explains.

Before the water treatment plant's installation, members of Estefany's community collected rainwater from contaminated sources like lakes and streams, sharing these unsanitary resources with livestock. “That is not life,” she says. “Salt water is not drinkable. Maybe for animals, but not for people.” Where no local water system exists, women and girls must collect water from untreated reservoirs, traversing rough terrain and risking gender-based violence. Many girls miss out on a comprehensive, quality education because of this arduous daily task, limiting their chances at employment and economic opportunity.

Expanding WASH services to build a healthier future for all. With UNICEF training, Estefany and the other members of her local water committee learned how to operate and maintain their new water system. Mastering these valuable technical skills and knowing that she can help her community build longterm resiliency inspired Estefany to continue her education, “so that I can work and so that my children have a better future.”

The expanded program aims to enhance access to quality, climate-resilient WASH services to directly benefit 12,000 children and families, and their broader communities, in Colombia's La Guajira and Chocó departments. Estefany describes how the water plant has changed her community. “When we did not have this system here, we used to buy water by tank truck, which cost between 320,000 and 350,000 pesos (\$80 – 90) for 1,320 gallons of water. Imagine those in the community that don't have the means to pay 320,000 pesos. It is important to maintain the system longterm to continue enjoying the clean water we have here.”

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Safe, sustainable WASH services safeguard children's health, well-being and education. Supported by UNICEF social behavior change training, more than 2,100 people, including over 850 children and adolescents, no longer practice open defecation. Self-built latrines and water points in homes and schools have led to more dignified environments and better public health outcomes.

Modifying behaviours and norms is essential to maintaining improved sanitation practices once UNICEF and its partners have completed their work. The extended partnership will support 70 communities — 45 in La Guajira and 25 in Chocó — in eliminating fecal contamination and open defecation. Thirty of these communities will also receive support to improve hygiene practices and increase access to climate-resilient WASH services in six schools.

One project, many interlocking goals

Adopted by United Nations Member States in 2015, the 2030 Agenda for Sustainable Development, set forth 17 interconnected UN Sustainable Development Goals (SDGs), illustrating how the global community can work together to tackle poverty, improve lives and protect the environment. Every SDG affects children's ability to reach their full potential.

The collaboration between UNICEF and the Baxter International Foundation demonstrates how one partnership can address multiple targets. In implementing new WASH infrastructure and sustainable, climate-resilient systems that are managed by community members, the project touches on SDGs pertaining to WASH, infrastructure, climate action, gender equality, and sustainable cities and communities. For her own children, Estefany hopes that “They have a way to study and that the water system is not temporary, but permanent because we all benefit from it, children and adults.”

Mozambique, Malawi and Tanzania sign MoU for the Joint Management of the Rovuma/Rovuma River Basin

The Rovuma River Basin countries — Malawi, Mozambique and Tanzania — on 31 July signed a Memorandum of Understanding in Dar es Salaam in pursuit of stronger cooperation in water management. The MoU will be the reference point for further discussions on basin management cooperation efforts in general, the crafting of a basin treaty and the establishment of River Basin Organisation in particular. The riparian states are receiving support from the SADC, working with the GIZ-TWM, IUCN, GWPSA and WaterNet. The governments of Mozambique, Malawi and Tanzania intend to maximise their contributions to the mutual management of the resources of the

Rovuma River Basin. The memorandum, signed on Wednesday in Dar es Salaam, foresees the strengthening of cooperation in matters of use, development, protection, conservation and sustainable management of the Rovuma River Basin, a press release issued by the Mozambican Ministry of Public Works, Housing and Water Resources reads. Shared by the three countries, the Rovuma River Basin extends for 760 km, 650 km of which serves as the border between Mozambique and Tanzania. It is rich in aquatic and terrestrial biodiversity, in particular the 42,400 square kilometre Niassa National Reserve, which covers parts of the provinces of Cabo Delgado and Niassa, whose development is likely to be boosted by the implementation of the Integrated Transboundary Water Resources Management.

The agreement was signed during the meeting of the Council of Ministers for the Rovuma Basin by Carlos Mesquita, Minister of Public Works, Housing and Water Resources; Jumaa Hamido Aweso, Minister of Water of Tanzania; and Abida Sidik Mia, Minister of Water and Sanitation of Malawi. The agreement serves as a platform for cooperation partners, the Southern African Development Community (SADC) and member states to assess the progress of the basin roadmap and discuss the implementation of the subsequent project, financed by the Global Environment Facility (GEF).



At the ceremony, the Mozambican government was represented by the Minister of Public Works, Housing and Water Resources, Carlos Mesquita, who said that the agreement would bring numerous advantages to the three countries, namely the openness of member states to the development of regional projects, as well as the possibility of mobilising financing for their implementation, resulting in economic and social benefits for the communities living along the Rovuma Basin.



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Minister Mesquita further highlighted that the Rovuma River basin was almost unparalleled in the SADC region as being among the few shared basins that are still in their natural conditions, that is, without storage infrastructure (dams). “This river basin is rich in aquatic and terrestrial biodiversity, and a large part of it is still intact, especially in Mozambique, where the Rovuma flows through the provinces of Niassa and Cabo Delgado,” Minister Mesquita said.

“In this sense, Mozambique considers that there are many challenges for its management, with emphasis on the sustainable use and guarantee of water supply to the main water-using sectors, the vulnerability associated with water (floods and droughts), water quality and health of the aquatic ecosystem, as well as good water governance and implementation of Integrated Water Resources Management, from the perspective of transboundary water management,” he added.

These challenges “increase the need to adopt structural and non-structural measures, which require cooperative actions between the riparian states. In the current context of climate change, in which our region was hit by El Niño, we hope that the ongoing initiative will help to create and promote integrated and sustainable resource management through the implementation of measures to guarantee water safety in the Rovuma river basin, in order to mitigate the occurrence of water-borne diseases, such as COVID-19 and diarrhoeal diseases, and mitigate the impacts resulting from water scarcity”.

Cooperation between the three countries also extends to the Zambezi River basin, with the creation of the Zambezi Watercourse Commission (ZAMCOM) in 2024. Malawi has however not yet ratified the agreement establishing the commission.

South Bay Plant Awarded \$400M Contract to Expand Facility by Border Water Authority

California’s elected leaders Wednesday applauded the International Boundary and Water Commission’s announcement that it has awarded the contract for a project to expand the South Bay International Wastewater Treatment Plant. Over the course of the project, the IBWC will use the more than \$400 million in federal funding secured by the Congressional delegation to repair and expand the plant.



“Today’s announcement for the South Bay International Wastewater Treatment Plant is a step in the right direction in beginning to seriously address toxic waste and raw sewage flowing from the Tijuana River. The health and environmental hazards created by this pollution has contaminated Southern California’s air and water for too long, and I’m committed to fighting for more federal resources to address this crisis with the urgency it demands”, said Sen. Alex Padilla, D-California.

In March, the San Diego Congressional delegation secured over \$156 million in funding toward critical repairs to the South Bay International Wastewater Treatment Plant. In 2019, the delegation secured \$300 million to expand the South Bay plant from 25 million gallons per day to 50 million gallons per day. In 2022, the delegation passed legislation to clear the path for the IBWC to use the funds to address harmful pollutants in the Tijuana River Valley. “Our communities can’t wait. I’m glad to see the IBWC take this important step, which will allow them to put the more than \$400 million my colleagues and I secured for the South Bay International Wastewater Treatment Plant to work for repairs and upgrades,” said Rep. Juan Vargas, D-San Diego. “This project will help double the plant’s capacity, prevent up to 90% of untreated wastewater from reaching the coast, and provide cleaner and safer water. I’ll keep fighting alongside the San Diego Congressional delegation to secure the resources needed to combat pollution in the Tijuana River Valley, make sure Mexico does its part, and ensure our water, land, and air is safe for all,” he said.

In May 2024, the elected officials called on the U.S. Centers for Disease Control and Prevention to look into the contaminants in the water, soil, and air from the sewage and the connection to reported increases in illnesses and other symptoms. The CDC has agreed to begin an investigation into the public health impacts of the Tijuana River sewage pollution. “This announcement has been a long time coming — and I’m so excited to see the \$400 million that our congressional delegation secured result in big, meaningful progress to end the Tijuana River Valley crisis,” said Rep. Sara Jacobs, D-San Diego. “Our work isn’t over yet, and we will continue to review the progress of the IBWC construction, collaborate with our Mexican counterparts, and work together to ensure that communities on both sides of the border can live safely.”

Key Scottish sectors warned of doubling of drought events by 2050

Key Scottish industries are being encouraged to do more to adapt to climate change after researchers found that the number of water scarcity events in Scotland could double by 2050.

AUGUST 2024

GLOBAL WATER NEWS



The research, led by The James Hutton Institute, focused on how climate change is impacting water availability for the farming and whisky sectors, which could be left increasingly high and dry.

In some catchments, it found that surface water scarcity events, where river levels drop to significantly low levels, could increase in frequency from one every five years to every other year – or even more often, potentially meaning more restrictions on using these waters.. The study was commissioned by Scotland's Centre of Expertise for Waters (CREW), which is based at the Hutton, with partners at Scotland's Rural College, the University of Aberdeen and the British Geological Survey.

Dr Miriam Glendell, who co-led the work at the Hutton, said: "We found that, for many, water scarcity is already an increasing issue. At critical times of the year, even short periods of water shortage could lead to vegetable and fruit crop failure.. Some are already taking measures to adapt, particularly in the distilling sector, where technical advances could help reduce their need for water for cooling, but many could be at risk if they don't take more action. Our work suggests more information would help them, about resources, but also adaptation strategies they can take, as well as help funding these and collaborating across catchments over resources."

The study found that April/May and late August/September, in particular, are expected to be noticeably drier, potentially impacting crop yields and livestock gains. Recommendations included using more efficient irrigation methods, avoiding the introduction of more water demanding crops, increasing water harvesting and storage of water during wetter months. While using groundwater was seen as a potential way to address water shortages, more information was needed on where and when this could be a viable option. In some areas, summer groundwater levels have been lower in recent years, compared with previous decades. Areas with low groundwater storage capacity and decreasing groundwater recharge are likely to become increasingly vulnerable to drought. To support these areas, British Geological Survey and the University of Aberdeen developed a

new framework to help estimate groundwater resilience. The report also suggests that increased monitoring could help, as well as improved coordination of water resources use across catchments and the provision of adaptation advice and funding was also recommended.

Dr Kirsty Blackstock, who co-led the work at the Hutton, said: "Water scarcity is a clear risk to business resilience and, once aware of these risks, participants were looking for solutions. But more information is needed on potential returns on investment and how the solutions can fit in with existing farm practices. Clarity on funding opportunities for these interventions in the new Agricultural Payments Tiers would also help them to adapt." The project team also recommended cross-sector coordination to prepare for future water extremes and a greater role for river catchment partnerships to coordinate use of water resources at landscape scale.

Rethinking desalination: Turning wave power into freshwater using advanced offshore desalination technology



Co-funded by the
European Union

OSLO, NORWAY –Norwegian clean-tech group Ocean Oasis will turn seawater into freshwater using renewable wave power to address water scarcity issues on the Canary Islands. Situated off the west coast of Africa, the islands in the archipelago face serious water shortage problems, putting pressure on already depleted water resources. As such, business and communities on the island have become much more dependent on sea water desalination for freshwater. The consortium's DESALIFE (Desalination for Environmental Sustainability And LIFE) project will test and validate Ocean Oasis' wave-powered solution providing desalinated water from floating buoys in deep water off the coast of Gran Canaria.

Floating desalination buoys will increase the volume of affordable and sustainable freshwater available to the local population and farmers in the north region of the island. A pilot buoy, Gaia, has been employed already to validate the technology at a site offshore the Port of Las Palmas, made possible by co-funding from the European Innovation Council Accelerator, Innovation Norway and other funders.

Creating accessible and abundant water

DESALIFE's consortium aims to have the first pre-commercial buoys producing fresh water by mid-2026. Kristine Bangstad Fredriksen, CEO and Co-Founder of Ocean Oasis, said: "At Ocean Oasis we believe that by harnessing the power of renewable energy, such as wave power, we have the potential to create a future where clean water is accessible and abundant, not scarce. We are honoured to lead the DESALIFE project consortium to deliver renewable powered desalinated water, with zero emissions, to Gran Canaria. This first-of-a-kind project will demonstrate our solution for the Canary Islands, and the potential to deliver freshwater to other coastal areas and island nations facing water scarcity." Ocean Oasis' technology addresses the challenges associated with access to affordable and clean freshwater. More than 300 million people rely on desalination of seawater for their water supply, a number that is expected to double by 2030 due to climate change, droughts, increasing populations and urbanization.

Incorporating innovative systems

The north coast of Gran Canaria was chosen for its wave potential, operating conditions and proximity to existing onshore desalination facilities. The local population currently relies on three desalination plants for drinking water. One of those, the Arucas-Moya seawater desalination plant will contribute to the implementation and operation phases of the DESALIFE project by integrating the offshore freshwater produced by the desalination buoys with its own production.

As a result, the facility will increase production by 2,000 m³/day on average, the equivalent of the daily consumption of 15,000 people. This will be achieved without the need to expand the existing on shore plant, or increase its energy consumption, CO₂ emissions or its brine discharge from shore. The Councilor of Territorial Policy, Territorial Cohesion and Water of the Government of the Canary Islands, Manuel Miranda, highlighted the values of the project, which he said, "combines solutions to address the increasing water production demand in the Islands with an environmentally friendly alternative". Miranda added that the proposal is "aligned with the collaboration between diverse institutions to incorporate innovative systems to the water cycle in the Archipelago, already a pioneer when searching for formulas for obtaining fresh water". "The Government of the Canary Islands will continue to focus on evaluating how systems can be incorporated to not only provide greater production efficiency but also allow further deepening on measures contributing to mitigate climate change," said Councilor Miranda.

Norwegian offshore industry experience

Ocean Oasis' buoys produce freshwater using membrane-based

desalination technology powered directly by wave induced motion, with no need for grid power, any emissions to the atmosphere and without chemicals on board. The technology has been developed for sustainable use of the oceans drawing on 50 years of experience and knowledge development in the Norwegian offshore industry.

Dr. Thomas B. Johannessen, CTO, co-founder and inventor of the technology commented: "We are grateful and feel privileged to be given this opportunity to take the Ocean Oasis technology to the next commercial level. Wave power is abundant, and a concentrated energy form compared with solar and wind power. Whereas the power of the waves must be treated with respect in engineering and design of offshore structures, the pilot testing carried out to date suggests that direct desalination is a very good way to utilise wave energy bypassing many of the challenges associated with electricity production by wave power."

The DESALIFE consortium received nearly €6 million in funding from the European Executive Agency on Climate, Infrastructure and Environment (CINEA) under its framework of Circular Economy and Quality of Life Programme. The project will be led by Ocean Oasis Canarias, a subsidiary of Ocean Oasis, which is based in Gran Canaria. The Consortium include key institutional and private partners: The Canary Islands Institute of Technology (ITC), The Oceanic Platform of the Canary Islands (Plataforma Oceánica de Canarias, PLOCAN), The Group for the Research on Renewable Energy Systems (GRRES) of the Universidad of Las Palmas de Gran Canaria (ULPGC) and elittoral, an environmental consultancy specialized in coastal and oceanographic engineering.

A commitment to renewable energy

Miguel Hidalgo, vice president of the Gran Canaria Island Water Council, stated: "The participation of the Gran Canaria Island Water Council in the DESALIFE project, within the scope of insular hydrological planning, represents a strong commitment to promoting and developing reference projects aimed at harnessing renewable energy resources, such as wave energy."

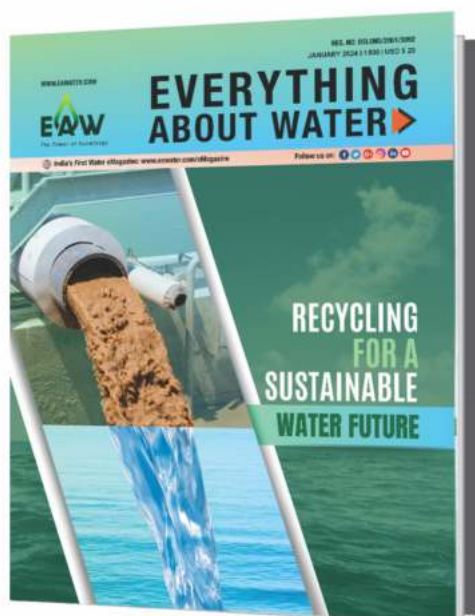
It is also a central objective in the project to investigate the scalability of the technology to provide fresh water to other islands in the archipelago, which are also experiencing water scarcity issues. Once operational, the buoys will facilitate the transition toward a sustainable, energy-efficient and climate-resilient economy in the archipelago. They will also demonstrate that the solution has potential for use in other coastal communities, to provide emission-free, cost-effective sources of fresh water.

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BENTLEY SYSTEMS TO HOST 'BENTLEY ILLUMINATE 2024' IN NEW DELHI

New Delhi, 12th August, 2024, – Bentley Systems, Incorporated (Nasdaq: BSY), the infrastructure engineering software company is set to host its prestigious marquee event, 'Bentley Illuminate' at Pullman Hotel, New Delhi on September 10th. At the event, Bentley Systems will showcase its transportation, water infrastructure, electric utilities, and airport solutions, as they light the path to a more efficient, resilient, and sustainable future for India's economy. This initiative aligns with the government's Viksit Bharat 2047 roadmap to turn India into a USD 30-trillion developed economy in about two decades for a projected 1.65 billion population.

'Bentley Illuminate' will bring together industry leaders, experts, and stakeholders to discuss and explore innovative strategies and technologies to build a resilient and sustainable future for India's infrastructure. The event will feature insightful plenary keynotes, addressing the opportunities and challenges for Indian infrastructure, industry solutions to support Viksit Bharat 2047, and strategies for advancing sustainable civil infrastructure.

'Bentley Illuminate' will include a demo of digital twin projects by the company and a series of parallel industry tracks focused on transportation, water infrastructure, electric utilities, and transportation showcasing Bentley's innovations in each of these sectors. Bentley calls out to all industry leaders to join them at the event, network and work towards new strategies in infrastructure planning and delivery to better serve our communities and businesses. More details about 'Bentley Illuminate 2024' can be found

here
<https://events.bentley.com/bentleyilluminateindia/partnerrefMedia>

About Bentley Systems

Bentley Systems (Nasdaq: BSY) is the infrastructure

engineering software company. We provide innovative software to advance the world's infrastructure – sustaining both the global economy and environment. Our industry-leading software solutions are used by professionals, and organizations of every size, for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, mining, and industrial facilities. Our offerings, powered by the iTwin Platform for infrastructure digital twins, include MicroStation and Bentley Open applications for modeling and simulation, Seequent's software for geoprofessionals, and Bentley Infrastructure Cloud encompassing ProjectWise for project delivery, SYNCHRO for construction management, and AssetWise for asset operations. Bentley Systems' 5,200 colleagues generate annual revenues of more than \$1 billion in 194 countries.

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DANFOSS - STAYING THE COURSE DESPITE MARKET HEADWINDS: H1 2024

- **India remains the fastest-growing region for the Danfoss Group, with strong double-digit growth in H1** driven by increasing opportunities in energy efficiency and electrification, supporting the Group's ambitious plans to double sales in India by 2025
- After three years of significant growth, organically and through M&A, the first half of 2024 has proven to be challenging for Danfoss due to lower demand in select key markets.
- Group sales amounted to EUR 5 billion, and a half-year EBITA of EUR 533 million corresponding to an EBITA margin of 10.6% as against 12.4% last year. Staying the course, investments in innovation continue at a high level.
- The lower demand is expected to continue for the rest of the year, and actions to adapt to the current market situation are in progress.

Nordborg, Denmark; Chennai, India, August 24, 2024:

Danfoss continues to see robust performance and resilience, especially in their Climate Solutions, Drives, and most of the Electrification businesses. The most important growth drivers continue to be decarbonization in industrial sectors, digitalization/datacenters, and electrification. The lower demand is seen in selected end-markets like agriculture and construction/roadbuilding, which are in a downcycle impacting Danfoss Power Solutions segment. The European construction market continues to be soft, particularly in Central Europe, impacting especially the heating business, such as residential heat pumps and the district heating market. Finally, the automotive/EV-market, in both Europe and the US, has seen significant reductions in OEM production schedules for 2024 and 2025. The activity level in Europe and China continues to be soft and is expected to continue for the rest of the year, while the US show signs of a slowdown. We continue to see good growth momentum in India.

"I would like to thank the Danfoss team for showing resilience and strong engagement, maintaining full focus on serving our customers. It is exciting to see how the entire team is fully engaged to stay the course and does what it takes to manage through this cycle. We have successfully navigated various economic cycles before, and we are doing so again. While the current situation may be challenging, it is important to emphasize that we will continue pursuing our long-term growth strategy," says Kim Fausing, President & CEO of Danfos. Our three segments continued to invest in innovation and developing our global footprint, bringing innovative solutions and technology to the market and our customers. Research and development investments amounted to EUR 247 million (H1 2023: 249 million),

on par with last year and corresponding to 4.9% of sales (H1 2023: 4.5%).

Danfoss India

Danfoss India is experiencing robust growth, driven by the rapid expansion of data centers, commercial buildings, and cold chain infrastructure across the country. Additionally, the Indian government's strong push towards decarbonization, coupled with initiatives like the Production-Linked Incentive (PLI) schemes, is further fuelling our growth momentum. As a leader in sustainable solutions, we are committed to supporting India's ambitious carbon neutrality goals. Our innovative products and solutions are designed to help customers reduce their carbon footprint and transition to cleaner, more energy-efficient processes. With our expertise in electrification, energy efficiency, and climate-friendly technologies, we are well-positioned to be a preferred decarbonization partner for our customers in India. We will continue to invest in and develop cutting-edge solutions that enable our customers to achieve their sustainability objectives, while also driving business growth and competitiveness.

Mr Ravichandran Purushothaman, President, Danfoss India,

says, "India continues to be the fastest growing region for Danfoss group, and we're proud to be at the forefront of the country's sustainable transformation. With the rapid expansion of data centers, commercial buildings, and cold chain infrastructure, coupled with the government's strong support for decarbonization, we're confident in our plans to double sales by 2025. Our innovative products and solutions are designed to support India's carbon neutral ambitions, and we're committed to being a trusted partner for our customers as they navigate this journey."

Setting Danfoss up for the future

We have initiated the implementation of an updated operating model, aiming to further support our long-term growth strategy, strengthen innovation and our entrepreneurial mindset, and improve performance. Guided by focus on market and customer proximity, scalability, and simplification, we want to establish stronger end-to-end accountability in the business, increase cost competitiveness, and speed up decision-making across the company.

Mr Kim Fausing, CEO, Danfoss Global, says, "By updating our operating model, we are setting Danfoss up for the future. This is essentially about further decentralization and empowering our teams to make decisions closer to our customers. We will simplify the organization by eliminating duplications and reducing the fragmentation of accountabilities, enabling faster decision-making and a more responsive organization."

As we are targeting to simplify and eliminate duplication and fragmentation of accountabilities, this also means parting from some of our talented and dedicated colleagues. While this is not an easy decision to make, it is an important step to enable the long-term success of Danfoss. Additionally, as several businesses are impacted by the volatility and lower demand in the market, they are seeing the need to adapt to the current market situation.

Danfoss' commitment to sustainability

We remain committed to decarbonizing our global operations (scope 1 and 2) by 2030, as part of our three step-change initiatives on Decarbonization, Circularity, and DE&I (Diversity, Equity, and Inclusion). In the first half of the year, we continued to reduce our own emissions. In China, we signed a local Power Purchase Agreement (PPA) that, from 2025 onward, will reduce our annual scope 1 and 2 emissions in China by 33% and 9% globally. In total, we have now secured agreements to decarbonize 60% of our operations in China.

Outlook for the year

Danfoss has a continued ambition to expand or maintain our market share. Due to the current downcycle, sales are now expected to be in the lower end of the range of EUR 10.0-11.5 billion for the full year. The EBITA margin is now expected to be in the range of 11.0-12.0%, following the continued integration of already acquired businesses as well as investments in the development of new products and solutions. We are in the process of assessing our strategic options to reduce our cost base, which might cause further one-off costs. The expected growth and profitability performance is dependent on the development of global supply chain stability, the geopolitical environment, and inflation as well as general global growth rates.

Danfoss Global - Key figures for the first six months of 2024

- Sales decreased 9% to EUR 5,012 million (H1 2023: 5,528m).
- Investments in innovation (R&D) continued on high-level EUR 247m (H1 2023: 249m), corresponding to 4.9% of sales (H1 2023: 4.5%).
- Investments (CapEx) excluding M&A was EUR 220 million (H1 2023: 274m).
- Operating profit (EBITA) decreased 22% to EUR 533 million (H1 2023: 686m), leading to EBITA margin of 10.6% (H1 2023: 12.4%).
- Free operating cash flow after financial items and tax (before M&A) amounted to EUR -118 million (H1 2023: -125m).
- Net profit decreased 28% to EUR 291 million (H1 2023: 402m).

HARNESSING IOT FOR SUSTAINABLE WATER INFRASTRUCTURE: REVOLUTIONIZING WATER MANAGEMENT AND CONSERVATION

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

INTRODUCTION

As populations grow, urbanization accelerates, and climate change exacerbates water stress, the imperative of sustainable water infrastructure has never been more pressing. Traditional approaches to water management are no longer sufficient to meet the demands of rapidly evolving urban landscapes. In this context, the convergence of IoT technologies with water infrastructure holds immense promise for optimizing resource allocation, reducing losses, and enhancing resilience in the face of water-related challenges.

In the face of escalating water scarcity and the pressing need for sustainable resource management, the integration of Internet of Things (IoT) technologies with water infrastructure offers a beacon of hope. By leveraging IoT sensors, connectivity, and data analytics, water utilities and municipalities can revolutionize the way water is managed, conserved, and distributed. In this comprehensive exploration, we delve into the role of IoT in sustainable water infrastructure, with a focus on water management,

conservation efforts, and the transformative potential of smart water meters.

INTRODUCTION TO IOT IN WATER INFRASTRUCTURE

The Internet of Things (IoT) represents a paradigm shift in the way we interact with the physical world, leveraging the power of connectivity and data to enhance efficiency, productivity, and sustainability. In the context of water infrastructure, IoT technologies play a transformative role by enabling the seamless integration of sensors, devices, and data analytics tools to monitor, manage, and optimize every aspect of the water supply chain. By collecting real-time data on parameters such as water flow, pressure, quality, and consumption patterns, IoT empowers water utilities and municipalities to make informed decisions, detect anomalies, and respond swiftly to emerging challenges. From smart meters and leak detection systems to advanced analytics platforms, IoT holds the key to unlocking new levels of efficiency, resilience, and sustainability in water infrastructure, ensuring the reliable delivery of clean water to

communities while minimizing waste and environmental impact.

WATER MANAGEMENT IN THE IOT ERA

At the heart of IoT-enabled water management lies the ability to collect real-time data from sensors embedded throughout the water supply chain. These sensors monitor various parameters such as water flow, pressure, quality, and temperature, providing utilities with unprecedented insights into system performance and demand patterns. By analyzing this data in real-time, water utilities can identify inefficiencies, detect leaks, and optimize distribution networks to ensure reliable and efficient service delivery.

ROLE OF IOT IN WATER CONSERVATION

Water conservation is a critical component of sustainable water management, particularly in regions facing acute water stress. IoT technologies play a pivotal role in advancing conservation efforts

through the implementation of smart water management strategies. Smart irrigation systems equipped with IoT sensors can monitor soil moisture levels, weather conditions, and plant water requirements to optimize watering schedules and minimize wastage. Similarly, IoT-enabled leak detection systems can quickly identify and repair leaks in residential, commercial, and municipal water networks, thereby conserving valuable resources and reducing non-revenue water losses.

THE EVOLUTION OF SMART WATER METERS

Among the most transformative applications of IoT in water infrastructure is the development of smart water meters. Unlike traditional meters, which provide limited insights into water consumption and require manual reading, smart water meters are equipped with advanced sensors and communication capabilities that enable remote monitoring and data collection. These meters offer a range of benefits, including real-time consumption monitoring, leak detection, automated billing, and consumer empowerment.

BENEFITS OF SMART WATER METERS

Smart water meters play a pivotal role in the Internet of Things (IoT) ecosystem, offering a multitude of benefits that contribute to more efficient and sustainable water management:

Real-time Monitoring: Smart water meters, equipped with IoT sensors, provide real-time data on water consumption, allowing utilities to monitor usage patterns continuously. This enables proactive management strategies and immediate response to fluctuations in demand or unexpected events.

Data-driven Insights: By harnessing IoT capabilities, smart water meters collect vast amounts of data on consumption, leakage, and system performance. Advanced analytics tools can then analyze this data to identify trends, detect anomalies, and optimize resource allocation, leading to more informed decision-making.

Remote Management: IoT-enabled smart meters enable remote monitoring and control of water infrastructure, reducing the need for manual intervention and site visits. Utilities can remotely access meter readings, troubleshoot issues, and adjust settings, enhancing operational efficiency and reducing maintenance costs.

Leak Detection and Prevention: Smart water meters utilize IoT sensors to detect leaks in the distribution network with precision. By continuously monitoring flow rates and pressure levels, these meters can identify leaks in real-time, allowing utilities to take prompt action to minimize water loss and prevent damage to infrastructure.

Consumer Engagement: With IoT-enabled smart meters, consumers gain access to real-time data on their water usage via mobile apps or online portals. This transparency fosters greater awareness and accountability, empowering consumers to adopt water-saving behaviors and reduce their environmental footprint.

Billing Accuracy and Efficiency: Smart water meters automate meter reading and data collection processes, eliminating the need for manual readings and reducing billing errors. This streamlines billing operations, improves accuracy, and enhances customer satisfaction.

Integration with Smart Grids: In the context of smart cities and IoT-enabled infrastructure, smart water meters can be integrated with other systems such as smart grids and energy management platforms. This integration enables holistic resource management, optimizing the use of water and energy resources for maximum efficiency and sustainability.

Overall, smart water meters serve as a cornerstone of IoT-centric water infrastructure, delivering actionable insights, operational efficiencies, and environmental benefits that contribute to a more resilient and sustainable water future.

CURRENT SCENARIO OF SMART WATER METERING AND IOT AROUND THE WORLD

In recent years, companies around the world have been harnessing the power of IoT technology to develop innovative smart water meters that are revolutionizing water conservation and management efforts. These advanced meters, equipped with sensors, communication capabilities, and data analytics tools, offer a range of benefits that contribute to more efficient and sustainable water usage practices.

Singapore's Smart Water Network: Singapore has emerged as a global leader in smart water management, leveraging IoT technologies to enhance efficiency and resilience in its water infrastructure. The city-state's Smart Water Network integrates sensors, analytics, and automation to monitor and

optimize water distribution, reduce leakages, and ensure reliable supply to residents and industries.

Barcelona's Water Efficiency Program: Barcelona's Water Efficiency Program employs IoT-enabled smart meters to monitor water consumption in residential and commercial properties. By providing consumers with real-time feedback on their usage, the program has successfully reduced water consumption, promoted conservation behaviors, and improved overall water management in the city.

CHALLENGES AND CONSIDERATIONS

While the benefits of IoT in sustainable water infrastructure are undeniable, several challenges must be addressed to realize its full potential. These include concerns related to data privacy and security, interoperability of IoT devices and platforms, upfront investment costs, and the need for skilled personnel to manage and interpret the vast amounts of data generated by IoT sensors.

CONCLUSIONS:

As the global water crisis intensifies and the demand for sustainable solutions grows, the integration of IoT technologies with water infrastructure emerges as a powerful tool for addressing water management and conservation challenges. From smart meters and sensors to advanced analytics and automation, IoT offers a pathway to more efficient, resilient, and equitable water systems. By harnessing the transformative potential of IoT, water utilities, governments, and communities can work together to build a future where water is managed responsibly, conserved wisely, and accessible to all.

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

MANAGEMENT OF WASTEWATER & REUSE OF TREATED WATER THROUGH INDIGENOUS TECHNOLOGY LIKE TADOX®

Dr. S K Sarkar, Distinguished Fellow, TERI and former Secretary, Ministry of Water Resources, Govt. of India.
Dr. Nupur Bahadur, Associate Director, Senior Fellow, Circular Economy and Waste Management Division, TERI

Water is critical for life and essential input for economic development. India is a water distressed country; out of 764 districts, 256 districts are water stressed, and the country is moving towards a water scarce country in the coming years. Water demand is continuously increasing and as per NITI Aayog report (2019), the water demand is estimated to be twice the water resources supply by 2050 due to various reasons. Rainfall is erratic due to global warming and climate change and there is spatial and temporal variation in this regard. The need for effective of wastewater (it is not waste, but used water referred as Apna Jal) is essential. The Budget Speech 2024-25 of Finance Minister in Parliament under Priority 5 talks about use of treated water for irrigation and filling up of tanks. The wastewater should be adequately treated for point of use.

India generates a huge amount of wastewater, about 72.4 billion litres produced daily (2024) while only 28 percent is treated. Remaining water flows untreated into sea, polluting water ways causing disease and killing wildlife. The States which produces about 40 percent wastewater are Maharashtra (9.1 billion litre), UP (8.3 billion litres), Tamil Nadu (6.4 billion litres), Gujarat (5.0 billion litres). In India, about 1093 sewage treatment plants had operation capacity of 26.9 billion litres of water per day with around 400 plants non-operational (2021). About 11,622 MCM is estimated amount of treated wastewater available for water

reuse (2021). It is expected to be 15,288 MCM by 2025, and 35,175 MCM by 2050.

About 70 percent of surface water in India is unfit for direct human consumption. Everyday almost 40 million litres of wastewater enter into rivers and other water bodies, only with a small amount of adequate treatment (2019). Such a release of polluted water upstream, lowers economic growth in downstream areas thus reducing GDP growth. Apart from economic costs, lack of water, sanitation, and hygiene results in loss of about 400,000 lives per year in India [Ref].

In Delhi, there is a gap of about 227 MGD of sewage treatment out of 790MGD sewage generation. The present STPs do not meet the standards of treated wastewater (2019).

Untreated waste goes to Yamuna river. The treated waste should have the following standards: PH (5.5-9.0), BOD (10mg per liter), TSS (20mg per liter), COD (50 mg per litre) N Total (10 mg per litre). Phosphorus Total (1 mg per litre), NH4-N (5mg per litre), Faecal Coliform (less than 230 MPN /100 ML). These standards are not normally fully met by STPs in Delhi using conventional wastewater treatment technology.

Thus the causes of water pollution are, inter alia, untreated or inadequately treated municipal sewage

coming through open drains from unauthorized colonies which are non-sewered in most cases, industrial wastewater coming as direct discharge and/ or outlet of ETPs/CETPs and non-point sources like the runoffs from agricultural activities and the urban areas.

Hence, we need to look wastewater treatment and management together with treated water reuse holistically and have short-, medium- and long-term strategies to mitigate and address challenges and concerns towards solving the water pollution problem.

TADOX® TECHNOLOGY

It is in this pursuit, TERI has developed a novel technology (patent applied) called TERI Advanced Oxidation Technology (TADOX®) (<https://youtu.be/tCt5rxC7eik>), which provides an end-to-end treatment of wastewater containing industrial effluent having high color, COD, BOD, TOC, dissolved organics, non-biodegradable and persistent organic pollutants (POPs) and municipal wastewater. TADOX® is under TERI's Patent (grant awaited) and also under various categories of Trademark with the Trademark Office, Govt. of India. TADOX® involves UV-Photocatalysis as an Advanced Oxidation Nanotechnology (AON), leading to oxidative degradation and mineralization of targeted pollutants.

Also it involves, novel approaches which make very less use of chemicals in the overall treatment leading to much reduced quantum of sludge, preventing secondary pollution and provide highly resource and energy efficient treatment.

A. TADOX® TECHNOLOGY FOR INDUSTRIAL WASTEWATER TREATMENT

In case of Industrial wastewater treatment, TADOX® works as an integrated technology, retrofittable within conventional treatment systems at either pre-biological or post-biological treatment stages as per BOD/COD ratio or even for polishing at the last stage in case of removing color from MEE condensates. Former approach protects biological treatment process from shock loads while latter approach improves downstream treatment and enhances overall efficiency. Further, having small footprint, few hours treatment time and together with resource & energy efficiency, the overall treatment is expected to bring down OPEX by 20-30% and CAPEX by 40-50% than current values.

Recently TADOX® completed successful trail in a CETP of a Textile and Hosiery Park in Roama Industrial area of Kanpur, UP under a project funded by Namami Gange Program of the National Mission for Clean Gange (NMCG), Ministry of Jal Shakti, Govt. of India (Figure.1) where 20 KLD standalone plant was operational for 7 months from Feb-Sept 2023 (Figure 2).



Figure 2: 20 KLD TADOX® Plant in the textile CETP.

Table 1: Water Quality Characteristics of the Raw and TADOX® Treated Water

S. No.	Parameters (Units)	Raw Effluent from Equalization Tank	TADOX® Treated Water	Regulatory Norms
1	pH	8.6	7.8	6.5 – 8.5
2	Total Suspended Solids in mg/L	270	6	100, max
3	Oil and Grease in mg/L	31.2	2.4	10, max
4	Chemical Oxygen Demand (COD) in mg/L	990	54.4	250, max
5	Biochemical Oxygen Demand (BOD) in mg/L	312.5	11	30, max
6	Colour (Hazens)	1249	22.33	50, max



Figure 1: Project site: CETP of Textile Hosiery Park in Roama Industrial area of Kanpur, UP under Namami Gange Program.



After continuous operation of the plant for 7 months, NABL accredited Government lab of Council of Scientific and Industrial Research - Indian Institute of Toxicological Research (CSIR-IITR) Lucknow, UP analysed the untreated effluent and TADOX® treated samples as per ISO/IEC 17025: 2017 which is summarised in table 1 below.

From Table 1, the percentage removal was calculated and found removal of TSS by 97%, Oil and Grease by 92.3%, COD by 94.5% and BOD by 96.5%. The Techno Economic feasibility data showed an average cost of treatment of INR 100 /m³. Raw and TADOX® treated water samples are depicted in Figure 3.

Thus it can be seen that the treated water consistently met the standards for downstream biological treatment. Specifically, the plant achieved a Chemical Oxygen Demand (COD) of less than 250 mg/L and a color intensity of less than 50 Hazens, aligning with the project's objectives for a 20 KLD onsite plant. The average sludge generated from end-to-end TADOX® Process was around 0.20 Kg/m³ as against 30-40

Kg/m³. The performance of TADOX® technology was evaluated based on its ability to remove key pollutants from textile effluent and hence demonstrated significant improvements in effluent quality, aligning with regulatory standards for discharge and reuse.

B. TADOX® TECHNOLOGY IN SEWAGE AND MUNICIPAL WASTEWATER TREATMENT

In case of Sewage and Municipal wastewater treatment, TADOX® having Advanced Oxidation is sufficient for direct treatment, without any kind of biological treatment or disinfection technology, not even requiring any kind of grey and black water stream segregation. With total treatment time of 4-5 h, together with high grade treated water quality (in many cases Class A Grade water quality, as per CPCB, Govt. of India Norms) makes it an excellent choice in improving current efficiencies in wastewater treatment together offering augmentation of capacity within existing infrastructure. Also it could serve as Decentralized Wastewater Treatment system and micro-STP in upcoming and existing infrastructural projects, townships, commercial complexes, Green Buildings, AMRUT and Smart Cities Project. Also under SBM 2.0, where the requirement is to enhance treated water reuse, this technology could be used at the polishing stage of the current STPs. Direct treatment and polishing of treated sewage are shown as two possibilities in Figure 4.

CASE STUDY OF TREATMENT OF RAW STP WASTEWATER

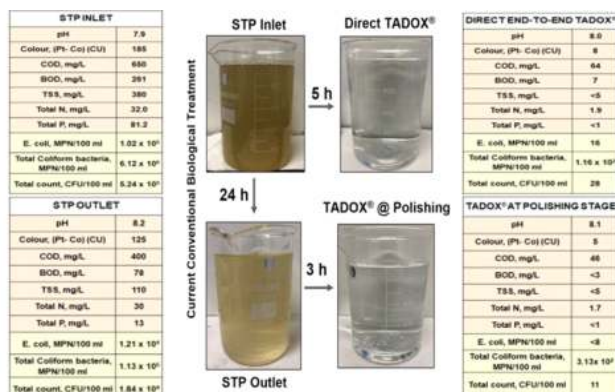


Figure 4: Possibilities of direct treatment and polishing of treated sewage

the National Mission For The project was funded by the National Mission For Clean Ganga (NMCG) under the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry

C. INTERNATIONAL RECOGNITION FOR TADOX® TECHNOLOGY

TADOX® Technology has been successfully implemented and piloted in both Industrial and Sewage treatment sectors and has been commercialized with two companies as Licensee Partners. These companies are Ion Exchange India Ltd. Mumbai and Dew Projects and Chemicals Pvt. Ltd. Noida and ready for deployment in field at small to medium scales ranging from 10 KLD-500 KLD. Efforts towards further upscale to 1 MLD and above is underway with the help of licensee partners and upcoming projects.

TADOX® Technology Demonstration Project bagged Silver Award in the prestigious International Water Association (IWA) Project Innovation Awards 2024, under the category of 'Breakthrough in Research and Development'. This award is amongst top three Innovation Projects in this category, which is amongst six categories of the Awards selected from 108 entries from 34 Countries was presented during the IWA World Water Congress & Exhibition (Figure 5).

The awarded project, titled "Integration of TADOX® Technology to achieve Net Zero in Textile Wastewater Treatment," successfully piloted TADOX® Technology in a Textile Common Effluent Treatment Plant (CETP) in the Roomba Industrial Area, Kanpur. This initiative marks a global first-of-its-kind deployment of UV-TiO₂ Photocatalysis-based Advanced Oxidation Technology on a full scale. The project was funded by



Figure 5: TADOX® Technology bagged Silver Award in the prestigious International Water Association (IWA) Project Innovation Awards 2024.

of Jal Shakti, Government of India, and was supported by the Roomba Pollution Control Association (RPCA).

AGENDA FOR ACTION

First, newer, advanced, clean, green and indigenous technologies like TADOX which are developed keeping Indian scenarios in mind should be promoted and incentivized by Policy makers and Regulators for early adoption by Industry and ULBs.

Second, there is hardly any skilled manpower for maintenance of new technology process. For this, there should be a suitable training program and stakeholder engagement in various industry set up.

Third, environmental Regulators in the states should monitor the strict effluent and discharge water quality standards for industries, municipalities and other sources.

Fourth, data availability mechanisms for monitoring should be set up using AI powered sensors, IOT devices, for detection of water pollution and meeting regulatory standards caused by wastewater before and after treatment using improved technologies.

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SUN TO TAP: SOLAR-POWERED WATER TREATMENT SYSTEM

Mohammed Naser Azeez, Managing Director of Aquality Intelligent Solutions Pvt. Ltd.

India, a nation renowned for its rich cultural heritage and rapid economic growth, is grappling with an increasingly critical challenge—severe water scarcity. With a population exceeding 1.45 billion and faster urbanization, the demand for clean water is surging at an unprecedented rate. This crisis is further exacerbated by declining groundwater levels, inefficient water use in agriculture, and rising water pollution.

The scale of India's water crisis is staggering. According to a report by NITI Aayog, over 600 million people in India are facing extreme to severe water stress and 21 big cities are expected to run out of groundwater, further affecting around 100 million people. It has also been reported that approximately 70% of India's water is contaminated and water-borne diseases cause a huge burden while also resulting in significant loss of life. It is a major cause of death in Children under five. According to a report, 1 in every 10 people does not have access to a safe drinking water source.

Among the four major water-borne diseases in India, diarrhoea is the most widely reported one, followed by typhoid and viral hepatitis. The cases of cholera are very minimal in comparison to these three. Over the years, diarrhoea accounted for more than 85% of all the cases reported. Rest is comprised of Typhoid, also called enteric fever, with around 14% of the cases and hepatitis with 1% of all the cases. Nine states accounted for more than 65% of all the cases reported on diarrhoea and typhoid. The states are both relatively developed states like Karnataka, Maharashtra, Andhra Pradesh, and relatively less developed states like Odisha, UP, Madhya Pradesh, and Rajasthan.

Climate change is intensifying the problem, with erratic monsoon patterns disrupting traditional water cycles. Many regions experience either prolonged droughts or sudden, intense rainfall leading to heavy floods, both contributing to water insecurity. The agricultural sector, which consumes about 80% of India's freshwater, faces significant challenges. Inefficient irrigation practices, coupled with water-intensive crop choices like rice and sugarcane in water-stressed regions, compound the issue.

In urban areas, rapid population growth strains existing water infrastructure. Many cities struggle with outdated distribution systems, resulting in substantial water loss through leakages and pilferages. The lack of adequate wastewater treatment facilities leads to the pollution of rivers and groundwater sources. India currently generates over 72 billion litres of municipal wastewater from urban centres, but only about 40% of it is treated before disposal, leaving a significant gap in wastewater management.



Addressing these challenges requires a multi-faceted approach. The government has initiated several programs, including the Jal Shakti Abhiyan, aimed at water conservation and management. Efforts are being made to promote rainwater harvesting, restore water bodies, and improve irrigation efficiency.

The evolving landscape for water and wastewater treatment in India is a crucial aspect of the country's sustainable development. There's a growing emphasis on adopting advanced technologies for water purification and recycling. However, the implementation of these solutions faces hurdles such as high costs, lack of skilled personnel, and inadequate infrastructure.

As India strives to balance its developmental needs with environmental sustainability, effective water management remains a pivotal challenge. The country's ability to innovate, implement, and scale up sustainable water treatment solutions will be critical in securing its water future and supporting its continued growth and prosperity.

THE INNOVATIVE APPROACH: SUN TO TAP

The quest for sustainable and reliable clean water solutions has led to the development of solar-powered water treatment systems. These systems use renewable solar energy to power the entire water purification process, making them especially valuable in areas with limited access to traditional energy sources or where water infrastructure is underdeveloped.

Solar-powered water treatment systems utilize solar energy to provide clean drinking water directly

from a tap. They integrate innovative treatment technologies to ensure the water is free of contaminants and safe for consumption. These systems are particularly advantageous in off-grid locations or remote communities where conventional power and water treatment facilities are either unavailable or impractical.



Solar panels are the backbone of these systems. They convert sunlight into electrical energy using photovoltaic (PV) cells. The size and efficiency of the panels determine the amount of power available for running the system's various components. High-efficiency panels are crucial for maximizing energy production, especially in regions with less sunlight. The system connects to a local water source, which could be a well, river, rainwater catchment, or another untreated water supply. The quality of this source water directly impacts the treatment process and determines the type of filtration needed to produce safe drinking water.

Several filtration stages are used to purify the water depending upon the contamination in source water. A UV (Ultraviolet) disinfection is employed to kill any remaining bacteria, viruses, and other pathogens. Once treated, the clean water is stored in a tank. The tank helps maintain a steady supply of water and may include additional filtration or disinfection features to keep the water safe until it is used.

These solar-powered water treatment systems include advanced control and monitoring features. These systems track energy production, water flow, and treatment processes. Remote monitoring capabilities can provide real-time data on system performance and alert users to maintenance needs. Solar-powered systems reduce reliance on fossil fuels and minimize greenhouse gas emissions, thus

gaining with carbon credits. By using renewable solar energy, these systems contribute to a lower carbon footprint and promote environmental sustainability.

AQUALITY INTELLIGENT SOLUTIONS PIONEERING INNOVATIONS

Aquality Intelligent Solutions Pvt. Ltd. has been a pioneer in delivering clean drinking water, clean air, and advanced technology solutions to both people and industries. In its ongoing efforts, the company has been focusing on providing sustainable and renewable water filtration solutions specifically designed for Indian security forces stationed in remote and forested areas where conventional energy sources and clean water are scarce.

The concept for a Solar Powered Water Filtration System was conceived in 2015 when the company introduced a prototype to the Ministry of Water & Sanitation, targeting various establishments, including local communities in areas with severe water challenges.



This groundbreaking solar water filter features a high-speed filtration unit capable of purifying water from nearly any source, including hand pumps, swamps, wells, floodwaters, rivers, and even wastewater. By employing advanced purification techniques, the system effectively eliminates impurities, providing high-quality drinking water without relying on electricity.

KEY FEATURES

- Fully mobile, capable of installation anywhere.
- Quick deployment in emergencies or disaster situations.
- Available in various sizes, from small to large-scale community or commercial use.
- Stand-alone, user-friendly system for water purification and disinfection.

- Solar-powered alternative to traditional water treatment methods.
- Provides clean water to armed forces in the field, regardless of source water quality.
- Reduces the logistical challenges of transporting water tankers or bottled water.
- Highly scalable, with a single unit capable of producing 500 to 20,000 litres of clean water daily.
- Promotes sustainability by lowering demand for electricity and bottled water.
- Minimizes carbon footprint, energy consumption, and bottled water transport disposal.
- Portable, modular unit ideal for providing safe drinking water during humanitarian missions.
- Can be vehicle-mounted to deliver clean water to different locations each day.
- Solar-powered purification offers a viable solution for providing safe, clean drinking water.

Solar-powered water treatment systems are more than just technological innovations; they symbolize hope, providing a sustainable approach to tackling critical water challenges. Harnessing solar energy, these systems offer an environmentally friendly solution, representing a crucial step towards the mission to ensure access to clean water for everyone.

The purification unit is compact, approximately the size of a large box, and operates with minimal power requirements. It is designed to be low-maintenance, with no replaceable components like carbon filters or reverse osmosis membranes. Additionally, the system can recycle water for toilet flushing, addressing the challenge of water shortages.

This innovation not only eliminates the logistical burden of transporting bottled water but also significantly reduces the risk of waterborne diseases that could jeopardize mission success. It ensures a consistent supply of clean water to remote areas where security forces are stationed and to villages suffering from water scarcity due to the lack of electricity.

NEXT STEP

Solar-powered water treatment systems represent a significant advancement in providing clean, reliable drinking water while leveraging renewable energy. These systems offer a sustainable and cost-effective solution for improving water accessibility and quality, especially in remote or underserved areas. As technology continues to evolve, solar-powered systems will play an increasingly important role in meeting global water needs and supporting environmental sustainability.

ABOUT THE AUTHOR



Mohammed Naser Azeez is the Managing Director of Aquality Intelligent Solutions Pvt. Ltd., a leading ISO 9001:2015 certified company focused on cutting-edge water treatment technologies. His impactful work in delivering clean drinking water solutions has greatly enhanced the quality of life for many, reflecting his deep dedication to technological advancement and maintaining the highest standards of quality.

Mohammed Naser Azeez
Managing Director of Aquality Intelligent Solutions Pvt. Ltd.



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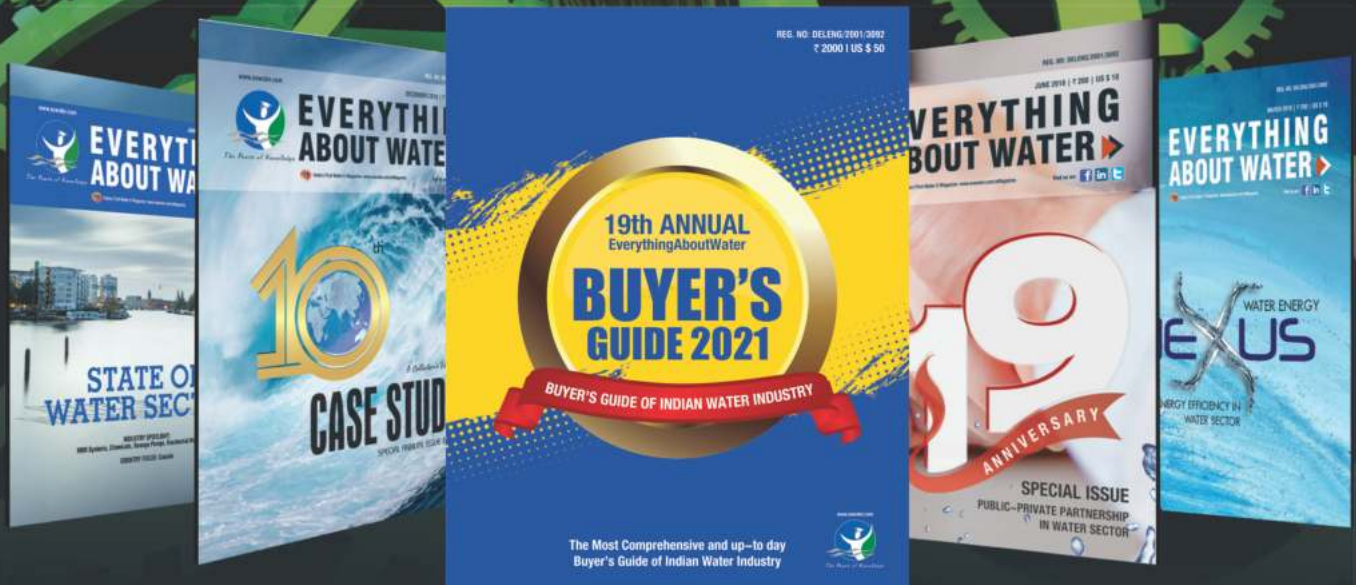
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DIGITAL TRANSFORMATION IN WATER UTILITY

Ran Kedem, Partner at Reali Technologies Ltd.

BACKGROUND

Many water utilities around the world have been suffering for years from underinvestment, alongside significant deterioration of the water system due to aging infrastructure and inadequate maintenance.

Today, water utilities face additional challenges, such as increased water consumption coupled with a decrease in water sources due to extreme climatic events, pollution, and inefficient management of existing systems. Additionally, there is a need to enhance control and monitoring of all water systems to ensure a continuous supply of safe drinking water to the entire population. This challenge is even greater in rural and remote areas, where there are additional issues such as resource scarcity, lack of skilled manpower, rising operational costs, and limited budgets.

To address these challenges, it is necessary to focus on two levels: the operational level and the data management level.

At the operational level, we can define five main challenges:

- Intermittent water supply
- Limited maintenance and service levels
- Lack of automation, remote monitoring, and control, resulting in a lack of real-time data
- Delayed response to critical events, causing significant damage and expenses
- Limited or non-existent corporate governance, both at the utility and state/national levels

In terms of data challenges, there was a time when the primary issue was the insufficient data available about the operation within the water network. However, today, the capacity to gather real-time data from the field is virtually limitless. This abundance of information introduces new challenges related to managing this data and utilizing it in real-time to



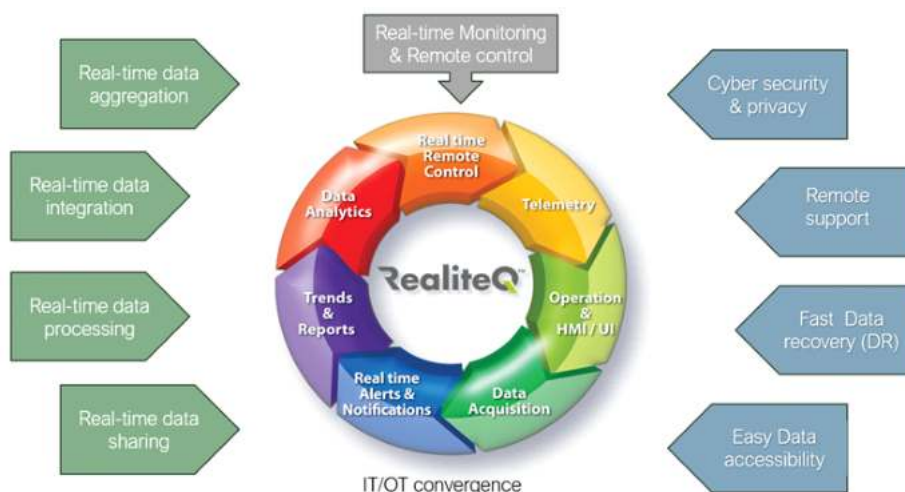
Draw 1 – Water utilities challenges

address the operational challenges previously mentioned.

The first step in improving the operation of water systems lies in the real-time collection and management of relevant and accurate data from remote facilities. Considering this, the characteristics required of data management systems in water corporations include the following parameters:

- Real-time data collection from all critical sites
- Real-time monitoring and remote control
- Real-time data aggregation
- Real-time data integration
- Real-time data processing
- Real-time data sharing

Additionally, we must address the cybersecurity challenge due to global threats to strategic facilities, including water systems.



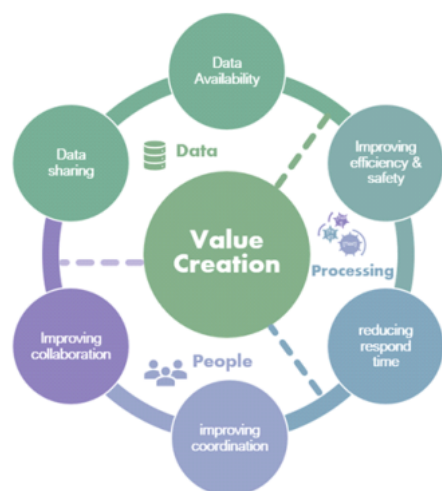
Draw 2 – “Must have” requirements from modern information technology system

THE DIGITAL TRANSFORMATION CHALLENGE

Digital transformation is the integration of the physical-operational layer with the digital-informational layer. It involves incorporating Internet of Things (IoT) and cloud computing technologies into an organization to enhance control, safety, efficiency, productivity, and ultimately improve the organization's operations and business outcomes.

Without a doubt, digital transformation represents the most significant revolution in the water market since the introduction of control and automation technologies.

In 2016, GWI magazine published a report highlighting that the water and wastewater industry is transitioning to a digital revolution. Digital transformation is a game changer for water utilities, adding value by connecting real-time data, people, and processes.



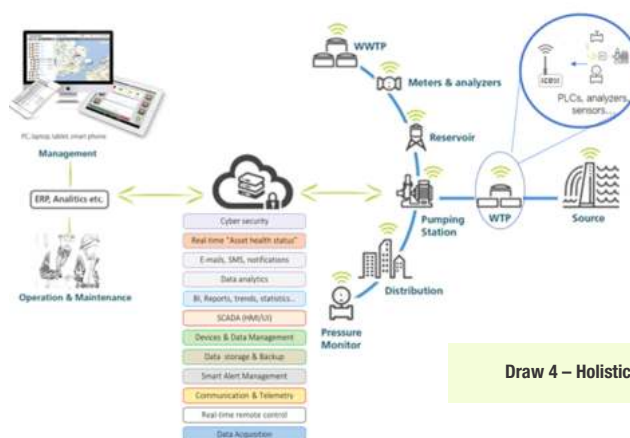
Draw 3 - Value Creation Connecting in Real-time Data + People + Processing

However, a recent publication by the SWAN forum stated, "The United States represents the epicentre of the global digital economy, at least in terms of technology development and go-to-market strategies. The U.S. municipal water sector, however, has lagged its peers in other advanced economies" (Smart Water Report, SWAN).

This phenomenon characterizes not only the water companies in the USA but is typical of a considerable part of the water companies around the world. Various studies point to a variety of reasons for this, but all agree on three main factors contributing to the slow adoption of the digital transformation process:

- Cost (construction and maintenance)
- Technological complexity (installation, maintenance, and use) due to a lack of skilled teams
- Information security (especially cyber protection)

To address these challenges and simplify the digital transformation process while ensuring it remains secure and affordable for all, a fifth market segment has been introduced in recent years. This segment offers comprehensive cloud software and IoT hardware solutions that span from the infrastructure level, including communication, up to the ICT and SCADA systems level, and extend to cybersecurity and data analytics. This market segment is developing at a fast pace and is led by RealiteQ". (Frost & Sullivan)



Draw 4 – Holistic platform for water utilities

CASE STUDY: DIGITAL TRANSFORMATION IMPLEMENTATION IN WATER UTILITY

BACKGROUND:

The Water Commission of the State of Mexico – CAEM, is a decentralized public entity known as the "State Commission for Water and Sanitation," with its own legal status and assets. Its general purpose is to build, maintain, operate, and manage potable water and sewer systems for the benefit of urban and rural communities in the State of Mexico. Essentially, it is responsible for the distribution of potable water in the State of Mexico and its municipalities, and thus operates specialized facilities for the storage, distribution, and exploitation of potable water wells.

In the second half of 2019, there was an overflow in one of the most important water storage tanks in the eastern area of the State of Mexico. This situation presented the first opportunity to demonstrate the

effectiveness of process automation in water management facilities through real-time remote control and monitoring via the IIoT platform from RealiteQ. This initiative started with the Cerro Gordo tank located in the municipality of Ecatepec, which has now become possibly the largest project in Mexico in terms of the number of installations controlled remotely and in real time.

The organization's management was aware of the technology offered by RealiteQ through prior work with our local solutions integrator, who immediately proposed a plan to eliminate the operational risk of continued tank overflows due to operational errors, primarily caused by the lack of personnel or the handling of valves and pumping equipment at specific times.

Within a week, our local integrator implemented the improvement plan, which involved automating the tank's operational processes. Manual measurements were replaced with a complete set of digital sensors to obtain tank levels, start and stop pumping equipment, gather data from various flow meters installed in the network, and automated valves to control flow based on operational directives defined by CAEM management according to water distribution needs. Since then, the Cerro Gordo tank has been remotely controlled in real-time and operates autonomously according to operational guidelines, minimizing personnel intervention. As a result, there have been no tank overflows since it began operating automatically through the RealiteQ platform.

ABOUT REALITEQ SCADA 4.0 HOLISTIC PLATFORM

RealiteQ Scada 4.0 - Bundle of IIoT & cloud programs & tools from the infrastructure level through the ICT, SCADA level and up to the Cybersecurity & data

analytics level for real time, remote-control operation & Data management

RealiteQ allowing real-time interfacing between all the different devices from different manufacturers on

- COMP (Central Online Management Portal) – Mediates communication, data, security & users.
- UI – Browser-based graphical user interface (HMI/SCADA)
- VPN – for remote secured accesses to PLC on remote sites

RealiteQ is on the one hand, the most advanced solution existing today but on the other hand, it is simple to install, use and maintain, it is highly secured, and most importantly it is affordable to any organization from the smallest to the largest.

SCOP OF WORK

With the evidence of efficiency in managing such installations, CAEM decided to extend the pilot project to its entire network and for that they have been engaged with APRA - a Mexican company dedicated to offering end-to-end comprehensive solutions. The collaboration model designed for CAEM is an integral service that develops the process automation plan, transitioning from manual/analog to digital operation, and is responsible for the equipment, maintenance, and replacement of all necessary components for the operation of the automation system. This ensures that each component functions adequately and that those that fail are replaced as quickly as possible, ensuring uninterrupted operation once a facility is automated.

Additionally, APRA handles all the design work of automated processes and their programming, as well as the initial configuration of the platform and the multiple control dashboards.

The service is complemented by ongoing training for users authorized by CAEM management.

The project includes:

- Installation of electrical and communication network engineering to comply with the project specifications at each site.
- Automation configuration: networking, device programming, provision of various measuring instruments and sensors.
- 24/7 permanent maintenance of the automation system: maintenance and replacement of any device required in the operation of the tanks.
- Remote monitoring and control of site operation 24/7 from any place.
- All sites are connected to one centralized remote monitoring and control system.

SCADA 4.0

IoT & Cloud-computing

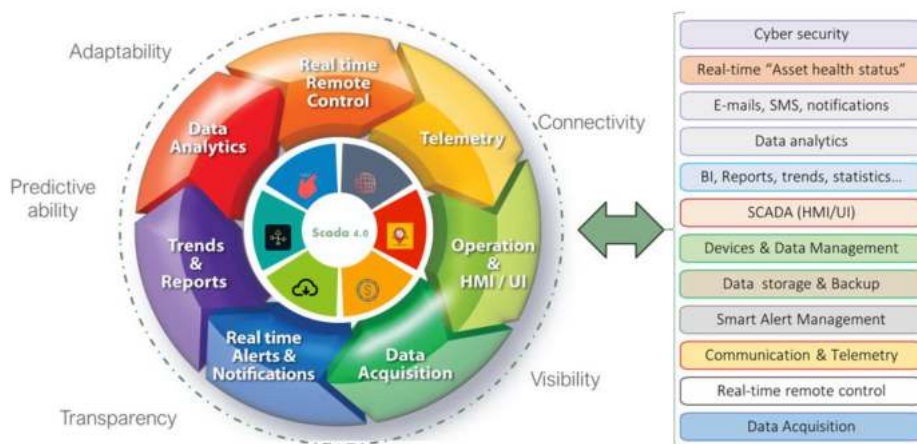


RealiteQ is a Holistic solution for digital transformation - single-source solution of IIoT hardware and Cloud software from the infrastructure level through the ICT & SCADA level and up to the Cybersecurity & data analytics level, providing a comprehensive solution for real-time, Secured, remote-control operation & Data management from "A" to "Z" (Data acquisition, telemetry, real-time & historian data management, Alert & Notification, data analytics & BI, cybersecurity, remote control & visualization) of devices, sites, facilities, and the entire networks.

site and connecting all sites in the network together, allowing data sharing and improve the transparency within the utility to provide the highest quality information to the operational level and decision-makers.

The technology consists of four system components:

- ICEX (Integrated Cellular and Ethernet Explorer) – Smart gateway installed in remote sites.



Draw 5 – RealiteQ Scada 4.0 – the fifth segment



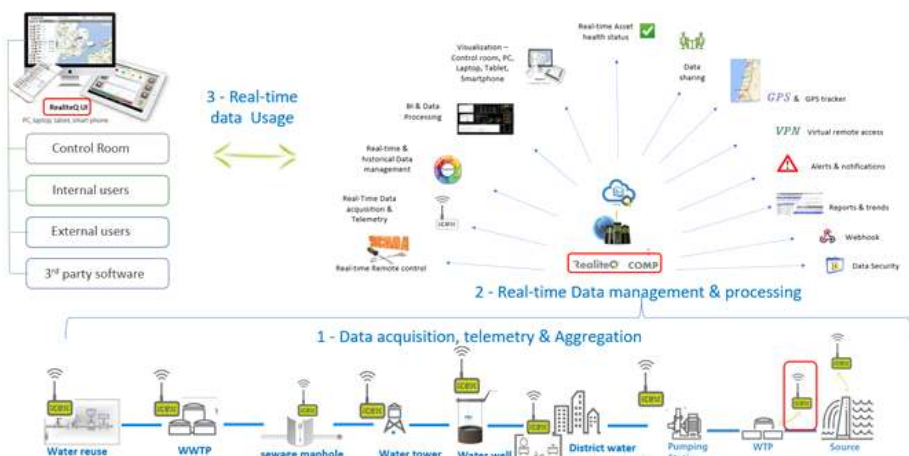
Draw 6 – Project scope of work, the 5 stages



Draw 9 – The connected facilities

Currently, CAEM controls via the RealiteQ wide range of facilities including:

- Water storage tanks with capacities up to 50,000 cubic meters
- Water conveyance lines with diameters up to 60 inches over dozens of kilometers
- Pumping plants
- Monitoring of pressure in conveyance lines at critical points
- Automated valves controlled by target flow or specific volume across different communities or urban areas
- Deep potable water wells where the production of each installation and the status of their assets, such as pump motors, are monitored
- Water Treatment Plant
- Weather stations for monitoring climatological variables, mainly rainfall



Draw 7 – Solution architecture

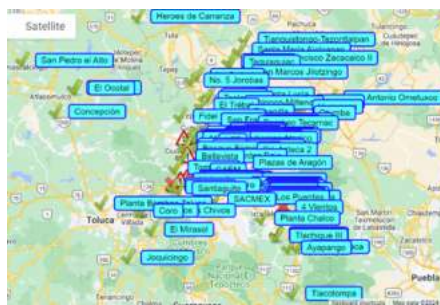
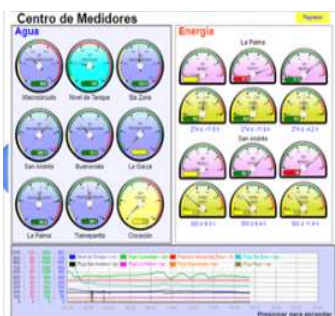
The project objectives:

- Remote monitoring and control of site operation 24/7 from any place.
- The facility can be operated under the guidelines authorized by Operations DG remotely and in real time, without restriction of schedules or the distance it is.
- Values of all measured and controlled parameters are presented in real time in an intuitive, easy to follow manner. Historical data of important measured parameters enables optimizing of different parts and the whole process.



Draw 8 – RealiteQ dashboard of BI & Trends

Over the past four years, the original scope of process automation for potable water management has expanded to various types of installations in more than 120 facilities.

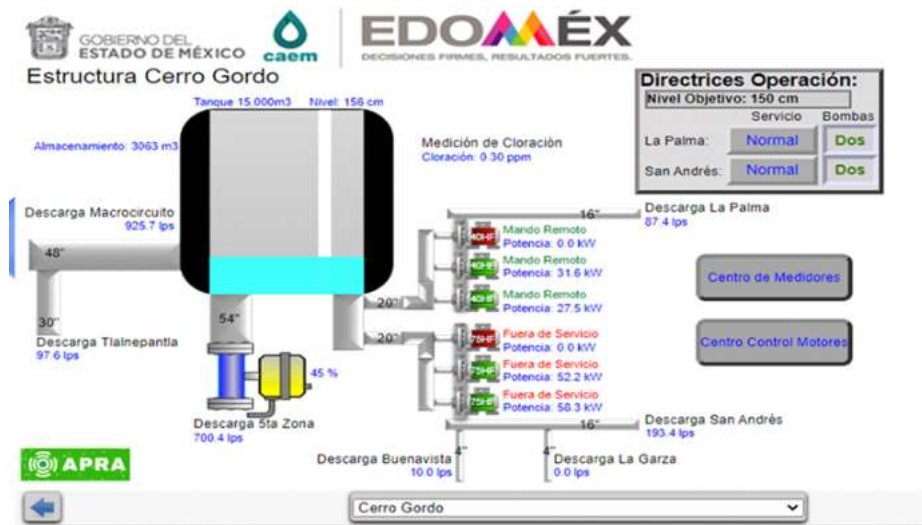


Draw 10 – some of the facilities

As part of the solution CAEM have all the tools they need to improve the operational efficiency of the connected facilities using RealiteQ UI which includes, operational dashboards, trends, tables, smart alert and notification system, BI dashboards....:

RealiteQ allowing real-time interfacing between all the different devices from different manufacturers on

- Increase in safety in the operating guidelines.
- Reduce operational costs
- Reduce water loss
- Save energy
- Service without interruption.
- Stability in different basic parameters, such as:
 - Storage levels.
 - Exact water consumption for each circuit
- Eliminating the overflow of storage tanks
- Reducing emergency response times
- Operating water distribution circuits remotely
- Having information on operational trends of different installations
- Sharing critical potable water availability information with municipalities.



Draw 11 – RealiteQ SCADA dashboard for remote control

RESULTS & OUTCOME:

Using RealiteQ not only allow to have real-time monitoring and remote control (SCADA) of the remote facilities, but it also provides:

IT/OT convergence (real-time data integration)- Real-time processing & integrates information technology (IT) with operational technology (OT) used to monitor events, processes, and devices, adjusts in networks sites, machines, enterprise and industrial operations and offers significant benefits in cost, quality, speed and reliability.

Data management - RealiteQ platform is much more than just a remote-control platform, it is a real-time data management system from A to Z, from the data acquisition to Big data analytics. By using RealiteQ you are not only operating and controlling the system in real-time, but you also can use the data to increase efficiency.

Data Aggregation - Real time Data aggregation and data analysis to improve the utility operational efficiency is one of the biggest challenges water utilities are facing today, RealiteQ makes it available, accessible, and affordable to any utility by providing real-time secured IT/OT convergence.

Real time display of assets health - RealiteQ provides for real time graphic display (on a Google map and more) of the status of each of the devices (assets) connected using a dashboard display.

Smart alerts system – highly advanced mechanism for managing faults. Each fault may be defined as a fault that requires a confirmation action, deliberate faults may be silenced for an extended time, there is no limit to the number of faults or the number of fault recipients, a “nagging” mechanism may be used for recurrent alerts until the problem is resolved, and there is an alert escalation mechanism, ensuring that it is transferred to a number of parties based on the priority for remedial action and responsibility.

Secure hierarchical system – the Comprehensive Cloud based SCADA system allows for connection of local systems to a secure hierarchical central system at the country (and even global) level. The system allows for access by an unlimited number of users (according to personal authorizations) while building a clear hierarchy from the worker on the ground to the facility level, network operator, regional manager... to the entire country and world.

The project was very successful and the main CAEM has achievements from the project were:

COSTUMER TESTIMONY (CAEM - ING. SALVADOR IBARRA, DIRECTOR OF FACILITIES MAINTENANCE)

- The communication between different CAEM's areas improved given a better, quicker and accurate information flow about several performance operative variables produced at facilities level.
- Better control and efficiency in water distribution. Now we can determine target flows at specific times and areas of the city based on hard and accurate data in real time using the ReliteQ's Central Management Online Portal.
- Improved relationship with community leaders. We can share with the community and its representatives accurate and reliable information about the flows that are delivered in certain periods of time at different seasons of the year and demonstrate that we comply with the agreed commitments.
- With RealiteQ the time to attend municipal authorities' requirements for the distribution of drinking water has improved significantly because now from the central online management portal we can change the flows in different conduction lines simultaneously and in real time, having the ability to respond immediately to the demands of the community.
- Reduction of maintenance costs. We have reduced total stop hours at facilities due to the failure of pumping equipment. With the RealiteQ platform it is possible to permanently monitor the main performance variables of the pumping equipment and determine in advance when any equipment requires repair.

- We achieved the elimination of the risk of flooding of facilities due to sudden excess inflows that are greater than storage tank capacity, it resulted in the total loss of expensive water pumps and electrical installations.
- The use of the RealiteQ Platform allows us to operate our facilities in a safer environment for our collaborators. Before RealiteQ, it was normal to send personnel to facilities far from the city to manipulate valves or pumps at night and in high-risk areas in security terms. Now all facilities inflows and outflows are monitored at any time by the responsible personnel.

CONCLUSIONS:

I believe that the solution presented in this article and the successful case study is very relevant for the water market in India (cities as well as remote rural villages) as well as many other areas in the world who suffered from all of some of the challenges described in this article

This corresponds very closely with the priorities set by the Government of India and the initiatives that the Government of India has been leading in recent years. The government of India's focus on improving water management and conservation, as well as increasing access to clean water for all citizens. The government is encouraging and investing in digital transformation initiatives in the water utilities sector.

One of the main initiatives for digital transformation in the water utilities sector in India is the "Smart Cities Mission" focuses on the use of digital technologies to improve the quality of life and service delivery in the cities. Another initiative is the "AMRUT" (Atal Mission for Rejuvenation and Urban Transformation) and "AMRUT 2.0" scheme, which aims to provide basic infrastructure in 500 cities and towns across India. The scheme also focuses on the use of digital technologies to improve water management and distribution.

Note:

I would like to thank Mr. Pedro Carrillo from APRA company for the great work he and his company are doing with CAEM, and for the information he provided me with regarding the project at CAEM that helped me a lot in to write this article.

ABOUT THE AUTHOR



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Partner at
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Partner at Reali Technologies Ltd, a breakthrough company in IoT & Cloud computing for real-time remote control and data management. The developer of RealiteQ – Scada 4.0

Ran has 30 years of executive management experience in Global Business development in the field of advanced environmental technologies with emphasis on water & agriculture. Ran holds two academic degrees B.Sc. in Water and soil sciences and MBA.

Prior to Reali technology Ran was part of the founding team and served as EVP at Miya, (a global company specialized in large scale NRW & water efficiency projects), leading some of the world largest and most successful NRW reduction projects.

Recently (August 2024) Ran was an expert guest lecturer in a four-day course on achieving 24/7 drinking water supply in Urban Centers was successfully organized by Atal Mission for Rejuvenation and Urban Transformation (AMRUT), and Indian Institute of Technology, Madras.

Ran also was a panel member at the CII-Triveni Water Institute. The panel was about Disruptive Technologies, Digital IoT for Water and Wastewater Management" was an intriguing session at the recently concluded CII Water-Tech Summit 2024. Ran was a member of the Steering Committee "International Standards for smart Water management" (ISO/TC).





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ASSESSMENT OF LAND SUBSIDENCE DUE TO OVEREXPLOITATION OF GROUNDWATER: A CASE STUDY IN THE RAJASTHAN STATE, INDIA

Divyang Soni, Indian Institute of Technology, India

Kapil Dev Sharma, Greenfield Eco Solutions Private Limited, India

Riddhish Soni, Aumsat Technologies LLP, India

V. Srinivas Chary, Administrative Staff College of India

ABSTRACT

This study investigates a land subsidence event in Sahajrasar village, Bikaner district, Rajasthan, on April 16, 2024. Analyzing groundwater, rainfall, and geological data revealed significant groundwater depletion, leading to aquifer desaturation, soil compaction, and subsidence. A novel approach was employed by combining multi-frequency radar interferometry and satellite gravimetry to assess the extent of land subsidence and its impact on regional groundwater hydrology. The integration of advanced space-based technologies provided detailed insights into the spatial and temporal dynamics of land subsidence and groundwater overexploitation. Our results highlight the critical link between excessive groundwater extraction and land subsidence, emphasizing the need for sustainable groundwater management practices. Radar interferometry offered high-resolution displacement measurements, while satellite gravimetry provided insights into subsurface

mass distribution changes. The accuracy and reliability of our findings were ensured through field validation and geophysical investigations. This comprehensive approach not only quantifies the extent of land subsidence but also assesses its implications for regional water resources. Our study underscores the effectiveness of space technologies in promoting environmental sustainability and advocates for their routine use in groundwater monitoring to mitigate overexploitation's adverse effects and ensure the long-term stability in vulnerable regions.

Keywords: Subsidence, Interferometry, Groundwater Abstraction, Groundwater Depletion

INTRODUCTION

Rising global water demand is a result of growing irrigated agricultural land, increasing population densities, and economic growth. While surface water

availability such as water in lakes, rivers, and reservoirs can meet this demand, there are significant regional variations that cause water stress in pockets (Wada et al., 2010). Groundwater is often used as the primary source of water in regions with significant aquifer systems and prolonged water stress. Overexploitation or chronic groundwater depletion occurs when groundwater abstraction surpasses the natural recharge of groundwater over extended periods of time (Wada et al., 2010).

When groundwater extraction consistently surpasses recharge rates over multiple seasons, it results in substantial depletion of groundwater levels. This depletion causes the desaturation of underground aquifers, leading to the compaction of soil pore spaces and ultimately resulting in the collapse of aquifers (Galloway et al., 1999). The collapse of these aquifers causes the land to sink or subside in the affected areas. This process illustrates how the overexploitation of groundwater directly causes land

subsidence (Poland, 1984).

The state of Rajasthan in India has been characterized as having an arid and semi-arid continental climate. Around 37% of the districts in Rajasthan were found to have a declining groundwater level trend (Monir & Sarker, 2024). Over the years, Rajasthan has experienced significant variability in its rainfall patterns, with an average annual rainfall of approximately 575 mm, which is unevenly distributed across the state (Central Ground Water Board, 2023).

In this study, we shed light on the recently reported land subsidence incident that occurred in the Sahajarasar village of Bikaner district, Rajasthan on 16th April 2024 (Madhav Sharma, 2024). As per the report, at 03:30 AM during the night, around 0.4 hectare of land near the Sahajarasar village collapsed rapidly, causing a massive sinkhole measuring with an estimated depth between 20 and 25 meters. A deep pit was formed as a result of the land subsidence. Preliminary data and reports believed groundwater exploitation in the region to be the driving force behind this incident.

Modern remote sensing technologies have given us the power to monitor groundwater exploitation-induced land subsidence over large areas using advanced satellite radar interferometry methods (Ferretti et al., 2001). In this research, we use a novel combination of multi-frequency InSAR (Interferometric Synthetic Aperture Radar) and satellite-gravimetry. This approach allows us to monitor land surface displacements with high precision. We further corroborated these findings with groundwater level data.

2. OBJECTIVES AND SOURCES OF DATA

In this study, we utilized a novel combination of SBAS-InSAR technique coupled with satellite-gravimetry and geomorphology data to identify the land subsidence incident that occurred in the Sahajarasar village in Rajasthan, India on 16th April, 2024. We reveal variations in cumulative line of sight (LOS) displacements over the region of interest over a three-month period with high coherence. The results were corroborated with groundwater data obtained from Central Ground Water Board, Ministry of Water Resources, India.

2.1 Geographical and Geomorphological summary of the study area

The study area lies in the Sahajarasar village of the Lunkaransar Block in the Bikaner District of

Rajasthan, India, roughly at the $28^{\circ}21'08.7''\text{N}$ latitude and $73^{\circ}45'42.2''\text{E}$ longitude (Figure 1). The Sahajarasar village is situated approximately 36 km from the sub-district headquarter of Lunkaransar and 72 km from the district headquarter of Bikaner. The average annual rainfall in Lunkaransar, Rajasthan, India ranges from 240 mm to 400 mm (Central Ground Water Board, 2023).

The major hydrogeologic formations in the region include Aeolian sand and older alluvium, with frequent occurrences of evaporite lenses such as gypsum. The groundwater table ranges from 9 to 120 meters deep and is declining at a rate of approximately 0.5 meters per year. Overall, the groundwater quality is slightly to moderately saline.

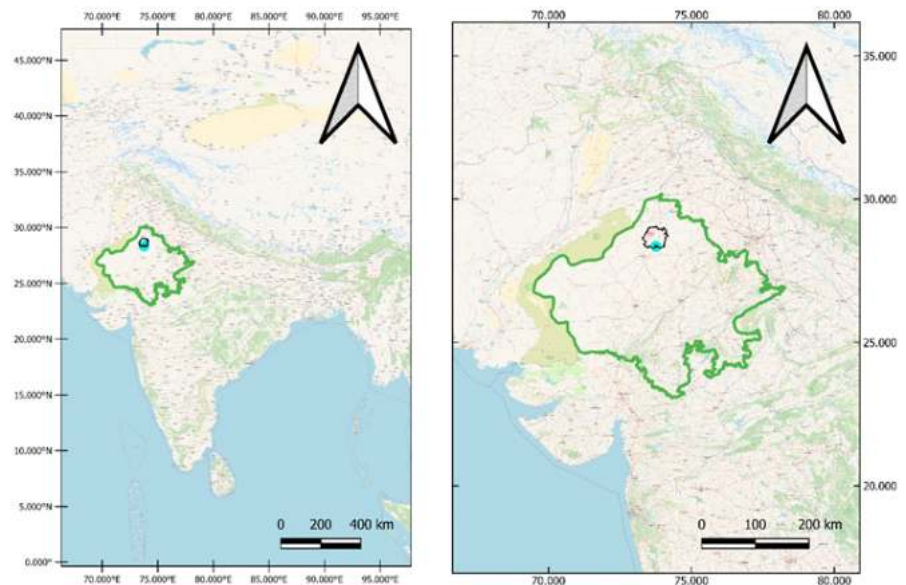


Figure 1. Location of the study area in Lunkaransar tehsil, Bikaner district, Rajasthan

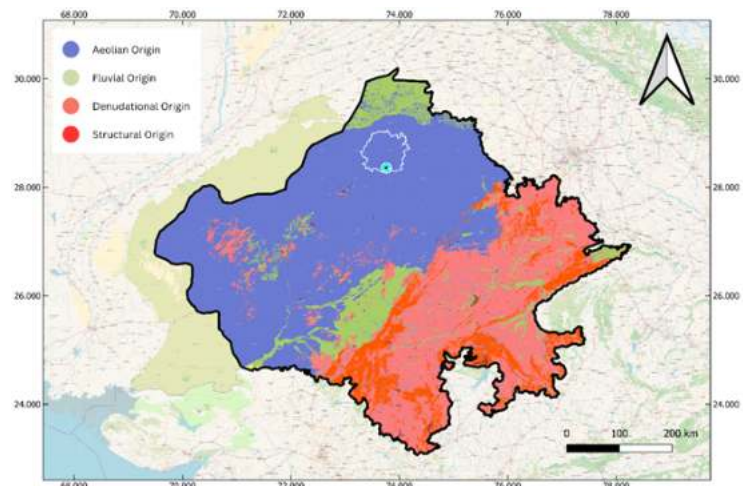


Figure 2. Geomorphology of the region (Source: Bhuvan Portal, ISRO)

2.2 DATA SOURCES

For equivalent water heights, Gravity Recovery and Climate Experiment (GRACE) data were used which spanned a period starting from 2002 to 2024. GRACE helps us understand the groundwater storage dynamics using the principles of satellite-based gravimetry. (CNES. Grace Plotter. n.d.)

Sentinel-1 Single Look Complex (SLC) data was used for multi-frequency radar interferometry. The scenes used in the study are listed in Table 1. All six scenes are based on the Single Look Complex (SLC) with Interferometric Wide (IW) operating mode having a spatial resolution of 5 meters by 20 meters and a swath width of 250 kilometres. All images are part of the descending orbit acquisition.

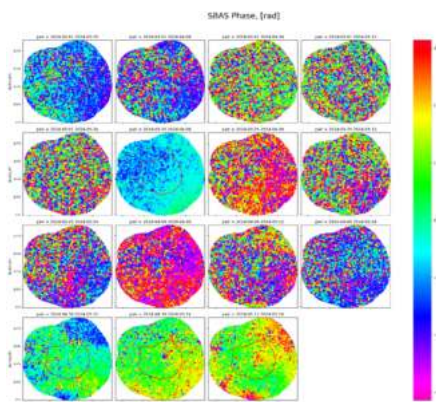


Figure 8. Interferometric Phase (in radians) for each SBAS pair

Table 1. Satellite (Sentinel-1 SAR) Data used in the study

Sr. No	Scene	Acquisition Date
1	S1A_IW_SLC_1SDV_20240301T010058_20240301T010125_052781_066320_9485	1 st March 2024
2	S1A_IW_SLC_1SDV_20240325T010059_20240325T010125_053131_066FAE_3560	25 th March 2024
3	S1A_IW_SLC_1SDV_20240406T010059_20240406T010126_053306_06765C_09A3	6 th April 2024
4	S1A_IW_SLC_1SDV_20240430T010100_20240430T010127_053656_06842B_1C00	30 th April 2024
5	S1A_IW_SLC_1SDV_20240512T010100_20240512T010127_053831_068AC7_F1B8	12 th May 2024
6	S1A_IW_SLC_1SDV_20240524T010100_20240524T010126_054006_0690CB_D723	24 th May 2024

The Digital Elevation Model (DEM) data were obtained from the ALOS World 3D (AW3D) provided by JAXA which has a 1 arcsecond (30 meter) resolution. Rainfall data were provided by the Vedas web portal, ISRO.

4. RESULTS

4.1 Interferometric Phase and Phase Unwrapping

Interferometric phase refers to the phase of the radar signal that bounces back from the Earth's surface, therefore it is wrapped in a 0 to 2π periodic cycle and is expressed in radians. This phase is referred to as "wrapped phase" since it consists of phase ambiguity due to the periodicity. Phase unwrapping is the process in which actual phase measurements are reconstructed from the wrapped phase values. This phase can now truly represent continuous surface deformations (Goldstein et al., 1988). Phase unwrapping was achieved using the SNAPHU phase unwrapping tool (Figure 10).

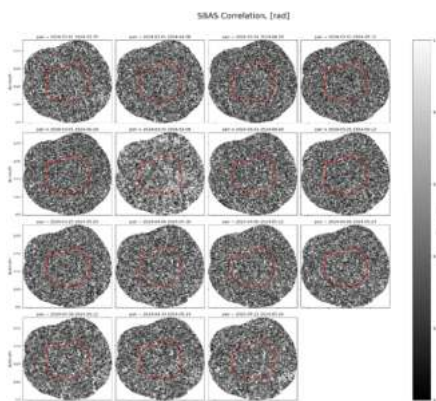


Figure 9. Coherence for each SBAS pair

4.2 Phase Trend Analysis

Phase trend was spatially corrected and observed (Figure 11). Phase trends refer to systematic variations in the phase values that can arise due to

various factors such as orbital errors, topographic effects, atmospheric delays, etc. These trends need to be understood and, if necessary, corrected to accurately interpret the displacement or deformation measurements.

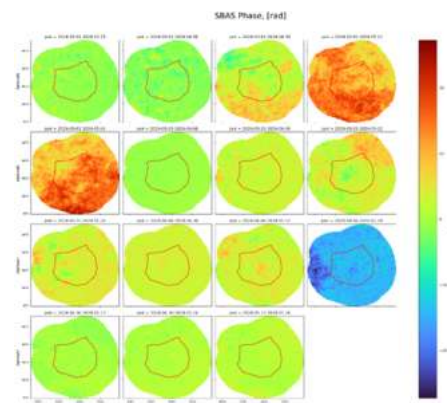


Figure 10. Unwrapped Phase

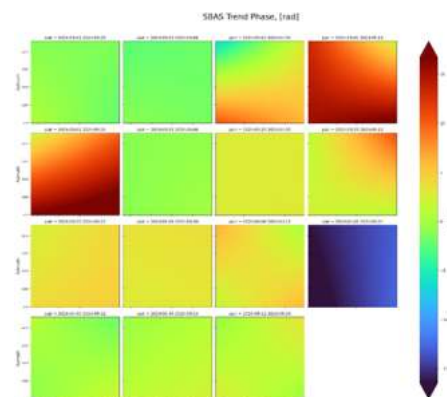


Figure 11. Phase Trend Observations

As evident, there was a substantial difference in the phase between the 6th April 2024 and 24th May 2024 SAR images. This period includes the land subsidence incident date of 16th April 2024 indicating the occurrence of a serious deformation.

4.3 Cumulative LOS Displacement

Further, using the unwrapped interferograms, cumulative LOS displacement maps were generated for each SBAS scene pair (Figure 12). Cumulative LOS displacement helps us understand true surface displacement trends and their temporal variations (Ferretti et al., 2001).

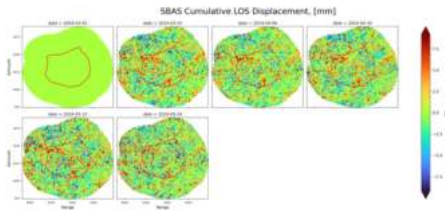


Figure 12. Cumulative LOS Displacement

4.4 SBAS Velocity

Further, a simple least squares model was used to compute the average SBAS velocity over the area of interest. The results indicated substantial vertically downward displacement velocity (Figure 13).

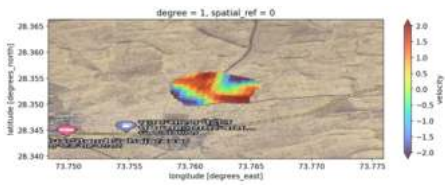


Figure 13. Vertical SBAS Velocity (mm/year)

4.5 Satellite Gravimetry

Satellite-based gravimetry analysis showed a strong negative trend in underground water storage for the Sahajarasar village in Bikaner district of Rajasthan. GRACE equivalent water heights data highlights the alarming rate at which the groundwater table is falling in this region. Trend modelling indicated a strong declining groundwater table trend of -3.59 cm per year (Figure 14). This strong negative trend in groundwater storage sheds light on the severely stressed and over-exploited groundwater resources in the region of interest.

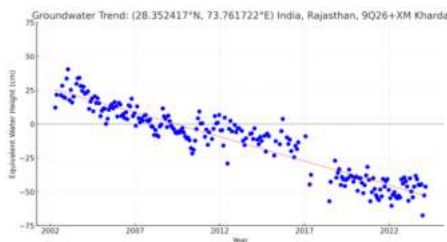


Figure 14. GRACE Groundwater Heights data from 2002 up to 2024

DISCUSSION

The findings from our study coupled with hydrological and geomorphological data of the Sahajarasar village, Bikaner, Rajasthan strongly indicates that the primary source of the land sinking incident, which occurred on 16th April 2024, is the prolonged overexploitation of groundwater resources in the region. As satellite-based remote sensing keeps improving with technological advancements, we need to realise that field data validation is equally necessary to corroborate the findings from satellite-based radar interferometry (Galloway & Burbey, 2011). This hybrid approach provides high accuracy in the results and ensures that the results could be trusted. For field data validation, data published by the Central Ground Water Board (CGWB) and ISRO may be utilized.

Another important observation was that although satellite-based radar interferometry has great potential in monitoring land-subsidence over large regions quickly and efficiently, this technology has some limitations as well. This technology requires a certain level of skill and experience to perform accurate analysis. Also, since the spatial resolution of Sentinel-1 SAR data is 10 meters, monitoring land subsidence for small areas becomes challenging because of this. From our research experience, we believe satellite-based radar interferometry is an excellent tool to monitor land deformations over large regions with millimetre-level accuracy, but for small regions it may not be that efficient. Therefore, it is advisable to select a large area of interest for better results.

CONCLUSIONS:

This study provides a comprehensive assessment of the land subsidence event in Sahajarasar village, Bikaner district, Rajasthan, on April 16, 2024. By analyzing groundwater, rainfall, and geological data, we identified significant groundwater depletion as the primary cause of aquifer desaturation, soil compaction, and subsequent land subsidence. Our innovative approach, combining multi-frequency radar interferometry and satellite gravimetry, has proven effective in measuring the extent of subsidence and understanding its impact on regional groundwater hydrology. Geophysical, geomorphological and hydrological data further corroborated the accuracy and reliability of our findings. This study underscores the need of a multi-faceted approach combining advanced earth observation tools with traditional survey methodologies to monitor groundwater stress in regions experiencing less annual rainfall and excessive exploitation of groundwater resources. This comprehensive approach aims to provide a powerful tool to the communities facing severe water stress so that they can understand how susceptible they are to such disasters. We hope that the methods discussed in this study shall be used in future research applications to monitor groundwater stress in arid regions and empower vulnerable communities with a focus centred around groundwater conservation. In the near future, as remote sensing technology keeps evolving, there will always remain a potential to improve this methodology using advanced image processing and readily-available data.

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KOZANI WATER DISTRIBUTION SYSTEM LEADS GREECE IN TECHNOLOGICAL ADVANCEMENT

Sandra DiMatteo, Industry Marketing Director, Water Infrastructure at Bentley Systems

Water Utility Implements Digital Twin Model to Decrease Water Loss and Improve Water Monitoring.

Following Greece's government-debt crisis and subsequent economic burdens introduced by the COVID-19 pandemic, the country has honed in on a National Recovery and Resilience Plan. The plan prioritizes bringing digital transformation to key infrastructure to create environmentally and economically positive outcomes. One key reform outlined in the plan is the improvement of water and wastewater regulation.

Greece's public water supply loses around 26% of its water to leaks every year, according to a 2017 report from the Organisation for Economic Co-operation and Development. As a result, Greek households consume more drinking water than any other country in the European Union, around 170 cubic meters per household each year.

Leading the charge for water system reform in Greece is Kozani, a city in Western Macedonia with a modest population of around 60,000. Concerted improvements to Kozani's water system began in 1985 when the Municipal Water Supply and Sewerage Company of Kozani, also known as DEYAK, was founded. DEYAK expanded the water network over several decades, eventually offering service to 63 settlements in and around Kozani.

Over the past 12 years, the system has undergone significant technological upgrades, including segmentation in district metered areas, (DMAs),



Once the map was complete, the utility implemented a SCADA system supported by Bentley's OpenFlows water distribution analysis software to measure water pressure, flow, and quality.

pressure management, and, recently, creation of a comprehensive digital twin model to streamline water monitoring processes and system performance.

Dimitris Papailiopoulos owns the Greek company Tech-Go-Round, which consulted on the implementation of the digital twin. When his team began working with the Kozani Water Distribution System, he said that it had many of the same challenges and shortcomings as other water networks across Greece.

"Everything was done manually, if at all," he said. "There were great water losses. The quality of the water was manually tested on a regular basis, but they knew they could do better."

Kozani also presented an ideal opportunity to create a model system for other Greek utilities. "It's easier to bring smaller water authorities to a point where they can adopt this innovative technology," Papailiopoulos said.

“[With] a large water authority, like the Athens Water Authority for example, there is a lot of preparatory work that has to take place, and it may take several years before they are even in a position to install it.”

DIGITAL UPGRADES

Before any digital upgrades could be incorporated, DEYAK first had to conduct a thorough mapping assessment. According to Papailiopoulos, the water utility did not have a complete map of the water network. There were areas where it was not known what materials were used or on what side of the road pipes passed.

Once the map was complete, the utility's next step was to implement a supervisory control and data acquisition (SCADA) system supported by Bentley's water distribution analysis software, OpenFlows. Using digital sensors, the SCADA system measures water pressure, flow, and quality. Later, Papailiopoulos' team assisted in furthering that model by incorporating Bentley's water infrastructure digital twin software solution. This solution allows the utility to view data collected through the SCADA system on a unified platform, enabling quicker assessments and more accurate decision-making about possible system issues and necessary repairs.

“In the past, they had to go to the SCADA system to monitor whether the tanks were full, and on a different screen, monitor water pressure,” Papailiopoulos said. “Now, they can have everything on one screen, which expedites their day-to-day process.”

In the near future, Papailiopoulos' team hopes that the utility will be able to use the digital twin to help automate decision-making around repairs and system adjustments and generate corresponding work orders.

However, there are some challenges to overcome before the digital twin's potential can be fully tapped. Throughout the course of mapping the system, implementing the SCADA system, and adding other technological upgrades, DEYAK contracted with various vendors who used different—and often encrypted—software platforms, making it difficult to create a single open platform that vendors and utility staff can access.

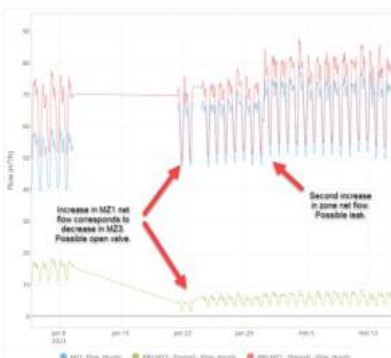
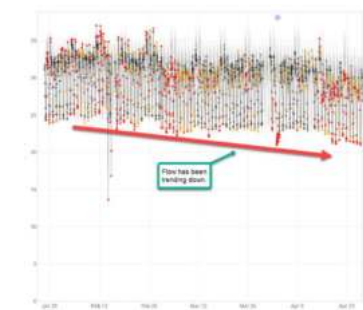
Konstantinos Gkonelas, Ph.D., the hydraulics technical manager for the digital twin project, said that this challenge is common among water distribution networks.

“This is something that I believe happens worldwide unfortunately,” Gkonelas said.

Additionally, he said that Kozani's water utility is still working through maintaining the system so that it operates continuously and efficiently. “There is a lot of effort needed in order to keep the system in operation,” Gkonelas said. “You need people to keep the connections and signals of the equipment connected with the digital twin to gain the right insights at the right time from all the data.”

POSITIVE OUTCOMES

The introduction of the digital twin has brought multiple benefits to Kozani. Utility staff spend 40% less time on pressure management tasks. Leaks are also identified more quickly, leading to faster and higher-quality repairs. Improved leak management has cut down on water waste, with 20% less water flowing through the network. Kozani residents will reap the benefits as well, with reduced water loss translating to lower utility bills.



Additionally, preventing water loss is important from an environmental and economic perspective. At the end of 2022, EU leadership released a directive focused on ensuring residents' right to access clean water. EU member states were urged to put systems in place to ensure water is “wholesome and clean,”

meaning that it is clear of microplastics, toxic chemicals, and dangerous micro-organisms.

Additionally, states were ordered to assess leakage rates from their water infrastructure. By 2028, the EU is expected to enact legislation to formally enforce regulations surrounding these water standards, including a requirement to report water quality and system performance data to consumers.

“You cannot provide all this information to the customer without a digital twin, so we are ready for this positive change” Gkonelas said.

SPOTLIGHT ON KONSTANTINOS GKONELAS

Hydraulics Expert Wants to See His Field Embrace Technological Advancement

Konstantinos Gkonelas, Ph.D., a civil engineer specializing in management of water networks, has been involved in many efforts to implement and upgrade water networks across Greece, the Balkans, and the Persian Gulf over the past decade—both as a co-founder of the hydraulic engineering firm ReonHydor and as a freelance consultant working alongside companies that include Tech-Go-Round.

While earning his Ph.D. in Water Distribution Systems Management from the University of Thessaly, Gkonelas began to hone his interest in the hydraulics field, focusing on how new digital technologies could be used to optimize pressure management and reduce water losses.

Most recently, this interest has manifested in harnessing the power of digital twins, which Gkonelas sees as the future of water supply management. One of his recent projects, a digital twin of the Kozani Water Distribution System in Northern Greece, went live in June this year.

“The implementation of a digital twin helped us gain useful insights to improve the performance and operations of our entire water supply network,” Gkonelas said. “[A number of] strategies regarding reducing nonrevenue water were improved: pressure management, active leak control, speed and quality of repairs, and asset management.”

Compared to many other types of infrastructure, Gkonelas feels that water networks have been slow to adopt 21st-century technology and digital advancements due to a persistent out-of-sight, out-of-mind attitude.

"I think that there is a gap between the ongoing technology and its implementation in water networks because it is an underground—and in many cases, unknown—infrastructure," he said.

However, Gkonelas also considers the field of water management to be uniquely suited to digital transformation. Where water is concerned, there is no such thing as a fixed or static environment. Water models, therefore, should be dynamic and sensitive to minute-to-minute system changes to best optimize network functionality. It is something a digital twin can offer—along with many other associated efficiencies, as the Kozani digital twin has proven.

"[Resource hour] times for pressure management were reduced by 40% [in Kozani], and the speed and quality of repairs on newly reported and unreported leaks were improved by 50% due to the automatic location of isolation valves and the use of genetic algorithms that helped to identify them," Gkonelas said.

In the decades to come, Gkonelas is confident that these benefits will have even greater weight as clean water becomes a scarcer resource, becoming "the oil of the future." And across Greece and the globe, water utilities will look to the cutting-edge improvements in Kozani as a model.



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

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HOUSEHOLD CHORES COULD SAVE LOTS OF FRESH WATER

Mrs. Kavita Kapadia, Science Educator
Dr Heli Shah, Pathologist

Water - the sole lifeline of the mankind and a precious gift of nature – is becoming increasingly scarce. In the face of climate change, India's freshwater resources are at threat. Water in India becomes a commodity as precious as gold in summers. The country has 18 percent of the world's population, but only 4 percent of its water resources, putting it among one of the most water stressed countries in the world. The situation prevailing today calls for looking at ways of conserving fresh water to the maximum possible extent, reuse it several times and recycle wherever possible.

Well, while a very large proportion of water (~70%) is deployed for agriculture and industries (~20%), domestic use still accounts for ~10% fresh water consumption. It cannot be the sole responsibility of Agriculture and Industries to adopt water saving methods. The daily household chores should also look at the localised and workable solutions to use lesser quantum of water as far as possible. In order to meet the growing water needs, we must make changes in our everyday routine and habits. The home makers must discover ways to conserve water at home. Energy-efficient gadgets available in today's market have eased the efforts of home makers in conserving water.

It is the objective of this article to appraise the readers about some water conservation ideas that could be put into practice in different areas of general household chores. It should be an endeavour of every home maker to adapt to such water saving habits to protect water resource for longer period of time.

COOKING

Reuse of cooking water: Rather than casually discarding water generated during cooking, it is always better to reuse it for next batch of cooking or water plants in the kitchen garden. The whey of milk products like Paneer / Curd / Cheese, the Pasta water

etc are especially safe to save and store for reusing them for various cooking purposes like making dough / gravy, cooking rice and so on. While adding complexity, nutritious richness and tenderness to the noodle/ paneer like recipes, such a practice also saves some amount of fresh water.

Vegetable & fruits washing :

- The water collected after cooking can be used to wash fruits and vegetables. The water collected after washing the vegetables/ fruits, should then be used for watering potted plants.
- If one happens to use fresh water for washing vegetables, there is no need to leave the tap running while washing fruits and veggies because a running tap pumps out almost 6-12 litres of water every minute. The sink or a washing-up bowl should be filled with just enough water to loosen any dirt from the produce. The left-out water should be used for watering the pots and garden plants.

Steam rather than boil vegetables: Steaming the vegetables, rather than boiling, not only saves water but it also makes the vegetables more nutrient-rich. This is because boiling water causes nutrients to leak out that makes our veggies less healthy in the process.

Boiling: Whenever self is boiling something, water just enough to cover the food should be used instead of filling the pot to the rim.

Rinse water: The rinse water for utensils should be saved and used to water the houseplants or other cleaning purposes in the house such as floors, toilets and sinks.

Defrosting the food: For defrosting the frozen food, it is a general practice to let the faucet run till the food attains desired temperature.



Use of a large bowl filled with water in such cases can save good amount of fresh water.

Sink-to-toilet system: A modern and technologically advanced option is to install a sink-to-toilet system in the kitchen. This system has an adjustable sink top attached to the toilet's refill cycle. The system filters the sink drainage and then stores the water in a reservoir, which is used to flush the toilet.



DRINKING WATER

RO system: Most of the houses are accustomed to RO systems for drinking and cooking purposes. These systems need to discard a considerable amount of water as Reject Water. Rather than allowing this water to be drained off, it should be collected and used for bathing, car washing, compound / porch washing.

Cold drinking water: In order to get very cold water from water cooler or fridge, many a times, a substantial quantity of perfectly good water is drained down. This water should be collected in a large jug and reused for filling the fridge containers.

Unwanted ice: Instead of dumping ice from overstayed ice trays from the freezers or ice coolers in the drain, it should be spread on the garden grass or around plants and let the ice melt into liquid.

Unused drinking water: Drinking water stored for a long period of time has a stale taste. It also has a great probability of being contaminated by bacteria. Instead of disposing off it, it should be used for washing utensils and other household chores as it is not that dirty. Stale pet water can also be used on potted plants.

Hot water: Generally, the kettles are filled upto the rim while warming drinking water for tea making or drinking. Rather than filling the kettle fully with each use, one should measure the amount of water needed before filling the kettle. This way, the wastage of water can be avoided. Moreover, it also saves time and energy/gas.

CLEANING

Use of dishwasher: More effective utilization of the household appliances is a great way to save water.

- For a housewife, it is always prestigious to keep her kitchen clean, but habit of running the dishwasher without having a full load, goes through a lot of water. By waiting until the dishwasher is full, a home maker is really valuing the water in true spirit of conservation. It gets the most 'bang for the buck'!
- One might think that not using a dishwasher is a good idea when it comes to water saving. However, the fact is that use of dishwasher at full load will always use relatively less water than hand-washing the utensils.
- Pre-washing of the dishes is not required for most modern dishwashers, so skipping this step can save water.
- For too big and dirty items, the home makers would prefer to rinse them prior to washing to remove food buildup and stains. As a matter of fact, rinsing the pots and pans needs running tap water, which consumes good amount of water. Under such circumstances, one should prefer to soak such dirty items in large bowl of water and skip the rinse step.

Use of Washing Machine: Like dishwasher, it is the best idea to run the washing machine only when it has full load of dirty clothes. Apart from saving water, the user gets more clean clothes at full load because too much of water dilutes the detergent action and leaves clothes less clean. This way, one can get fresher whites and deeper colours by washing full loads.

- However, while washing a smaller load of laundry, one must make sure that the machine controls are adjusted to compensate water level with smaller load.
- Cold water wash cycle of machine consumes less water and energy. So hot cycle should be avoided.

Reuse of water from laundry: Waste water from laundry cleaning can be directed for outdoor use. To augment this, the discharge hose of machine should be connected to a longer run off hose that can reach the yard. This arrangement will enable the collection and use of wastewater every time laundry is done. With longer hose pipe, it is easy to move the outlet to different points in the yard to avoid erosion and ensure even watering of the lawns. The laundry water can also be used for cleaning the compounds, pavements and the driveways.

Leak checks: The unknown leaks from pipes and the household appliances are a major source of water loss. Therefore, it is a best practice to check the leakages periodically.

Towels & Napkins: The bath towels, napkins, dish cloths etc should be used several times before tossing them in the laundry after hanging them to dry in between. Similarly, jeans clothes and other dark coloured clothes could be used more than once before washing, particularly in winter season when perspiration does not take place. This does not only save the water, but it also increases the durability of these items.

Upgradation of appliances: A household saves good amount of water by upgrading the appliances to water-efficient appliances. Not only will this cut back on water consumption, but it will also save money over time when it comes to utility costs. As a rule of thumb, front-loading washers use less water than top-loading machines.

MORNING ABLUTIONS

Brushing / Shaving: Turning off the taps while brushing or shaving is the easiest way to cut back on water usage.

There is no need to keep the water running while oneself is in the process of cleaning the teeth or trimming the beard. Use of a tumbler to rinse mouth after finishing brushing or shaving can save water as compared to the practice of using hands under running tap for rinsing the mouth.

Toilet flush:

- Toilet should be flushed only when necessary. Use of courtesy flush should be avoided and flushing should be done only once at the end of using the toilet.
- Tissues, cigarette butts and other stuff should not be disposed off in toilet. If toilet is used conveniently like a waste basket, it needs unnecessary flushing.
- Wherever, dual-flush toilets are available, it should be ensured to use the smaller button when getting rid of liquid waste to avoid wasting water.
- The flush tanks generally have capacity of storing 7.5 to 15 litres of water. Its button, once pressed, will pour entire quantity of water stored. For conserving water, it is worthwhile to displace part of water quantity by dropping a bottle or bag filled with pebbles into the flush tank. This will displace some water and minimize the amount of water needed to fill the tank. This water saving might sound meagre, but the same very minor quantity of water could save sizable water quantity when multiplied by the number of times a fellow is required to flush the toilet in a day.
- High-efficiency toilets have improved flushing system that deploys water and vacuum for flushing. This design of commode and flush tank have dramatically reduced water consumption to almost one third of the common design. When going for toilet renovation, installation of high efficiency commode and flush tank must be considered.
- **Damaged pipes and leaky taps:** Those living in Metros should inspect their water meter and utility bills every month to see how much water is used. Any noticeable spike is a sign that there are some leaky pipes somewhere in the home. Such pipes and taps should be immediately identified and replaced. Poorly sealed toilets waste a lot of water. Many a times, it is difficult to make out whether there is a leak or not. The internal leaks of flushing line can be checked by pouring a drop of colour pigment in toilet's tank and waiting for 10 – 15 minutes to see the passing of colour in the toilet commode.

If the colour shows up in the commode, there is a leakage which needs to be arrested.

BATH:

- Everyone loves a long, hot shower, but the showerhead uses roughly 5-7 litres of water a minute. The long duration of shower does not add to cleaning of the body. One can be just as squeaky clean with short showers as normally would be after a long shower. Therefore, everybody should get into the habit of taking showers that last 5 minutes or less whenever possible.
- One should bear in mind that a long shower generally consumes more than 100 litres of water, whereas a short one consumes less than half.
- Use of bath tub should be avoided as it consumes around 300 litres of water. Switching from 30 minutes soak in a bath tub to 10 minutes shower could save about half of the water quantity.
- If affordable, it is better to switch to water-saving fixtures by low-flow alternatives of showerhead and faucets. This can cut back dramatically on water usage. By adopting to these fixtures, water can be saved without even changing the ways to wash, flush, or shower!
- If switching of fixtures is out of the budget, installation of a cheap aerator on each of the taps should be considered to throttle the water flow. This installation will not cause any alteration in the habits of family members and they will not even notice the change easily.
- When using geysers, people need to waste >10% water during waiting for hot water to arrive out of tap or shower. It is a creative idea to collect running water from tap or shower in a bucket till hot water starts flowing. The fetched water can be used for flushing the toilet, watering the plants or washing the car / floor.

OUTDOORS

Gardening: There is a need to change the gardening habits. There are a variety of ways to save water for landscaping or gardening.

- Plantation of native or drought-resistant plants for home garden does not call for frequent watering. One should be careful while selecting the plant varieties so as to stick to native rather than exotic plant species.

- If watering can is deployed instead of a hose for watering the plant, good quantity of water will be saved.
- Pruning of the garden and taking the weeds out not only keep the plants healthy but also cut back on the water requirements.
- Since longer grass helps soil retain moisture, the lawns should not be cut to the maximum. Setting of lawnmower blades at 2-3 inches higher when mowing can help fight droughts and restrict water use.
- Up to 50% of water sprinkled in the garden is lost due to wind, evaporation and runoff caused by inefficient watering methods. The watering schedules should commensurate with season e.g., water sprinklers should be operated less frequently during winter season.
- If watering is done in the morning hours, less water is lost by way of evaporation.
- Use of compost or wood chips or straw is another great way to conserve water in the garden, because it prevents evaporation and helps plants to hold their moisture.

Car Washing: Instead of using garden hose to clean the car, a few buckets should be filled to rinse and wipe the car. There are water less cleaning products available to clean the vehicles, which will cut out the need for water entirely.

Porch / Driveway cleaning: Sweeping of the driveway, sideway and porch should be done instead of washing with a pressurised fresh water hose. For cleaning something especially dirty, a damp cloth should be used for cleaning it by hand instead of leaving the hose running. Such practices will of course take a few extra minutes, but they will be saving a lot of water. When utmost essential, these outdoor areas should be washed using water collected from washing machine or cooking.

Rainwater harvesting: Harvesting rainwater is a natural and excellent way of saving water. If rainwater is collected in clean barrels, the water can be later reused for yard cleaning or garden.

CONCLUSIONS:

Water conservation has become necessary in the present times because the natural resources are reducing along with the increasing population and their usage. Conserving water helps us by supplying more amount of water for longer usage. Saving water does not require major lifestyle changes. By changing a few small habits, we can go a long way towards making the world a better place! Adopting small habits can have a big impact on the water footprint. The small ideas and steps presented in this article would not save a lot of water on

their own, but they will definitely add up to a substantial figure over time! Using water efficiently helps to preserve the environment, minimize the impact of droughts, and take some pressure off of the public water supply. At the same time, it cuts the utility cost of a household to make a great favor for the wallet of the family!

ACKNOWLEDGEMENT

The authors are extremely thankful to Dr MJ Kapadia for his inspiration, constant motivation and assistance in preparation of manuscript as well as critical reading.

ABOUT THE AUTHOR



Mrs. Kavita Kapadia
Science Educator

Water conservation has become necessary in the present times because the natural resources are reducing along with the increasing population and their usage. Conserving water helps us by supplying more amount of water for longer usage. Saving water does not require major lifestyle changes. By changing a few small habits, we can go a long way towards making the world a better place! Adopting small habits can have a big impact on the water footprint. The small ideas and steps presented in this article would not save a lot of water on their own, but they will definitely add up to a substantial figure over time! Using water efficiently helps to preserve the environment, minimize the impact of droughts, and take some pressure off of the public water supply. At the same time, it cuts the utility cost of a household to make a great favor for the wallet of the family!



Dr. Heli Shah
Pathologist

Dr (Mrs) Heli Shah is a medical professional possessing MD (Pathology) degree from prestigious BJ Medical college of Ahmedabad. She has been providing her professional services to Pathology Laboratories for >6 years. She also has worked in a medical college for teaching under-graduate students. In addition to her professional assignments, she fondly carries out kitchen activities and other household jobs. She has mastered few recipes. She has attended various medical conferences and undertook a few pathology projects.



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UV OZONE – IS IT USEFUL in SWIMMING POOLS

In India, UV Ozone is most often used by the client, not knowing its utility. They are most often recommended for water treatment, especially for Swimming pool Ozonation. The criteria of selection is more associated to overall prices than the consideration of benefits. UV ozone are 10 times cheaper than the conventional Corona type.

Ozone is well known for its strong Disinfectant properties. However, the Benefits & uses of Ozone will depend on the method of ozone generation. Primarily there are two ways of producing ozone:

1. Ozone using UV lamps
2. Ozone by the Corona discharge method.

World over UV ozone is normally deployed for very small application especially for Laboratory uses and in use of ozone for Air purification where the concentration of ozone required is as low as 0.04ppm. For all larger application, especially commercially, CD ozone generator are preferred due to the fact that they generate ozone at concentration 10 to 1000 times more, results are more predictable. UV Ozone are always used in conjunction with other modes of Sterilization.

ROLE OF OZONATION

The main purpose of Ozonation is of dual nature. Ozone is expected to perform both Oxidation and disinfection. (Oxidation to remove organics and inorganic contaminants and disinfection to kill bacteria etc). Irrespective of the amount of ozone generated per hour, a minimum concentration of at least 3% is required for both oxidation and disinfection.. UV ozone generators cannot generate Ozone at these concentrations to perform simultaneous oxidation and disinfection.

CONCENTRATION OF OZONE

CD OZONE Generators can produce Ozone at a concentration ranging from 3 to 13% w/w compared to 0.1 to 0.001% w/w by UV ozone. This as mentioned already is 10 to 1000 times less when compared to CD ozone generators. The amount of air required for UV Ozone generators is 10 times more than that required for CD units with consequent low Ozone concentrations.

UV LAMPS USED

Most UV Ozone generators available today use 254 nanometers (nm) radiation.

89% of relative spectral energy of UV lamps are at 254 nm, and low of 218 nm. Maximum production of UV ozone occurs at 260 – 265 nm. Hence by using 254 nm UV bulbs, it is impossible to produce more than traces of Ozone.

MECHANISM OF ACTION

This is the most important difference. The ozone generated by UV ozone is immediately decomposed by UV radiation to form free Hydroxyl radicals. In aqueous solutions these Hydroxyl free radicals (OH⁺) are very powerful oxidizing agents. But the greatest disadvantage is that the half-life of these Hydroxyl radicals is in the order of MICROSECONDS compared to 22 minutes of Ozone. Consequently Ozone Generated by UV method cannot be expected to remain in solution for sufficient period of time to provide adequate disinfection, although chemical oxidation can occur.

It is only recently that UV ozone using 172 nm bulbs was tried. These can produce higher concentration of O₃, but these bulbs have not been described as commercially available nor tested.

WHY CONCENTRATION OF OZONE IS SO IMPORTANT

The solubility of Ozone in water is only partial and is governed by Henry's Law (the solubility of the gas in water is directly proportional to its partial pressure in the gas phase). Consideration of Henry's Law lead to the obvious conclusion that the higher the Ozone concentration the greater will be the solubility of ozone in water. The more ozone is dissolved in water the more effective it is as a disinfectant. It is therefore very clear that Ozone generated through UV radiation, not much of Ozone is available in the water for both Oxidation and disinfection.

So Next time you use ozone for swimming pools, avoid UV ozone.

Do you know that ozone is used for medical purposes?

Some of the major purposes of the ozone are:

- 1) Anal use for relief of piles condition.
- 2) In Diabetes to prevent Gangrene and subsequent amputation of limbs.
- 3) Auto - Haemo therapy for relief in Arthritis and blood purification.
- 4) In Burns Therapy for prevention of Staph infections.
- 5) Disinfection of Operation Theatres.
- 6) In Surgical scrub water disinfection.

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ROOPKUND LAKE'S SKELETON MYSTERY



High in the icy reaches of the Indian Himalayas, hidden within the folds of towering mountains, lies Roopkund Lake—a place as haunting as it is enigmatic. Surrounded by snow-capped peaks and glacial silence, this remote lake, often shrouded in mist and mystery, holds a secret that has both baffled and fascinated the world for decades. Known as Skeleton Lake, Roopkund harbors a chilling enigma beneath its serene surface, an ancient riddle carved into the bones of hundreds of human skeletons scattered along its shores.

The origins of these skeletal remains date back over a millennium, with carbon dating suggesting that most of the bones are from the 9th century. The lake, frozen for most of the year, was first discovered by a British forest ranger in 1942. What he found was a scene straight out of a nightmare—hundreds of skeletons lying in and around the lake, perfectly preserved by the cold. Theories abound, from mass ritual suicide to a lost army, yet none could fully explain the chilling mystery of Roopkund.

The most widely accepted theory is that these individuals were pilgrims or travelers caught in a sudden, violent hailstorm, their skulls bearing unmistakable signs of blunt force trauma.

The hailstones, some as large as cricket balls, would have fallen with deadly precision, killing those who ventured too close to the lake's treacherous terrain. The storm, as sudden as it was violent, left the pilgrims at the mercy of nature's fury, their bodies left to the elements, eventually preserved by the cold.

However, the mystery deepens. DNA analysis of the remains revealed not just one group but two distinct groups of people—one of South Asian descent and another of Mediterranean or Middle Eastern origin. This finding has fueled further speculation about the identities and fates of those who met their end at Roopkund. Were they all pilgrims on a holy journey, or were they travelers from distant lands drawn to the lake by some unknown force? The lake offers no answers, only more questions, as its dark waters reflect the passing clouds.

Today, Roopkund Lake stands as both a natural wonder and a macabre memorial to those lost in time. The skeletons, visible through the crystal-clear water during the brief summer thaw, serve as a reminder of the fragile line between life and death, a line that was brutally crossed centuries ago. The lake, though remote and isolated, continues to draw adventurers, trekkers, and scientists, all eager to uncover the truth behind its haunting legacy.



EVENT CALENDAR



August 2024

The Water Expo 2024

20 - 22 Aug 2024
Miami Airport Convention Center, Miami, USA
www.thewaterexpo.com/

AgriTech India 2024

22 - 24 Aug 2024
BIEC Bengaluru International Exhibition Centre,
Bengaluru, India
agritechindia.com

September 2024

19th EverythingAboutWater Expo 2024

10-12 September 2024
Yashobhoomi, IICC, Dwarka, New Delhi
www.eawaterexpo.com

EcwaTech 2024

10 - 12 Sep 2024
Crocus Expo, Moscow, Russia
en.ecwatech.ru

CamWater 2024

11 - 13 Sep 2024
Diamond Island Convention and Exhibition
Center, Phnom Penh, Cambodia
www.camwaterexpo.com

Taiwan International Water Week 2024

11 - 13 Sep 2024
Taipei World Trade Center, Taipei, Taiwan
www.taiwanintlwaterweek.com

Water & Wastewater Management Expo 2024

11 - 12 Sep 2024
The Emergency Services Show, Birmingham,
UK
www.ess-expo.co.uk

Indo Water Expo & Forum 2024

18 - 20 September 2024
Grand City Mall & Convex Surabaya, Surabaya,
Indonesia
indowater.com/

Water and Wastewater Fair 2024

24 - 26 Sep 2024
Elmia, Jönköping, Sweden
www.elmia.se/en/va-massan/

October 2024

Aqua Ukraine

15-17 Oct 2024
Ukraine, Kyiv | International Exhibition Centre
www.iec-expo.com.ua/en/aquaen-2024

WWEM - Water, Wastewater and Environmental Monitoring Conference

09-10 Oct 2024
NEC, Birmingham, UK
www.ilmexhibitions.com/wwem/

WETEX 2024

01-03 Oct 2024
Dubai World Trade Centre (DWTC)
www.wetex.ae

IFAT India

16-18 Oct 2024
Bombay Exhibition Centre, NESCO, Mumbai
www.ifat-india.com

Cairo Water Week 2024

13 - 17 Oct 2024
The Nile Ritz-Carlton Cairo, Cairo, Egypt
www.cairowaterweek.eg

November 2024

Produced Water Management, Treatment & Reinjection 2024

28 Oct - 01 Nov 2024
Dubai, UAE
10times.com/e1x5-z5p1-f9sp

Deepwater Operations Conference & Exhibition 2024

05 - 07 Nov 2024
Moody Gardens Hotel Spa and Convention
Center, Galveston, USA
www.offshore-event.com/2024home/home

Vietwater 2024

06 - 08 Nov 2024
Saigon Exhibition and Convention Center, Ho
Chi Minh, Vietnam
vietwater.com

SADC Groundwater Conference 2024

13 - 15 Nov 2024
Maseru, Lesotho
www.sadc.int

Annual WMAO Conference 2024

19 - 20 Nov 2024

Crowne Plaza Columbus North - Worthington,
Columbus, USA
wmao.org

Clean India Show 2024

21 - 23 Nov 2024
Bombay Exhibition Centre (BEC), Mumbai, India
ctwindia.com/clean-india-show/

Floodex 2024

27 - 28 Nov 2024
ExCeL London, London, UK
floodex.co.uk

National Drainage Show 2024

27 - 28 Nov 2024
ExCeL London, London, UK
drainageshow.com

December 2024

GeoSmart India (GSI)

02 - 05 December 2024
Hyderabad, India
geosmartindia.net/2024/

Pak Water & Energy Expo 2024

03 - 05 Dec 2024
Karachi Expo Center, Karachi, Pakistan
www.pakwaterexpo.com

Exhibition on Water / Water Forum

04 - 06 December 2024
Belgrade Fair - Hall 3 / Belgrade / Serbia
www.sajamvoda.rs

Aquatech China 2024

11 - 13 Dec 2024
Shanghai New International Expo Centre
(SNIEC), Shanghai, China
www.aquatechtrade.com/shanghai

January 2025

Water Exhibition & Conference

14 - 16 Jan 2025
ADNEC Centre Abu Dhabi, Abu Dhabi, UAE
www.worldfutureenergysummit.com

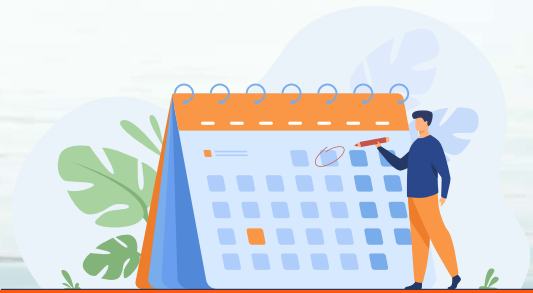
NEWEA Annual Technical Exhibition & Conference

26 - 29 Jan 2025
Boston Marriott Copley Place, Boston, USA
annualconference.newea.org

InterAqua

29 - 31 Jan 2025

EVENT CALENDAR



Tokyo Big Sight, Koto, Japan
en.www.interaqua.jp

Michigan Onsite Wastewater Conference
07 – 08 Jan 2025
Kellogg Hotel and Conference Center,
Lansing, USA
events.anr.msu.edu/event

February 2025

Indomach
06 - 08 Feb 2025
Adityapur Auto Cluster, Jamshedpur, India
indomach.in

World Ag Expo
11 - 13 Feb 2025
International Agri-Center, Tulare County, USA
www.worldagexpo.com

Mountain States Ground Water Expo
13 - 14 Feb 2025
Aquarius Casino Resort, Laughlin, USA
mountainstatesgroundwater.com

Water and Waste Expo
20 - 22 Feb 2025
Pragati Maidan, New Delhi, India
indiawatersolidwaste.in

World Water Tech Innovation Summit
25 - 26 Feb 2025
Park Plaza London Riverbank, London, UK
worldwatertechinnovation.com

Membrane Technology Conference & Exposition
24 - 27 Feb 2025
Long Beach, USA
www.amtaorg.com/awwaamta-membrane-technology-conference-exposition

Water Today's Water Expo
26 - 28 Feb 2025
Chennai Trade Centre, Chennai, India
www.waterexpo.biz

March 2025

International Conference on Advances in Water Treatment and Management
1 - 2 March 2025
Gandhinagar, Gujarat, India
www.pdeu-h2o.com

Sioux Empire Water Festival
4 - 5 March 2025
Sioux Falls, USA

sewf.org

Hot Water & Hot Air
4 - 6 March 2025
Portland, USA
www.aceee.org/2025-hot-water-hot-air-forums

International Conference on Water Management Modeling
5 - 7 March 2025
Toronto, Canada
www.icwmm.org

Oman Sustainability Week
11 - 15 May 2025
Muscat, Oman
www.omansustainabilityweek.com

ISH - World's leading trade fair HVAC + Water
17 - 21 March 2025
Frankfurt, Germany
ish.messefrankfurt.com/frankfurt/en.html

Aqua Netherlands
18 - 20 March 2025
Evenementenhal Gorinchem, Netherlands
www.aquanederland.nl/en

Water & Clean Tech India Expo
19 - 21 March 2025
Pragati Maidan, New Delhi
www.smartcitiesindia.com

Water Philippines Expo & Conference
19 - 21 March 2025
SMX Convention Center, Manila, Philippines
www.waterphilippinesexpo.com

April 2025

China Clean Expo Shanghai
31 Mar - 03 Apr 2025
Shanghai New International Expo Centre(SNIEC), Shanghai, China
www.chinacleanexpo.com/en

American Worlds Water Association Annual Conference
07 - 10 Apr 2025
Anaheim, USA
www.inawwa.org/event/2025-annual-conference-april-21-25th/

Baku Water Week
08 - 10 Apr 2025
Baku Expo Center
bakuwaterweek.az/en/

Water Environment Association of Ontario Annual Conference
13 - 15 Apr 2025
London Convention Centre, London, Canada
weao.org/about/

Smart Water Systems
14 - 15 April 2025
London, United Kingdom
www.smgconferences.com

MiningWorld Russia
23 - 25 Apr 2025
Crocus Expo International Exhibition Center, Krasnogorsk, Russia
miningworld.ru/en/

Our Ocean Conference KOREA
28 - 30 Apr 2025
Centum City Industrial Complex, Busan, South Korea
ourocean2025.kr

2025 Water for Food Global Conference
28 Apr - 02 May 2025
University of Nebraska
waterforfood.nebraska.edu

19th EVERYTHING ABOUT WATER EXPO 2024
SOUTH ASIA'S LARGEST WATER EXHIBITION AND CONFERENCE
10-12 | Hall No. 2C, Yashobhoomi, Sep 2024 | IICC, Dwarka, New Delhi, IN

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UNITING THE WATER INDUSTRY: JOIN US AT THE 19TH EDITION OF EVERYTHINGABOUTWATER EXPO 2024

Dear Readers,

On behalf of the EverythingAboutWater team, I am delighted to welcome all participants to the 19th edition of the EverythingAboutWater Expo 2024. This event promises to offer a valuable platform for stakeholders in the water sector to engage and connect with one another.

The event continues to build on its success, featuring nearly 100 exhibitors and companies from the water industry, alongside international participants.

We invite all visitors attending the Expo from the 10th to 12th September to immerse themselves in the wealth of knowledge and experience available. Many insights will cover crucial topics within the water sector, providing plenty of material for reflection.

Events like this serve as a hub for networking and exchanging ideas, and the 19th EverythingAboutWater Expo is no exception. In addition to stimulating discussions, over 100 water-related products will be showcased. Visitors can look forward to taking home a guaranteed gift and creating lasting memories.

I extend my sincere thanks to all participants, sponsors, exhibitors, and visitors for their involvement in making this event a success. We welcome your feedback to help us improve future editions of the Expo. We look forward to seeing you at the event!

Warm regards,

Nisha Aggarwal

Vice President, Earth Water Foundation



FROM THE EDITOR'S DESK

Dear Readers,

We hope you enjoyed exploring this special edition, where we have made an effort to bring together the water and wastewater industry. You must have found articles and case studies offering in-depth perspectives on industry trends, challenges, and the promising future ahead.

The Indian water sector is currently in a unique position. Despite having abundant water resources, factors like uneven distribution, unpredictable rainfall, and insufficient infrastructure contribute to water scarcity in many areas. Additionally, inadequate management and a lack of a comprehensive regulatory framework lead to inefficient usage of these vital resources.

The wastewater sector faces similarly urgent challenges, with a large percentage of untreated wastewater being released into rivers, lakes, and groundwater. This not only contaminates water sources but also poses significant risks to public health and the environment. Limited treatment facilities and a lack of awareness about wastewater management continue to aggravate the issue.

Addressing the challenges faced by the Indian water and wastewater sectors requires immediate, coordinated action. By adopting a comprehensive and sustainable approach, involving all stakeholders, and making strategic investments, India can ensure long-term water security and protect both public health and the environment. It's crucial for the government, private sector, and civil society to come together to tackle this water crisis and work towards a sustainable future.

With this vision, we are pleased to welcome you to the 19th EverythingAboutWater Expo and Conclave, taking place from 10th to 12th September at Dwarka, New Delhi. During the international conclave, industry leaders will discuss the challenges and explore opportunities within the sector.

Supported by the Government of India, the Expo promises to be a platform for networking and learning. Experts from India and around will share their perspectives on key water sector issues at the conclave. We look forward to seeing you at the Expo.

Warm regards,

Simran Arora

Associate Editor, Earth Water Foundation

BAYWATCH



Date: 25-27 September 2024

Venue: CIDCO Exhibition & Convention Centre, Mumbai

Website: india.boilerworldexpo.com

BOILER INDIA is a global conclave of boiler & allied industries which provides a unique networking & progress-driven platform that brings together Indian & global boiler & allied industries under one roof.

After the success of Boiler India 2020 and Boiler India 2022, Boiler India 2024 is back to steam up the boiler and ancillary industry with a vision to move towards a more sustainable future.



Date: 11-12 September 2024

Venue: NEC, Birmingham

Website: www.ess-expo.co.uk

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In 2023, WRM welcomed 1,709 high-level attendees eager to discover cutting-edge technologies, lucrative investment opportunities, and crucial insights that elevated their operations.

BAYWATCH



The 19th EverythingAboutWater Expo 2024 stands as a remarkable and all-encompassing annual event in India, spotlighting cutting-edge technologies and solutions within the water sector. This event serves as an exceptional gateway for stakeholders worldwide to immerse themselves in the expansive and dynamic realm of the Indian Water management Industry, facilitating the exchange of business opportunities, networking, and the exploration of innovative Water solutions.

Date: 10 - 12 September 2024

Venue: IICC, New Delhi

Website: www.eawaterexpo.com

India is currently on a trajectory towards severe water stress, with projections indicating a critical situation by 2025. The rapid pace of Industrialization and the burgeoning population have significantly widened the gap between water supply and demand, a matter of deep concern for both the Central and State Governments. Within the framework of the 19th Everything About Water Expo 2024, unparalleled business prospects will emerge for both domestic and international players in the Water Industry. Attendees will have the opportunity to gain valuable insights, discover future trends, and navigate the evolving landscape of the Indian Water market.



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Date: 10 - 12 September 2024 | Venue: Crocus Expo, Moscow

Website: en.waste-tech.ru

T E N D E R

Augmentation Work of Ghanteshwar 13.5 mld Capacity Water Treatment Plant With 2 years Comprehensive Maintenance.			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Gujarat, Rajkot		
Bid Open Date	10 September 2024	Tender Value	84.01 Lac
Doc Collection Date	10 September 2024	FTID	24082932160
Repair and Maintainance of Water Treatment System, It panels, Xlpe Ug/Submersible Cable, Earthing and Allied Works of Water Supply at hq ub area under ge(east) bareilly.			
Category	Agro, Marine, Food Products tenders		
Location	Uttar Pradesh, Bareilly		
Bid Open Date	07 September 2024	Tender Value	49.00 Lac
Doc Collection Date	05 September 2024	FTID	24083149850
Urgent Refilling of Liquid Chlorine for Raw Water and Pure Water Treatment at 160 mld Salauli Water Works for One Year. I 2			
Category	Agro, Marine, Food Products tenders		
Location	Goa, Sangaum		
Bid Open Date	06 September 2024	Tender Value	18.39 Lac
Doc Collection Date	04 September 2024	FTID	240831414380
Repair/Maintenance of Water Supply Distribution System and Misc Works at Domestic Area At Afs Kumbhirgram.			
Category	Electrical and Electrical Equipment tenders		
Location	Assam, Cachar		
Bid Open Date	07 September 2024	Tender Value	9.50 Lac
Doc Collection Date	05 September 2024	FTID	24083142000
Special Repair To Drainage System (Ph-Ii) And Provn Of Ladies Toilet And Water Cooler At Various Location In Domestic Area At Af Station Gwalior			
Category	Sewer, Sewerage, Sanitation, Environmental Services tenders		
Location	Madhya Pradesh, Morar		
Bid Open Date	12 September 2024	Tender Value	33.0 Lac
Doc Collection Date	05 September 2024	FTID	24083144470
Repair And Maint Of Gi And Ppr Line, Valve And Water Storage Tanks And Other Connected Works At Ifsu, Jak, Garh Rif, Cisu Apjd, Fd Regt, Chuje And Maratha Ground Under Ge Tawang Now Ge 859 Ews.			
Category	Automobiles, Spares tenders		
Location	Jammu & Kashmir, Jammu		
Bid Open Date	06 September 2024	Tender Value	27.70 Lac
Doc Collection Date	05 September 2024	FTID	240831460

T E N D E R

Special Repairs To Wtp (Water Treatment Plant) Filtration Bed And Allied Works At Ats Belagavi Under Ge (Af) Sambra			
Category	Furniture, Sports, Home Equipments tenders		
Location	Karnataka, Belgaum		
Bid Open Date	09 September 2024	Tender Value	38.95 Lac
Doc Collection Date	06 September 2024	FTID	240831419270
Interception And Diversion For Tapping Nallah And Setup Of Sewage Treatment Plant For Used Water Management Of Harpalpur Town			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Madhya Pradesh, Nowgong		
Bid Open Date	09 September 2024	Tender Value	3.61 Cr
Doc Collection Date	07 September 2024	FTID	240831425540
Installation Of Arsenic Free Water Treatment Plant At Pashchim Chikanpara Kashiswari Fp School At Chikanpara Sansad-X Id-97791609			
Category	AMC, Repair, Maintenance, Installation tenders		
Location	West Bengal, Barasat		
Bid Open Date	10 September 2024	Tender Value	7.00 Lac
Doc Collection Date	05 September 2024	FTID	240831432250
Construction Of Water Treatment Plant With Water Atm At Lalbazar Of Machnan Sansad,Mouza-Machnan, JI No. 214,Plot No. 298,Id No. 89687804			
Category	Construction, Infrastructure, Civil Work tenders		
Location	West Bengal, Kajlagarh		
Bid Open Date	16 September 2024	Tender Value	10.98 Lac
Doc Collection Date	14 September 2024	FTID	240831444380







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112	Analyser Instruments Co. Pvt. Ltd.	11	91 94141 88611	sales@aicplindia.com	www.aicplindia.com
113	Andritz Technologies Pvt Ltd	03	-	separation.in@andritz.com	andritz.com/separation
114	Axis Solutions Pvt. Ltd.	01	+91 79229 00860	info@axisindia.in	www.axisindia.in
115	Customized Webinar by EAW	49	+91 85889 11033	enquiry@eawater.com	www.eawater.com
116	EAW Training & Conferences	Inside Back Cover	+91 85889 11033	enquiry@eawaterexpo.com	www.eawaterexpo.com
117	EverythingAboutWater Expo 2024	Back Cover	+91 85889 11033	enquiry@eawaterexpo.com	www.eawaterexpo.com
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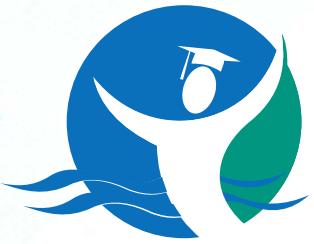


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